

SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

A1: Introduction

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

DEIA	Detailed Environmental Impact Assessment
EBRD	European Bank for Reconstruction and Development
Erdene	Erdene Mongol LLC and Erdene Resource Development Corporation
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
IWF	Integrated Waste Facility
KGP	Khundii Gold Project
MLA	Mineral License Area
PR	Performance Requirement
ROM	Run of Mine

1. INTRODUCTION

1.1 Project Background

Erdene Mongol LLC (Erdene) is a wholly owned Mongolian subsidiary of Erdene Resource Development Corporation – a Canada-based resource company focused on the acquisition, exploration, and development of precious and base metals in Mongolia. Erdene Resource Development Corp. is listed on the Toronto and Mongolian stock exchanges. Erdene commissioned a consortium consisting of Sustainability East Asia LLC, Ramboll Australia Pty Ltd, and Eco Trade LLC to undertake this Environmental and Social Impact Assessment (ESIA) of the Khundii Gold Project (KGP or the Project) in accordance with Mongolian statutory and selected international standards and requirements, principally those of the European Bank for Reconstruction and Development (EBRD).

Erdene's exploration success has led to the discovery and definition of the Khundii Gold District, including the Bayan Khundii and Altan Nar Gold Deposits. The Khundii Gold Project (KGP) includes the Company's two high-grade gold deposits – Bayan Khundii and Altan Nar located on the Khundii and Tsenkher Nomin Mineral License Areas (MLA), respectively. The MLAs are fully owned by Erdene. The Bayan Khundii and Altan Nar deposits are being considered for development.

Bayan Khundii is a low sulphidation epithermal gold deposit located in Shinejinst soum, Bayankhongor aimag. Altan Nar is an intermediate suphidation gold-polymetallic deposit located in Bayan-Undur soum, Bayankhongor aimag, roughly 16 km north of Bayan Khundii deposit.

The Project Mine plan is based on an open-pit mining operation targeting 600,000 tonnes per year of feed material to the process plant. The KGP has expected mine life of 11 years, comprising a one year pre-production period, six-year operating life for Bayan Khundii, three-year operating life for Altan Nar, and one year mine closure. The Project plans to use the ore processing facility at Bayan Khundii to process Altan Nar ore.

The KGP site is accessible on sealed roads from Ulaanbaatar to Bayankhongor aimag centre (630 km), followed by unsealed regional gravel roads from Bayankhongor to Shinejinst (310 km), then another 90 km dirt road to the site. The Project is located approximately 160 km from the Chinese Mongolian border. The location of the KGP is shown in Figure 1.

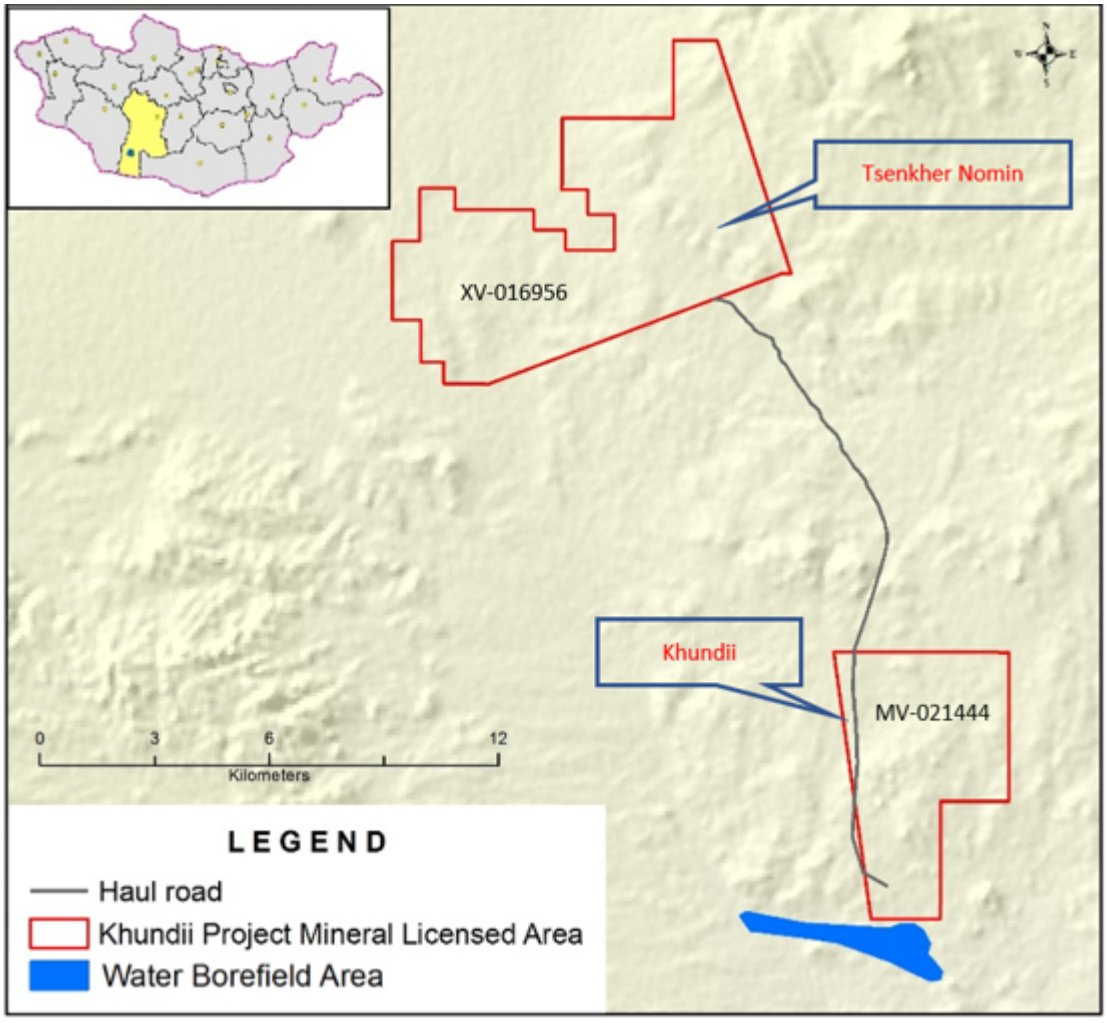

Figure 1 Location of the Khundii Gold Project in South-West of Mongolia

1.2 Mining Infrastructure

The Bayan Khundii site will be developed first with all process and mine supporting infrastructure located there.

The KGP will contain the following key mine infrastructure components:

- Open pits;
- Ore processing plant and mining offices;
- Integrated Waste Facility (IWF) for waste rock and tailings;
- Run-of-Mine (ROM);
- Workers' accommodation village located on the Khundii MLA;
- Off-grid diesel-solar power station; and
- Onsite waste landfill.

Additional support facilities such as workshops, warehouses, wastewater treatment plants will be located on the Khundii MLA. Details of the KGP infrastructure are provided in *Chapter A5: Project Description.*

1.3 Purpose of the Environmental and Social Impact Assessment

The European Bank of Reconstruction and Development (EBRD) as well as other national and international financial institutions are considering to provide financing to Erdene to construct and operate the KGP. Given the scale and nature of the project, the Project is designated as Category A under the EBRD Environmental and Social Policy. Consequently, the Project requires a comprehensive Environmental and Social Impact Assessment (ESIA).

This ESIA has been prepared as a condition of the existing EBRD financing of the Project and to meet EBRD's Performance Requirements (PR) for project financing under the Bank's Environmental and Social Policy requirements and . It is to identify and assess potential environmental and social impacts of the KGP on the biophysical and human environments and to set out measures to avoid, minimise, mitigate and manage potential significant adverse impacts to acceptable levels.

The ESIA incorporates and documents the following:

- national and international legal frameworks and agreements that form the legislative constraints to the KGP;
- analysis of alternatives considered for the KGP siting, and design technology;
- component parts of the KGP, associated processes and infrastructure on and off-site;
- detailed environmental and social baseline data of the KGP site and the surrounding area that may be affected;
- identification and assessment of potential environmental and social impacts, both adverse and beneficial, associated with the KGP activities;
- measures adopted to avoid, or where avoidance is not possible, minimise or mitigate and manage potential adverse impacts on sensitive receptors, including workers, affected communities, other stakeholders, and the broader environment;
- feasible opportunities for improved environmental and social performance adopted by the KGP; and
- performance monitoring and evaluation processes to demonstrate how environmental and social performance may be tracked and optimized.

Legislative and EBRD requirements for the KGP ESIA are discussed in *Chapter A2: Policy and Legal Framework.*

1.4 Development of the Environmental and Social Impact Assessment

This ESIA builds upon environmental baseline data derived from environmental field studies undertaken in 2016, 2017, and 2019 by Eco Trade LLC in support of the Mongolian statutory requirements. The 2016 and 2017 studies covered Tsenkher Nomin and Khundii licence areas and surroundings. In collaboration with Sustainability East Asia LLC, the 2019 field surveys covered, in addition to the two license areas, water exploration areas, Altan Nar and Bayan Khundii haul road between the license areas, and areas along the public access road between Shinejinst and the mine site. Social baseline data have been derived principally from social field studies undertaken in August 2019 by Sustainability East Asia LLC. Additional social data were available from studies conducted by the University of British Columbia in 2018 and 2019. The full complement of studies and reports relied upon within this ESIA are referenced in the baseline

chapters, as well as the impact assessment chapters, where relevant. Environmental and social baseline assessments are included in Section B of this ESIA. The ESIA development processes are described in *Chapter A3: Methodology*.

1.5 Scope of Environmental and Social Impact Assessment

Prior to commencing the ESIA assessment, the ESIA team completed a scoping exercise, with inputs from the Project design and management team, for the Project and identified the potential impacts from the KGP in relation to the environmental and social baseline conditions. On June 10, 2019, upon preliminary review of the Project, the Government of Mongolia issued its initial environmental screening document (the statutory General Environmental Impact Assessment) for Bayan Khundii, detailing the applicable assessment requirements. All potential direct and indirect impacts from the KGP activities and infrastructures has been included in the scoping assessment. A scoping report was prepared, and comments sought from Erdene and the EBRD.

The direct Project Area of Influence of the KGP site includes Bayan Khundii and Altan Nar Mineral License Areas (MLA), the water supply bore field 2-5 km south of Bayan Khundii, and the public Access Road between Bayan Khundii MLA and Shinejinst soum centre. The Area of Influence is further refined in each of the topic specific chapters to reflect the nature of potential impacts and the types of receptors.

This ESIA identified and assessed potential impacts from the planned KGP to environmental and social receptors within the defined AoI. The impact assessment process used select approaches that were deemed appropriate for the purpose. Impacts assessment approaches and findings are described in Section C of this ESIA.

1.6 Environmental and Social Impact Management

The Khundii Gold Project Environmental and Social Management Plan (ESMP) has been developed as part of this ESIA. A suit of environmental and social impact Management Plans form the ESMP. The Management Plans describe impact mitigation measures, monitoring, and reporting and auditing requirements. The ESMP Management Plans are included in Section D of this ESIA.

1.7 Environmental and Social Impact Assessment Structure

The ESIA has been prepared to provide an integrated assessment of the Khundii Gold Project across all relevant social and environmental media and across all phases of the Project. The Khundii Gold Project ESIA structure is presented in Table 1.

Table 1 Environmental and Social Impact Assessment Structure

ESIA Section	Chapters
Section A: Introduction	A1: Introduction A2: Policy and Legal Framework A3: Methodology A4: Alternatives Analysis A5: Project Description A6: Stakeholder Engagement
Section B: Baseline Assessment	B1: Introduction B2: Climate and Air Quality B3: Noise and Vibration B4: Topography, Landscape, Geology, Soils and Seismicity

ESIA Section	Chapters
	B5: Water Resources B6: Biodiversity B7: Waste B8: Demography B9: Social Structures B10: Economy B11: Employment and Labour B12: Social Infrastructure B13: Land Use B14: Cultural Heritage B15: Community Health, Safety and Security B16: Transport
Section C: Impact Assessment	C1: Introduction C2: Climate and Air Quality C3: Noise and Vibration C4: Topography, Landscape, Geology, Soils and Seismicity C5: Water Resources C6: Biodiversity Conservation C7: Waste C8: Population and Demographics C9: Economy and Employment C10: Land Use C11: Cultural Heritage C12: Occupational and Community Health, Safety and Security C13: Traffic and Transport C14: Cumulative Impacts
Section D: Management Plans	D00: Framework Environmental and Social Management Plan D01: Air Quality Management Plan D02: Noise and Vibration Management Plan D03: Water Resources Management Plan D04: Biodiversity Management Plan D05: Waste Management Plan D06: Hazardous Materials Management Plan D07: Community Health, Safety and Security Management Plan D08: Contractor and Procurement Management Plan D09: Crisis and Emergency Response Management Plan D10: Human Resources Management Plan D11: Land Use and Livelihoods Management Framework D12: Occupational Health, Safety and Security Management Plan D13: Stakeholder and Communications Management Plan D14: Local Cooperation Management Plan D15: Transport Management Plan D16: Land Disturbance and Rehabilitation Management Plan D17: Mine Closure Framework Plan
Section E: Appendices	Appendix A1.1: Khundii Gold Project Critical Habitat Assessment



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A2: Policy and Legal Framework

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

DEIA	Detailed Environmental Impact Assessment
EIA	Environmental Impact Assessment
EBRD	European Bank for Reconstruction and Development
ESIA	Environmental and Social Impact Assessment
EU	European Union
GEIA	General Environmental Impact Assessment
GIIP	Good International Industry Practice
ILO	International Labour Organisation
MET	Ministry of Environment and Tourism
PR	Performance Requirements
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change

2. POLICY AND LEGAL FRAMEWORK

2.1 Chapter Overview

This Chapter provides an overview of the national and international policy and legal framework within which the Project is being developed. It discusses the overall policy and legal framework in Mongolia together with specific sectoral laws on environment and land use, as well as health and safety, and labour. This Chapter provides an overview of the following:

- applicable Mongolian legislation covering environmental protection, worker health and safety, labour management, and property rights;
- applicable environmental health and safety standards;
- relevant international agreements; and
- requirements and guidelines of the EBRD and other international financial institutions (IFIs) with regard to environmental and social matters, where applicable.

2.2 Legal Framework in Mongolia

This Section describes the main Mongolian Laws for environmental impact assessment, environmental protection, and relevant national standards.

2.2.1 Environmental Laws

2.2.1.1 Law on Environmental Impact Assessment (1996)

The Law of Mongolia on Environmental Impact Assessment (EIA), as amended, stipulates the environmental impact assessment requirements in Mongolia. This is the main legislation in Mongolia for a project environmental impacts assessment before development commences. The law determines the following assessments and their requirements for a project's development:

- Environmental baseline assessment;
- Environmental Impact assessment;
- Strategic environmental assessment; and
- Cumulative impact assessment.

The environmental baseline assessment is required for all applicable projects to establish the existing state of the environment and identify any concerning issues with regard to the proposed project.

There are two types of EIAs defined in the Law, a General EIA (GEIA) and a Detailed EIA (DEIA). GEIA of mining projects is conducted by the Ministry of Environment and Tourism. The GEIA is a scoping process for further impacts assessment and its outcomes determine the DEIA scope of work.

The Strategic environmental assessment is required for national policies or programmes that may have broader regional environmental impacts, whereas the Cumulative impacts assessments are required in certain regions / river basins to identify potential impacts of multiple projects.

Project proponents, like Erdene, are responsible for undertaking the environmental baseline and EIA assessments, whereas needs for conducting the Strategic environmental assessment and Cumulative impact assessments are determined by regulators

2.2.1.2 Law on Environmental Protection (1995)

The purpose of the Environmental Protection Law is to manage the environment using the principles of sustainable development. This is a framework law setting out broad principles and requirements for natural resources use, environmental protection, rehabilitation and the payment for using natural resources. The law determined fauna, flora, water, air, land and sub-soil as key environmental components to be protected in Mongolia.

2.2.1.3 Law on Fauna (2012)

The purpose of this law is to regulate the protection and breeding of fauna permanently or temporarily residing in the soil, water or on land within Mongolia. Articles 6 and 7 describe methods of protection of fauna and the designation of 'rare' or 'very rare' animals. The 'rare' and 'very rare' designations are not based on International Union of Conservation of Nature (IUCN) assessment criteria. However, these designations serve as the regulatory list for identifying species of high conservation value in Mongolia. Inclusion and assessment of the fauna species in the KGP Critical Habitat Assessment (CHA) is based on the legally designated fauna species.

2.2.1.4 Law on Natural Plants (1995)

This law regulates the protection, sustainable use and restoration of natural flora, other than forest and cultivated plants. Flora is classified based on reserves and restorative capacity into three categories, i.e. 'very rare', 'rare' and 'common'. As in the Law on Fauna, the 'rare' and 'very rare' designations are not based on IUCN assessment criteria for endangered species, but serve as the regulatory list for identifying species of high conservation value in Mongolia. Inclusion and assessment of the flora species in the KGP CHA is based on the legally designated rare flora species.

2.2.1.5 Water Law (2012)

The purpose of the law is to govern relations concerning the protection and rational use and restoration of water resources and basins. The law contains requirements on the activities that shall be prohibited in the hygienic sanitation zone, i.e. to construct buildings and installations of equipment for purposes other than direct mining or dispose of waste and chemicals.

It sets out a regime for an inventory of water resources and outlines the powers bestowed to, and responsibilities required, across all levels of government within Mongolia with regard to water issues. Water use/pollution fees must be paid by the water user or persons who produce waste water as part of a commercial operation.

2.2.1.6 Law on Air (1995)

This revised law regulates the protection of air and prevention from air pollution in order to ensure the human right to live in a healthy and safe environment, and maintain environmental balance for present and future generations. The law establishes a licensing system for certain sources of stationary pollution, and imposes fees for certain levels of pollution. Licences are required to be obtained from the local Governor.

2.2.1.7 Mongolian Land Law (2003)

The purpose of this law is to regulate possession and use of state-owned land and other related issues. Land includes the surface of land and airspace above, but excludes minerals. The Law provides different land tenure definitions and associated rights. The Law defines pastureland as a common tenure system owned by the state. The Law on Land also addresses land use planning and expropriation.

The Law requires that land must be monitored, protected, restored and used efficiently for its permitted use. Any land use activities that may cause damage to human health; nature and ecological balance; or national security are prohibited.

2.2.1.8 Law on Subsoil (1988)

This law regulates issues related to use and protection of subsoil in the interests of the present and future generations when such activities as mining, construction and conducting geological surveys are carried out.

2.2.1.9 Law on Special Protected Areas (1994)

This law regulates areas under special protection, preservation and the protection of natural landscapes. The Law provides for four categories of protected areas: i.e. Strictly Protected Areas, National Conservation Parks, Nature Reserves and Monuments. Nature Reserves are classified into four sub-categories, i.e. Ecological Reserves, Biological Reserves, Paleontological Reserves and Geological Reserves

2.2.1.10 Law on Buffer Zones of Protected Areas (1995)

The purpose of this Law is to regulate the determination of Special Protected Area Buffer Zones and the activities therein. The Law specifically provides for zones in two categories – Strictly Protected Areas and National Conservation Parks.

2.2.1.11 Law of Mongolia on Soil Protection and Preventing Desertification (2012)

This law regulates the relation concerning soil degradation, rehabilitation and preventing desertification.

This Law provides definitions for various states of soil degradation and desertification for common understanding and clarity. The Law also specifies measures to be taken for soil protection and preventing desertification for various states of soil degradation and desertification.

Roles and responsibilities of citizens and legal entities regarding soil protection and preventing desertification are also provided. Penalties for breaching the law requirements and legal incentivises to promote exemplary measures for soil protection and desertification prevention are also specified in the Law.

2.2.2 Regulations for Natural Resource Use Payment

2.2.2.1 Mongolian Law on the Natural Resource Fees (2012)

Under this Law, certain fees are required to be paid for the use of natural resources such as water, mineral water, timber and fuel wood, land, animal and natural flora. The purpose of this Law is to define the percentage of these fees that will be applied towards environmental protection and the restoration of natural resources.

2.2.2.2 Law on Water Pollution Fee (2012)

A water pollution fee is determined by and collected in accordance with the procedures set forth with this Law. This law is separate from the water use fee, which is based on the amount of water used and the water use purpose. According to this law requirements, water pollution fee is determined by the types and amount of water quality contamination substances contained in the used water released to the environment.

2.2.2.3 Law on Land Use Fee (1997)

This law regulates the relations concerning the imposition of fees for the possession and use of state owned land for citizens, business entities and organizations as well as the payment of such fees to budget.

2.2.2.4 Law on Air Pollution Fee (2010)

This law sets the requirements for air pollution payment and a payment collection process. Emissions monitoring and a pollution mitigation technology, including Greenhouse Gas ('GHG') mitigation technology is required in all new or expanded facilities in line with international standards.

2.2.3 Waste and Hazardous Substances

2.2.3.1 Mongolian Law on Waste (2004)

This law regulates the collection, transportation, storage, reuse and disposal of waste(s). Waste is classified as a) ordinary solid waste and b) dangerous waste (harmful to human and animal health and environment). Hazardous waste must be disposed by a certified company in designated waste facilities in accordance with prescribed techniques and/or technologies.

Under this law waste recycling and reprocessing is encouraged. Citizen and business entities conducting activities, such as recycling and the re-use of wastes, have the right to own the end product. The aimag/capital city Governor oversees waste management that is undertaken by licensed organisations.

2.2.3.2 Mongolian Law on Hazardous and Toxic Chemicals (2006)

This law addresses the import, export, transportation, storage, use, and control of toxic chemicals. It imposes measures to prevent the impact of toxic and hazardous substances on human health and the environment.

2.2.4 Cultural Heritage

2.2.4.1 Mongolian Law on the Protection of the Cultural Heritage (2014)

This Law is to regulate the collection, registration, research, classification, evaluation, preservation, protection, promotion, restoration, possession and usage of cultural heritage including tangible and intangible heritage.

The Law requires that an authorised organisation undertake archaeological, paleontological, and ethnological exploration and surveying prior to commencing mineral exploration, mining and associated development. These activities must be carried out by a duly permitted and authorised organisation, at the expense of the minerals license holder.

In the event that items of cultural or heritage value are discovered in the course of development, and may be at risk of disturbance, the law requires immediate notification to the soum Governor, local police, and protection of the heritage site and/or items. The soum Governor is responsible for decisions about identified heritage sites and items following the completion of research. The land and subsoil where items of historical, scientific, and cultural value are located fall within State protection and any findings become State property.

2.2.5 Labour and Employment

2.2.5.1 Labour Code (1999)

This law determines the common rights and duties of employers and employees who are parties to labour relations based on an employment agreement. The Law determines and regulate all aspects of the labour and employment agreement, including:

- collective agreement and bargaining;
- labour disputes;
- working conditions;
- liabilities for breach of the legislation; and
- gender equality assurance.

Under this law an employee has the right to be provided with:

- safe working condition;
- payment for work done;
- holiday entitlements;
- ability to join labour unions for protecting their rights and interests; and
- other rights and benefits regarding pensions and social insurances etc.

Collective agreements may be concluded within professions or economic sectors and at the region, soum, aimag, district or capital city level. All such collective agreements must be registered with the relevant regulator. The Labour Arbitration Court settles collective labour disputes and a court or commission settles individual labour disputes.

2.2.6 Health and Safety

Laws addressing the storage, use and handling of chemicals are addressed in Section 2.4.9 above.

2.2.6.1 Law of Mongolia on Labour Safety and Hygiene (2008)

This law defines the state policy and main principle on labour safety and health. It establishes labour and workplace health and safety standards and conditions for employees and working citizens to work in healthy and safe environments.

2.2.6.2 Law of Mongolia on Health (2011)

This law ensures the rights of individuals to healthy and safe living and working conditions and to define the rights and duties of individuals and businesses in this regard.

This law requires the following activities to be carried out in accordance with regulations addressing such activities:

- supply of drinking and household water;
- Air quality management including dust, smog and pollution;
- Soil sanitation, waste disposal, sewage facilities, water holes and lavatories;
- disposal of hospital waste, radioactive and toxic chemicals;
- construction of housing and facilities for public use;
- use of toxic chemicals and ionising rays;

- Activities in environments that are noisy or that are impacted by vibration, electromagnetic fields or radio waves;
- production and use of foodstuffs; and
- import of products and technologies.

Duties of business entities under this law include:

- Ensuring compliance with relevant regulations within their business, including employing a health, labour safety specialist; and
- Requiring its employees and customers to fulfil health laws and requirements.

2.2.7 Mongolian Minerals Law (2006)

The purpose of the Minerals Law is to regulate the exploration and mining of minerals and the protection of mining areas and their surroundings. This law makes provision for mining licences to be granted to Mongolian companies or partnerships (legal persons) that are taxpayers in Mongolia.

A mineral licence holder includes the following rights:

- to use the mining area for mining and related activities;
- to access the mining area subject to the consent of adjoining land owners and occupiers;
- to use land and water in compliance with applicable laws;
- to sell all types of minerals products and minerals from the mining claim in national and/or international markets;
- to transfer the mining licence for all types of minerals under the terms and conditions of this law;
- to surrender all or part of the mining area; and
- to extend the term of the mining license except radioactive minerals two times for a period of twenty (20) years each depending up on the reserve of the mineral.

Mineral licence holders have the following obligations:

- to define the boundaries of the mining area;
- to comply with environmental protection laws; and
- to deposit funds equal to 50% of the environmental protection budget in any one year in a special bank account established by the Ministry of Environment and tourism (MET). If the licence holder does not comply with its environmental obligations, these funds may be used by the MET to address such issues.

Environmental impact assessment and environmental management plans shall be undertaken and approved prior to the start of the project. It is required that mining license holders record all instances of adverse environmental impact resulting from mining activity, prepare and send a copy of its annual report on the implementation of the environment management plan to the State central administrative agency in charge of environment, the Governor of relevant aimag, soum or district and the state professional inspection agency. If a licence holder fails to comply with its environmental obligations or regulations dealing with mine safety operation and its operation

causes hazard to human life, health, or surroundings, then mining operations may be suspended by the State Inspector until the breach is rectified, upon the permission of prosecutor. The mining licence may be revoked in accordance with a procedure set out in the Minerals Law which provides the licence holder with the right to appeal to the Court.

2.3 Mongolian Government Regulations

2.3.1 Regulation on Environmental Impact Assessment (2013)

Mongolian Government approved (Annex 2, Resolution No 374, 16 November 2013) the environmental impact assessment regulation following the Environmental Impact Assessment Law revision in 2012. This regulation provides processes and requirements for undertaking Environmental Impact Assessment (EIA), roles and responsibilities of parties involved in the EIA, and relevant decision making.

The regulation provides requirements for EIA development (i.e. baseline study, general or detailed environmental impacts assessments, environmental management plans), EIA appraisal, reporting and assessment of management plan implementation, and EIA data base.

2.3.2 Rehabilitation and Closure Procedure for Mining and Processing Plants (2019)

This procedure was approved by joint Order No A/181,A/458 between Minister for the Mining and Heavy Industry and Minister for the Environment and Tourism (28 August 2019).

This procedure regulates rehabilitation aspects of mine and ore processing plants, requirements for development of mine closure management plan and approval steps for mine closure, and environmental monitoring and maintenance programmes.

Closure of oil and radioactive minerals closure is not covered by this procedure.

2.4 Mongolian Environmental, Health and Safety Standards

Select environmental quality and health and safety standards relating to the KGP Project are summarised in Table 1. These standards govern compliance with Mongolian national requirements.

Table 1 Mongolian Environmental and Social Standards Related to Project Construction and Operations

No	Environmental / Health and Safety Standards	
Air quality		
1	MNS 4585:2016	Air quality – Air Quality Parameters. Technical general requirements
2	MNS 5885:2008	Accepted concentration of air polluting substances. Technical general requirements
Water quality		
3	MNS 4943:2015	Water quality. Effluent Water
4	MNS 4288:1995	General requirements for selecting a site for wastewater treatment plants and treatment technologies and effectiveness
5	MNS 4288:1995	General requirements for selecting a site for wastewater treatment plants and treatment technologies and effectiveness
6	MNS 6734:2018	Treated water for re-use. General technical requirements
7	MNS 6148:2010.	Water quality. Maximum limit of substance contaminating the ground water
8	MNS4586:1998	Water Quality. General requirements
9	MNS ISO 5667-11:2000.	Water quality. Sampling. Part 4: Guidance on sampling of groundwater
10	MNS (ISO) 5667-1:2002	Water quality. Sampling. Part 1. Guidance on the design of sampling programmes

11	MNS 900:2005	Environment. The human health protection. Security. Drinking water. Hygienic requirements and quality control
12	MNS (ISO) 5667-10:2001	Water quality. Sampling. Part 10. Guidance on wastewater sampling procedure
13	MNS (ISO) 5667-13:2001	Water quality. Sampling. Part 13. Guidance on wastewater and water treatment facility sludge sampling procedure
14	MNS 3342:1982	General requirements for protection of groundwater from pollution / contamination
Land and Soil		
15	MNS 5914:2008	Environment. Land reclamation. Terms and definitions
16	MNS 5915 : 2008	Classification of degradation area during the mining and industrial activities
17	MNS 5916:2008	Environment. Requirements for fertile soil removing and its temporary storage during the earth excavation
18	MNS 5917 : 2008	Reclamation of land destroyed due to mining
19	MNS 5918:2008	Environment. Re-vegetation of destroyed land. General technical requirements
20	MNS5850:2008	Soil quality. Soil pollutants elements and substance
21	MNS3298-90	Environmental protection. Soil. General requirements on the probe for analytical purposes
Occupational Health and Safety		
22	MNS6458:2014	Occupational safety and health. General requirements for storage of toxic and hazardous chemicals and products
23	MNS5029:2011	Occupational safety and health. Label and marking of toxic and hazardous chemicals
24	MNS 5002:2000	Occupational Health and Safety. General requirements for noise norm and safe working procedure
25	MNS 25003: 200	General requirements for the measurement of noise
26	MNS 4585:2016	Mongolian National Air Quality Standards (permissible noise level)
27	MNS 0017-5-1-21:1992	Noise of Motor Vehicles. Level of Noise and Measurements Methods
28	MNS 5003:2000	Occupational Health and Safety. General requirements for noise measurement
29	MNS12.1.009:1985	Occupational Safety. Noise. Noise accepted level in apartment and civil facility
30	MNS 2.1.16:1988	Occupational Safety standard system. Extreme high noise. General requirements for safety
31	MNS 12.4.005:1985	Occupational Health and Safety. Protection tools and methods against noise. Classification
32	MNS 12.1.017:1988	Occupational Safety standard system. Extreme high noise. Workplace noise pressure measure method
33	MNS 6437:2014	Health and safety of Mining industrial area. General requirements
34	MNS4223:1994	Explosives. General requirements
35	MNS0012-104:1994	Explosives safety. General requirements

2.5 International Agreements

International agreements are commitments by states to act or refrain from acting in the manner prescribed in the agreement. If the obligations contained in international agreements are to be applied nationally, governments must promulgate national laws implementing the terms of the international agreement. While the GoM has promulgated specific laws implementing specific international agreements, it has also incorporated provisions in national laws indicating that where the national law is inconsistent with international agreements to which Mongolia is a signatory, the requirements of the international agreement will prevail. For project finance consideration, EBRD (and most IFIs) requires compliance with relevant international agreements under funding terms, as referenced in the performance requirements. Accordingly, the terms of international

agreements, regardless of whether Mongolia is a signatory, that affect a Project need to be understood. Set out below is a brief summary of international agreements relevant to the Project.

2.5.1 Protection of Flora and Fauna

2.5.1.1 The Convention on the Conservation of Migratory Species of Wild Animals ('CMS')

Mongolia ratified this Convention in 1999. This Convention aims to conserve terrestrial, marine and avian migratory species throughout their range. Under the framework of the CMS, a number of agreements and Memoranda of Understanding (MoU) have been entered into, focussing on specific endangered species. Mongolia has ratified the CMS and is signatory to the following Agreements and MoUs. Additionally, Mongolia is a range state for the CMS Central Asian Mammal Initiative (CAMI) and the Central Asian Flyway.

2.5.1.2 MoU concerning the Conservation of Migratory Birds of Prey in Africa and Eurasia

Mongolia signed this MoU in 2008. The objective of this MoU is to achieve the favourable conservation status of migratory birds of prey with reference to their range, population dynamics and habitat. A range of measures are included in the MoU to achieve these objectives, including the promulgation of appropriate national laws, the identification and maintenance of habitats and action to recover population numbers.

2.5.1.3 MoU concerning the Conservation of the Saiga Antelope

Mongolian signed the MoU in 2010. The objective of the MoU is to provide a road map to guide the implementation of conservation action for the Saiga Antelope in the range states and in those countries which import Saiga produce such as the horns. A range of measures to achieve these objectives include improved monitoring of populations, control of poaching, awareness raising and captive breeding.

2.5.1.4 Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat

Mongolia ratified this Convention in 1992. The Convention on Wetlands, called the Ramsar Convention, is an intergovernmental treaty that provides a framework for national action and international co-operation for the conservation of wetlands of international importance and the sustainable use of all wetlands.

2.5.1.5 Convention on International Trade in Endangered Species

Mongolia ratified the Convention in 1995. The Convention on International Trade in Endangered Species of Wild Fauna and Flora aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

2.5.2 Biodiversity and Sustainable Development

2.5.2.1 Convention on Biological Diversity

Mongolia ratified the Convention in 1993. The Convention on Biological Diversity focuses on promoting sustainable development and establishes three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources.

2.5.2.2 UN Convention to Combat Desertification

Mongolia ratified the Convention in 1996. Established in 1994, the United Nations to Combat Desertification (UNCCD) is the sole legally binding international agreement linking environment

and development to sustainable land management. The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found.

2.5.3 Energy, Climate Change and Air Quality

2.5.3.1 United Nations Framework Convention on Climate Change

Mongolia ratified the Convention in 1994. The objective of this Convention is to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

2.5.3.2 Paris Climate Accord

Mongolia joined the Accord in 2016. An agreement within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with greenhouse gas emissions mitigation, adaptation, and finance starting in the year 2020.

2.5.4 Hazardous Substances

2.5.4.1 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

Mongolia ratified the Convention in 2001. This Convention covers pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons by parties to the convention and which have been notified by parties for inclusion in the Prior Informed Consent Procedure. Under the Prior Informed Consent Procedure, all parties have an opportunity to make informed decisions as to whether they will consent to future imports of certain listed chemicals.

2.5.4.2 Stockholm Convention on Persistent Organic Pollutants

Mongolia ratified the Convention in 2004. The objective of this treaty is to protect human health and the environment from chemicals that remain intact in the environment for long periods; become widely distributed geographically; and which are bio-accumulative in humans and wildlife.

2.5.5 Waste

2.5.5.1 Convention on the Trans-boundary Movement of Hazardous Wastes and their Disposal

Mongolia ratified the Convention in 1997. The Convention includes a number of principles including environmentally sound management and the disposal of waste close to its source. It also includes controls on the trans-boundary movement of hazardous waste including the requirement for movement documents and, in some cases, prior written notification by the State of export to the competent authorities of the States of import and transit.

2.5.6 Tangible and Intangible Cultural Heritage

2.5.6.1 Convention concerning the Protection of World Culture and Natural Heritage

Mongolia accepted the Convention in 1990. This convention focuses on the identification, protection, conservation, presentation and transmission to future generations of cultural and natural heritage.

2.5.6.2 Convention on the Safeguarding of Intangible Cultural Heritage

Mongolia ratified the Convention in 2005. This Convention focuses on protecting intangible cultural heritage which includes: language; music; song; performing arts; social practices; rituals

and festive events; traditional crafts and knowledge; and practices concerning nature and the universe.

2.5.7 Labour Relations and Workers' Rights

Mongolia has been a member of the International Labour Organisation ('ILO') since 1968 and has ratified a range of ILO Conventions, including:

- Forced Labour Convention, 1930 (No. 29), ratified 15/03/2005;
- Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87), ratified 03/06/1969;
- Right to Organise and Collective Bargaining Convention, 1949 (No.98), ratified 03/06/1969;
- Equal Remuneration Convention, 1951 (No.100), ratified 03/06/1969;
- Maternity Protection Convention (Revised), 1952 (No. 103), ratified 03/06/1969;
- Abolition of Forced Labour Convention, 1957 (No. 105), ratified 15/03/2005;
- Discrimination (Employment and Occupation) Convention, 1958 (No. 111), ratified 03/06/1969;
- Employment Policy Convention, 1964 (No. 122), ratified, 24/11/1976;
- Workers' Representatives Convention, 1971 (No. 135), ratified 08/10/1996;
- Minimum Age Convention, 1973 (No. 138), Minimum age specified: 15 years, ratified 16/12/2002;
- Tripartite Consultation (International Labour Standards) Convention, 1976 (No. 144), ratified 10/08/1998;
- Occupational Safety and Health Convention, 1981 (No. 155), ratified 03/02/1998; and
- Vocational Rehabilitation and Employment (Disabled Persons) Convention, 1983 (No. 159), ratified 03/02/1998.

2.6 Requirements for Project Financing

This Environmental and Social Impact Assessment is also used to satisfy the applicable requirements of international financial institutions that are prospective lenders to the project (IFIs). Erdene has adopted the European Bank for Reconstruction and Development (EBRD) Performance Requirements and standards as the main international standards for compliance during the execution of Project activities.

2.6.1 EBRD Performance Requirements

In accordance with EBRD's 2019 Environmental and Social Policy, EBRD seeks to ensure, through its environmental and social appraisal and monitoring processes, that the projects it finances:

- are socially and environmentally sustainable;
- respect the rights of affected workers and communities; and

- are designed and operated in compliance with applicable regulatory requirements and good international practice.

To translate this objective into successful practical outcomes, EBRD has adopted a comprehensive set of PRs covering key areas of environmental and social impacts and issues. EBRD is committed to promoting EU environmental standards as well as the European Principles for the Environment, to which it is a signatory, and which are also reflected in the PRs. The Bank expects clients to assess and manage the environmental and social issues associated with their projects so that projects meet the PRs. EBRD cannot finance or support projects which do not comply with the Bank's PRs.

PR1: Assessment and Management of Environmental and Social Impacts and Issues

PR1 establishes the importance of integrated assessment to identify the environmental and social impacts and issues associated with projects and the client's management of environmental and social performance throughout the life of the project. The KGP has been categorised as a 'Category A Project' which means it will be subject to a full Environmental and Social Impact Assessment (ESIA).

PR2: Labour and Working Conditions

PR2 recognises that for clients and their business activities, the workforce is a valuable asset, and that good human resources management and a sound worker-management relationship based on respect for workers' rights, including freedom of association and right to collective bargaining, are key ingredients to the sustainability of business activities. This PR assures that human resources policies, procedures and standards meet the following minimum requirements during the life of a project with regard to labour and working conditions:

- respect and protect the fundamental principles and rights of workers;
- promote the decent work agenda including fair treatment, non-discrimination and equal opportunities of workers;
- establish, maintain and improve a sound worker-management relationship;
- promote compliance with any collective agreements to which the client is a party and national labour and employment laws;
- protect and promote the safety and health of workers, especially by promoting safe and healthy working conditions; and
- prevent the use of forced labour and child labour (as defined by the ILO) as it relates to project activities.

In addition, EBRD requires compliance with relevant EU Occupational Health and Safety requirements and, where such requirements do not exist, relevant IFC Occupational Health and Safety Guidelines.

PR3: Resource Efficiency and Pollution Prevention and Control

PR3 recognises that increased economic activity and urbanisation can generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. Therefore, resource efficiency and pollution prevention and control are essential elements of environmental and social sustainability, and projects must meet good international practice (GIP) in this regard. The objectives of this PR are to:

- identify project-related opportunities for energy, water and resource efficiency improvements and waste minimization;
- adopt the mitigation hierarchy approach to addressing adverse impacts on human health and the environment arising from the resource use and pollution released from the project; and
- Promote the reduction of project-related GHGs.

PR4: Health and Safety

PR4 recognises the importance of avoiding or mitigating adverse health and safety impacts and issues associated with project activities on workers, project-affected communities and consumers. The objectives of this PR are to:

- protect and promote the safety and health of workers by ensuring safe and healthy working conditions and implementing a health and safety management system, appropriate to the relevant issues and risks associated with the project.
- anticipate, assess, and prevent or minimise adverse impacts on the health and safety of project-affected communities and consumers during the project life cycle from both routine and non-routine circumstances.

PR5: Land Acquisition, Involuntary Resettlement and Economic Displacement

Unless properly managed, involuntary resettlement may result in long-term hardship and impoverishment for affected persons and communities, as well as environmental damage, and adverse socio-economic impacts in areas to which they have been displaced. Under some circumstances, poorly executed involuntary resettlement may leave the client exposed to legal action in other jurisdictions. Objectives for this PR are to:

- avoid, or when unavoidable, minimise, involuntary resettlement by exploring alternative project designs;
- mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of and access to land by: (i) providing compensation for loss of assets at replacement cost, and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected;
- restore, or where possible, improve the livelihoods and standards of living of displaced persons; and
- improve living conditions among physically displaced persons through provision of adequate housing with security of tenure at resettlement sites.

PR6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

PR6 recognises that the conservation of biodiversity and sustainable management of living natural resources are fundamental to environmental and social sustainability. This PR recognises the importance of maintaining core ecological functions of ecosystems and the biodiversity they support. All ecosystems support a complexity of living organisms and vary in terms richness, abundance and importance of species. Objectives for this PR are to:

- protect and conserve biodiversity using a precautionary approach;

- adopt the mitigation hierarchy approach, with the aim of achieving no net loss of biodiversity, and where appropriate, a net gain of biodiversity; and
- promote good international practice in the sustainable management and use of living natural resources.

PR7: Indigenous Peoples

There is no universally accepted definition of "Indigenous Peoples." Indigenous Peoples may be referred to in different countries by such terms as "Indigenous ethnic minorities," "aboriginals," "hill tribes," "minority nationalities," "scheduled tribes," "first nations," or "tribal groups." In EBRD PR 7 the term "Indigenous Peoples" is used in a technical sense to refer to a social and cultural group, distinct from dominant groups within national societies, possessing all of the following characteristics in varying degrees:

- self-identification as members of a distinct indigenous ethnic or cultural group and recognition of this identity by others;
- collective attachment to geographically distinct habitats, traditional lands or ancestral territories in the project area and to the natural resources in these habitats and territories;
- descent from populations who have traditionally pursued non-wage (and often nomadic/transhumant) subsistence strategies and whose status was regulated by their own customs or traditions or by special laws or regulations;
- customary cultural, economic, social or political institutions that are separate from those of the dominant society or culture;
- a distinct language or dialect, often different from the official language or dialect of the country or region.

Based on this definition, and the requirement to possess all of the above listed characteristics in varying degrees in order to be considered as "Indigenous Peoples", this PR is not triggered in Mongolia in relation to herders. Furthermore, there is no Government designation of indigenous peoples in Mongolia. In this ESIA herders are considered as a "vulnerable group" given the pressures being placed on their traditional lifestyle by economic development and social changes.

PR8: Cultural Heritage

PR8 recognises the importance of cultural heritage for present and future generations. The aim is to protect cultural heritage and to guide clients in avoiding or mitigating adverse impacts on cultural heritage in the course of their business operations. EBRD requires the protection of cultural heritage from project activities. Objectives for this PR are to:

- support the protection and conservation of cultural heritage;
- adopt the mitigation hierarchy approach to protecting cultural heritage from adverse impacts arising from the project;
- promote the equitable sharing of benefits from the use of cultural heritage in business activities; and
- promote the awareness and appreciation of cultural heritage where possible.

PR9: Financial Intermediaries

There are no financial intermediaries associated with this Project.

PR10: Information Disclosure and Stakeholder Engagement

PR10 recognises the importance of an open and transparent engagement between the client, its workers, local communities directly affected by the project and, where appropriate, other stakeholders as an essential element of Good International Industry Practice (GIIP) and corporate citizenship. In particular, effective community engagement is central to the successful management of risks and impacts on communities, as well as to achieving enhanced community benefits. The specific objectives of this PR are to:

- outline a systematic approach to stakeholder engagement that will help clients build and maintain a constructive relationship with their stakeholders, in particular the directly affected communities;
- promote improved environmental and social performance of clients through effective engagement with the project's stakeholders;
- promote and provide means for adequate engagement with affected communities throughout the project cycle on issues that could potentially affect them and to ensure that meaningful environmental and social information is disclosed to the project's stakeholders; and
- ensure that grievances from affected communities and other stakeholders are responded to and managed appropriately.

2.7 Erdene Standards

In addition to the regulations and standards introduced above, Erdene's own guiding policies protecting its core values of integrity, transparency, accountability, social responsibility and environmental stewardship will be enforced during all phases of the KGP Project. Erdene's policies cover its key functional areas listed below:

- Health, Safety and Security
- Financial Management
- Exploration and Field Operations
- Human Resources
- Administration
- Information technology
- Environmental Management
- Stakeholder Relations Management

2.8 References

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

A3: Methodology

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
CHA	Critical Habitat Assessment
DEIA	Detailed Environmental Impact Assessment
EBRD	European Bank for Reconstruction and Development
EHS	Environment, Health and Safety
ESMP	Environmental and Social Management Plan
ESIA	Environmental and Social Impact Assessment
GIIP	Good International Industry Practice
IFC	International Finance Corporation
IFI	International Financial Institution
KGP	Khundii Gold Project
MLA	Mineral Licensed Area
PR	Performance Requirement

3. ESIA METHODOLOGY

3.1 Introduction

This chapter sets out the overall requirements and approach to the preparation of the Environmental and Social Impact Assessment (ESIA) of the Khundii Gold Project (KGP or the Project), summarizing the key stages in the preparation of the ESIA. The methodology outlines the processes of developing an environmental and social impact assessment of a project and how these requirements have been applied to the KGP.

3.2 ESIA Requirements

ESIA is a formal process in which the effects of development projects on the biophysical and social environments are identified and assessed. ESIA findings are taken into consideration when authorities and institutions make decisions whether to grant development consent or provide financial support. Environmental management objectives and mitigation plans for potential environmental and social impacts are developed as part of the ESIA.

The ESIA assessment is carried out in agreement with the European Union Environmental Impact Assessment Directive (2014/52/EU of the European Parliament and of the Council of 16 April 2014 on the assessment of the effects of certain public and private projects on the environment) requirements.

3.2.1 Information used

The KGP ESIA builds on information from the environmental and social baseline data collected for the KGP area by Eco Trade in 2016 and 2017, and most recently in collaboration with Sustainability East Asia LLC in June and August 2019. Additional information supporting the ESIA has been sourced from various sources, including the KGP Feasibility Studies, hydrogeological surveys undertaken for the Project site, Environmental, Health, and Safety (EHS) Guidelines developed by International Financial Institutions (IFI), scientific articles for impact assessment and environmental conservation, and Mongolian government hosted environmental and regulations databases. References used in the ESIA are provided in the individual ESIA chapters.

3.3 Key ESIA Stages

3.3.1 ESIA Screening

The first stage in the international ESIA process involves ‘screening’ or categorisation of the Project in line with the expected environmental risk (as required by EBRD screening criteria). The EBRD categorised the KGP as a Category A project, thus a comprehensive ESIA is required. Similarly, the Government of Mongolia examined the Project through its screening process, the Mongolian statutory General Environmental Impact Assessment, which resulted in the determination of the Project undergoing a Detailed Environmental Impact Assessment. The ESIA and Mongolian DEIA processes have been undertaken in parallel, according to the relevant statutory, lender, and company requirements.

3.3.2 ESIA Scoping

Scoping is a key element of the impact assessment process and is a requirement of EBRD Performance Requirement 1 (PR). The KGP ESIA scoping assessment was completed following the initial baseline data collection and review and the ESIA Scoping and Risk Assessment workshop in September 2019 in Ulaanbaatar involving the ESIA assessment team and the Project’s technical and management personnel. The scoping process also included the Mongolian

statutory Detailed Environmental Impact Assessment (DEIA) requirements for the KGP environmental impact assessment.

The Scoping process identified the following key requirements of ESIA:

- Identify the Project Area of Influence (AoI);
- Determine the Environmental and Social Baseline Conditions;
- Identify needs for specialist studies;
- Highlight potential environmental and social issues and impacts; and
- Outline the methodologies for assessing and avoiding or mitigating impacts.

The Scoping Report was issued to Erdene and (at the direction of Erdene) to the EBRD in October 2019 for review and comment. Comments have been taken into account in the finalisation of the Khundii Gold Project Scoping Report and in the preparation of the ESIA.

3.3.2.1 ESIA Technical Scope

The following aspects, as outlined and agreed in the scoping process, are considered in the Khundii Gold Project ESIA:

- Climate and Air Quality;
- Noise and Vibration;
- Topography, Landscape, Geology, Soils and Seismicity;
- Water Resources;
- Biodiversity;
- Waste (mineral and non-mineral);
- Traffic and Transport;
- Population and Demographics;
- Economy and Employment;
- Land Use;
- Cultural Heritage;
- Occupational and Community, Health, Safety and Security;
- Traffic and Transport; and
- Cumulative Effects.

The scoping process excluded some environmental and social impacts from further investigation. The scoped-out impacts (Table 1) are not likely to be significant, given the Project scale and location, and can be readily managed through the application of environmental management plans and procedures.

Table 1 Environmental and Social Impacts Scoped Out of Environmental and Social Impact Assessment

Topic	Aspect Scoped Out	Planned Mitigation and Controls
Resettlement	Physical displacement	There is no physical displacement associated with the KGP.

Topic	Aspect Scoped Out	Planned Mitigation and Controls
Air quality	Air pollution by ozone (O_3), lead (Pb), and benzo(a)pyrene (BaP)	O_3 is not a pollutant that is emitted directly by sources; rather, it is formed in the atmosphere as the result of photochemical reactions on precursors that consist primarily of NOx and volatile organic compounds that are emitted by sources over a large region. O_3 is generally considered an urban pollutant and no assessment procedures are readily available to evaluate the impacts from individual sources. Pb and BaP will not be evaluated because emissions of these pollutants are not expected in significant quantities from the Project.
Biodiversity	Habitat fragmentation	Resource development projects in remote greenfield areas could fragment wildlife habitat by constructing linear infrastructures such as road. Proposed linear infrastructures at the KGP site include localised water supply pipeline and on-site electricity transmission overhead line. Habitat fragmentation assessment is scoped out for this Project considering the proposed linear infrastructures limited coverage within a few kilometres around the KGP mine development area in the Khundii MLA.
Biodiversity	Invasive species	This ESIA envisages no impacts from invasive species on local biodiversity due to the existing environment which is characterised by extreme continental climate with arid landscape.

3.3.2.2 ESIA Temporal Structure

This ESIA considers the following aspects of the Khundii Gold Project:

- Construction activities;
- Operations activities; and
- Closure and Decommissioning activities.

3.3.2.3 Project Area of Influence

The Direct 'Project Area of Influence' (AoI) includes Bayan Khundii and Altan Nar Mineral License Areas (MLA), the water supply borefield 2-5 km south of Bayan Khundii, and the public Access Road between Bayan Khundii MLA and Shinejinst soum centre. Project Areas of Influence for indirect effects were defined initially in the KGP Scoping Report (October 2019) and further determined during the impacts assessment process. In summary, the AoIs were determined in relation to the nature of the identified impacts to the biophysical and social environment and the presence of the sensitive receptors to the impacts. AoI from specific impacts are described in the relevant technical chapters of this ESIA.

The KGP Scoping process recommended to undertake a Critical Habitat Assessment (CHA) under the biodiversity baseline and impacts assessment, which was subsequently completed as part of the ESIA.

3.3.2.4 Technical Information Input

This ESIA has been undertaken based on the most up-to-date information on the KGP as described in *Chapter A5: Project Description*.

3.3.2.5 Baseline Conditions

The KGP ESIA predicts the likely scale / magnitude of change in environmental conditions as a result of the KGP Project. The assessment of the scale/magnitude and significance of a predicted

change is undertaken against a reference condition, known as the baseline. In most cases, the baseline represents the environmental condition of the KGP site and surrounding area at the time of assessment.

Baseline data have been collected through a combination of the following:

- field data collection for the key environmental and social elements that may potentially be impacted by the KGP development;
- consultation with residents of Shinejinst and Bayan-Undur soums, local authorities and government bodies, and other civil society groups;
- review of reference environmental studies and specialist technical studies, such as hydrogeological investigation results; and
- secondary data review through public sources of information.

3.3.3 Impact Assessment

Impact assessment and significance have been evaluated in this ESIA with reference to definitive standards, accepted/published criteria and legislation, where available. Where it has not been possible to quantify impacts and effects, qualitative assessments have been made, based on expert knowledge and professional judgement. Where uncertainty exists, it has been noted in the relevant chapters.

The significance of impacts and effects has been determined by establishing the magnitude of the impact combined with the sensitivity of the receptor. The magnitude of an impact is a measure of the scale of change from baseline conditions for a given receptor. This measure of change can be described by considering the following factors in combination:

- Extent: spatial extent (e.g., habitat impacted) or population extent (e.g., proportion of population/community affected) based on scale of site; local; regional; national or transboundary;
- Duration: period over which an impact will interact with a receptor based on scale of long, medium and short term or permanent;
- Frequency: how often the impact will occur based on a scale of infrequent, periodic, or constant; and
- Reversibility: restoration of the pre-impact status of a receptor, being either reversible or irreversible.

Using a combination of the factors, the magnitude of an impact has been defined as beneficial, or adverse, with ratings of very low, low, medium or high according to criteria for each environmental and social topic.

Once the respective magnitudes of each impact have been allocated, receptor sensitivity was determined based on the following two aspects:

- degree to which a receptor is resilient to change; and
- value attributed to the receptor by stakeholders or applicable regulations/policies.

Receptor resilience takes into consideration not only activity-receptor-impact pathways, but also the characteristics of a receptor that might make it more or less resilient to change. As such, a receptor can be considered along a scale of vulnerable to resilient.

Receptor value takes into consideration its importance as represented, for example, by its conservation status, its socio-cultural importance and/or its economic value. Certain receptors are deemed to be of greater importance than other receptors. Receptor sensitivity will be categorised as low, medium or high according to criteria for each environmental and, where relevant, social topic.

Impact magnitude and receptor sensitivity results were combined to determine impact significance. This was done by using an impact significance matrix (Table 2). Using this matrix, an impact of low magnitude affecting a receptor of medium sensitivity would result in an overall impact significance of Minor. An impact of high magnitude affecting a receptor of medium sensitivity would result in an overall impact significance of Major. The significance of a given impact is defined in

Table 3.

Table 2 Impact Significance Matrix

Impact Significance Matrix			
Impact Magnitude	Receptor Sensitivity		
	Low	Medium	High
Beneficial	Positive	Positive	Positive
Very Low	Negligible	Negligible	Minor
Low	Negligible	Minor	Moderate
Medium	Minor	Moderate	Major
High	Moderate	Major	Major

Table 3 Impact Significance Definitions

Impact Significance Definitions	
Major	Impacts of Major significance are likely to disrupt the function and value of a receptor and may have broader systemic consequences (e.g. ecosystem or social well-being). These impacts are a priority for mitigation to avoid or reduce the significance of the impact.
Moderate	Impacts of Moderate significance are likely to be noticeable and result in lasting changes to baseline conditions, which may cause hardship to or degradation of a receptor, although the overall function and value of a receptor is not disrupted. These impacts are a priority for mitigation to avoid or reduce the significance of the impact.
Minor	Impacts of Minor significance are expected to be noticeable changes to baseline conditions, beyond natural variation, but are not expected to cause hardship, degradation, or impair the function and value of receptor. However, these impacts warrant the attention of decision-makers, and should be avoided or mitigated where practicable.
Negligible	Any impacts are expected to be indistinguishable from the baseline or within the natural level of variation. These impacts do not require mitigation and are not a concern of the decision-making process.
Positive	Impacts that have the potential to create beneficial or uplifting effects on an environmental or social receptor. Enhancement measures should be identified to maximise expected benefits.

To provide a consistent approach to the presentation of the significance of effects, the following terminology will be used throughout the KGP ESIA:

- Adverse: detrimental or negative effect to an environmental resource or receptor;

- Neutral: no effect to an environmental resource or receptor; and
- Beneficial: advantageous or positive effect to an environmental resource or receptor.

3.3.4 Impact Management

3.3.4.1 Design of Mitigation Measures and Monitoring

For each area of impact, mitigation measures have been prepared describing the actions to be taken. In addition to mitigation and management measures, means to manage the residual impacts through the KGP mine life have been incorporated into the suit of KGP Environmental and Social Management Plans (ESMP) as part of this ESIA. The following hierarchy of mitigation measures has been followed:

- "Designing-out" impacts by adopting an initial design that avoids impacts;
- Assessing alternatives and, where feasible, adopting those with less or lower impacts;
- Applying mitigation measures to manage remaining impacts; or
- Establishing fair compensatory measures to address residual impacts that remain after implementation of the above steps.

Mitigation measures that are generally consistent with Good International Industry Practice[1] (GIIP) have been built into the KGP design and will be implemented throughout construction, operations and closure. These are detailed further in *Chapter A5: Project Description* of this ESIA.

The ESMP consists of a suite of 15 individual management plans specific to each biophysical and social sensitive receptors, and two framework management plans (i.e. overarching framework plan and conceptual mine closure plan). The management plans determined KGP's roles and responsibilities to implement the management plan requirements, standards to meet, impact mitigation controls and monitoring and auditing requirements for continued improvement.

3.3.5 Assumptions and Limitations

The assessment of impacts are based on the available technical descriptions of the KGP, baseline information collected through field and desktop review. The assessment therefore relies on the accuracy of the data and information sources.

3.3.6 Cumulative Impacts

The EBRD PR1 *Assessment and Management of Environmental and Social Impacts and Issues* requires the ESIA process to consider the cumulative impacts of the project in combination with impacts from other developments.

Cumulative impacts have generally been assessed using professional judgement as the majority of cumulative impacts are hard to quantify. It is recognised that there is an inherent uncertainty in the range of potential cumulative impacts that may arise, although this ESIA seeks to identify the main impacts in a qualitative manner in order to provide for robust analysis.

The assessment of cumulative impacts considers the socio-economic and environmental cumulative effects of Khundii Gold Project in combination with other development in the region.

[1] Defined as the exercise of professional skill, diligence, prudence and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally (IFC PS2).

The scope of cumulative impacts addressed by this ESIA is set out in *Chapter C14: Cumulative Impacts*.

3.4 References

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

A4: Alternatives Analysis

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

BAT	Best Available Techniques
BIBO	Bus-in Bus-out
CIP	Carbon-in-pulp
DEIA	Detailed Environmental Impact Assessment
EBRD	European Bank for Reconstruction and Development
ESIA	Environmental and Social Impact Assessment
FIFO	Fly-In Fly-Out
g/t	grams per ton
HV	Heavy vehicle
IWF	Integrated Waste Facility
KGP	Khundii Gold Project
Ktpa	Kilotonne per annum
LV	Light vehicle
PEA	Preliminary Economic Assessment
PFS	Preliminary Feasibility Study
PR	Performance Requirement
R&R	Rest and relaxation
ROM	Run of Mine
RPM	RPMGlobal Asia Limited

4. ALTERNATIVES ANALYSIS

4.1 Introduction

This chapter provides an analysis of the alternative design options considered for the Khundii Gold Project (the Project or the KGP). The alternatives analysis (or assessment of alternatives) is a key step in the management of environmental and social risks of a project through a robust analysis of technically and financially feasible alternatives to reducing potentially significant impacts.

As the Khundii Gold Project will be located on 'greenfield land', it is appropriate that the locations of the main infrastructure and processing elements of the Project should be subject to a detailed review, with a view to avoiding and reducing any potential for health and safety hazards and environmental or social harm.

The European Bank for Reconstruction and Development (EBRD) specifies the need for alternatives analysis for Category A projects in its Performance Requirement (PR) 1: Environmental and Social Appraisal and Management. The EBRD requires an examination of these alternatives along with documentation of rationale for selecting the particular course of action proposed.

4.2 Project Alternatives

A review was undertaken of the various studies and investigation work commissioned by Erdene to arrive at the current design and layout of the Khundii Gold Project. The National Instrument 43-101 (NI 43-101) Technical Report prepared by Tetra Tech Canada Inc. (December 2019) encompasses two studies: a Preliminary Feasibility Study (PFS) for the Bayan Khundii deposit and a Preliminary Economic Assessment (PEA) for the Altan Nar deposit. The Bayan Khundii PFS focuses on the Bayan Khundii deposit and surrounding infrastructure based on an open-pit mining operation scheduled to operate for seven years, while the Altan Nar PEA focuses on the Altan Nar deposit and surrounding infrastructure, contingent on establishment of the Bayan Khundii mine and infrastructure.

Baseline studies were also used to help inform design of the Project, such as the General Environmental Impact Assessment, Detailed Environment Impact Assessment and Management Plan, and this Environmental and Social Impact Assessment. These studies cover potential impacts to the environment, and the legal requirements and mitigation measures discussed therein helped to shape design and layout of mine infrastructure. The location of the mine itself has few alternatives as it is bound by geology, but the iterative process of developing the ESIA alongside design of the mine helped to inform and refine other aspects of the Project.

Alternatives include consideration of different means to meet the purpose and requirements of Project activities. For the Khundii Gold Project, the following are the major activities for which alternatives have been evaluated:

- Mining methods;
- Process Methodology and Technology, including:
  - Processing methods;
  - Reduction and recycling of cyanide;
  - Waste rock and tailings handling and disposal.

- Project Infrastructure, including:
  - Water supply;
  - Power supply and transmission lines;
  - Non-mineral waste management;
  - Transport; and
  - Workforce accommodation.

This section also describes the "no project" scenario under which the Project would not take place.

4.3 "No Project Scenario"

Under the "no project" scenario, the Project would not be delivered – no mine would be built or operated. Table 1 below provides a simplified summary of comparison of the Project versus "no project" scenarios for key social, economic and environmental indicators.

Table 1 "No Project" Scenario

Impact Category	No Project Scenario	With Project Scenario
Fiscal and National Economic Impacts	• No revenues to national or local governments from the Project. • No opportunities to add further mine development to economy.	• Revenues to national and local governments. • Further enhancement of mining as key contributor to national economy in Mongolia.
Socio-Economic Impacts	• No direct impacts on local communities, both potentially negative and positive, from the Project. • Lost opportunity for employment and skills enhancement.	• Some minor impact on local • communities in terms of access to grazing land. • Opportunities for local employment, skills enhancement and potential diversification of local economy
Environmental Impacts	• No environmental impacts from the Project. • No consumption of natural resources by the Project (e.g. water).	• Minor environmental impacts associated with water use, and habitat loss. • Sustainable and managed consumption of natural resources (e.g. water).

Under the scenario of the Project proceeding, there would be some environmental and social impacts, mainly at the local level. These are, however, considered to be outweighed by the potential positive economic effects the Project would have at both the local and national levels.

4.4 Mining Methods

A selective open pit mining method was determined as the most efficient method for extraction of mineralised material for the Project based on the grade of the resources, the size of the deposit, the proximity of the ore to the surface, and the structurally controlled nature of the orebody. The underground mining method was examined as an alternative to the open pit method with some potential environmental benefits, such as potentially less land disturbance. However, considering the lack of experience and expertise in underground mining development in Mongolia and the increased capital investment required to develop the mineral reserve at Bayan Khundii, the open pit method was selected as preferred mining method for KGP. The open pit mining method was also preferred in terms of operational safety aspects. While underground mining can be done

safely, the required investment and training to reach the Project's required occupational health and safety standards is considered to be greater than those required for open pit mining.

Geotechnical investigations were conducted to assess the expected rock quality at Bayan Khundii, along with characterisation of structural domains for slope stability and pit design considerations. Geotechnical analysis provided recommendations for bench parameters and overall slope angles to maintain a safe and efficient pit design. The final pit design was based on the Whittle™ shell which presented the lowest risk and highest economic viability of the reviewed pit shells (Tetra Tech 2019). Conceptual study of underground mining methods indicated that open pit methods were more economically feasible.

The proposed mine will use conventional open-pit truck and shovel methods for ore extraction. Mining equipment selected for operations have been chosen based on maintaining productivity and selectivity while reducing capital costs. Separate ore and waste equipment are proposed. Additional core equipment includes drills and waste dozers, while auxiliary equipment selected includes haul road, pit and waste dump maintenance equipment and mobile equipment support vehicles.

4.5 Process Methodology and Technology

The current conceptual design is for a 600 ktpa (kilotonne per annum) processing facility which will process ores initially from the Bayan Khundii open pit followed by Altan Nar ore once Bayan Khundii ore feed has been exhausted. The primary considerations in selecting process methodologies and technologies were to:

- Provide a simple, reliable, low cost processing route that is easy to maintain in the relatively remote location.
- Incorporate a robust metallurgical flowsheet, which ensures maximum gold recoveries and flexibility for minor changes in ore types.
- Ensure that the plant tailings and discharges are environmentally acceptable.

4.5.1 Process Methods

A significant body of test work has been amassed for the KGP. Overall, the test work showed that the KGP ore is amenable to conventional cyanide leaching with reported recoveries consistently reaching 90% to 95% plus. Heap leach was considered for its lower capital cost, but due to the relatively low recovery rate (i.e. 40% gold recovery, under certain conditions) and greater environmental risks than for Carbon-in-Pulp (CIP) method, this method was not a desirable extraction option for KGP. The CIP method can provide greater gold recovery and operational control than heap leach.

The use of gravity recovery methods showed some promise, however, the capital and operating cost of including a gravity circuit did not justify the recovery gains and cost saving gained. Testing also showed conventional cyanide leaching recovered the same amount of gold as a combined gravity-cyanide leach circuit. Merrill Crowe[1] recovery method was also considered, but was ultimately not selected due to potential operational complexity at small grind size (<75 microns P80) and additional capital expenditure for the flotation circuit required. Various methods of cyanide recovery and reuse were considered in the design to minimize the cyanide consumption and discharge to the environment and maximize re-use (Tetra Tech 2019). Plant tailings are planned to be thickened following cyanide detoxification and filtered to a dry cake before disposal

[1] The Merrill Crowe recovery method is a separation technique for removing gold from a cyanide solution.

alongside waste rock in the integrated waste facility. Tailings handling is further discussed in Section 4.6.4

4.5.2 The Use of Cyanide

Cyanide leaching for gold recovery has become the standard recovery method for gold in non-alluvial deposits, such as the Bayan Khundii Project. No other chemical provides the same gold recovery, process robustness and low operating costs as cyanide, usually in the form of sodium cyanide.

For any gold project, leaching with cyanide is tested first and to check whether there are specific factors which exclude its use. Tests have shown that cyanide leaching will be highly effective on this Project. A number of processes and reagents other than sodium cyanide have been used historically for the recovery of gold. Gravity concentration and amalgamation with mercury have long been in use, but bioaccumulation and other highly significant environmental and health and safety issues associated with mercury use at any scale make this process untenable in a modern mining operation. Sodium hypochlorite, sodium thiosulphate, bromine, and chlorine were all used commercially prior to 1880 for some limited types of gold ores. However, the development of the cyanidation process in the late 1880s and early 1890s provided a simple, low-cost alternative that was effective on a much wider range of ore types. Cyanide has been used to recover approximately 80% of the gold produced internationally since that time, and over 90% of the gold produced in the last 20 years (ICMC 2020).

Although the workplace health and safety procedures and general environmental management practices for handling cyanide are well established, such measures do have a related economic and risk management cost which must be borne by the mining operation. In an effort to improve the economics of the extraction process, major mining companies and research institutions have been working for many decades to develop acceptable alternatives to the use of cyanide for gold extraction.

Numerous other reagents have been identified as possible alternatives to cyanide in addition to those in use prior to the development of cyanidation. Some have been subject to studies, including ammonium thiosulphate, hypochlorite/chloride and thiourea. Only limited research has been done on many of the other possible reagents due to factors such as high costs, harsh operating requirements, or a poor understanding of their basic chemistry, among others.

All identified alternatives that could currently be viewed as potentially viable are either less effective, more costly, require more extreme operating conditions (e.g. high temperatures, very acidic/low pH processing environments), necessitate high concentrations and large volumes of various reagents, and/or present risks to health or the environment equal to or greater than use of cyanide, especially when the need to transport large volumes of less effective reagents is considered. A systematic evaluation of alternative reagents to cyanidation has been developed by Gos and Rubo (“The Relevance of Alternative Lixiviants with Regards to Technical Aspects, Work Safety and Environmental Safety”). Their assessment concludes that despite the fact that cyanide is not an ideal reagent for gold extraction it is substantially better than any alternatives when viewed under BAT (Best Available Technique) criteria. Until a new reagent is proven more effective in all respects for gold extraction, it must be concluded that cyanide is BAT for gold extraction.

Cyanide could pose serious health, safety and environmental risks without suitable management controls in place. The Project design is advancing with consideration for compliance with the International Cyanide Management Code (ICMC), with additional detail in terms of operations

management plans and procedures under development for implementation prior to commissioning of the process plant. Applicable cyanide lifecycles, such as transportation, storage and use, and their respective safety standards and principles required under the ICMC, will be included in the respective management plan documents at KGP.

Considered options for cyanide transporting and handling to reduce the potential risks are described further in Section 4.7 Transport. Erdene will develop a Hazardous Materials Management Plan which includes worker safety, emergency response, employee and contractor training and transportation, with particular reference to the key approaches and commitments related to cyanide management.

4.6 Project Infrastructure

4.6.1 Siting of Key Infrastructure

The project is a “greenfields” site and has only minor infrastructure present associated with the exploration activity which is similar to other remote sites found in the region. It is planned for the Bayan Khundii site to be developed first with all infrastructure located there, and the Altan Nar site will be developed later as a satellite operation with minimal facilities.

Project Infrastructure for the mine will be predominately located in close proximity to the Bayan Khundii pit and the Integrated Waste Facility (IWF), as shown in Figure 1. The exception to this is the Accommodation Village and its associated infrastructure, which is sited approximately 4 km north of the Bayan Khundii pit.

The Project infrastructure includes construction of power generation equipment and associated substations, water supply and management facilities and security fences for the process plant. Other facilities including an accommodation camp, administration office, laboratory, and warehouse and workshops will also be required.

Infrastructure placement and design was sited with consideration of heavy vehicle (HV) and light vehicle (LV) movements with a focus on safety and vehicle separation by type; minimisation of land take and fenced areas; prevailing winds on site to mitigate dust formation and erosion; potential pedestrian traffic; and drainage and catchment areas to mitigate potential flooding and collection of storm water.

Topography west of the BK pit consists of small hills, less suitable for placement of plant and mine infrastructure. The IWF utilizes the existing hills to the north to reduce the need for land disturbance for construction and to better integrate with the landscape.

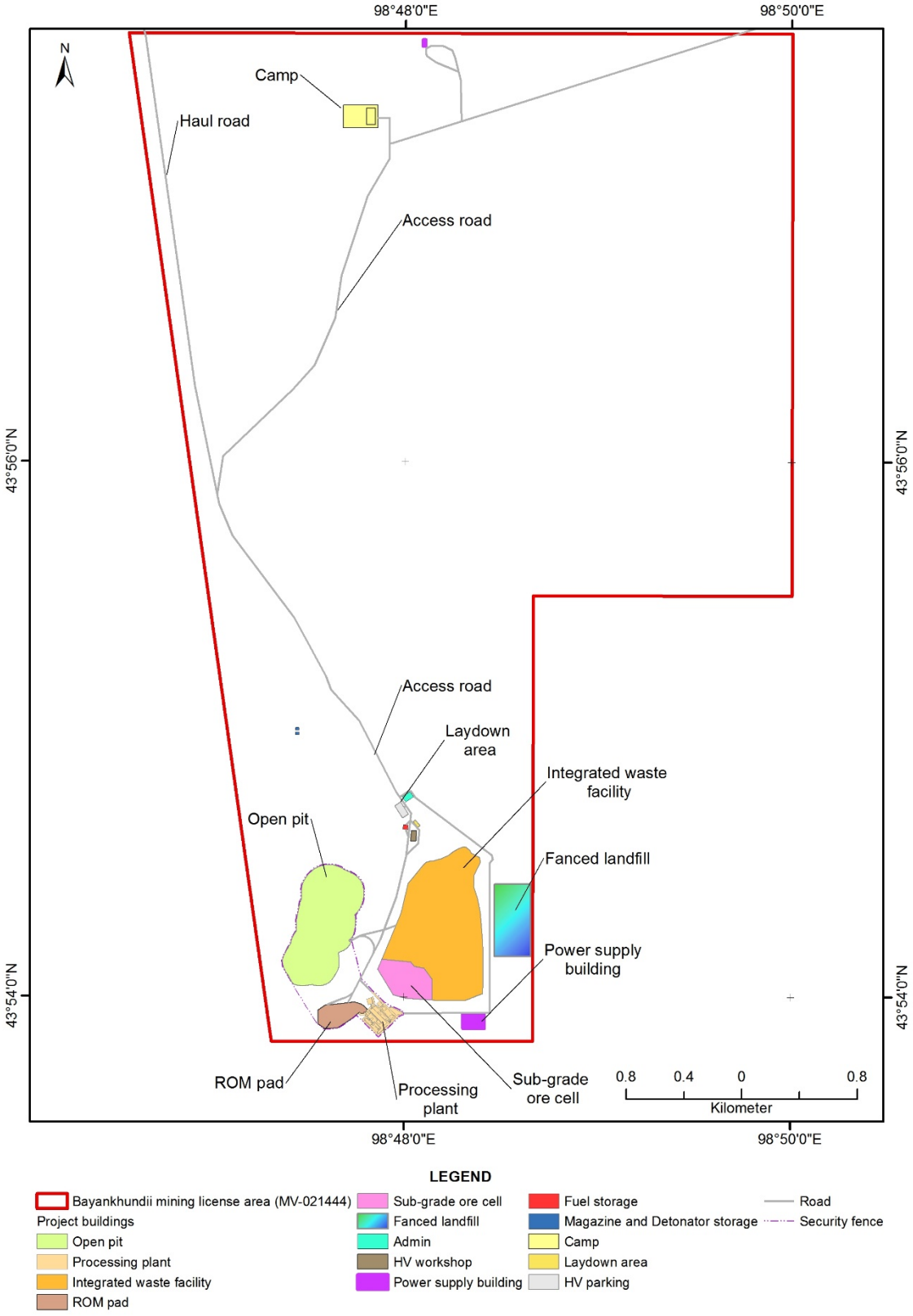

Figure 1 Siting of Key KGP Infrastructure and Components

4.6.2 Site Power Supply

Power

Erdene undertook power supply options studies for the site in 2017 and 2018, with a fixed connection to the national electricity supply grid considered the most economically attractive option initially. It was estimated that a 15kV line of approximately 110 km would be needed for connection to be established at Shinejinst soum centre. This option was later determined to contain significant risk in terms of electricity supply availability and reliability, as it is prone to voltage fluctuations and (planned and unplanned) outages.

Erdene has also undertaken renewable energy integration studies to examine scenarios for grid and off-grid power supply to Bayan Khundii. The site's solar irradiance is among the best in the country, with over 260 days of sunshine per year on average, and wind loads, while requiring further study, appear of similarly high potential. Due to the continuous load requirements of the mine plant, any intermittent power supply would need to be combined with a reliable back-up supply, typically diesel gensets in Mongolia (RPMGlobal 2019).

As a base case, an on-site power generation solution was selected. Erdene solicited quotations from a number of local power station vendors, with a hybrid solar-diesel power station selected as optimal. The power station will be designed to allow for an average load demand of approximately 4 MW, a maximum demand of approximately 5 MW and to be able to maintain a stable voltage and frequency output when the High Voltage mill drives are started.

Consideration of placement of powerlines and the potential impacts thereof on birds also supported the on-site power generation solution at the KGP, which minimised the erection of powerlines that would be required should the Project have pursued connection to the national grid. In the on-site power generation option, power lines are limited to within the mine development area and workers camp, which minimises the potential for interaction with sensitive bird species.

Back-up power supply options were also considered. The off-grid power station shall be able to operate with sufficient spinning reserve, at all times, to cover the loss of the capacity of the largest operating generator in an uncontrolled shutdown or loss of solar power availability. This is expected to consist of gensets in at least n+1 formation.

Heating

The Project includes two coal-fired heat-only boilers (HOBs), one supplying heat to the process plant and mine support facilities, another for the permanent camp. The expected installed capacity for a single heating station is up to 1.8 MW. Thermal coal is available from the Khotgor deposit near the Shinejinst soum centre, approximately 75km from the Project site. Alternative heating sources considered for KGP included electrical heating, but it was eliminated as sole source of heating due to inefficiency and the high cost of electricity at site. The Project plans to use electricity and HOBs, in combination, for heating the offices and accommodation facilities, whereas, the mine facilities as well as the permanent camp will be supplied by HOBs.

4.6.3 Water Supply

Water is scarce in the Gobi and, and Erdene considers water as one of the most critical inputs of the Project in relation to operational, environmental, and social management. The region supports a relatively small population but increasing industrial and urban development may inevitably place strains on this desert area's water resources. Erdene is committed to working with communities throughout the project lifecycle to ensure that the community is not negatively impacted by Project use of water and that best water management practices are applied by all users.

The KGP, which is located in the Gobi region, has limited surface water resources due to very low annual precipitation. Groundwater resources are also limited, particularly potable groundwater which tend to be found in shallow near-surface aquifers. Shallow groundwater within 2 m of the surface has traditionally been the main source of water for herders and their animals and, where shallow enough, can also be exploited by the local flora and fauna. As noted above, the issues associated with the limited water supply (and increasing demand) in the South Gobi are recognised by the various levels of Government and international organisations such as the World Bank, Asian Development Bank and the EBRD (ADB 2014). Recognising these issues, Erdene has carefully considered the potential sources of water available; assessing available options at a high level and then evaluating these in more detail. In addition to the evaluation of alternative water sources, the Project is also aware that water is a valuable asset and seeks to minimise water use through all aspects of the mine operations.

Groundwater is proposed as the primary water supply for the KGP operations, as there are no permanent surface water sources in the site area. Furthermore, the use of public water supplies was also ruled out, given the lack of existing public water infrastructure in the area and remoteness of the site.

Site water supply is expected to be aquifer-sources from bore fields approximately 2 km southwest of the Bayan Khundii pit. In order to arrive at the eventual option chosen, a number of possible aquifers were tested. Tetra Tech provided a preliminary water-supply assessment for the Project (Tetra tech 2019). From this assessment it was established that out of 12 boreholes drilled, five boreholes produced water yielding between 2 L/s to 4 L/s. From this data it was inferred that the groundwater reserves within the Khuren Tsav (KT), Bosgyn Sair (BS) and Camp Well aquifers were in the order of 10.5 L/s, based on inferred aquifer dimensions and the projected life of the mine. The water requirements from the KT and BS aquifers are estimated in the range of 6-7 L/s. Assuming that these water use estimates are accurate, the inferred groundwater reserves in the KT and BS aquifers could provide water for the Project (TT, 19 September, 2019). Okhi Us LLC—the qualified Mongolian hydrogeological contractor for the Project—conducted hydrogeological prospecting and exploration work, resulting in the identification and permitting of the Project's proposed groundwater source.

The Project investigated potential groundwater inflows to the pit. However, the volumes of water available for use were determined to be small and minor. Water from the pit in the latter years of operations may be recoverable for localised use.

Additionally, the Project investigated potential groundwater at Doloonii Tsenkher, the basin directly west of the Altan Nar deposit. The hydrogeological prospecting at Doloonii Tsenkher identified and registered with the Mongolian government a significant inferred resource. However, the cost and land disturbance associated with providing water from Doloonii Tsenkher to Bayan Khundii were considerably greater than those required for the KT-BS aquifer.

4.6.4 Integrated Waste Facility

The waste rock and tailings management strategy for Bayan Khundii has been developed from Erdene's closure objectives and waste characterisation and is based on constructing an Integrated Waste Facility (IWF). The IWF is planned to contain all waste rock from BK, all tailings from BK, and potentially tailings from early production at Altan Nar.

The design for the IWF has gone through three iterations, as design of the BK site has been refined. With the decision to have the processing plant in the south of the BK site, the most current design of the IWF was undertaken in September 2019. The IWF is designed to have a footprint

of 57 ha, a maximum RL of 1290, a capacity of 20,000,000 m^3, and less clean cover material required upon mine closure (Tetra Tech 2019). The mixed tailings and waste rock will be encapsulated withing an environmentally benign and durable erosion-resistant cover.

Tailings from the process plant will be thickened following cyanide detoxification and filtered to a dry cake before disposal alongside waste rock in the integrated waste facility.

Separate paddock tailings dam design and waste rock waste dumps were considered as an alternative and determined to be inferior to the selected integrated mineral waste management approach. A simplified comparison of the integrated and separated approaches is given in the table below.

Table 2 Comparison of the Integrated and Separated Approaches to Waste Rock and Tailings Management

Indicator	Preferred: Integrated	Alternate: Separated

Key features	• Waste rock and tailings co-mixed in a single facility.
	• Contains approximately 20 million m^3 comprising of:
	  ○ 18.9 million m^3 waste rock.
	  ○ 0.4 million m^3 sub-grade
	  ○ 1.8 million m^3 tailings.
	• Tailings and waste rock will be mixed at an approximate ratio of 1:5.
	• The co-mixed tailings and waste rock will be compacted to an in-situ density of 2.0 t/m^3.
	• The total volume of co-mixed tailings and waste rock is approximately 10 million m^3, or 50% of the total IWF volume.
		• Waste rock dump and tailings storage facility are two separate landforms.
		• A standalone waste rock dump which will require a cover system to manage infiltration and seepage production.
		• Separate impoundment to contain tailings.
		• Embankment will need to be constructed from benign material and incorporate an underdrainage system with leachate recovery and a central decant system.
		• Tailings will have to be shaped at closure to form a water-shedding landform and require a cover system to be constructed across the surface.

Footprint (est.)	• 57 hectares (single facility).
	• This footprint is believed to be the optimum when balancing the factors of; height, footprint and constructability.
		• 82 hectares, consisting of:
		  ○ 57 hectares for waste dump.
		  ○ 25 hectares for tailings storage facility.
		• Potentially an additional disturbed footprint from sourcing material to construct the initial embankment.
		• Assuming a placed density of 1.6 t/m3 and an embankment height of 10 metres.

Initial cost (CAPEX)	• 5.114 billion MNT (USD$1.89 million) including tailings handling and initial development of one site.	• 4.492 billion MNT (USD$1.66 million) including tailings handling and initial development of two sites. • Potentially require development of a third (borrow) site for construction material.
Operating cost (OPEX)	• More complex and costly during operation • Very low closure cost	• Less complex, but similar cost. • Very high closure cost.
Closure duration	• Less than one year. This is based on the premise that the methodology for the IWF incorporates progressive	• 2-5 years.

	remediation during operations, leaving only a small portion to be capped at closure. • It is estimated that completion of the cover would be accomplished within 4 months.	
Operational risk	• Very little – tailings are dewatered at the process plant and trucked to the IWF. • Low risk of dust generation due to placement method.	• High operational risks from pipeline failures (slurry and water return). • High risk of dust generation as tailings beaches dry out during cycling of deposition points – note drying of the beaches is necessary to optimise placed density and assist consolidation.
Risks	• Potential hydraulic head and leaching into groundwater. • Containment of detoxified tailings within waste rock.	• Potential hydraulic head and leaching into groundwater. • Concentration of processing plant tailings in a single location, subject to failure, ponding, etc.
Opportunities	• Maximum water recovery and re-use. • Progressive reclamation, simpler closure. • First example of co-mingled disposal in Mongolia.	• Nil.

4.7 Transport

The Project is accessible via paved roads from Ulaanbaatar to Bayankhongor city centre (630 km), followed by regional gravel roads from Bayankhongor to Shinejinst (310 km), then another 85 km to site via dirt road. The Project is located approximately 160 km from the Chinese Mongolian border. The nearest commercial airport to the KGP is the Bayankhongor airport, which is served by one weekly flight to and from Ulaanbaatar that varies from season to season. The remote location of the KGP necessitated the investigation of a number of options in relation to both the modes of transport to the site and the routes thereof.

4.7.1 Modes of Transport

Three alternatives were assessed in relation to modes of transport of the workforce to site:

1. Fly-in Fly-out (FIFO) from Ulaanbaatar to the KGP site;
2. Bus-in Bus-out (BIBO) from Ulaanbaatar to the KGP Site; and
3. Combination FIFO and DIDO to the KGP site.

The FIFO options considered were for an airstrip based on a typical 50-seater commuter turbo prop aircraft that allows for a full crew change. A Bombardier Dash 8 300 was used as reference, as typical of aircraft used in remote mining around the world. These aircraft allow for unrefuelled roundtrip from Ulaanbaatar to site and back, a round trip distance of approximately 1,500 km. These aircraft require a field length of approximately 1,000m depending on local meteorological conditions (RPMGlobal 2019). While not definitively excluded, the FIFO only option has not yet been determined to be economically feasible, although investigations are ongoing.

The BIBO option requires a longer, two-day drive, with an overnight stop in order to get the workforce to site for their shift. This is not the most efficient option, but may be used selectively

depending on roster preference. This option does present nominally higher safety risks associated with driving (fatigue, collisions), which are manageable with proper mitigation measures in place.

The third and chosen option, is a combination FIFO and BIBO. This option utilises the existing airport infrastructure available in the region (in Bayankhongor city centre, and Ulaanbaatar), thereby removing a significant (630 km) of road travel. By flying to Bayankhongor city centre, the workforce is then transported via bus to site, in what is a one day trip to the mine site in total from Ulaanbaatar. This option is considered as the most cost effective and efficient transport option for the workforce.

Goods will be transported from Ulaanbaatar, with limited direct freight from the Chinese border during the construction phase (see discussion below).

4.7.2 Routes

KGP Site to the Shivee Khuren Border

Transport infrastructure to access southwestern Mongolia's natural resources from China is being rapidly developed. The Project is located approximately 200 km northwest of the Nariin Sukhait mining complex (Ovoot Tolgoi) from which South Gobi Resources and MAK all produce (or have in the past) coal and transport product through the Ceke (Chinese) / Shivee Khuren (Mongolia) border point. This border crossing includes a paved eight-lane highway and a major automated railcar coal loading facility with three railway terminals where coal trucked in can be loaded on train and shipped out over the Jiayuguan– Ceke Railway, Ejin–Hami Railway or Linhe–Ceke Railway. Planning is underway to extend the standard gauge rail into Mongolia's coal mining districts. Having noted this, KGP would produce only high-value doré which could be trucked and not railed to the border, therefore other options were not further investigated.

With respect to the road options used to travel to the border crossing point, a number of options were considered, prior to selection of the existing unsealed roads between Gurvan Tes soum centre and Bayanleg soum centre. This route has the least amount of overlap with the Gobi Gurvansaikhan National Park—crossing only in the eastern part of the Park—when compared with the other existing public roads that transect the Park.

Transport from Bayankhongor- Shinejinst- Bayan Khundii Camp

The public road network between Ulaanbaatar, Bayankhongor aimag centre, and Shinejinst soums is well established. Similarly, a number of existing public dirt roads cover Shinejinst soum, including access to its bagh centres. These roads are mostly unimproved dirt tracks, with sporadically improved surfaces.

In preparation for the mine development, Erdene undertook a review of this route in order to determine any alternative routes and the extent of potential upgrading requirements to allow for construction and operations traffic. No viable alternatives were identified beyond the existing roads. Local governments provided input into the Project road selection within the scope of the land use permitting requirements.

4.8 Project Workforce and Accommodation

4.8.1 Workforce Recruitment

Local employment is a central socio-economic benefit that the Project can directly bring to people living in the soums nearest to the KGP. The wider Bayankhongor workforce, and potentially workers at a national level, are also likely to be able to access employment opportunities. National

content targets were in place at the time of reporting (as per Mongolian statutory requirements), stipulating that at least 90% of positions must be filled by Mongolian nationals.

The construction workforce peaks at approximately 500 people (including contractors) for an estimated construction period of up to 12 months. The operations phase workforce will comprise a maximum of up to 420 people. Not all employees will be on site at one time.

Erdene, in collaboration with the relevant Mongolian Government and non-government agencies, intends to ensure that there is a suitably qualified and experienced workforce available to meet the requirements of the KGP. The options available to Erdene to achieve this include:

- Recruitment from the global workforce (international);
- Recruitment from across Mongolia (national);
- Recruitment from Bayankhongor aimag (regional); and
- Local recruitment from Shinejinst and Bayan-Undur soums (local).

The assessment of recruitment and workforce options has been framed in the context of the objectives of Erdene to recruit as locally as possible from the Mongolian workforce, Mongolian statutory requirements on the composition of the workforce, and tempered by the available skill sets in the local, regional and national workforce.

A central goal of Erdene is to ensure that preference is given to hiring from local communities in Project-impacted soums and baghs in the first instance, and thereafter, regionally and nationally. Furthermore, Erdene is also committed to meet the statutory requirements that 90% of the workforce will be Mongolian, which is anticipated on or before the Project's operations phase. One of the challenges experienced by the local communities in Shinejinst and Bayan-Undur specifically, is that due to the remoteness of the soums, skilled locals tend to move to the aimag centre or Ulaanbaatar to obtain employment other than herding. This is further exacerbated by the low attractiveness of the two soum centres as a place to live due to their remoteness from urban centres of Mongolia, associated lack of business opportunities other than herding, and poor social infrastructure and services. One of the cornerstones of Erdene's recruitment strategy is establishing local hiring preference through a specific timeframe of residency in the local area and also recruiting from the local diaspora who may be working / living elsewhere. With local migration to the area generally viewed positively among local community members (established during social baseline), this strategy may allow diaspora to return to the area and strengthen family ties.

Detailed discussion of employment-related impacts and proposed measures to enhance local employment, among others, are provided in *Chapter C9 Economy and Employment* and the associated management plans.

4.8.2 Workforce Accommodation

A number of options for employee accommodation were investigated in tandem with the investigation of transport options for the workforce (see above in Section 4.7), and taking into account employee roster design considerations (see below). A key constraint in relation to the options analysis for workforce accommodation was the remote location of the mine from the nearest urban centres and infrastructure. The options explored were as follows:

1. Developing a mining/Company town;
2. Integrating employees in local soum / bagh centre communities with daily transport to site;

3. Integrating employees in local soum / bagh centre communities with transport to site-based accommodation for each roster; and
4. Housing employees on site through a purpose built accommodation camp.

The first option was dismissed as unfeasible for a number of reasons, including high upfront investment costs, the relatively short mine life of the Project (as per current estimates) not justifying the development of a purpose built town; the lack of alternative employment opportunities when the mine closes for residents of the town; the impact on surroundings of developing a town; and the remote location of any such town and associated challenges in relation to service and infrastructure provision for the workforce and their families. Existing government policy is to support the development of the settlement closest to the mine – Shinejinst soum centre, for KGP. These challenges outweighed the benefits of a new town option, which include improved quality of life for workers in living with their families.

Likewise, the second option was also deemed practically unfeasible given the remoteness of the mine site from the nearest soum / bagh centres (closest soum centre - Shinejinst – being around 70km away) and the associated risk of transporting the workforce to and from the closest urban centres to site each day (collisions, fatigue). In addition, this option presented a greater potential for influx and associated risk of social tension, and community, health, safety and security related impacts to host communities and workers, among others. This option would provide infrastructure and employment benefits for local communities and also allow workers to live with their families.

A third option was to integrate employees (and their families) within local communities with transport provided for workers to the mine site for each roster. This option is considered to apply primarily to local community members who obtain employment at the mine and potentially diaspora and / or other workers who choose to relocate with their families to live in the local soum centres (this is anticipated to be limited in number as noted above). This option may provide social benefits to workers to live with their families, and it may also increase opportunities for local businesses. On the other hand there may be social tensions that emerge between workers and local community members, for example around income disparities.

The development of an accommodation camp at the mine site option to house workers during their roster is cost effective from a capital expenditure perspective in comparison to the other two options noted above, although the cost of transport is higher. The workforce are also able to have more choice in where their families are located and homes established, however there is a greater potential risk of family disfunction and parenting problems with the worker being away from their family during their roster (AIFS 2014). This option is also associated with limited local cultural, environmental and economic impact.

The approach to accommodation of the workforce represents a combination of options three and four, which best meets Erdene's needs and from an impact perspective. The accommodation village will be constructed in the early phases of construction to allow it to support the ongoing construction activities. Erdene currently have a 60-bed temporary camp on-site to service drilling and exploration activities. This temporary camp will be used and expanded if required to service construction activities while the permanent village is constructed. Both facilities will provide self-contained accommodation and messing for construction / operations labour. The camps will be autonomous and operated on a self-contained basis, therefore minimising workers' interaction with the neighbouring communities and the need for the workforce to use community infrastructure. As noted above, workers will be bussed into site for their roster from Bayankhongor aimag centre (with some workers flying in from Ulaanbaatar). As noted in option three, regional

and local workers may be bussed to site from local soum centres, facilitating a combined workforce accommodation strategy to be pursued by Erdene.

4.8.3 Workforce Roster

A key consideration of Erdene was in finding an optimal roster solution for the development and operation of the KGP. Optimal roster design is based on a combination of factors, including considering the transport options to site, accommodation / housing strategy for the workforce, logistics, asset utilisation, labour utilisation, workload variations, leave usage and management, employment agreement conditions, interaction between maintenance and production, skill set requirements, fatigue management, among others (Austmine 2017). A key concern underpinning the options assessed was choosing a roster that placed mental health and wellbeing of future employees at the forefront. Studies have shown there is a greater risk of mental illness amongst those workers operating under FIFO work arrangements, such as psychological distress, fatigue, depression, and suicide (Centre for Transformative Work Design 2018).

A number of roster lengths were investigated, including 18 days on and 9 days off; 5 days on and 2 days off. Research has shown that workers on even-time and shorter rosters (i.e. 2 weeks on/2weeks off, 8 days on/6 days off, 5 days on/2 days off) reported significantly better outcomes on all mental health and wellbeing measures compared to workers on longer rosters with less time for recovery (e.g., 4 weeks on and 1 week off, 3 weeks on/1 week off, 2 weeks on/1 week off). Further considerations included that rest and relaxation (R&R) time needed to be of sufficient length for recovery and detachment from work, as well as to have quality time with family and friends. Also taken into account was that high compression rosters and travelling long distances encroach on workers' time off, potentially adding to stress and fatigue levels according (Centre for Transformative Work Design 2018).

A 5 day on and 2 day off roster was not considered practical with a 2-hour drive one-way to the soum centre and no FIFO solution deemed feasible at this point.

The roster option selected was an 18 days on and 9[2] days off roster, which is considered to be the optimal roster that takes into account the remote location of the mine in Mongolia, and globally, as well as the transport and accommodations strategies for the KGP. In addition, this roster reduces travel time by enabling the use of the FIFO-BIBO option, instead of BIBO only. Workers will work on 8 or 12 hour shifts on site, with the mine operating on a continual 24-hour basis.

4.9 Conclusions

Erdene has evaluated a range of options to develop the KGP as currently defined. This section has outlined a number of the key issues that have been subject to options analysis to derive the most effective solutions while taking account of environmental and community concerns and constraints.

The alternatives set out in this section represent strategic or macro-level alternatives. Alternatives selection for more detailed operational issues related to the implementation and operation of the Project are described throughout the ESIA.

[2] Some contractors may use a 28 day on and 14 day off roster.

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SUSTAINABILITY
EAST ASIA LLC

ERDENE MONGOL LLC

A5: Project Description

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

CIP	Carbon-in-Pulp
Erdene	Erdene Mongol LLC
ESIA	Environmental and Social Impact Assessment
FEL	Front End Loader
ILR	In-Leach Reactor
IWF	Integrated Waste Facility
HCN	Hydrogen Cyanide
KGP	Khundii Gold Project
kV	Kilo Volt
L	Litre
LV	Light Vehicle
MW	Mega Watt
MWh	Mega Watt-Hour
mln	Million
NKMA	New Kazak-Mongol Arc terrain
PFS	Pre-Feasibility Study
ROM	Run-of-Mine
t	ton
TAT	Trans Altai Terrane
WAD	Weak Acid Dissociable

5. PROJECT DESCRIPTION

5.1 Introduction

This Chapter of the ESIA introduces a description of the physical characteristics and operational processes of the Khundii Gold Project (the Project).

The following principal aspects of the Project are described:

- Project overview;
- Project infrastructure;
- Ore mining and processing methods;
- Project resources use; and
- Project work force.

Summary descriptions of the Khundii Gold Project elements are provided in this Chapter with more detailed descriptions of relevant site elements provided in the baseline chapters of Section B. Technical reports used for preparing the Project descriptions are listed in the references section of this document (section 5.7).

5.2 Project Overview

5.2.1 Project location

The Khundii Gold Project site is located in Bayankhongor *aimag,* approximately 980 km south-west of Ulaanbaatar (Figure 1). The nearest towns from the Project site are Shinejinst and Bayan Undur *soum* centres, located 70 km northeast and 80 km to the north, respectively.

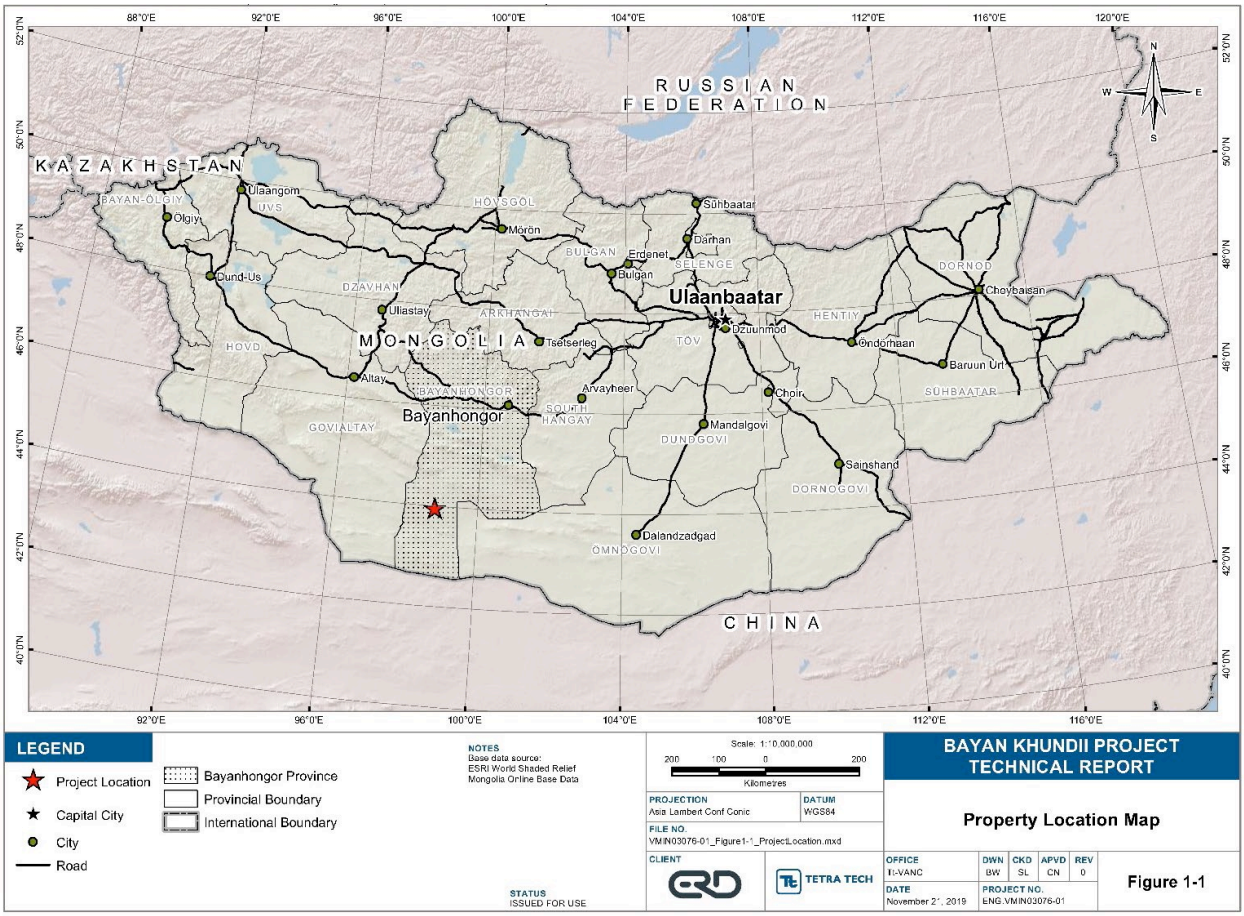


Figure 1 Location of Khundii Gold Project in Southwest Mongolia

5.2.2 Mineral Tenure

The Khundii Project includes two deposits, Bayan Khundii and Altan Nar, located on Tsenkher Nomin (XV-016956; 4,668.64 ha) exploration licence and Khundii (MV-0021444; 2,308.62 ha) mining licence. The Tsenkher Nomin and Khundii mining licenced areas are located about 16 km apart in Bayan Undur and Shinejinst *soums,* respectively, of Bayankhongor *aimag* (Figure 2). The Tsenkher Nomin and Khundii mining licences are fully owned by Erdene Mongol LLC, a Mongolian subsidiary of Erdene Resource Development Corporation based in Canada.

Both the Bayan Khundii and Altan Nar deposits are hosted within the Trans Altai Terrane (“TAT”). The TAT forms part of the western end of the large, composite, arcuate-shaped Carboniferous-Permian New Kazak-Mongol Arc terrain (“NKMA”) and consists mostly of Middle Paleozoic volcanic, sedimentary and meta-sedimentary rocks that were intruded by Middle Paleozoic calc-alkaline plutons.

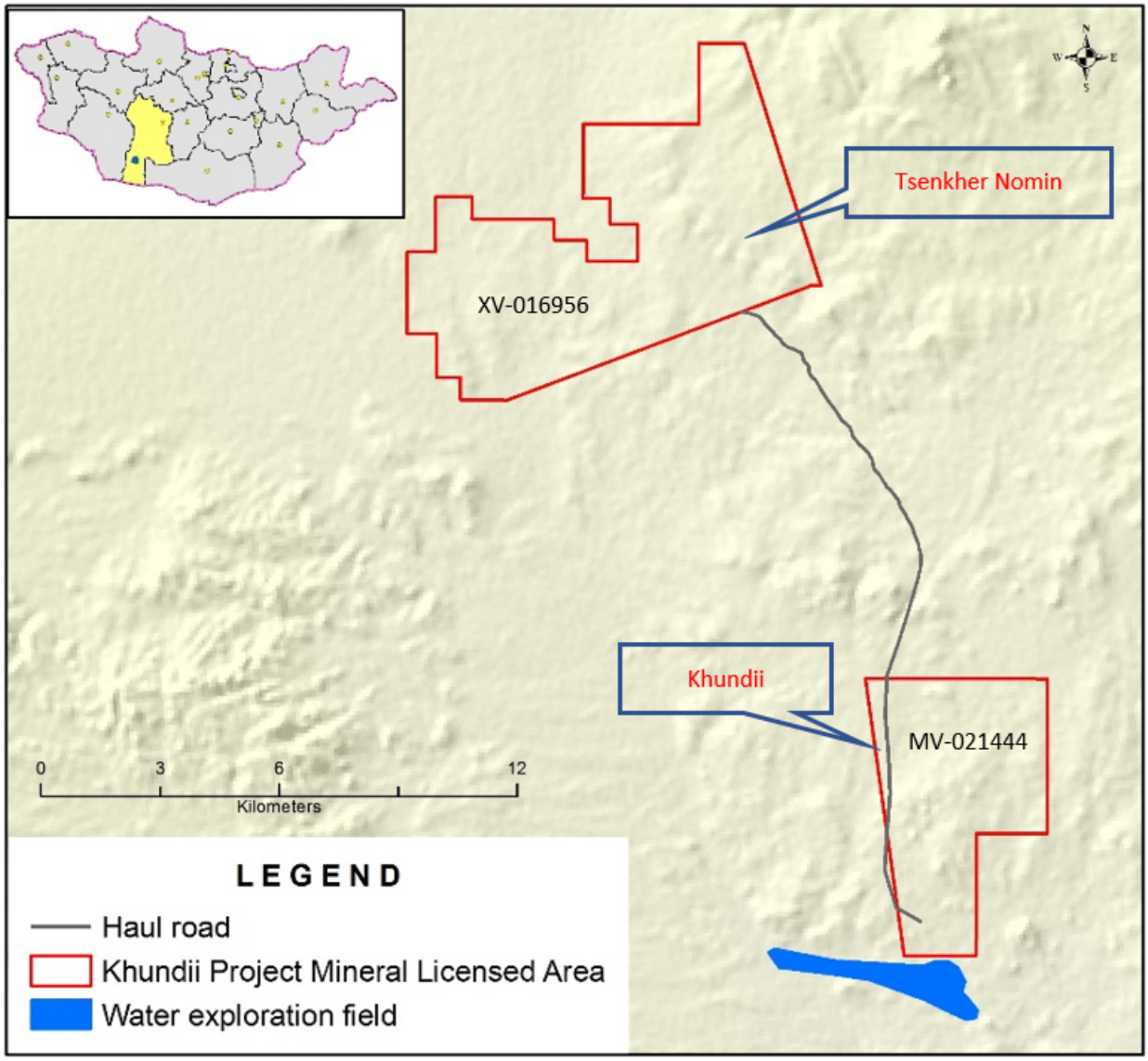


Figure 2 General Locations of the Tsenkher Nomin and Khundii Mining Licenced Areas

5.2.3 Site Access

The Project is accessible on sealed roads from Ulaanbaatar to Bayankhongor aimag centre (630 km), followed by unsealed regional gravel roads from Bayankhongor to Shinejinst (310 km), then another 90 km dirt road to the site. The Project is located approximately 160km from the Chinese Mongolian border. Distance to the nearest operational border point Shivee Khuren is about 200 km from the Project site. Actual travel distance by road between the Project site and the Shivee Khuren is about 540 km via Gurvantes *soum* of Umnugobi *aimag.*

A weekly flight services the public commercial airport in Bayankhongor Aimag Centre. A small airstrip is located on site which is capable of accommodating light aircraft only. Private airline service is available from Ulaanbaatar and a one-way trip takes approximately 3 hours.

5.2.4 Ore Reserves

The Project Mine plan is based on an open-pit mining operation targeting 600,000 tonnes per year of feed material for the process plant. The KGP plans to develop the Bayan Khundii and Altan Nar deposits sequentially using conventional processing at the Bayan Khundii processing facility.

5.2.4.1 Minerals Resource Statement

The combined estimate of Khundii Gold Project mineral resources[1] is presented in Table 1. The effective date of the Bayan Khundii mineral resource estimate is October 1, 2019, and the effective date of the Altan Nar mineral resource estimate is May 7, 2018.

Table 1 Khundii Gold Project Combined Mineral Resources

Resource Classification	Quantity (mln.t)	Grade (Au/t)	Gold (oz)
Measured	1.40	3.77	171
Indicated	8.70	2.39	668
Measured and Indicated	10.10	2.59	839
Inferred	4.30	2.10	289

Source: TetraTech 2019

5.2.4.2 Minerals Reserve Statement for Bayan Khundii Deposit

Tetra Tech (2019) estimated the Bayan Khundii deposit mineral reserves[2] in accordance with the National Instrument 43-101 standards and with reference to the 2014 Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards (2014 CIM Definition Standards) and the 2003 CIM Best Practice Guidelines. As of 15th October 2019, the following Mineral Reserves has been estimated for the Bayan Khundii deposit:

- Proven and Probable Reserves for the Bayan Khundii operation are inclusive of mineral resources and based on a three-year moving average gold price of $1,267/oz.
- Mining costs of $2.50/t, milling costs of $16.46/t and general and administrative costs of $6.58/t have been used to estimate the reserves along with the gold price stated above.
- The pit reserves reported below assume full mine recovery and are reported on a dry in-situ basis.
- Dilution has been incorporated into the block model and is reported as a percentage of waste in ore material within the schedule. Additional dilution of 9% and losses of 5% have been included in the Mineral Reserves.
- Waste to ore cut-offs were determined using an NSR for each block in the model. NSR is calculated using prices and process recoveries for each metal accounting for all off-site losses, transportation, smelting and refining charges. NSR cut-off was calculated to be $22.93 and includes 5% royalty deduction.
- Reserve estimates were completed using a pit-constrained resource, with an economic pit shell designed in GEMS™.

A summary of the Mineral Reserves for the Bayan Khundii deposit is shown in Table 2.

Table 2 Bayan Khundii Deposit Mineral Reserve Estimate

Resource Classification	Quantity (mln.t)	Grade (Au/t)	Gold (oz)
Proven	1.1	4.4	165

[1] A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. There is no guarantee that all or any part of the mineral resource will be converted into mineral reserves.

[2] The Mineral Reserve estimates are based on a mine plan and open pit design developed using modifying parameters including metal price, metal recovery based on performance of the processing plant, and operating cost estimates. Reserve calculations are valid at the time of estimation and use cut-off grade assumptions which were made prior to finalization of the economic model.

Probable	2.4	3.4	256
Total Proven and Probable	3.5	3.7	422

Source: TetraTech 2019

The KGP has an expected mine life of 11 years, comprising a one year pre-production period, six-year operating life for Bayan Khundii, three-year operating life for Altan Nar, and one year mine closure. The Project plans to use the Bayan Khundii ore processing facility for the Altan Nar deposit as second phase of the KGP development.

5.3 Project Infrastructure

Most of the KGP infrastructure will be located on the Bayan Khundii site. General layout of the mine and mine support infrastructure at Bayan Khundii is shown on Figure 3.

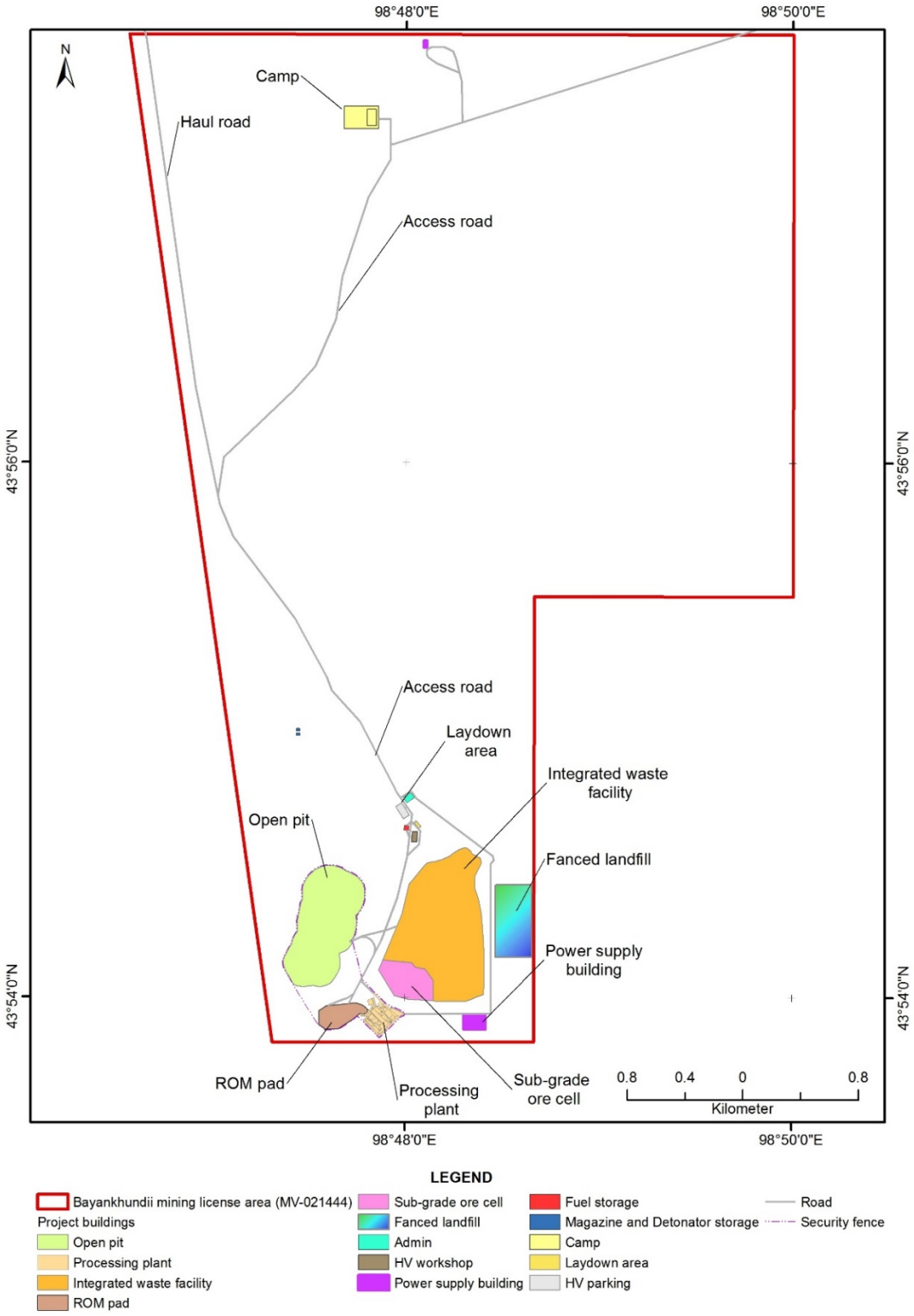


Figure 3 Proposed Mining Infrastructure for Khundii Gold Project

5.3.1 Process Plant

5.3.1.1 Plant Facilities

To allow plant operation to continue unimpeded during the winter months of November to February, the process plant mechanical equipment will be contained within several buildings and the conveyors will be enclosed. Nominal building footprints are based on similar projects and sized for required mechanical equipment.

The areas currently expected to be partially contained for appropriate access and safety are:

- Primary Crushing – Nominal footprint: 12 m x 7 m (integrated into ROM pad)
- Filtered Tails Stockpile – Nominal footprint: 20 m x 16 m

The areas currently expected to be contained in common buildings are:

- Primary and Secondary Grinding – Nominal footprint: 14 m x 9 m
- Leach, CIP, Tails thickening, detoxification and filtration – Main building – Nominal footprint: 72 m x 14 m
- Gold recovery circuit (Elution, Electrowinning and Carbon Regeneration) – Nominal footprint: 10 m x 5 m
- Reagent (Prep and Dosing) Building – Nominal footprint: 22 m x 9 m

5.3.1.2 Office Administration

Nominal footprint: 23 m x 14 m, based on similar projects and for approximately 30 people.

Single storey transportable building of 6 butted floors for use by admin staff. Comprises 28 office open planned work stations, 2 individual offices for manager/superintendent, 1 boardroom, 2 meeting rooms, 1 comms room, 1 kitchenette/breakout meals room. Includes office furniture, cupboards and reverse cycle heating/air conditioning.

5.3.1.3 Emergency Services Centre

Nominal footprint: 15 m x 8 m, based on similar projects and sized for 4 people.

Single story transportable building of 2 butted floors for use by first aid and fire services staff. Comprises treatment room, ESO office, waiting/reception room, kitchen, pharmacy room, office. Includes office furniture, cupboards and treatment beds and reverse cycle heating/air conditioning.

5.3.1.4 Emergency Services/Ambulance Carport

Nominal footprint: 15 m x 14 m, based on similar projects and sized for 2 vehicles.

Single story in-situ building of carport kit structure on concrete floor slab. Open plan and to be located next to Emergency Services Centre.

5.3.1.5 Sample Preparation and Laboratory

Nominal footprint 15 m x 4 m, based on similar projects and sized for 4 people.

Laboratory: single story transportable building of 1 floor for use by sampling staff. Comprises sample preparation area, laboratory, storeroom and offices for processing of samples. Samples will be assayed for composition and gold loading. Includes office furniture, cupboards, sampling benchtops and reverse cycle heating/air conditioning.

Sample storage: single story separate steel shed with insulated walls and roof on concrete floor slab for the receipt and storage of samples.

5.3.1.6 Light Vehicle and Plant Workshop

Nominal footprint: 50 m x 15 m, based on similar projects.

Single story in situ building of steel portal framing with insulated walls and roof on concrete floor slab. Comprises offices, LV workshop floor, Plant workshop floor, small kitchenette/meals room. Includes power, lighting, comms, compressed air, specialist equipment for maintenance of LV fleet, tool storage. Office reverse cycle heating/air conditioning and workshop floor heating/cooling.

5.3.1.7 Plant Warehouse

Nominal footprint: 25 m x 20 m, based on similar projects.

Single story in-situ building of steel portal framing with insulated walls and roof on concrete floor slab. Comprises offices, warehouse floor with storage shelves/racks, small kitchenette/meals room. Office reverse cycle heating/air conditioning and warehouse floor heating/cooling.

5.3.1.8 Reagent Stores (Short term and long term)

Long Term Store nominal footprint: 25 m x 20 m, based on similar projects.

Short Term Store nominal footprint: 12m x 8m, based on similar projects. Long Term Store consists of 1 flat roofed shelter fixed to sea containers on concrete floor slab. Sea containers provide additional storage space for reagents. Includes lighting, perimeter fencing for security. To be located on side of warehouse.

Short Term / Day Store consists of 1 flat roofed shelter fixed to sea containers on concrete floor slab. Sea containers provide additional storage space for reagents. Includes lighting, perimeter fencing for security.

5.3.1.9 Control Room

Nominal footprint: 5 m x 5 m, based on similar projects.

Prefabricated building containing computer interface and control panels for the plant management system.

5.3.1.10 Ablutions

Nominal footprint: 15 m x 4 m, based on similar projects.

Single story transportable building for male, female, disabled patrons. Includes sanitary fixtures, partition system.

5.3.1.11 Rubbish Shed

Nominal footprint: 6 m x 6 m, based on similar projects.

Single story in-situ building of open carport kit structure on concrete floor slab. Comprises open plan with no roller doors or walls. Includes wash down area, bins and power for potential future installation of a compactor.

5.3.1.12 Bus Shelter

Nominal footprint: 20 m x 4 m, based on similar projects and sized for two buses.

Single story in-situ building of carport kit structure on concrete floor slab. Comprises steel structure with roof and walls for weather protection. Includes bench seating. To be located next to Office Administration building.

5.3.1.13 Ice Machine

Nominal footprint: 15 m x 4 m, based on similar projects.

Single story transportable building for proprietary ice machines, drinking fountains/hand wash basins and utility/storeroom.

5.3.1.14 Meals Room

Nominal footprint: 15 m x 7 m, based on similar projects and sized for 50 people.

Single story transportable building of 2 butted floors. Comprises dining tables, seats, kitchenette, drinks fridges, microwave and coffee/tea making appliances. Includes reverse cycle heating/air conditioning.

5.3.1.15 Gatehouse

Nominal footprint: 9 m x 7 m, based on similar projects.

Single story transportable building of 2 butted floors for use by security staff for recording movement to/from site, plus drug/alcohol testing of contractors and staff. Includes boom gate, swipe card access, control work stations, CCTV equipment, kitchenette. Includes reverse cycle heating/air conditioning.

5.3.2 Mining buildings and infrastructures

Mining buildings including the heavy vehicle workshop and warehouse, contractor mining offices and light vehicle parking, explosive storage magazines and heavy vehicle laydown areas are located approximately 500 m northeast of the Bayan Khundii pit and service mining contractor activities. Explosives and blasting accessories magazines are located approximately 2 km north of the Bayan Khundii pit.

Building footprints reported below are indicative and based on similar projects given a certain personnel or vehicle count requirement. Building descriptions provided below are conceptual and describe typical fit-out for each required building.

5.3.2.1 Offices and Administration Building and LV Parking

Provision has been included for an office building containing 20 individual offices and a central meeting room and break rooms on the second floor, and a change and dry area with lockers which is located on the ground floor. This building is expected to cater for management and mining and geology contract staff. Parking for passenger and light site work vehicles is located directly outside the office building.

5.3.2.2 Heavy Vehicle Workshop and Warehouse

The heavy vehicle workshop is designed with four maintenance bays for large mobile equipment, sized to accommodate the largest working vehicle on site, CAT 773 waste haul trucks. One of the maintenance bays will be equipped with wash-down equipment for both haul trucks and other mobile equipment when required. This building has also been designed with provision for a warehouse for all equipment parts and tools necessary for maintenance, sized at 15 m x 25 m. In

addition, this workshop and warehouse complex will host supply chain activities and is designed with 10 offices for maintenance management or planning staff and supply chain staff. A change and dry area with lockers and a break room is also included. The currently planned refuel and storage area is located opposite the maintenance and warehouse buildings for ease of access.

5.3.2.3 Laydown Area

The heavy vehicle laydown area is located on the main haul road between the admin and warehouse facilities. This area is designed at 100 m x 50 m and built as a raised gravel pad to accommodate space for all mobile equipment to be parked between shifts and for ease of access by the equipment operators change and dry area in the admin building opposite.

5.3.2.4 Magazine and Detonator Storage

Magazine and detonator storage has been placed north of the admin building on the main haul road to the Bayan Khundii pit, approximately 2km north of the mine and mill facilities. In addition to the 450 m exclusion zone for volatile materials, explosive storage should be kept at least 100 m from any building or road and have been located outside the minimum distance radius from the planned site access road. There will be two magazines for explosives and accessory storage, built with reinforced roofs at a distance of 40 m, with a surrounding earthen berm of the same height as the buildings for protection. Explosive storage silos have not been included as the drilling and blasting activities on site are expected to be conducted by a local contractor, providing both explosives and loading of the holes on scheduled blasting days.

5.3.2.5 Security and Fencing

In addition to the employment of security guards, fencing will be included to be prevent trespass to the mine site and associated infrastructure. The fence is expected to enclose the pits and process plant, with localised fencing enclosing other infrastructure. The main purpose of fencing is to assist in the prevention of equipment and gold theft as well as to limit access of wild-life for the safety of the local fauna and the area's operators.

5.3.3 Fuel Supply and Storage

The total amount of the site-based diesel fuel is projected to be as much as 650 tons. Diesel will be stored primarily at the fuel farm and with estimated additional 3-day storage at the main power station. These facilities are located in proximity to the HV workshop/parking and adjacent to the power station, respectively. Storage will be achieved using a containment design that will be compliant with local regulatory and design standards. It is anticipated that storage requirements for diesel must meet a minimum of at least two weeks. It is expected that diesel fuel will be transported to the site fuel farm and HV refuel station using fuel tankers (40 t).

5.3.4 Water Supply

5.3.4.1 Bore Field

Site water supply is expected to be aquifer-sourced from bore fields located approximately 2-3 km southwest of the Bayan Khundii pit. Each bore pump will pump to a booster pump station, if required, which will supply raw water to the process plant raw water tank, which will then provide distribution to the rest of the site.

Due to the high salinity content and hardness of the bore water, a portion will be treated using reverse osmosis treatment technology to provide a potable water supply for drinking water and safety showers and high-quality water supply to the Gold Recovery Circuit (Elution).

5.3.4.2 Water Distribution

Shallow buried pipeline is proposed to transport water from the bore field to a raw water tank adjacent to the processing plant for desalination and water hardness treatment.

The terrain between the tank and the bore field well locations is relatively flat and has little shrubbery, which will lend itself to decreased earthworks during the construction phase.

Site reticulation will be fed from the raw water tank which will include feed lines to mining infrastructure, power station/fuel farm and plant infrastructure.

5.3.4.3 Heating

Two coal-fired heat-only boiler (HOB) plants are expected to be developed to provide heating to the process plant and mine facilities as well as the accommodation village, respectively. The plant will consist of a chain grate stoker boiler with a 20 m tall stack . Heating is expected to be required for up to 183 days per annum. Coal storage is planned at each HOB site in a fenced outbuilding enclosure. The coal storage enclosures are estimated to take approximately 200 and 400 m^2 areas, respectively, at the camp and process plant, in order to accommodate at least two weeks' coal supply.

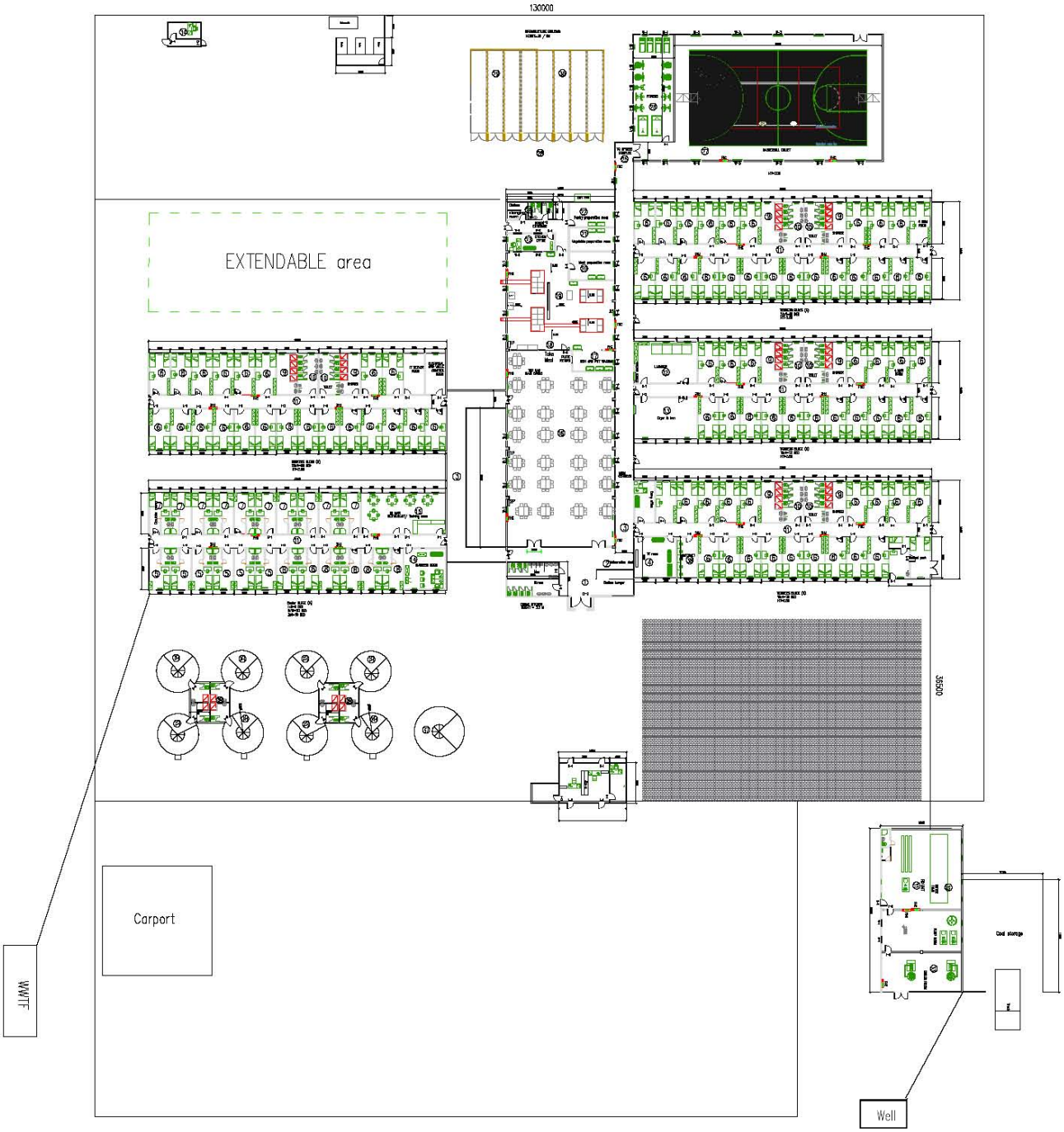
5.3.5 Accommodation

5.3.5.1 Accommodation Village

KGP Accommodation Village and its associated infrastructure will be located approximately six km north of the Bayan Khundii pit.

The accommodation village will be built to allow for a combination FIFO/DIDO (fly-in/fly-out / drive-in/drive-out) arrangement for approximately 300 to 375 personnel.

The village boiler and generator set compound is located out from the boundary of the village and offset approximately 350 m North East of the village. The Accommodation village layout is presented in **Error! Reference source not found.**.



Source: Erdene Mongol LLC 2019

Figure 4 Khundii Gold Project Workers Accommodation Village Layout

5.3.5.2 Construction Camp

The accommodation village will be constructed in the early phases of construction to allow it to support the ongoing construction activities. Erdene currently have a 60-bed temporary camp on-site to service drilling and exploration activities. This temporary camp will be used and expanded if required to service construction activities while the permanent village is constructed. Both facilities will provide self-contained accommodation and messing for construction labour during the construction period.

5.3.6 Waste Infrastructure

5.3.6.1 Landfill

Inert solid waste will be transported, disposed and handled at the landfill area sited to the east of the Integrated Waste Facility (IWF). The landfill area will be fenced and is expected to be separated into and operated as cells, sequentially opened and then closed and rehabilitated.

Prevailing winds, predominantly blowing from the South West were taken into consideration when siting the landfill to ensure any odour and/or dust resulting from landfill operations is not transported over the populated areas.

5.3.6.2 Wastewater Treatment

Grey and black water treatment will be achieved using a packaged plant located near the camp. Grey water will be treated and recycled where possible to reduce raw water makeup requirements.

5.3.6.3 Integrated Waste Facility

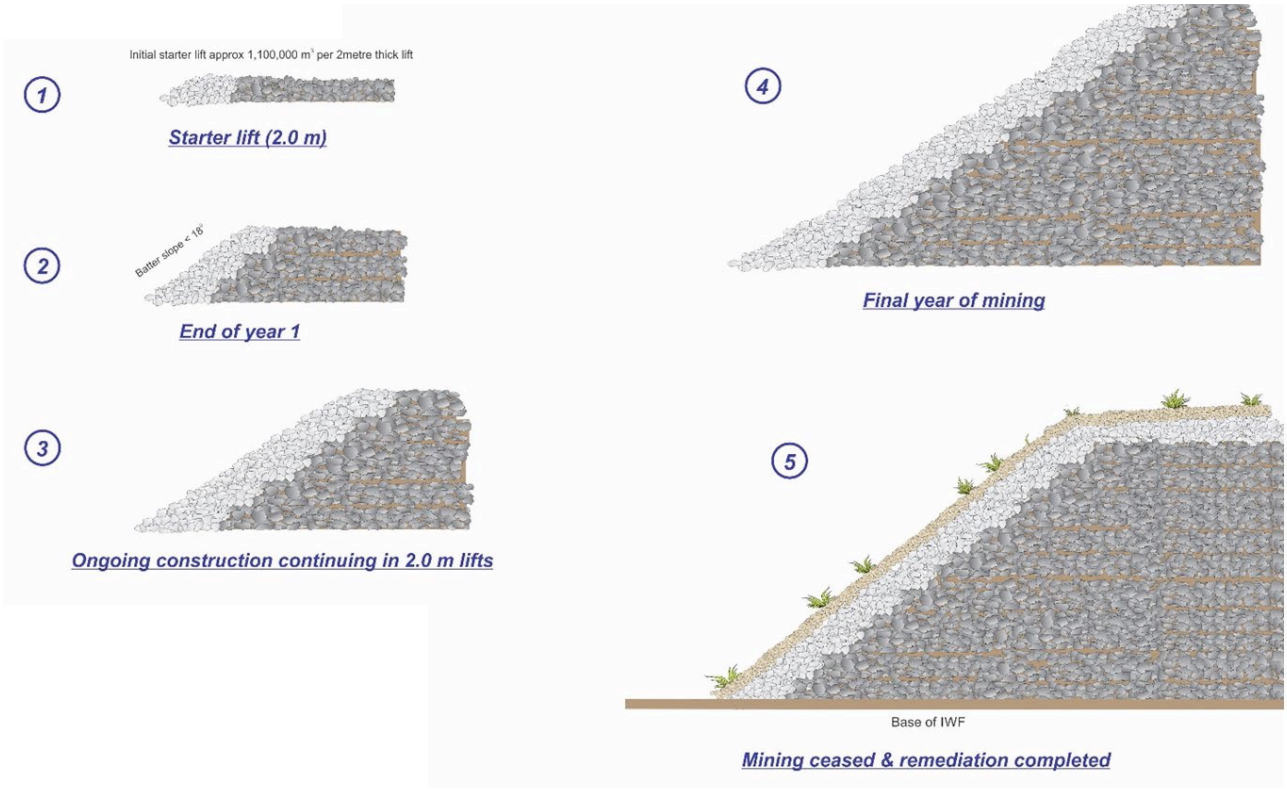
Mined waste rock and processed tailings will be contained within an Integrated Waste Facility (IWF) as a single above-ground structure located directly east of the Bayan Khundii pit. The IWF will consist of a core of mixed tailings and waste rock encapsulated within an environmentally benign and durable erosion-resistant cover.

The IWF will be constructed in the following manner:

- The footprint (approximately 57 ha) will be cleared of topsoil and sub-soil.
- The topsoil and sub-soil will be stockpiled for subsequent placement on the surface of the IWF during rehabilitation.
- An initial starter layer (approximately 2.0 m thick) will be constructed across the entire footprint. It will consist of an outer circumference of benign waste rock around a core of co-mixed tailings and waste rock.
- Tailings and waste rock will be co-mixed on the surface of the IWF and then placed in 2.0 m lifts until completion.
- Tailings placed in the IWF will have been passed through filter presses to recover process liquid and are anticipated to have a moisture content of around 15%. They will be transported to the IWF by truck from the process plant.
- The 2.0 m lifts will be compacted using dedicated compaction equipment.

- The batter slopes of the IWF will nominally be ≤ 18˚, with the actual slope to be based on the erosion resistance properties of the available cover material.
- A vegetation growth supporting layer will be placed over the final surface of the IWF, it is anticipated that the stockpiled topsoil and sub-soil will be used for this layer.
- Rip-rap for erosion protection will be incorporated into the growth supporting layer.

Constructing the IWF in this manner means that at the completion of mining and processing only a small portion of the final layer will require completion, with all the external slopes having been completed progressively over the operating period. It is expected that this small portion will be less than 15 ha of the upper surface. Typical cross sections of the proposed IWF is are shown in Figure 5.

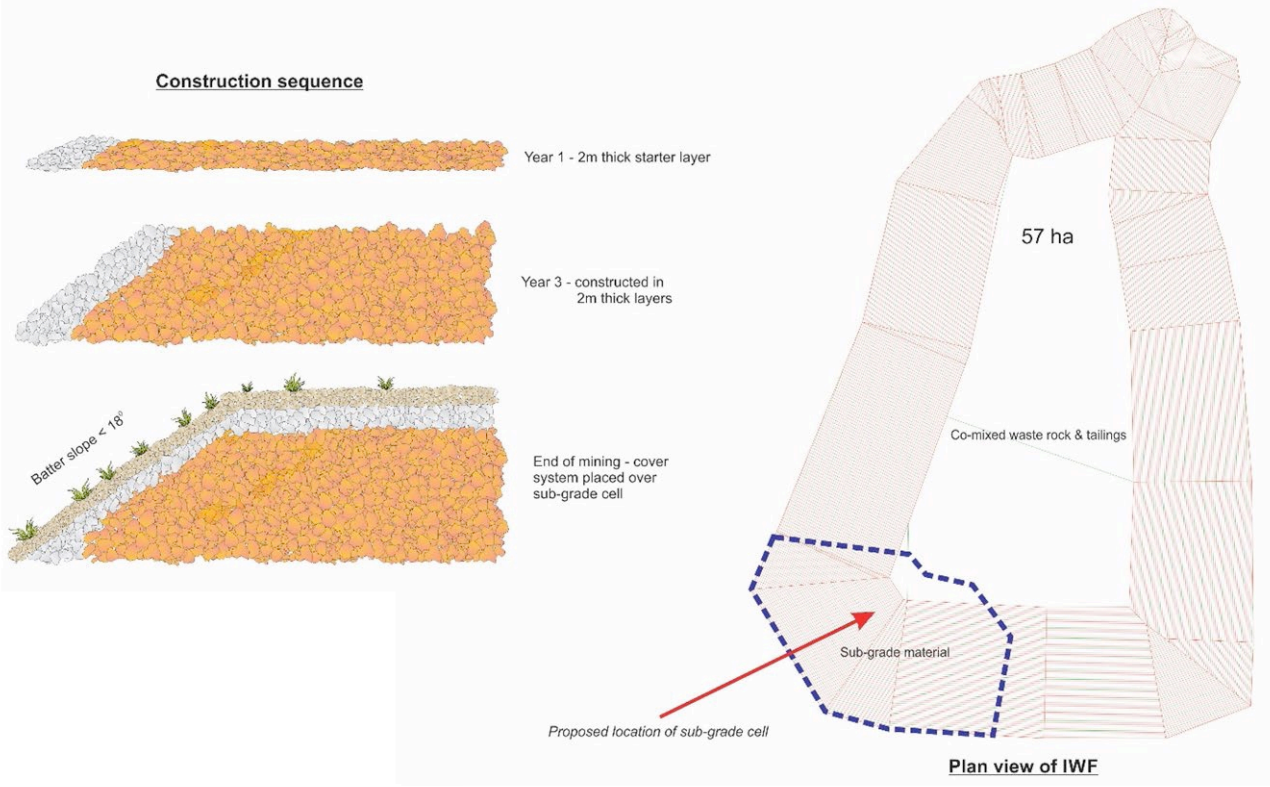


Source: Erdene Mongol LLC 2019

Figure 5 Bayan Khundii Integrated Waste Facility Design

5.3.6.4 Sub-Grade Ore

In accordance with Mongolian requirements to stockpile subgrade ore for potential future processing subject to justifiable project economics, sub-grade material (typically defined as material below the process plant feed grade and above 0.2 g/t Au) will be placed in a discrete section of the IWF. The south-west section of the IWF has been identified as the preferred location for the sub-grade stockpile. It will be integrated into the overall IWF and have the same cover system placed over it. Should in the future the sub-grade become economic to process, it can be reclaimed from the IWF efficiently without disturbing the overall landform.



Source: Erdene Mongol LLC 2019

Figure 6 Low-grade Ore Sell Design at Bayan Khundii

5.3.7 Process Run-of-Mine Stockpile

A run-of-mine (ROM) stockpile has been included in infrastructure considerations in order to accommodate periods where the mining rate exceeds the processing capacity at the mill. The ROM stockpile is located adjacent to and west of the process plant for direct loading into the primary crusher, with an estimated footprint of approximately 0.05 km^2. The ROM stockpile has been designed with this footprint to accommodate the maximum tonnage of planned stockpiled ore, with an estimated maximum height of 5 m based on a conservatively estimated 30˚ angle of repose for the coarse ore material.

5.3.8 Other support infrastructures:

5.3.8.1 Supply, site access and haul roads

General site access will be achieved via an access road from Shinejinst, which is approximately 90 km in length to the currently proposed accommodation village and approximately 100 km in length to the Bayan Khundii Pit. No improved road currently exists from Shinejinst to site, and road conditions are fair to poor.

An access road that follows the east side of the IWF has been included to allow vehicular traffic for plant consumable supply (reagents, liners, media etc.), diesel fuel supply for the power station and general LV traffic for maintenance and landfill. This access road will be the primary access for this type of traffic and serves to reduce LV traffic interaction with haul truck operations between the IWF and the Bayan Khundii Pit.

5.3.8.2 Haul roads

Upon the development of the Altan Nar mining area, a link road will need to be established back to Bayan Khundii for the transport of plant feed, personnel and materials, and for equipment travelling to and from the workshop. To ensure efficient operations, this road will need to be engineered and built to haul road standards.

5.3.9 Altan Nar Site Facilities

It is understood that the Bayan Khundii site will be developed first with all infrastructure located there, and later, the Altan Nar site will be developed as a satellite operation with minimal facilities.

The proposed facilities at Altan Nar include open mine pits and Integrated Waste Facility and access and haul roads (Figure 7).

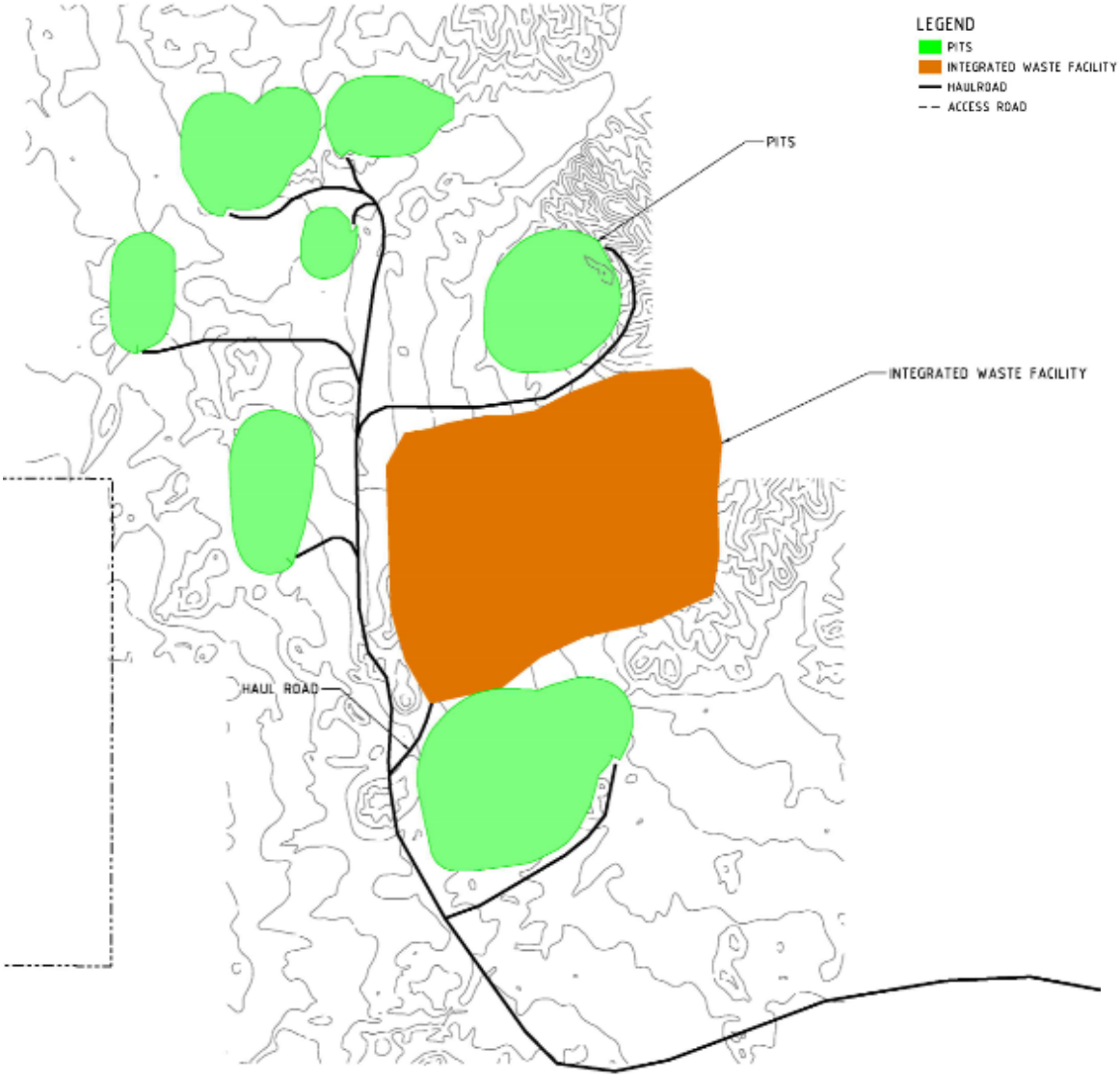


Figure 7 Proposed Infrastructure at Altan Nar site

5.4 Ore Mining and Processing Methods

5.4.1 Ore Mining

5.4.1.1 Site Preparation

All earthworks at the mine development have been assumed to be undertaken by the mining contractor using mining equipment at the start of the project. Geological surveys of the site indicate that there is very little to no soil profile developed, with fresh rock generally occurring from or very near to surface. Vegetation is sparse and restricted to grasses, bushes and shrubs. Preparation of the site for construction is limited to clearing this vegetation and any loose surface material.

5.4.1.2 Drilling and Blasting

Primary production drilling will be conducted using a 76 mm and 129 mm hole for ore and waste blasting respectively. The PowerRoc D60 and FlexiRoc D60 were selected due to their flexibility and ability to perform production, pre-splitting, and pioneering. There is also the option to use the drills for horizontal drilling if pore pressure builds up in the final walls and dewatering of the walls is needed. Both of these drills are durable and reliable and have highly efficient dust collection systems which will ensure the mechanical availability of the drills remains high while operating in a dusty environment. Blast design assumptions have been used to estimate the drilling production rate and consumables required. Two ore drills and three waste drills are required at peak production.

Blasting is assumed to be conducted three times per week during full production, with drilling and blasting completed by a contractor. It is assumed that ore material will require a more compact blast pattern than waste material in order to achieve the desired fragmentation prior to crushing.

5.4.1.3 Loading and Hauling

Following blasting and ore and waste classification, loading will be completed with separate ore and waste loaders. Selection of loading equipment was based on the ore to waste ratio, bench sizes and material selection control, with ore excavators a smaller size for higher selectivity, particularly in the lower benches of the pit where available space is lower due to the minimum mining width. Diesel hydraulic excavators were selected to further improve manoeuvrability.

One ore excavator and one waste excavator are required throughout the life of mine, inclusive of any time unavailable due to maintenance. The ore excavator was chosen assuming a 9 t bucket capacity, and the waste excavator with 13 t bucket capacity which have been paired with haul trucks which can be loaded within five passes.

Both excavator models were chosen due to their high reliability and proven performance in open-pit mines where manoeuvrability and selectivity are prioritized. Due to the high strip ratio at the Bayan Khundii pit, the CAT 6015B was selected for the waste excavator as it has higher productivity, better fuel efficiency, and a larger bucket than other shovels in this class.

Haul trucks were selected based on loader capacity and expected ore and waste material volumes from the schedule. A 38 t capacity articulated ore truck was chosen, with a 60 t capacity waste truck. Both ore and waste truck models selected are rear-dump vehicles, configured with a sloped truck box, to increase the fill factor and reduce the quantity of fine material retained following dumping. This is particularly useful for the ore trucks, as they will be used to transport tailings from the process plant to the waste storage facility as part of the ore cycle. Over the life

of mine, two ore trucks and nine waste trucks are required to meet the estimated production schedule.

5.4.2 Ore Recovery

The ore processing plant for the Khundii Gold Project will be a simple, conventional, gold cyanide leach plant. Plant throughput will be 600,000 tonnes per year, nominally 1,800 tonnes per day. The feed grade to the plant is expected to be in the order of 3.7 g/t Au with reportedly low silver as a feed into the crusher.

The plant can be separated into five distinct areas:

- Comminution
- Leach, CIP
- Gold Recovery Circuit
- Tails Handling
- Reagents

The overall Process Block Flow Diagram is shown in Figure 8.

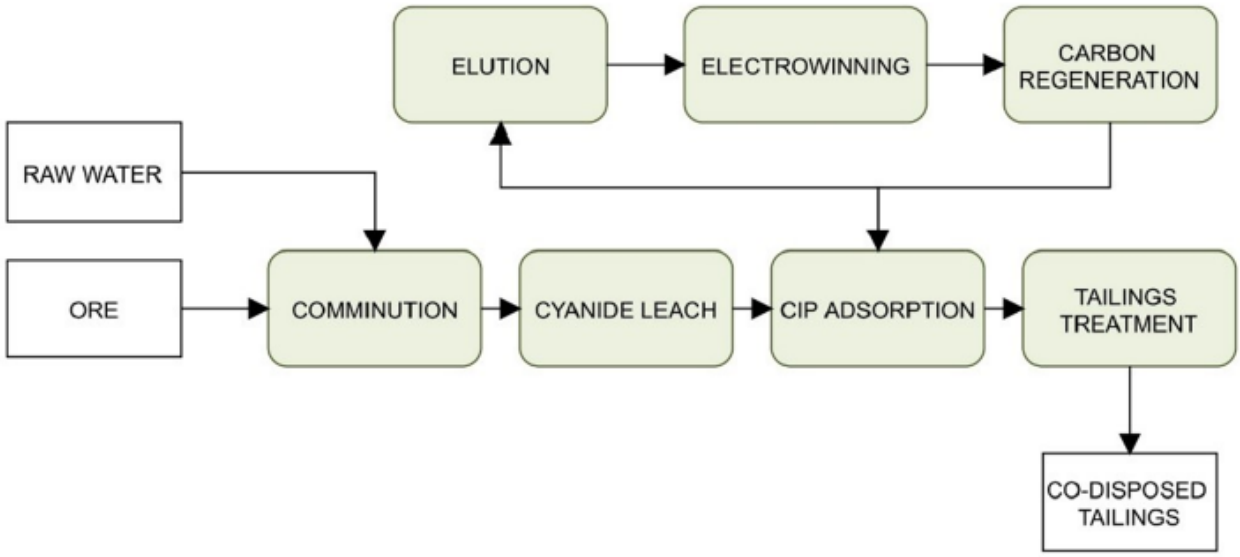


Figure 8 Overall Process Block Flow

5.4.2.1 Comminution

Ore from the Bayan Khundii pit is dumped on the ROM pad for storage and potential blending of feed grades. This ore is dumped into the crusher feed hopper via a grizzly screen by a Front-End Loader (FEL), which can potentially blend the feed by utilizing “fingers” of various grades stored on the ROM pad. Any oversize ore will be broken up via a rock breaker located by the grizzly screen. The crusher has a suitably sized dump hopper to allow the FEL operator to maintain the required plant feed rate.

As the utilization of a single crusher is expected to be nominally 70%, but the utilization of the mills is expected to be 92%, two full tonnage crushers will be installed in parallel in a duty/standby configuration. Dust on the ROM pad and in the dump hopper is managed via water sprays.

The crushed ore is fed to a high aspect SAG mill via the SAG mill feed conveyor. The SAG mill operates in a closed loop configuration with cyclones as classifiers. The circuit is designed to operate with a 250% recirculating load, which is typical for this kind of circuit. Mill scats report to a bunker for disposal as they should be free of gold. Sump pumps operate in the area and feed into the SAG mill feed chute.

The Ball mill operates in a closed loop configuration with cyclones as classifiers. The circuit is designed to operate with a 350% recirculating load. Mill scats report to a bunker for disposal as they should be free of gold. Sump pumps operate in the area and feed into the Ball mill feed chute. The primary grinding cyclone cluster overflow reports to the Secondary Grinding Cyclone Feed Hopper in order to minimize over-grinding in the ball mill. The secondary grinding cyclone cluster overflow reports via a trash screen to the Leach Feed Box.

5.4.2.2 Leach, CIP and Gold Recovery

The finely ground ore is leached with cyanide for 36 hours in agitated leach tanks. A configuration of five tanks in series was chosen to balance circuit complexity and cost, whilst minimizing any short circuiting of the feed to the product. Any additional oxygen required for the reaction will be provided by sparging Low Pressure Compressed Air down the shafts of the leach tank agitators. As the ore was not found to be “preg robbing” (an abbreviation commonly used to describe ore that adsorbs the leached gold thereby preventing it from being captured by the carbon), no carbon is added into the leach tanks, thereby maximizing the feed gold concentration to the first CIP tank.

The leached gold is adsorbed onto activated carbon in the Carbon-In-Pulp (CIP) tanks. A configuration of eight tanks in series was chosen to balance circuit complexity and cost, whilst providing enough equilibrium stages and minimizing any short circuiting of the feed to tails. The carbon flow is counter-current to the leach liquor, with the barren carbon being added to the last CIP tank. The carbon in each tank is regularly moved upstream using air-lift pumps. Each CIP tank is fitted with output screens to keep the carbon from flowing downstream.

The overflow liquor from the final CIP tank will be essentially barren of gold. This flow passes over a carbon safety screen to ensure no slippage of carbon to the tails area. The CIP tails is thickened to recover cyanide containing liquor for recycling and reuse. This process water is reused in the mills.

Elution Circuit

Several Elution methods were considered with each varying slightly in complexity and benefit. Two methods that were found to be most suited to the elution frequency requirements identified were the Pressure Zadra method and the Anglo-American Research Laboratories (AARL) method. The difference in the achievable elution times between these two methods is too small to provide a significant CAPEX or OPEX advantage between these two methods at this level of study. Vendors were requested to offer either option. Atmospheric Zadra was removed as an option on grounds of the significantly larger batch times.

The loaded carbon will be removed from the first CIP tank daily. The carbon is dewatered over a screen and then sent to the gold room to batch fill the elution column.

ElectroWinning

The gold will be electrowon from the pregnant elution liquor using standard atmospheric cells. The cells will be powered by rectifiers that are designed to maximize the maintainability of the cell room, whilst keeping the design simple. The cell room is designed to allow additional cells and their associated rectified, should Altan Nar ore be processed at a later date.

Gold Room

The gold room uses fluxes in a furnace to purify the sludge using pyrometallurgy and the clean molten precious metal is poured into Dore' and kept in a safe until the product is dispatched from site. Due to the size and cost of the gold room and since most plants are very similar, no test work was performed to optimize the costs or performance of this section of the plant. Typical fluxes and consumptions were used from similar projects.

Carbon Regeneration

The barren carbon will be regenerated in a small diesel-fired kiln. This will remove any volatile Organic Compounds (VOCs), leaving the carbon with the maximum active sites for storing gold in the CIP circuit. The hot carbon will be quenched in water prior to reporting back into the final CIP tank.

5.4.2.3 Tails Handling

The thickened and filtered tails are to be co-disposed with the mine waste. The thickener overflow liquor is used in the primary grinding circuit to recover any contained cyanide in this liquor.

Given the plant tonnage and the remoteness of the site, the INCO (or SO_2/Air) method was determined as the most appropriate cyanide detoxification method. This system will combine Sodium Metabisulphate (SMBS) as the SO_2 source, low pressure compressed air as the oxygen source and a small amount of Copper Sulphate to add to any copper in the ore. The reaction will take place in two tanks in series to minimize any feed short circuiting to the product stream and is sized for enough residence time to allow the reactions to go to completion.

The detoxified tailings will be filtered in a pressure filter to a "dry cake", which will be conveyed to a loading point to allow for ore trucks to be backloaded to haul the dry cake to the disposal facility. A feed tank and a filtrate tank will be provided to account for and match the batch cycles of the filters to the continuous rate of the plant. The detoxified filtrate will be used as process water for the plant.

5.5 Project Resources Use

5.5.1 Water Supply

Current water consumption in the Project site is limited to camp water supply, road watering for exploration vehicles, and water used for drilling and cutting of core samples. During the Project development and operation there will be elevated domestic and operational water requirements to meet the increased number of personnel and process water requirements. There will also be water demands during construction (concrete mixing and dust suppression) but these volumes will not be as high as the commissioning/operational water requirements. Total water demand for KGP is estimated to be 569,200 L/Day or about 7L/s. Details are provided in Table 3.

Table 3 Summary of Estimated KGP Water Use Demands

Water Use	Estimated Water requirement
Domestic use (Drinking and cooking, Laundry, Showers and Sanitation)	45,600 L/Day
Operations Water use: - Make-up water required for dust suppression (maximum)	91,600 L/Day
- Amount of water lost to vehicle washing	60,000 L/Day
- Process Water	360,000 L/Day
- Greenhouse use (April-Oct)	12,000 L/Day

5.5.2 Electricity

An on-site power plant is proposed to meet reliability and anticipated power requirements, with a combined solar diesel generation method. The power station will be designed to allow for an average load demand of approximately 4 MW, a maximum demand of approximately 5 MW and to be able to maintain a stable voltage and frequency output when the High Voltage mill drives are started.

The power station will generate at 6.6 kV to supply power for transmission to the process plant and mine infrastructure. Transmission is expected to be achieved using a combination of buried high voltage cable and overhead power lines to both these locations.

The KGP total electricity power consumption is about 1,185 MWh during the Project lifecycle (Figure 9). The milling equipment is the largest electricity user in the processing operation. Pumps, lights and forklift use in workshops are the other key electricity users during the mine operation.

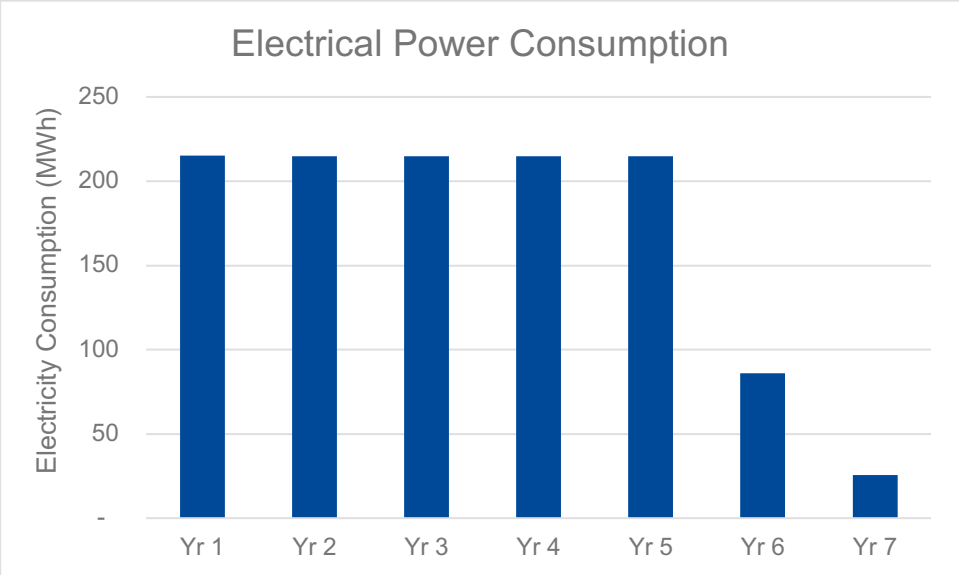


Figure 9 Estimated Electricity use Estimate for Khundii Gold Project

5.5.3 Diesel Fuel

The KGP total diesel fuel use is estimated to be 52.3 mln litre (L) during the KGP Phase One (i.e. Bayan Khundii deposit processing). The core mining equipment use (i.e. ore drill, waste and ore transport) consumes about half (50%)of the total diesel, followed closely by the diesel power

plants (44%). Other mining support auxiliary equipment (i.e. dozers, graders, water truck, workshop machinery etc.) is expected to consume the rest.

The diesel power plant fuel use has been estimated conservatively without considering the solar power plant input. Thus, in reality the total diesel fuels is expected to be less than the current estimate during the mine operational phase. Annual diesel consumption estimates are provided in Figure 10.

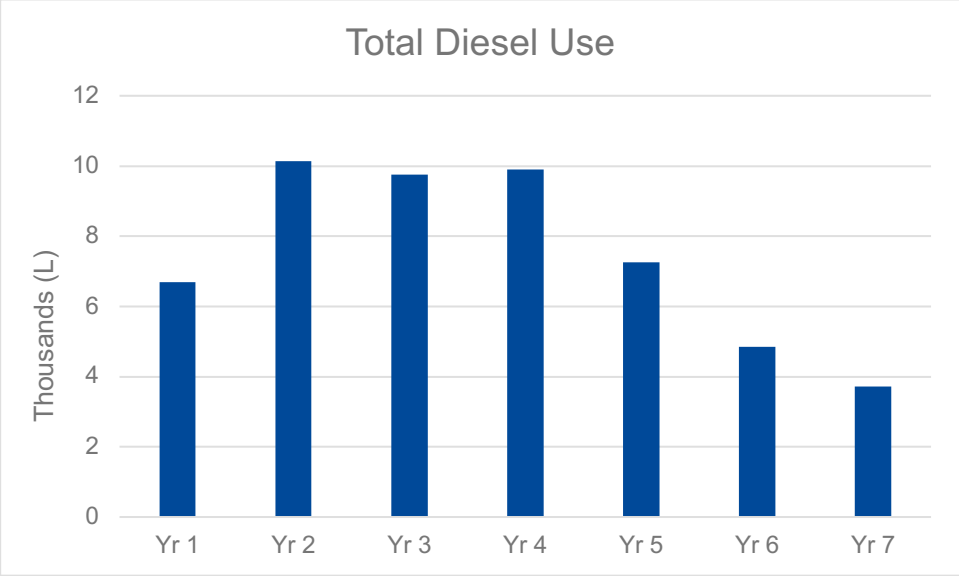


Figure 10 Estimated Diesel Fuel Consumption at Khundii Gold Project

5.5.4 Coal

A combined amount of approximately 9.3 t coal will be used annually for the proposed two coal-fired heat-only boilers located in the mine development area and in the accommodation village.

5.5.5 Chemicals and Reagents

Due to the remoteness of the site and the requirement for two weeks storage, the majority of the reagents are expected to be delivered as solids, either in 25kg bags on pallets, or in 1-2 t bulk bags. The lime is expected to be delivered as a powder and the flocculant and hydrochloric acid will be delivered as a liquid. The hydrochloric acid will be used at the supply strength however, all other reagents will be mixed to their required strength. Each reagent will have an agitated mixing tank and a large storage tank. Tank sizes have been chosen to allow enough time for operators to manage the mixing during day shift.

5.5.5.1 Lime

Lime is used in Leach and CIP to maintain pH in the range of 10 – 11 to prevent highly poisonous Hydrogen Cyanide (HCN) gas being produced. Lime is also used in cyanide detoxification to maintain the pH of the detoxification stirred tanks to approximately 8 – 9. This is also to avoid the evolution of HCN but also serves to ensure Weak Acid Dissociable (WAD) cyanide is oxidized to the less toxic Cyanate efficiently.

A Lime consumption of 975 g/t ore was calculated using a process model and is based on keeping Leach through to detoxification at the aforementioned pH's.

5.5.5.2 Sodium Cyanide

Sodium Cyanide (NaCN) represents the largest reagent cost in the process plant. Mitigation of Sodium Cyanide consumption is increased by recovery of cyanide liquor from the Tails Thickener overflow and the reuse of barren Electrowinning liquor. Sodium Cyanide is primarily used as a gold lixiviant during the leaching process, however is also be used to prepare the elution circuit pre-soak solution, but to a lesser extent.

5.5.5.3 Sodium Hydroxide

Sodium hydroxide is used as a pH modifier in the gold recovery circuit and represents the other main component in the Pre-Soak solution described above, in section 17.3.5.2. Sodium Hydroxide is used to ensure the pH does not become acidic in the presence of Cyanide.

A Sodium Hydroxide consumption of 363 g/t ore was calculated using a process model and is based on approximately 1.5 Elution Column Bed volumes of pre-soak solution for the pre-soak step of elution. The Pre-Soak solution contains approximately 2 % w/v NaOH.

5.5.5.4 Flocculant

Flocculant is regularly used for improving the settling characteristics of solid slurries, especially those with a lower particle size. Given the final grind size of 60um, it is likely the tails thickener will require flocculant assistance to thicken to nominally 50% w/w solids and to avoid needing an excessively large thickener. In the absence of thickening and flocculant screening test work, a high molecular weight poly acrylamide (PAM) type flocculant was assumed for the purpose of pricing. A dosing rate of 20 g Flocc / t solids was used.

5.5.5.5 Sodium Metabisulphite

Sodium Metabisulphite or SMBS as it is commonly known, is used in the INCO/SO_2/Air cyanide detoxification process as a source of Sulphur Dioxide (SO_2). The SO_2 dissolves into solution to produce Sulphite SO_3(2-) which when combined with dissolved oxygen and a copper catalyst, will oxidize the Weak Acid Dissociable (WAD) cyanide into the less toxic form, cyanate (OCN-).

A SMBS consumption of 2,930 g/t ore was calculated using a process model and is based on literature and represents a typical SMBS dosing rate for detoxification of slurries, this basis being 4 g SO_2 / g WAD Cyanide. If the process stream requiring treatment did not contain solids, this dosing requirement would likely be in the order of 3 g SO_2 / g WAD Cyanide.

5.5.5.6 Hydrochloric Acid

Hydrochloric acid is used solely for acid washing loaded carbon before it is stripped of gold. This step reduces fouling of the activated carbon, which if left unchecked could significantly reduce the effectiveness of the carbon to remove leached gold from the pregnant liquor in CIP.

A Hydrochloric Acid consumption of 560 g/t ore was calculated using a process model and is based on 1 column bed volume of acid wash at a HCl strength of 3% w/v.

5.5.5.7 Copper Sulphate

Copper Sulphate is used as a source of copper catalyst for the cyanide detoxification process. It is relatively minor in terms of total reagent costs and may not be required if there is enough soluble copper naturally occurring in the ore. A Copper Sulphate dosing of 21 g/t ore was calculated using a process model and is based on a target soluble Cu concentration of 30 mg/l in cyanide detoxification.

5.6 Project Work Force

As it is expected that mining activities will be undertaken by a contractor, the majority of technical staff and equipment operators and maintenance crews will be contracted. Managerial positions and geology technical staff will be permanent positions.

The KGP total work force will be around 345 people comprising of Erdene's permanent employees and contractors. The operations phase jobs will be longer term, for the operational life of the KGP.

Table 4 below provides the estimated breakdown of Erdene (direct) and contractor employees during the operations phase of the KGP.

Table 4 Employment at Khundii Gold Project

Employment Type	Estimated Number of Positions
Direct Employment Positions with Erdene	190
Contractor Employment Positions	155

5.7 References

RPMGlobal. NI 43-101 Technical Report for the Preliminary Economic Assessment of the Khundii Gold Project – February 2019

TetraTech. Khundii Gold Project NI 43-101 Technical Report – December 2019.



SUSTAINABILITY
EAST ASIA LLC

ERDENE MONGOL LLC

Chapter A6 – Stakeholder Engagement

April 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
CRM	Community Relations Manager
CSO	Civil Society Organisations
DEIA	Detailed Environmental Impact Assessment
EBRD	European Bank for Reconstruction and Development
ERD	Erdene Mongol LLC, the wholly owned Mongolian subsidiary of Erdene Resource Development Corporation, a Canadian private company listed on the Toronto Stock Exchange.
ESIA	Environmental and Social Impact Assessment
FGD	Focus Group Discussion
ICP	Informed Consultation and Participation
IFC	International Finance Corporation
KGP	Khundii Gold Project
KII	Key Informant Interview
km	Kilometre
NGO	Non-Governmental Organisation
PR	Performance Requirement
SEP	Stakeholder Engagement Plan

1. INTRODUCTION

Stakeholder engagement is a key element of the Environmental and Social Impact Assessment (ESIA) process, involving information disclosure and consultations. The European Bank for Reconstruction and Development (EBRD) Performance Requirement (PR) 10 defines stakeholders as: "…the various individuals or groups who (i) are affected or likely to be affected (directly or indirectly) by the project (affected parties); or (ii) may have an interest in the project (other interested parties). In accordance with this definition, stakeholders include locally affected communities, constituent groups and individuals and their formal and informal representatives, such as elected politicians, national, provincial and local government authorities, religious leaders, civil society organisations (CSOs), the academic community and other businesses. The main objectives of stakeholder engagement are to:

- ensure that adequate and timely information is provided to stakeholders who may be affected by the Khundii Gold Project (KGP);
- provide stakeholders with sufficient opportunity to provide their opinions and comment upon the risks, impacts and opportunities posed by the KGP; and
- ensure that stakeholder comments are received in a timely manner so that they can be considered in both the ESIA and KGP decision-making processes.

This Chapter presents an account of the stakeholder engagement that has been implemented as part of the ESIA process in relation to the KGP. The following technical appendices have been included:

- Appendix A6 – 1: Plan for Data Collection and Stakeholder Engagement;
- Appendix A6 - 2: Focus Group Discussion Guide and Key Informant Interview Guide; and

1.1 ESIA Process and Consultation

To identify specific stakeholders to be consulted for the KGP as part of the baseline studies, a two-stage process was implemented. Firstly, a map of the KGP and its related facilities was overlain with a map of *soum* and *bagh* boundaries. The KGP intersects with two *soums* that may experience direct and/or indirect environmental or social impacts from construction and operation of the Project. The Area of Influence (AoI) has been defined as Bayankhongor *aimag* at the macro-level, with sub-AoIs identified as the Shinejinst and Bayan-Undur *soums*, and in particular, the *baghs* – Urtiin gol and Idren, respectively (see Figure 1). Table 6.2 1 summarises the KGP components in each of the two *soums*.

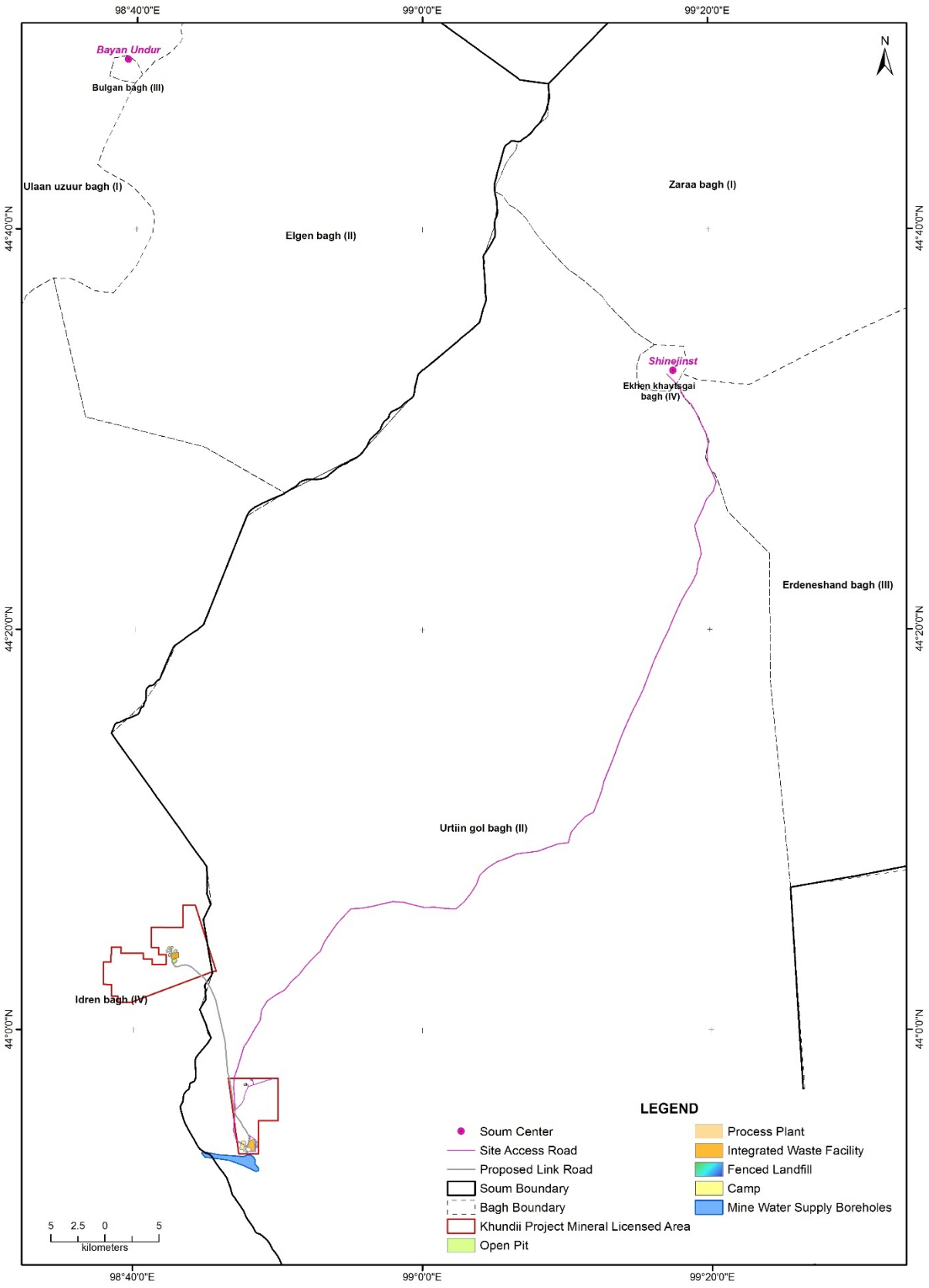

Figure 1 Khundii Gold Project Area of Influence

Table 1 *Soums* / *Baghs* Located in the Area of Influence

KGP Project Element	***Soum* / *Bagh***
Bayan Khundii deposit and Project infrastructure, including processing, support and accommodation facilities	Shinejinst *soum*, Urtiin gol *bagh*
Site Access Road	Shinejinst *soum*, Shinejinst *soum* centre, Urtiin gol *bagh*
Altan Nar deposit, including the Altan Nar to Bayan Khundii Link Road	Bayan-Undur *soum*, Idren *bagh*

Secondly, locational criteria were used to identify those stakeholders present in the affected *soums* and *baghs*, with a focus on key areas of interest, such as livestock herding, small and medium enterprises, and different perspectives, such as those of women and vulnerable people and groups. This provided the basis for engagement with affected communities and groups as well as regional and local governments at the *aimag*, *soum* and *bagh* levels as part of the social baseline study conducted in August 2019. The locational criteria were as follows:

- KGP Site: Approximate 20 km area from the centroid of the Altan Nar and Bayan Khundii deposits;
- Site Access Road: Approximate 20 km area of the Site Access Road route; and
- Shinejinst and Bayan-Undur *soum* centres.

Three distinct engagement phases are planned during the KGP ESIA process:

- ESIA Baseline Engagement Phase 2016-2019;
- ESIA Disclosure and Consultation Phase 2019 - 2020;
- Ongoing engagement after the ESIA disclosure process is complete and throughout the Project life cycle (from 2020).

For the ESIA baseline engagement phase, a Plan for Data Collection and Stakeholder Engagement (Appendix A6 – 1) was prepared to obtain baseline data and undertake consultations. The focus of the baseline study and fieldwork was the affected communities within the KGP AoI and, within these communities, key livelihood and other interests. The social baseline involved extensive planning and engagement with Project stakeholders from April to August 2019, building on the extensive engagement and information gathered by Erdene since it commenced exploration in the area in 2006, and through the DEIA surveys undertaken by Eco Trade LLC from 2016. The specific objectives of engagement during the ESIA baseline phase were to:

- further identify stakeholders related to the Project;
- identify and access relevant data for the baseline;
- gather stakeholder opinions on the Project and ensure that these opinions are fed into the assessment process;
- identify potential impacts and issues to be covered in subsequent phases (scoping)
- to gather stakeholder feedback on the development of management and mitigation measures for potential impacts, particularly where stakeholders have a potential role to play in these measures.

In 2019, the social baseline culminated in a statistically representative Household Survey in which 78 surveys were completed out of a total of 80 planned. Each survey took approximately 2.5 hours

to complete. Twenty-eight KIIs were planned (12 each in Shinejinst and Bayan-Undur *soums*, and 4 in Bayankhongor *aimag* centre), with 28 (13 in Shinejinst and 11 in Bayan-Undur *soums*, and 4 in Bayankhongor *aimag* centre) conducted. Key Informant Interviews (KIIs) were held with a range of respondents, including government representatives, community leaders, and institutional representatives.

Focus Group Discussions (FGDs), involving approximately 8-10 people were organised in each *soum* covering a variety of issues: population, cultural heritage issues, employment, health, local governance and budget revenues; natural resources; businesses, income generation and education, with particular emphasis on local perceptions and concerns. FGDs were organised to ensure representation by a diversity of community members, with particular reference to inclusion of vulnerable groups, including women, elderly, and disabled, where possible. Women's involvement in the FGDs with herders was equal to men, and in the other two thematic FGDs (Community and SMEs) held, was higher than men. Six FGDs were conducted in total, three in each *soum*. See Chapter B1 Introduction for further description of baseline consultation and data gathering.

Stakeholder engagement through the ESIA process has been conducted with reference to the Erdene Stakeholder Consultation Policy. Engagement activities have made use of Erdene's existing systems and procedures, including the company's Grievance Procedure.

1.2 Previous Consultation

Erdene has a history of over 15 years of engagement, including consultation with communities, government and institutions living and working in the area. Since 2004, the Company has spent over USD $50 million on exploration projects in Mongolia, which has led to multiple discoveries. First, Erdene identified the Altan Nar gold-polymetallic resource, with a Mineral Resource estimate announced in 2015. Later that year, Erdene conducted an initial exploration program on the southern portion of its Khundii exploration license. In 2018, the Company announced a maiden Mineral Resource estimate for the Bayan Khundii gold deposit. In 2019, the company converted the Khundii license to a mining license and received state registration of the AN deposit (i.e. the precursor to mining license conversion). Also in 2019, Erdene completed a Preliminary Feasibility Study for BK and an updated Preliminary Economic Assessment for AN. In late 2019, Erdene had launched further detailed studies to deliver a definitive Feasibility Study for BK.

Consultation with communities has included that required by the Government of Mongolia during the preparation of statutory studies, including the General Environmental Impact Assessment (GEIA) and Detailed Environmental Impact Assessment (DEIA) documentation for all components of the Project. In addition, there has been consultation with local communities by the University of British Columbia as part of a research programme facilitated by Erdene on mineral exploration and community development. Erdene has also undertaken extensive engagement with local communities, and authorities in the course of its exploration activities in the region. This engagement is discussed in further detail in the sub-sections below.

1.2.1.1 Mongolian Statutory Engagement for GEIA and DEIA

The statutory consultation conducted as part of the GEIA / DEIA process in 2016 and 2017 by Eco Trade LLC revealed the following issues from the community:

- potential impacts on and disturbance of pastureland, resulting in reduced carrying capacity;
- potential for uncontrolled road development impacting local soils;

- dust creation through mining and mine traffic impacting vegetation in the area.
- positive impacts on local infrastructure development, supply chain and employment opportunities; and
- potential for cooperation between mining companies and communities on protection of wells, water and pastureland, and protecting the environment from desertification.

Statutory engagement in Shinejinst for the BK DEIA has been planned in 2019, subject to the necessary government approvals. The purpose of this session is twofold: 1) provide information about the Project, its potential impacts, and the proposed management plans to residents of the bagh within which it is located and 2) give an opportunity to provide input into the mitigation and management plans of the Project. Participation is targeted of approximately 50 households, plus the local government representatives from bagh, soum and aimag levels.

1.2.1.2 University of British Columbia Stakeholder Engagement and Research

Stakeholder engagement by UBC researchers is documented in two peer-reviewed research publications (Fraser et al, 2019 and Fraser et al, 2018). Engagement in support of this research project included KIIs and FGDs with herder households, local government organisations, civil society representatives, non-governmental organisations, and industry partners, among others. Some of the key findings and themes from this engagement are noted as follows:

- "Erdene's community engagement approach has resulted in positive outcomes for the company and its stakeholders. The majority of respondents said Erdene is trusted to engage with the community and to consider community needs when planning its projects."
- "…herders are worried about mineral development and mining in Bayankhongor. Their unease is driven primarily by concerns about water availability. The potential for mining to cause environmental impacts to the Gobi pastureland, upon which their herds and livelihoods depend, is another key consideration."
- "Herder views appear to be generalized to the industry rather than being solely linked to Erdene. Approximately 25 per cent of external stakeholders interviewed knew about Erdene's water stewardship work."
- "Stakeholders also mentioned the value received from the company for its long-standing scholarship program begun in 2012."
- "Interviewees also attached importance to a new initiative: making available company shares to residents of the two *soums* closest to the Bayan Khundii project."[1]
- Overarching research themes raised by stakeholders during consultation vis-à-vis exploration and mine development (generally, not specific to Erdene) included:

[1] In 2018, ERD became the first international public company to earn approval for a secondary listing of its shares on the Mongolian Stock Exchange ("MSE"). As part of the secondary listing, ERD cooperated with the local governments of Shinejinst soum and Bayan-Undur soum – as well as the company's Mongolian brokerage company partners and financial regulatory authorities—to administer smaller share subscriptions for local residents of these two soums, involving as few as 20 shares per subscription. Further information about the company's secondary listing on the MSE is available in the company press release dated June 14, 2018 on www.erdene.com.

- Economic development: jobs, opportunities, local procurement, small & medium enterprises;
- Herd welfare: Declining herd health due to dust, climate change, drought, harsh winters; conflicts over pasture and water;
- Environment: Climate change, air quality, harsh conditions, decreasing pastureland, soil erosion, impacts of roads, and micro mining;
- Water: Availability, quality, need for testing and monitoring, withdrawal impacts on surface and aquifer water; and
- Governance: capacity, corruption, policy uncertainty, low trust, lack of transparency.

1.2.1.3 Erdene Stakeholder Engagement

Table 2 highlights key engagement activities undertaken by Erdene in Shinejinst, Bayan-Undur and/or Bayankhongor historically. It is not meant to be exhaustive, but instead is intended to provide an indication of the breadth and duration of the Company's engagement in the communities hosting the Khundii Gold Project, including prior to the discovery of both Altan Nar and Bayan Khundii deposits. In some instances, engagement came through the company's local cooperation programs, providing an entry point for supporting local cultural and social institutions.

Table 2 Summary of Engagement Undertaken by Erdene Historically

#	Year	Activity	Location
1	2006		
2	2007	• Organized livestock animal bank program in cooperation with soum government	• Shinejinst
3	2008	• Established community liaison committee • Conducted public outreach on geosciences • Co-funded public park development	• Shinejinst • Shinejinst • Bayankhongor aimag centre
4	2009	• Supported the traditional cultural festival ("Lamiin Gegeen") • Provided emergency relief to local herders in Bagh 2 due to natural disaster • Convened stakeholders to facilitate a range of initiatives via Community liaison committee	• Bayankhongor aimag centre • Shinejinst • Shinejinst
5	2010	• Provided learning materials and volunteer assistance in schools • Provided books and material support for local secondary school • Organized local stakeholder visits to exploration site, including for secondary school eco clubs • Supported the 315th anniversary of the Amarbuyant Monastery and participated in commemorative events	• Shinejinst • Bayan-Undur • Bayan-Undur, Shinejinst • Bayan-Undur

		• Conducted public workshops on geoscience and natural resource management	• Bayan-Undur, Shinejinst
6	2011	• Academic leadership awards (public secondary school) • Supported leadership training for civil service • Organized public education event and consultation on environmental assessment process • Held statutory DEIA consultations for the Zuun Mod molybdenum-copper project	• Shinejinst • Bayankhongor aimag centre • Shinejinst • Shinejinst (Bagh 2)
7	2012	• Initiated the Erdene academic scholarship for students in university who graduated from the soum public schools	• Bayan-Undur, Shinejinst
8	2013	• Supported and participated in the annual spring festival of the soum	• Shinejinst
9	2014	• Negotiated and concluded cooperation agreement to support for local infrastructure as directed by aimag citizens representative council	• Bayankhongor aimag centre
10	2015	• Supported and participated in local camel festival • Supported and participated in the opening of a new bagh centre building	• Bayan-Undur • Shinejinst
11	2016	• Convened stakeholders to facilitate a range of initiatives via Community liaison committee	• Bayan-Undur, Shinejinst
12	2017	• Convened stakeholders to facilitate a range of initiatives via Community liaison committee • Organized site visit for local soum stakeholders	• Bayan-Undur, Shinejinst • Bayan-Undur, Shinejinst
13	2018	• Convened stakeholders to facilitate a range of initiatives via Community liaison committee • Organized site visit for local soum stakeholders • Supported youth basketball league development	• Bayan-Undur, Shinejinst • Bayan-Undur, Shinejinst • Bayankhongor aimag centre

1.3 Grievance Management

Erdene has in place an existing Grievance Policy and Procedure that includes provision for complaint escalation to record and respond to stakeholder concerns and to facilitate the resolution of stakeholder complaints in compliance with good international industry practice. This Grievance Procedure has been reviewed and updated as part of the ESIA process.

1.4 Stakeholder Engagement on the ESIA Report

The KGP ESIA disclosure is expected to involve dissemination and presentation of the final ESIA Report for stakeholders. Disclosure and consultation on the KGP ESIA Report is planned to ensure that stakeholders have had the opportunity to make themselves aware of the environmental and social impacts that may occur and how the KGP will avoid, minimise and / or manage these impacts. Key activities are:

- The KGP ESIA Report, Management Plans and a Non-Technical Summary will be posted on the Erdene website and will be available in Erdene offices in Ulaanbaatar, and governors' offices in Bayankhongor aimag, Shinejinst and Bayan-Undur soums, and Urtiin gol and Idren baghs.
- Disclosure of the ESIA documentation and summary information will be in Mongolian and English, as relevant to the location.
- A Non-Technical Summary on key ESIA themes / topics and commitments by Erdene to manage impacts will be prepared in English and Mongolian and used during consultation with residents in Shinejinst and Bayan-Undur *soums*.
- Erdene will publicly notify how a copy of the KGP ESIA documentation can be accessed for stakeholders to give feedback, including through an Erdene e-mail, telephone, comment books at Erdene offices and through Erdene staff as part of routine consultation activities.
- Links to the Erdene website from the EBRD website will be provided in accordance with Lender disclosure requirements.
- The company will convene a dedicated public consultation exercise, such as a townhall meeting or remote feedback collection, in the course of the ESIA report disclosure and/or the preparation of the Mongolian statutory detailed environmental impact assessment. This exercise will take place in Shinejinst soum for the Bayan Khundii deposit, and in Bayan-Undur soum for the Altan Nar deposit.

Erdene will conduct pre-disclosure planning with *aimag* and *soum* authorities and lenders to settle on a process for ESIA disclosure that is reasonable and fit-for-purpose.

1.5 Ongoing Engagement

Ongoing engagement is undertaken with stakeholders in order to provide a foundation for a cooperative relationship with the identified stakeholders. Through ongoing engagement, the Company aims to:

- Reaffirm relationships between the Company and the local communities;
- Foster a relationship of trust and understanding between Company management and local governments;
- Relieve any tensions between the Company and the local communities;
- Anticipate and counteract attempts at misrepresenting the Company's activities;
- Promote the contribution of the Company towards improving living standards in impact areas;
- Alleviate concerns related to the introduction of new processes and equipment through facts and evidence-based presentations;

- Improve internal Company communications and thereby increase efficiency of the work process as a whole.

Erdene has steadily increased capacity in and implementation of its stakeholder relations goals, through the development of systems and approaches that seek to deliver sustainable outcomes and staff with responsibility for these actions. The significant mechanisms through which Erdene works to achieve ongoing engagement are Local Cooperation Agreements (LCA) with Bayankhongor *aimag,* Shinejinst and Bayan-Undur soums. Mining companies have a statutory obligation to establish community agreements. The purpose of LCAs is for Erdene's business operations to contribute to the development of the local area and livelihoods of its citizens and, conversely, for local stakeholders to contribute to the success of Erdene's business operations. The LCAs are intended to function until KGP closure. LCA implementation involves representatives of local government, Citizens Representative Khurals, and community members.

Erdene became the first and to date only international mineral exploration and mining company to cross-list its shares on the Mongolian Stock Exchange (MSE). As part of its commitment to stakeholder engagement, the company produces all of its public press releases in Mongolian language in accordance with the principle of continuous disclosure (as that term is defined under Canadian Securities rules)—which are disseminated electronically on the websites of the MSE and Erdene.

In summary, information will be shared with stakeholders on an ongoing basis using the following channels:

- LCA meetings and ongoing activities within local communities;
- Face-to-face meetings – direct discussions with individuals and small groups for the exchange of specific Project information relevant to them. This is considered an appropriate means for delivering information to stakeholder representatives and / or engaging in detailed discussions about the KGP and stakeholder concerns and expectations.
- Social media – the primary media forum locally (and nationally) and a basis for 'word of mouth' dissemination.
- Websites – for sharing information with stakeholders who have internet access.
- Public meetings – for regular updates and discussion with local people (e.g., at *soum* and *bagh* public meetings).
- Erdene / KGP Newsletter – as a potential platform for providing regular feedback and updates to local stakeholders.
- Community notice boards – as a potential platform for announcing upcoming activity and general updates at *soum* and *bagh* centres, catalysing 'word of mouth' dissemination of information.

These efforts are further described in the *Stakeholder Engagement and Communications Management Plan*, which provides the framework for planning future stakeholder engagement and disclosure efforts.

2. REFERENCES

Fraser, J., Kunz, N. C., & Batdorj, B. 2018. Final Research Report: Creating and Sharing Value with Communities in the Early Mine Life-Cycle – The Case of Erdene Resource Development Corporation in Mongolia, November 2017 – July 2018. The University of British Columbia, School of Public Policy and Global Affairs.

Fraser, J., Kunz, N. C., & Batdorj, B. 2019. Can Mineral Exploration Project Create and Share Value with Communities? A Case Study from Mongolia. Resources Policy Vol. 63.

Appendix A6 – 1: Plan for Data Collection and Stakeholder Engagement

1. INTRODUCTION

Sustainability East Asia LLC (Sustainability) has prepared this draft document for Erdene Mongol LLC (Erdene) for review prior to commencement of baseline study fieldwork.

1.1 Purpose

This document provides the details of scoping and data collection plan for the social baseline study for Erdene's Bayan Khundii and Altan Nar Projects (the Project). The baseline study will later form part of the Social Impact Assessment (SIA) for the Project.

1.2 STRUCTURE

This document sets out the following information:

- Project Scoping;
- Social Baseline Data Collection Plan; and
- Stakeholder Engagement Plan for the SIA field work.
- Planned Field Schedule

2. PROJECT SCOPING

2.1 Project Area of Influence and Study Area

The Area of Influence is defined as the area in which a direct or indirect impact on the socio-economic or cultural environment might occur. The Project Area of Influence as described at this time includes the Soums of Shinejinst and Bayan-Undur (Bayankhongor aimag), with a particular focus on Idren bagh and Urtin Gol bagh.

Table A6-1: 1 Project Area of influence, Population and Likely Impacts

Settlement	Type	Population	Distance to Project site	Likely Impacts and Risks
Shinejinst soum centre	Shinejinst soum	291 (99 households)	Approx. 85km	Employment. Road safety (people and livestock); Local economy, supply chain and business.
Bayan-Undur soum centre	Bayan-Undur soum	529 (155 households)	Approx. 75km	Employment. Road safety (people and livestock); Local economy, supply chain and business.
Idren bagh	Shinejinst soum	433 (112 households)		As above
Urtin Gol bagh	Bayan-Undur	902 (267 households)		As above
Rural herder households	Seasonally nomadic and semi-settled households	25 Households*	Various (closest is 10.8km) within an approximate 20km radius	Road safety (people and livestock); Disruption of pastureland / access; Dust from road; Cultural heritage; Use of natural resources.

*To Be Confirmed.

The location of settlements and roads within the Study Area is depicted on the map below.

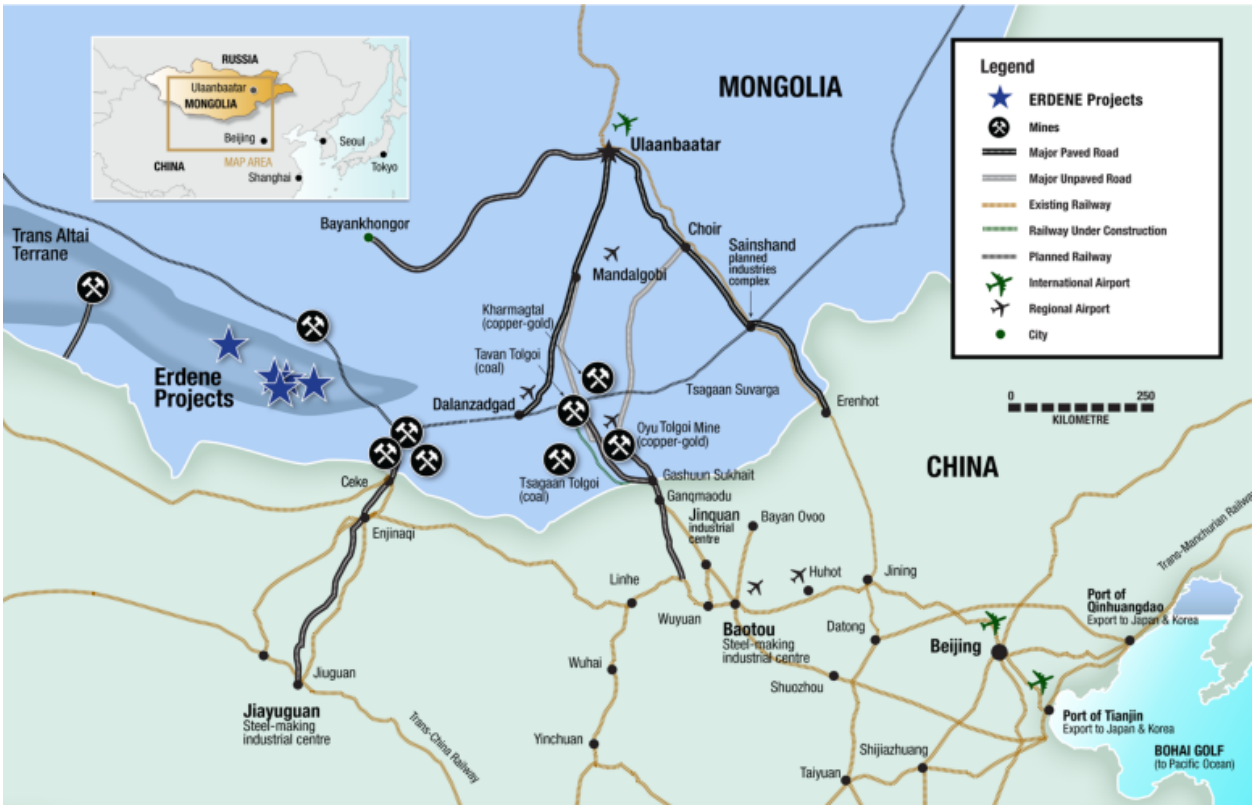

Figure A6-1:1 Location of Project and Key Settlements

3. SOCIAL BASELINE DATA COLLECTION PLAN

This section provides the data collection plan for the Social Baseline Study. In addition to the primary requirements of the European Bank for Reconstruction and Development (EBRD) Performance Requirements (2014), the Social Baseline Data Collection Plan has been developed with regard to the following references and guidance documents:

- International Council of Mining and Minerals (ICMM) Community Development Toolkit (2005);
- IFC Good Practice Note: Addressing the Social Dimensions of Private Sector Project (#3, December 2003);
- IFC Stakeholder Engagement: A Good Practice Handbook for Companies for Companies Doing Business in Emerging Markets (2007).

3.1 Social Baseline Data Requirements

Data gathering is based on several requirements. In this case, environmental and social baseline studies were carried out in 2017 to support national permitting requirements . This enables this forthcoming social baseline study to update and build upon information gathered through that report. Baseline data requirements have been developed based on the scope outlined by Erdene in the RFP for this Project. In addition, the scope has been further specified in consultation with Erdene, and through the conduct of a gap analysis to identify existing / available data and where additional data gathering is required to meet international standards for a social baseline study.

Erdene was able to provide additional data on some baseline aspects, including anecdotal data / feedback gathered by the Company's Community Relations Officers. This data is contained in the document "2019 ESIA – ERD Responses", and which will be utilised in the social baseline report, where appropriate.

Protocols for the social baseline data requirements (i.e. types and sources), data collection (i.e. household questionnaire, data processing) and associated communications for stakeholder engagement were developed prior to undertaking the surveys. These detailed protocols are not included in the ESIA disclosure package, but instead are available upon request, where appropriate.

3.2 Primary Data Gathering Strategies

This section details the primary data gathering strategies that will be used to collect social baseline data. The requirements for primary data gathering relate to quantitative and qualitative sampling.

3.2.1 Quantitative Methods

Quantitative surveys establish baseline data for key social parameters that can later be used as indicators to measure social impacts, and enables empirical measurement of project impacts and evaluation of progress to mitigate impacts or progress sustainable development activities. Quantitative methods are commonly used to generate data on:

- Household composition and demography;
- Livelihoods and occupations;
- Levels of education and skills;
- Sources and amounts of household income;
- Household expenditure;
- Household structures, land and other assets;
- Soil, vegetation and land capability survey;
- Access to health, education & other services;
- Health indicators; and
- General trends.

In this instance, a household survey will be used to fulfil quantitative surveying requirements. For quantitative sampling, participating households are selected based on the location of bagh, and the proportion of the bagh population in the total soum population. Once the number of households to be surveyed in the bagh are determined (sample population), participating households are selected randomly from this sample population.
The sample frame is based on the population and household data of the National Statistical Office of Mongolia (2018) as well as direct consultation with soum Governors to attain up to date population / household numbers for the focus baghs. All households of the two soums make up the sample population, so based on the data, the total sample population is 1,175.

Table A6-1: 2 Quantitative Sampling Methodology

Soum	Number of Households	Population
Shinejinst soum	606	**2,607**
Bayan-Undur soum	**569**	**2,448**

It was determined that 5% of urban households and 10% of rural households located in the directly affected baghs (sub-districts) of the sample provides an optimum representation in the study population. In addition it was determined that all households located close to the Project site and alongside the road between the Project site and the main road are to be surveyed as part of the household study.

A standard error of 0.05 percentage points and 95% of confidence level is accepted. In order to encounter clustering effect and to minimise non-sampling error the study defined an actual sample size as 80 households.

Applying the location and population proportion criteria, baghs were selected for the sample frame as follows:

- Shinejinst soum: Soum centre (urban) and Idren bagh (rural); and
- Bayan-Undur soum: Soum centre (urban) and Urtin Gol bagh (rural).

Table A6-1: 3 below describes the resulting sample frame for the quantitative survey.

Table A6-1:3 Sample Frame of the Quantitative Survey

Location	Designation		Households	Population	Sample size		Total (planned)
					5%	10%	
Bayankhongor *aimag*							
Shinejinst *soum*							
	Urban		99	291	5		6
	Rural		655	2,158			
		Idren bagh	112	433		11	12
Bayan Undur *soum*							
	Urban		155	529	8		9
			598	2,139			
	Rural	Urtin Gol *bagh*	267	902		27	28
Households near the Project**			25***				25
Total Household Questionnaires (Planned)							**80**

**Note that Total HH Questionnaires = HH Near Project + HH in Rural Areas + HH in Urban Areas*

*** All settled / semi-settled households near the Project and main access road to Project site (within approx. 20km radius to be interviewed as part of the HH Survey (where possible).*

****HH numbers located near to Project Site calculated based on existing data. Number may be revised with input from ERD. HH located near the road have been estimated (9 HHs).*

3.3 Sampling Methodology of Qualitative Research

Qualitative interview methods are used to provide insight into community social institutions and organisations, decision-making and leadership. Qualitative surveys are effective in obtaining descriptive information about household livelihood options, social differentiation, ethnic minorities, conflict, and the role of women, key resources, and local perceptions about a project. They are also effective in verifying quantitative data. A variety of qualitative techniques will be used for the Social Baseline Study:

- Focus Group Discussions: for understanding issues within a community, for example, with women, young people, social or cultural organisations, minority groups);
- Key Informant Interviews: for understanding detailed or complex information from a knowledgeable source;
- Case Studies: for capturing detail from Focus Group Discussions and Key Informant Interviews.

The type of information gathered using qualitative methods included:

- Quality of life of the population;
- Important and relevant characteristics of social differentiation;
- Key social institutions and customary decision-making structures;
- Characteristics of social organisation;
- Natural resource management and land use;
- Relevant cultural sites;
- Livelihood systems;
- Social mobility and division of labour;
- Perceptions of development in the area;
- Perceptions of sustainable development opportunities; and
- Perceived project impacts and mitigation options.

For qualitative sampling, the survey size was determined based on the topics or themes of interest in the survey in the relevant geographic area, and the potential pool of key informants and participants relevant to the themes.

Table A6-1: 4 Sample Frame of the Qualitative Survey

Aimag / Soum	Method of data collection	Sampling unit	Sample Size (Planned)
Bayankhongor *aimag*	Interview with key informants (KIIs)	Governor / CRK Speaker; Representatives from the Departments of: • Labour • Education • Agriculture and SMEs	**4 KIIs**
Shinejinst *soum*	Interview with key informants (KIIs) - *soum centre*	Governor / Head of Government Office Head of CRK Officers for: • Department of Environment / Environment Inspector / Land Registration • Police • Tax Department • Department of Social Welfare / Social Worker • Department of Labour / Labour Officer • Department of Education • Department of Infrastructure, Road, Transport • Department of Agriculture and SMEs • Hospital	**12 KIIs**[2]

[2] Note that it may not be possible for all KIIs to be completed due to availability of interviewees. Sustainability will endeavour to conduct the interviews listed.

		• River Basin Authority and River Basin Committee	
Bayan-Undur *soum*	Interview with key informants (KIIs)	Governor / Head of Government Office Head of CRK Officers for: • Department of Environment / Environment Inspector / Land Registration • Police • Tax Department • Department of Social Welfare / Social Worker • Department of Labour / Labour Officer • Department of Education • Department of Infrastructure, Road, Transport • Department of Agriculture and SMEs • Hospital • River Basin Authority and River Basin Committee	**12 KIIs**
Shinejinst soum	Focus group discussions (FGDs)	Community representatives (to include ASM, soum residents, women, elderly, road users). SMEs (Soum Development Fund, Business/Community reps) Herders	**3 FGDs**
Bayan-Undur soum	Focus group discussions (FGDs)	Community representatives (Herders, soum residents, women, elderly, road users). SMEs (Soum Development Fund, Business/Community reps) Herders	**3 FGDs**
Total number of Qualitative FGDs and KIIs			**34**

Where appropriate and possible, informal KIIs may be conducted by the field team, should it be identified that a person / household member has specific experience or expertise that may be of value to the social baseline study.

4. STAKEHOLDER ENGAGEMENT PLAN FOR BASELINE STUDY

Table 6-1: 5 below outlines a proposed stakeholder engagement plan (SEP) for the baseline study. In anticipation that engagement at the local level can be agreed and arranged (including with aimag, soum and bagh governments, Citizens Representative Khural (CRK) members, and with households in the directly impacted areas), the SEP in the following table is proposed.

The Communications Protocol provides expectations and guidance for communication by Sustainability's team with stakeholders whilst in the field. It also outlines the Sustainability team's role in communications in relation to the Erdene CRO's who will be accompanying the team.

Table 6-1:5 SEP for the Social Baseline Study

#	Stakeholder	Engagement	Timing	Responsibility
	Shinejinst Soum and Bayan-Undur Soum	Send Letters of Notification	Week of 15 July	SEA
1	Bayankhongor aimag government - Governor Head of Administration	Telephone to introduce ESIA and social baseline study. Request assistance / support for arranging KIIs with key heads of departments.	Week of 29 July	Erdene CLOs and SEA
2	Shinejinst soum government Governor Head of Administration Head of CRK	Telephone call with Erdene to introduce ESIA and social baseline study. Request assistance with arranging KIIs with heads of departments; notifying and arranging households for surveys (with Baghs); notifying and arranging participants for FGDs (with Baghs).	Week of 29 July	Erdene CLOs and SEA
3	Bayan-Undur soum government Governor Head of Administration / Head of CRK	Telephone call with Erdene to introduce ESIA and social baseline study. Request assistance with arranging KIIs with heads of departments; notifying and arranging households for surveys (with Baghs); notifying and arranging participants for FGDs (with Baghs).	Week of 29 July	Erdene CLOs and SEA
4	Bagh (Idren) head	Telephone call with Erdene to introduce ESIA and social baseline study Request assistance with notifying and arranging households for surveys; and arranging participants for FGDs.	Week of 29 July	Erdene CLOs and SEA
5	Bagh (Urtin Gol) head	Telephone call with Erdene to introduce ESIA and social baseline study. Request assistance with notifying and arranging households for surveys; and arranging participants for FGDs.	Week of 29 July	Erdene CLOs and SEA
6	Household survey participants	Introduce social baseline study Response to any Q&As agreed prior with Erdene.	Week of 05 August	Sustainability with support from Erdene CLOs
7	FGD and KII participants	Introduce social baseline study. Response to any Q&As agreed prior with Erdene.	Week of 05 August	Sustainability with support from Erdene CLOs

5. PLANNED FIELD SCHEDULE

Duration of the Field Trip: 05 – 14 August 2019

Locations: Shinejinst and Bayan-Undur soums of Bayankhongor aimag

Survey Team: Team consists of 4 consultants (SEA and Ecotrade personnel) and 2 drivers (i.e. 6 people in total), in addition to 3 proposed Erdene representatives accompanying the team.

Vehicle Arrangements: It is anticipated that the ERD team will have 1 vehicle available for use during the field trip, along with 2 SEA vehicle. A total of 3 vehicles will therefore be available to the team to conduct the fieldwork in order to maximise efficiency and ability to conduct planned fieldwork.

Accommodation Arrangements: Accommodation arranged in consultation with Erdene in soum centres and at the Project camp.

Timing Expectations for fieldwork:

- KIIs: Length is approximately 1 hour
- FGDs: Length is approximately 1:30
- HH Survey: Length is expected 1.5 hours (2 hours at a maximum). Reasonable expectation of 1 researcher conducting 4 to 5 per day working on a 10 hour field day.

Comments on Fieldwork Plan:

- The below daily fieldwork plan is the suggested arrangement for the fieldwork. It is noted that flexibility will be required to take account of changing circumstances in the field, with plans needing to be adjusted as required to accommodate changes (e.g. some days more interviews / surveys may be achieved, while on other days this may be less).

Table A6-1: 6 Fieldwork Plan

Date	Task	Key Personnel	Location	Overnight
05 August	Depart UB for site, stopping in Bayankhongor Aimag Centre to conduct 4 in-person KIIs with the Bayankhongor aimag Government representatives as follows[3]: Governor / CRK Speaker; • Representatives from the Departments of, Labour, Education, SMEs.	Each team member to conduct 1 of the interviews.	UB – Bayankhongor Aimag Centre	Bayankhongor Aimag Centre
06 August	Meet with soum Governor / representative to introduce the social baseline study, introduce team, and seek and advice on local conditions etc. for the conduct of HH questionnaires, KIIs, and FGDs in the soum.	Key team members at meeting.	Shinejinst Soum Centre	Shinejinst Soum Centre
	Conduct KII with soum Governor / representative (1 out of total 12)	SEA 1 (social lead) to conduct KII.		
07 August	Complete remaining KIIs in Shinejinst Soum Centre (11 remaining)	SEA 1: 6 KIIs	Shinejinst soum centre	Shinejinst soum centre
		SEA 2: 4 KIIs		
	6 HH Surveys in Shinejinst Soum Centre (6 out of total 6)	SEA 3: 5 HH Surveys		
		SEA 2: 1 HH Surveys		
	Commence rural HH Surveys in Idren Bagh (4 out of 12 in total)	SEA 4: 4 HH Surveys	Shinejinst Soum centre	
08 August	3 FGDs in Shinejinst soum centre	SEA 1 & 2: 2 FGDs	Shinejinst soum centre and Idren Bagh	Bayan-Undur Soum Centre
		SEA 3 & 4: 1 FGD		
	Thereafter, team completes remaining rural HH Surveys in Idren bagh (8 remaining)	SEA 1: 2 HH Surveys		
		SEA 2: 2 HH Surveys		
		SEA 3: 2 HH Surveys		
		SEA 4: 2 HH Surveys		
	Drive to Bayan-Undur Soum Centre	Team		

[3] Note – if interviews are not possible on the way to Project site, then these can be completed / arranged to be conducted on the trip back to UB.

09 August	Meet with soum Governor / representative to introduce the social baseline study, introduce team, and seek and advice on local conditions etc. for the conduct of HH questionnaires, KIIs, and FGDs in the soum.	Key team members to meet with soum Governor.	Bayan-Undur Soum Centre	Bayan Undur Soum Centre
	Conduct 1 KII with Soum Governor / representative (1 of 12)	SEA 1 (social lead) to conduct KII.		
	Conduct remaining KIIs in Bayan Undur Soum Centre (11 remaining)	SEA 1: 5 KIIs		
		SEA 2: 5 KIIs		
	Commence HH Surveys in Bayan-Undur Soum Centre (9 out of total 9)	SEA 3: 4 HH Survey		
		SEA 4: 5 HH Survey		
10 August	Conduct FGDs (3)	SEA 1 & 2: 2 FGDs	Bayan-Undur soum centre	Bayan-Undur soum centre
		SEA 3 & 4: 1 FGDs		
	Commence Urtin-Gol Bagh HH Surveys (10 out of 28 in total)	SEA 1: 2 HH Surveys		
		SEA 2: 2 HH Surveys		
		SEA 3: 3 HH Surveys		
		SEA 4: 3 HH Surveys		
11 August	nduct Urtin-Gol Bagh HH Surveys (18 remaining)	SEA 1: 5 HH Surveys	Urtin Gol bagh	Project Camp
		SEA 2: 5 HH Surveys		
		SEA 3: 4 HH Surveys		
		SEA 4: 4 HH Surveys		
	Drive to Project camp.	Team		
12 August	Commence HH Surveys in Project Area / Close to site (16 of 25)	SEA 1: 4 HH Surveys	Project Area	Project Camp
		SEA 2: 4 HH Surveys		
		SEA 3: 4 HH Surveys		
		SEA 3: 4 HH Survey		
		SEA 4: 4 HH Surveys		
13 August	Complete remaining HH Surveys in Project Area / Close to Site (9 remaining)	SEA 1: 3 HH Surveys	Project Area	Bayankhongor Aimag Centre
		SEA 2: 2 HH Surveys		
		SEA 3: 2 HH Surveys		
		SEA 4: 2 HH Surveys		
	Drive to Bayankhongor Aimag Centre	Team		
14 August	Return to UB (note that the return to UB may be earlier, depending on how quickly the HH Surveys are conducted)	Team	Bayankhongor to UB	NA
14 August	Data entry and documentation of interviews in SEA templates provided will be conducted with any available time.	SEA field team.	-	

Appendix A6 - 2: Focus Group Discussion Guide and Key Informant Interview Guide

1. FOCUS GROUP DISCUSSION GUIDE: HERDERS

1.1 Part One: Introductions

- Introduce facilitator
- Introduce purpose of workshop and topics to be discussed
- Ground rules and administration of the session (timing, duration, all participants requested to contribute, ok if don't want to answer particular questions, request that all participants respect others' views)
- Explain that the meeting today has a focus on issues specific to HERDERS; other topics will be covered by other FGDs, interviews and household surveys.

Introductory questions (purpose: get people talking comfortably), for example:

- Do you all know each other? How long have you lived in the area? Have you participated in a workshop like this before?

1.2 Part Two: Group Discussion

1.2.1 Land and Livelihoods

1. Which areas of grazing land do you all use? (mark areas on the map)?

2. What are the seasonal grazing patterns (which areas are used for summer pasture/winter pastures)? (mark areas on map)?

3. Do you have security of tenure (i.e. possession or land use certificates) or informal understanding that you can use particular areas? For what purpose (e.g. winter shelter, khashaa)? (mark these on the map)?

4. How do herders in this area manage pasture (e.g. by agreement with all herders, by government resolution, by negotiation, by direction of one formal/informal leader)? What are current practices? Are there traditional practices that are used?

5. Has there been any conflict over pasture management or use recently (last 5 years)? If so, what are the common conflicts, and how are these typically resolved?

6. Aside from pastures, what other natural resources do you use? What season are they used? Where are they located (mark these on the map)?,

7. Water (water sources/types/quality/seasonality)?,

8. Mineral resources (e.g. artisanal mining)?

9. Land for agriculture?

10. Is there competition to access these resources? If so, how is this managed? By whom?

11. Is there a water shortage? If so, why, and how do you resolve this?

1.2.2 Economic and Community Development

1. Are there any community programs in place to improve:

2. Herding practices/herd quality/pasture management/other technical aspects?

3. Lives for herder households/families?

4. What are the common views of the community to these programs? Are the programs wanted and needed?

5. What things influence / improve community development in the area? List influences. Which of these influences is most significant for herders? For soum centre residents?

6. What social infrastructure is available for herder households in this area? (approx. location) and accessibility (how it is used, how often)?

7. Water for household use, for livestock use

8. Communications: mobile service providers, post

9. Education facilities (kindergarten, primary, secondary, tertiary)

10. Health facilities:

11. Which practitioners: Doctors, midwives, traditional medicine,

12. Which facilities: for physical and mental health (hospital, clinic, mobile)

13. Banking and finance facilities (which banks, what type of credit/loans)

14. Community facilities (cultural centre, sports centre, other meeting places)

1.2.3 Women / Vulnerable people

1. What are the different roles and responsibilities that men and women have in the household? Are roles different for daughters now compared to parents or grandparents? If so, how?

2. Are you aware of any households with elderly, disabled, single women headed households in the community? What do you think are the particular challenges that these households face? (e.g. share any daily tasks with neighbours, can they access the same kinds of services as other households, do they face discrimination by the community)? Are these issues particular to herder households?

3. What do you think are the particular issues that young people face in the community here? Are there any examples of how these challenges are being addressed well? Are there any gaps/remaining problems? Are these issues particular to youth in herder households?

1.2.4 Social Organisation and Community Governance

1. What are the different community organisations herder households participate in? Which organisation(s) is most relevant for herder household interests? Why?

2. From where do herder households get most information about the community and local issues of interest? How do households make decisions?

3. How do households participate in decisions made about the community? Are there any barriers to participation?

4. Are traditional herder family practices carried out here? What are the most important traditions? (e.g. traditional practices on household structure, births, marriages, funerals, holidays, etc.)

5. What is your perception of outsiders coming into the community? Are new migrants welcome? Why or why not?

1.2.5 Economy

1. Which markets do herder households in the area access?

2. for buying and selling

3. for livestock and other goods

4. for local, aimag, national or international trade

5. Is trade done direct or via third parties (e.g. broker)

6. Are there any plans in the local area to improve opportunities for trade (e.g. new bigger businesses to supply to, industrial or economic development plans in place)?

1.2.6 Environment

1. Key issues, concerns, risks about the environment in relation to exploration and open pit mining (explore exploration and open pit mining separately)?

2. (Open question – if the following issues are mentioned - water, pollution, dust, arsenic, cyanide, Acid Mine Drainage – then probe understanding / perception of issues)?

3. Are the issues / concerns you mentioned (for exploration and mining), past (historical), present, or future concerns?

1.2.7 History and Culture

1. Have there been any major historical events for the area recorded? For example: Major environmental events, periods of major development / in-migration, major local political events.

2. Are there any particular cultural practices or places that are locally important? If so, what are they?

1.2.8 Erdene

1. Have you heard about Erdene?

2. How do you think Erdene's Project(s) might influence the local area?

3. Opportunities?

4. Limitations / concerns / potential conflict areas or issue

5. What expectatıons do you have from the project?

6. What is the best way for the company to share information with you and for you to participate in communications with the project from now on?

1.3 Close of FGD

- Explain what will happen to the information after it has been collected (i.e. Used by Project for ESIA, non-identifying public document).
- Thank you for your participation.

2. FOCUS GROUP DISCUSSION GUIDE: SMALL BUSINESS

2.1 Part One: Introductions

- Introduce facilitator.
- Introduce purpose of workshop and topics to be discussed.
- Ground rules and administration of the session (timing, duration, all participants requested to contribute, ok if don't want to answer particular questions, request that all participants respect others' views).
- Explain that the meeting today has a focus on issues specific to SMALL BUSINESSES; other topics will be covered by other FGDs, interviews and household surveys.

Introductory questions (purpose: get people talking comfortably), for example:

- Do you all know each other? How long have you lived in the area? Have you participated in a workshop like this before?

2.2 Part Two: Group Discussion

2.2.1 Economic and Community Development

1. What are the main community programs (if any) in place to improve:

2. Small business practices / quantity or quality of goods and services provided / Small business management / other technical aspects?

3. Lives for small business households/families?

4. What are the common views of the community about these programs? Are the programs wanted and needed? Are they appropriate for this area?

5. What things do you think influence / improve the local economy here? Which of these influences is most significant for small businesses?

6. What level of government budget support is in place for SMEs? How can small businesses access any funding?

2.2.2 Infrastructure

1. What social infrastructure is available for small businesses in this area? (How is it used? Or are there any barriers to use?)

2. Communications: mobile service providers, post, internet

3. Education facilities

4. Banking and finance facilities (which banks, what type of credit/loans)

5. Community facilities (cultural centre, sports centre, other meeting places)

2.2.3 Social organisation and community governance

1. What are the different community organisations SMEs participate in? Which organisation(s) is most relevant for SME interests?

2. What are the other main interest groups in the community (e.g. herders, agriculturalists, unemployed, civil servants, civil society groups, government reps)? How do these groups relate to SMEs? Where is the main overlap in interests? Or main differences in interests?

3. Where do SMEs get most information about the community and local issues of interest?

4. How do SMEs participate in decisions made about the community? Are there any barriers to participation?

5. Is there any difference between women and men in terms of their ability to start or operate a small business? If so, how is it different?

6. What is your perception of outsiders coming into the community? Are new migrants welcome? Why or why not? If they are welcomed, how does the community show this?

2.2.4 Economy and Employment

1. Which markets do SMEs access in the area?

2. for buying and selling

3. for local, aimag, national or international trade

4. Is trade done direct or via third parties (e.g. broker)

5. How do small businesses find their business opportunities / connect to clients and partner organisations? Are there any programs, plans or strategies on supply chains in the area that small business can be part of?

6. Is there an active trade union organisation(s) in this area? What support do they provide to SMEs, employees, other businesses?

7. What are the employment opportunities for people in this area with - SMEs, large employers, Government, CSOs, other organisations.

8. What is the status of wages and terms of employment for SME / other private sector employees? Are employers meeting legal requirements on labour and working conditions or do practices differ from what is legally required?

9. What is the status of SMEs with respect to occupational health and safety? Is there a high, medium or low awareness of OHS requirements by SMEs in this area? What actions, if any, have been or are planned to be taken to improve OHS by SMEs?

10. Are there any plans in the local area to improve opportunities for trade (e.g. new bigger businesses to supply to, industrial or economic development plans in place)? If so, how are SMEs contributing to this planning / development process?

11. What do you see are the gaps if any in helping SMEs to prosper in this area?

2.2.5 Erdene

1. Have you heard about the Erdene?

2. How do you think this project might influence the local area

3. Opportunities

4. Limitations / concerns / potential conflict areas or issue

5. What expectations do you have from the project?

6. What is the best way for the company to share information with you and for you to participate in communications with the project from now on?

2.3 Close of FGD

- Explain what will happen to the information after it has been collected (i.e. Used by Project for ESIA, non-identifying public document).
- Thank you for your participation.

3. FOCUS GROUP DISCUSSION GUIDE: COMMUNITY REPRESENTATIVES (GENERAL)

3.1 Part One: Introductions

- Introduce facilitator
- Introduce purpose of workshop and topics to be discussed
- Ground rules and administration of the session (timing, duration, all participants requested to contribute, ok if don't want to answer particular questions, request that all participants respect others' views)
- Explain that the meeting today has a focus on General Community Issues; other topics will be covered by other FGDs, interviews and household surveys.

Introductory questions (purpose: get people talking comfortably), for example:

- Do you all know each other? How long have you lived in the area? Have you participated in a workshop like this before?

3.2 Part Two: Group Discussion

3.2.1 Land and Livelihoods

General:

1. What are the common land uses in the soum area?
2. Are there seasonal use patterns? If so, what are they?
3. Has there been any conflict over land management or use recently (last 5 years)? If so, what are the common conflicts, and how are these typically resolved?

ASM:

1. Which areas of land (if any) are used for artisanal mining? (mark areas on the map)
2. Do artisanal miners have any security of tenure or informal understanding that they can use for particular areas? Describe permissions for artisanal mining.
3. Aside from mineral resources, what other natural resources do artisanal miners use? Where are they located (mark these on the map)?
4. Water (water sources/types/seasonality/quality)
5. Pastureland resources (e.g. herding)
6. Is there competition to access these resources? If so, how is this managed? By whom?
7. What are the main methods for mining the ore?
8. Is there a water shortage? If so, why, and how do you resolve this?
9. Which markets do ASM households in the area access?
10. for mineral resources and other goods

11. for local, aimag, national or international trade

12. Is trade done direct or via third parties (e.g. broker)

3.2.2 Economic and Community Development

1. What things do you think influence / improve the local economy here? List influences. Which is the biggest influence?

2. What things influence / improve community development in the area? List influences. Which is the biggest influence?

3. What social infrastructure is available for households in this area? (approx. location) and accessibility (how it is used, how often):

4. Water for household use / livestock (probe other uses – i.e. ASM);

5. Communications: mobile service providers, post?

6. Education facilities:

7. Kindergarten, primary, secondary, tertiary?

8. Health facilities:

9. Which practitioners: Doctors, midwives, traditional medicine?

10. Which facilities: for physical and mental health (hospital, clinic, mobile)?

11. Banking and finance facilities (which banks, what type of credit/loans)?

12. Community facilities (cultural centre, sports centre, other meeting places)?

3.2.3 Women / Vulnerable People

1. What are the different roles and responsibilities that men and women have in the household? Are roles different for daughters now compared to parents or grandparents? If so, how?

2. What do you think are the particular challenges that the vulnerable households face (e.g. women-headed households, elderly)? (e.g.can they access the same kinds of services as other households, do they face discrimination by the community)?

3. What do you think are the particular issues that young people face in the community here? Are there any examples of how these challenges are being addressed well? Are there any gaps/remaining problems?

3.2.4 Social Organisation and Community Governance

1. What are the different community organisations that you / family members participate in (probe for any specific to particular groups – ASM, women, youth, unemployed, disabled)? Why?

2. From where does your household get most information about the community and local issues of interest?

3. How do households participate in decisions made about the community? Are there any barriers to participation?

4. What is your perception of outsiders coming into the community? Are new migrants welcome? Why or why not?

3.2.5 Environment

1. Key issues, concerns, risks about the environment in relation to exploration and open pit mining (explore exploration and open pit mining separately)?

2. (Open question – if the following issues are mentioned - water, pollution, dust, arsenic, cyanide, Acid Mine Drainage – then probe understanding/perception of issues)?

3. Are the issues / concerns you mentioned (for exploration and mining), past (historical), present, or future concerns?

3.2.6 History and Culture

1. Have there been any major historical events for the area recorded? For example: Major environmental events, periods of major development / in-migration, major local political events.

2. Are there any particular cultural practices or places that are locally important? If so, what are they?

3.2.7 Erdene

1. Have you heard about Erdene?

2. How do you think this project might influence the local area

3. Opportunities?

4. Limitations / concerns / potential conflict areas or issue?

5. What expectatıons do you have from the project?

6. What is the best way for the company to share information with you and for you to participate in communications with the project from now on?

3.3 Close of FGD

- Explain what will happen to the information after it has been collected (i.e. Used by Project for ESIA, non-identifying public document)
- Thank you for your participation

4. KEY INFORMANT INTERVIEW GUIDES

4.1 Overview

This Key Informant Interview (KII) Guide is structured in sections as follows:

1. General Themes for Discussion with all Key Informants

2. Specific Additional Topics for Key Informants (note that the questions are a guide, and questioned may be omitted and adapted during the interview, as appropriate and required.

The following guide is for use in the following planned KIIs:

- Citizens Representative Khural / Governor
- Department of Environment / Environment Inspector / Environment Policy Officer
- Department for Land, Construction and Urban Development / Land Registration Officer
- Police
- Tax Department / Officer

- Department of Social Welfare / Social Worker / Social Development Policy Officer
- Department of Labour / Labour Officer
- Department of Education / Officer for Education, Culture and Children
- Department of Infrastructure, Road and Transport
- Department of Agriculture and SMEs
- Hospital
- River Basin Authority and River Basin Committee

4.2 General Themes for Discussion with all Key Informants

4.2.1 Introduction

Sustainability East Asia LLC (Sustainability) has been engaged by Erdene Mongol to complete a social baseline study for Erdene's Bayan Khundii and Tsenkher Nomin (Altan Nar) Projects (the Project). The social baseline involves the collection of information about the communities that may be impacted by the Project, and therefore a detailed understanding of the current situation of Project affected people is required in the first instance so as to enable the tracking of any changes in communities due to the Project.

4.2.2 Purpose

The purpose of KIIs is to:

- Understand the current context of the neighbourhoods in the Project Area; and
- Provide recommendations on critical issues for consideration by the Project.

4.2.3 Key Areas of Interest

The key areas of interest of the KIIs are as follows (additional information / data sources / key informants are welcomed):

- Livelihoods context;
- Economic and community development;
- Gender and marginalised groups;
- Social organisation and community governance;
- Health;
- Economic context;
- Socio-political context and relevant institutions;
- Historical context;
- Human rights context;
- Needs, values and expectations; and
- Cultural property and practices.

4.2.4 General Questions to ask at All KIIs

- Describe your organization / department and its interest in Erdene's Project(s).
- What is your current interaction with Erdene about the Project?

- What is your current understanding of the Project? What are your expectations of the Project and of Erdene in seeking to develop the mine?

4.3 Specific Topics for Key Informant Interviews

4.3.1 Citizens Representative Khural / Governor

Social Organisation and Community Governance

- Decision-Making:
  - What is the capacity of community / households to participate in decision-making processes and access to services and information?
  - Have there been any changes in community governance structures due to population movements?
  - What are the main issues discussed in the khural meetings?
  - Key decisions made in previous year, of these, how many fully implemented, how many under implementation, how many not implemented? Why?
  - Any comments on informal decision-making and dispute resolution? What sorts of issues, how are these resolved?
- Attitudes to outsiders / migrant workers
  - Have outsiders influenced how the community functions? If so, how? Health impacts? Crime impacts? Competition for jobs? Adaptation to local daily life? Has there been any discussion of these issues within communities?

Gender and Marginalised Groups

- How are vulnerable people in communities supported? Have there been any changes in the people who need support over time?
- Any issues relating to women/youth/elderly/artisanal miners other marginalized groups and their interactions with the community generally?
- Are young people actively involved in education? What other activities? What opportunities after completing schooling? Programs for youth in the district?

Human Rights and Security Context

- Any issues with security/safety personnel and community members?
- Awareness of any issues of conflict with/between community members e.g. regarding foreign investment, behavior of companies within communities, other issues of concern raised?
- Perceptions of corruption in the community and key institutions (government and private)? What/who is influencing these perceptions and why?
- Levels of crime, main criminal acts in the soum/aimag?

Economic Context:

- Economic context:
  - local and regional businesses and commercial structures?

- infrastructure supporting economic activity?
- government and other economic/industrial development plans for the area?

- Main economic activities of aimag / soum / bagh?
- Employment, unemployment and underemployment?
- Available of skilled manpower (types of skills)?
- Any differences between soums/baghs in herding vs other livelihoods activities?
- Which soums/baghs (if any) are considered better or worse off than others in terms of income and livelihoods?
- International migration/ legal/illegal/underage workers/forced labour?

Socio-Political Context and Relevant Institutions

- Which are the key institutions and influencers in the soum/aimag/bagh?
- Do these organisations / individuals coordinate to support the community? If so, how? On which issues?

Historical Context

- The historical context, how things have or are changing in the community/soum/aimag (e.g. environmental shocks, major political changes, major project developments)? Have there been any key events which have influenced the community/soum/aimag and how it functions? What lessons are there for future changes?

Cultural heritage

- What is your general perception on what cultural heritage means?
- Cultural property, practices and perceptions – are there cultural practices unique to this area?
- Where does the knowledge/information about local cultural heritage come from?
- Do local people receive any benefits from cultural heritage?
- How do you think soum cultural/historical heritages can be preserved?
- Was there any exploration, discovery and excavation of cultural heritage objects in the past 3 years? If so, what was the purpose?
- Have you heard of any illegal excavation of cultural heritage objects? What happened?
- Are there any government / private activities to promote cultural heritage awareness?
- Do soum schools/organizations organize any cultural heritage awareness activities?

Needs, Values and Expectations

- Broad attitudes to Erdene?
- People's expectations?
- What changes are expected within the community? Are people prepared for / able to deal with these changes?

- What is the best way for Erdene to communicate and engage with people in the community? Feedback: how do you perceive this has been performed so far?
- Development projects, activities which Erdene should engage with for future collaboration? (note: not donations)
- Any key concerns we haven't covered with respect to the Erdene's project?

4.3.2 Governors

Social Organisation and Community Governance

- Decision-Making:
  - What is the capacity of community / households to participate in decision-making processes and access to services and information?
  - Have there been any changes in community governance structures due to population movements?
  - Any comments on informal decision-making and dispute resolution? What sorts of issues, how are these resolved?
- Attitudes to outsiders / migrant workers
  - Have outsiders influenced how the community functions? If so, how? Health impacts? Crime impacts? Competition for jobs? Adaptation to local daily life? Has there been any discussion of these issues within communities?

Gender and Marginalised Groups

- How are vulnerable people in communities supported? Have there been any changes in the people who need support over time?
- Any issues relating to women/youth/elderly/artisanal miners other marginalized groups and their interactions with the community generally?
- Are young people actively involved in education? What other activities? What opportunities after completing schooling? Programs for youth in the district?

Human Rights and Security Context

- Awareness of any issues of conflict with/between community members e.g. regarding foreign investment, behavior of companies within communities, other issues of concern raised?
- Perceptions of corruption in the community and key institutions (government and private)? What/who is influencing these perceptions and why?
- Levels of crime, main criminal acts in the soum/aimag?

Economic Context

- Economic context:
  - local and regional businesses and commercial structures?
  - infrastructure supporting economic activity?
  - government and other economic / industrial development plans for the area?

- Main economic activities of aimag / soum / bagh?
- Employment, unemployment and underemployment and access to opportunities?
- Availability of skilled manpower (types of skills)?
- Sources of income?
- Any differences between soums / baghs in herding vs agriculture vs other livelihoods activities?
- Which soums / baghs (if any) are considered better or worse off than others in terms of income and livelihoods?
- International migration/ legal/illegal/underage workers/forced labour?
- Any other additional information in this section?

Socio-Political Context and Relevant Institutions

- Budget and Taxes
  - Performance / delivery of outputs by budgetary organizations and locally owned enterprises and their finances?
  - Contribution of taxes to the local budget?
  - What is the implementation status / key difficulties encountered with regard to the collection of taxes, payments and license fees (e.g. water, minerals of common use, animal and plant species etc.)?
  - What activities/outputs are funded by the local budget and state budget?
  - What activities/outputs funded by the state budget are not actually delivered?
  - What activities/outputs funded by the local budget are not actually delivered (For example land and water management)?
  - Main activities local budget is spent on?
  - How sufficient is budget allocated to local organizations?
  - The areas/activities the budget lacks most?
- Institutions
  - Which are the key institutions and influencers in the soum/aimag/bagh?
  - Do these organisations / individuals coordinate to support the community? If so, how? On which issues?

Historical Context

- The historical context, how things have or are changing in the community/soum/aimag (e.g. environmental shocks, major political changes, major project developments) Have there been any key events which have influenced the community / soum / aimag and how it functions? What lessons are there for future changes?

Cultural Property and Practices

- What is your general perception on what cultural heritage means?

- Cultural property, practices and perceptions – are there cultural practices unique to this area?
- Where does the knowledge/information about local cultural heritage come from?
- Do local people receive any benefits from cultural heritage?
- How do you think soum cultural/historical heritages can be preserved?
- Was there any exploration, discovery and excavation of cultural heritage objects in the past 3 years? If so, what was the purpose?
- Have you heard of any illegal excavation of cultural heritage objects? What happened?
- Are there any government / private activities to promote cultural heritage awareness?
- Do soum schools/organizations organize any cultural heritage awareness activities?
- Needs, Values and Expectations
- Broad attitudes to Erdene?
- People's expectations?
- What changes are expected within the community? Are people prepared for / able to deal with these changes?
- What is the best way for Erdene to communicate and engage with people in the community? Feedback: how do you perceive this has been performed so far?
- Development projects, activities which Erdene should engage with for future collaboration? (note, not donations)
- Any key concerns we haven't covered with respect to the Erdene's project?

4.3.3 Department of Environment / Environment Inspector / Environment Policy Officer

Livelihoods Context

- Land Use and Ownership
  - Land use and land ownership (use a map if possible)?
    - Description of land tenure, access, management activities?
    - Public, private, rented, special purpose – % of each land type
  - Significant natural resources used – including for cultural or livelihoods purposes?
  - Any differences between baghs / soums in livestock rearing vs crop production (if any) vs other livelihoods activities?
  - Describe nomadic herding prevalence?
  - Natural resources such as water, land, mineral resources (access, use, quality and management) and seasonal variations?
  - Agriculture, cropping, and other economic activities – what activities are done in what seasons?
    - Is this work formal or informal?

  - Seasonal or permanent?
  - Which markets do people in the community access to sell products? How do people access these?
- Which neighbourhoods (if any) are considered better or worse off than others in terms of income and livelihoods – does that influence land uses?
- Are there issues with food security? Who do these issues affect, and how are they managed?
- Labour and working conditions (i.e. Local requirements and practices)
- International migration/ legal/illegal/underage workers/forced labour?
- Is there any aspect on land ownership/use that is helping local sustainable economic development? Or limiting sustainable economic development? (e.g. particular use rights, lack of access for particular industries / types of land use, unsustainable land use types)
- Any other additional information in this section?

• Natural Resources Use

- Discussion on where, who and how:
  - The sites used for agriculture – what are the water supplies to these fields / areas?
  - Cultural practices – explain if there are natural resources used for cultural ceremonies/ practices?
  - Firewood – are there areas from where timber is sourced for firewood for household use or for commercial use?

Environment

• Key issues, concerns, risks about the environment in relation to exploration and open pit mining (explore exploration and open pit mining separately)?

• (Open question – if the following issues are mentioned - water, pollution, dust, arsenic, cyanide, Acid Mine Drainage – then probe understanding/perception of issues)?

• Are the issues / concerns you mentioned (for exploration and mining), past (historical), present, or future concerns?

Economic and Community Development Determinants

• Assessment of factors impacting on a sustainable local economy and community development?

• Level of access to water, sanitation, electricity, fuel, communication, community infrastructure, markets, health and education facilities and services?

• Any key concerns we haven't covered with respect to Erdene's project?

4.3.4 Department for Land, Construction and Urban Development / Land Registration Officer

Livelihoods Context

• Land Use and Ownership

- Land use and land ownership (use a map if possible)?

  - Description of land tenure, access, management activities?
  - Public, private, rented, special purpose – % of each land type
- Significant natural resources used – including for cultural or livelihoods purposes?
- Any differences between baghs / soums in livestock rearing vs crop production (if any) vs other livelihoods activities?
- Describe nomadic herding prevalence?
- Natural resources such as water, land, mineral resources (access, use, quality and management) and seasonal variations?
- Agriculture, cropping, and other economic activities – what activities are done in what seasons?
  - Is this work formal or informal?
  - Seasonal or permanent?
  - Which markets do people in the community access to sell products? How do people access these?
- Which neighbourhoods (if any) are considered better or worse off than others in terms of income and livelihoods – does that influence land uses?
- Are there issues with food security? Who do these issues affect, and how are they managed?
- Labour and working conditions (i.e. Local requirements and practices)
- International migration/ legal/illegal/underage workers/forced labour?
- Is there any aspect on land ownership/use that is helping local sustainable economic development? Or limiting sustainable economic development? (e.g. particular use rights, lack of access for particular industries / types of land use, unsustainable land use types)
- Any other additional information in this section?

• Natural Resources Use
  - Discussion on where, who and how:
    - The sites used for agriculture – what are the water supplies to these fields / areas?
    - Cultural practices – explain if there are natural resources used for cultural ceremonies/ practices?
    - Firewood – are there areas from where timber is sourced for firewood for household use or for commercial use?

Environment

- Key issues, concerns, risks about the environment in relation to exploration and open pit mining (explore exploration and open pit mining separately)?
- (Open question – if the following issues are mentioned - water, pollution, dust, arsenic, cyanide, Acid Mine Drainage – then probe understanding/perception of issues)?
- Are the issues / concerns you mentioned (for exploration and mining), past (historical), present, or future concerns?

Economic and Community Development Determinants

- Assessment of factors impacting on a sustainable local economy and community development?
- Level of access to water, sanitation, electricity, fuel, communication, community infrastructure, markets, health and education facilities and services?

Economic Context

- Economic context:
  - local and regional businesses and commercial structures?
  - infrastructure supporting economic activity?
  - government and other economic / industrial development plans for the area?
- Main economic activities of aimag / soum / bagh?
- Any differences between soums / baghs in herding vs other livelihoods activities?
- Housing types and size and standard of dwellings?
- Any other additional information in this section?

Needs, Values and Expectations

- Broad attitudes to Erdene?
- People's expectations?
- What changes are expected within the community? Are people prepared for / able to deal with these changes?
- What is the best way for Erdene to communicate and engage with people in the community? Feedback: how do you perceive this has been performed so far?
- Any other issues regarding Erdene we haven't discussed?

4.3.5 Police

Gender and Marginalised Groups

- How are vulnerable people in communities supported? Have there been any changes in the people who need support over time?
- Any issues relating to women/youth/elderly/artisanal miners other marginalized groups and their interactions with the community generally?
- Are young people actively involved in education? What other activities? What opportunities after completing schooling? Programs for youth in the district?

Human Rights and Security Context

- Awareness of any issues of conflict with/between community members e.g. regarding foreign investment, behavior of companies within communities, other issues of concern raised?
- Perceptions of corruption in the community and key institutions (government and private)? What/who is influencing these perceptions and why?
- Levels of crime, main criminal acts in the soum/aimag?
- Security issues of concern in the community?
- Does security impact the local economy / community development, if so, how?

Social Organisation and Community Governance

- Decision-making

- Any conflict and violence, or disputes in the soum / aimag? How are disputes resolved?

- Any comments on informal decision-making and dispute resolution? What sorts of issues, how are these resolved?

- Attitudes to outsiders / migrant workers
  - Have outsiders influenced how the community functions? If so, how? Health impacts? Crime impacts? Competition for jobs? Adaptation to local daily life? Has there been any discussion of these issues within communities?
- Any other issues regarding Erdene we haven't discussed?

4.3.6 Tax Department / Tax Officer

Economic and Community Development Determinants

- Assessment of factors impacting on a sustainable local economy and community development?

Economic Context

- Economic context:
  - local and regional businesses and commercial structures?
  - infrastructure supporting economic activity?
  - government and other economic/industrial development plans for the area?
- Main economic activities of aimag / soum / bagh?
- Employment, unemployment and underemployment and access to opportunities?
- Availability of skilled manpower (types of skills)?
- Sources of income?
- Any differences between soums/baghs in herding vs agriculture (if any) vs other livelihoods activities?
- Which soums / baghs (if any) are considered better or worse off than others in terms of income and livelihoods?
- International migration / legal / illegal / underage workers / forced labour?

- Any other additional information in this section?

Socio-Political Context and Relevant Institutions

- Budget and Taxes
  - Describe activities of local budgetary organizations?
  - Performance / delivery of outputs by budgetary organizations and locally owned enterprises and their finances?
  - Contribution of taxes to the local budget?
  - What is the implementation status / key difficulties encountered with regard to the collection of taxes, payments and license fees (e.g. water, minerals of common use, land / tree clearance, animal and plant species etc.)?
  - What roles bags play in soum budget revenues?
  - What activities/outputs are funded by the local budget and state budget?
  - What activities / outputs funded by the state budget are not actually delivered?
  - What activities / outputs funded by the local budget are not actually delivered (For example land and water management)?
  - Main activities local budget is spent on?
  - How sufficient is budget allocated to local organizations?
  - The areas/activities the budget lacks most?
  - What are public perceptions of how Erdene currently contributes / how it will contribute in future to the budget?
- Any other items regarding Erdene that we haven't discussed?

4.3.7 Department of Social Welfare / Social Worker / Social Development Policy Officer

Economic and Community Development Determinants

- Assessment of factors impacting on a sustainable local economy and community development?
- Level of access to water, sanitation, electricity, fuel, communication, community infrastructure, markets, health and education facilities and services?
- Level of access to / use of technology (personally and at work; mobile phone/internet, etc.);
- Levels of literacy and numeracy of population (men, women, children).

Gender and Marginalised Groups

- Any issues relating to women/youth/elderly/artisanal miners other marginalized groups and their interactions with the community generally? And with the Company?
- Specific comments on artisanal miner population? Disabled? Elderly? Other vulnerable groups?

- Are young people actively involved in education? What other activities? What opportunities after completing schooling? Programs for youth in the district?

Social Organisation and Community Governance

- Decision-Making:
  - What is the capacity of community / households to participate in decision-making processes and access to services and information?
  - Have there been any changes in community governance structures due to population movements?
  - What are the main issues discussed in the khural meetings?
- Attitudes to outsiders / migrant workers
  - Have outsiders influenced how the community functions? If so, how? Health impacts? Crime impacts? Competition for jobs? Adaptation to local daily life? Has there been any discussion of these issues within communities?
- NGOs
  - Number of organizations and status? Main NGO activities in the last year? Key difficulties faced by NGOs? Key successes of NGOs?
  - Potential directions for partnership development with Erdene in the future?

Health

- Access to health services in soum / aimag?
- Type of general and referral health services provided to the community in the soum/aimag?
- Physical environment in relation to health?
- Knowledge, attitudes and practices, social and psychosocial support networks?
- Communicable health risks, potential health risks that the project could create and ability to manage them?

Cultural Property and Practices

- What is your general perception on what cultural heritage means?
- Cultural property, practices and perceptions – are there cultural practices unique to this area?
- Where does the knowledge/information about local cultural heritage come from?
- Do local people receive any benefits from cultural heritage?
- How do you think soum cultural/historical heritages can be preserved?
- Was there any exploration, discovery and excavation of cultural heritage objects in the past 3 years? If so, what was the purpose?
- Have you heard of any illegal excavation of cultural heritage objects? What happened?

- Are there any government / private activities to promote cultural heritage awareness?
- Do soum schools/organizations organize any cultural heritage awareness activities?

4.3.8 Department of Labour / Labour Officer

Economic Context

- Economic context:
  - local and regional businesses and commercial structures?
  - infrastructure supporting economic activity?
  - government and other economic/industrial development plans for the area?
- Main economic activities of aimag / soum / bagh?
- Employment, unemployment and underemployment?
- Available of skilled manpower (types of skills)?
- Sources of income?
- Levels of income / income category of your aimag / soum / bagh (trend of income in the last five years)?
- Any differences between soums / baghs in herding vs agriculture (if any) vs other livelihoods activities?
- Which soums / baghs (if any) are considered better or worse off than others in terms of income and livelihoods?
- Labour and working conditions (i.e. Local requirements and practices)?
- International migration / legal / illegal / underage workers/forced labour?

Needs, Values and Expectations

- Broad attitudes to Erdene?
- People's expectations?
- What changes are expected within the community? Are people prepared for / able to deal with these changes?
- What is the best way for Erdene to communicate and engage with people in the community? Feedback: how do you perceive this has been performed so far?
- Development projects, activities which Erdene should engage with for future collaboration? (note: not donations)
- Any key concerns we haven't covered with respect to the Erdene's project?

4.3.9 Department of Education / Officer for Education, Culture and Children

Economic and Community Development Determinants

- Assessment of factors impacting on a sustainable local economy and community development?
- Level of access to water, sanitation, electricity, fuel, communication, community infrastructure, markets, health and education facilities and services?
- Level of access to / use of technology (personally and at work)?

Education:

- Data on access to education facilities and services?
- Data on education levels (highest level of attainment)?
- Levels of literacy and numeracy of population (men, women, children)?
- Type of school, number, catchment area, ownership and location (time to reach the type of school)?
- Number of students by age and sex by school?
- Promotion of students to higher grades, and dropout rates by level (causes of drop out)?
- Number of teachers by sex and level of education plus any key gaps in teacher qualifications/experience?
- School facility (water, toilets, dormitories, other facilities etc.), and who invests in and maintains these facilities (government, private, or a mix)?
- Education value given by the community to send their children (boys and girls) to school, and has there been any change in this over time (past 5 years)?
- Community participation in the educational service (PTA, motivating teachers, etc.)?
- What colleges and technical/vocational schools in the soum/aimag?
- Links between education facilities and potential employers?
- Level of satisfaction of the community in the educational services provided in the soum/aimag?
- Main challenges in teaching, learning and education services in the soum/aimag?
- After graduation – where do graduates go? Has there been any follow up surveying of graduates?
- Are there any differences in access to facilities between different people within the community (vulnerable households, single headed households, migrant families)?
- Any other comments or information?

Gender and Marginalised Groups

- Youth
  - Are young people actively involved in education? What other activities? What opportunities after completing schooling? Programs for youth in the district?
- Anything else about Erdene's project we didn't cover?

4.3.10 Department of Infrastructure, Road, Transport

Livelihoods Context

- Land Use and Ownership:
  - Land use and land ownership (use a map if possible)?
    - Description of land tenure, access, management activities?
    - Public, private, rented, special purpose – % of each land type?
  - Significant natural resources used – including for cultural or livelihoods purposes?
  - Any differences between baghs / soums in livestock rearing vs other livelihoods activities?
  - Describe nomadic herding prevalence?
  - Natural resources (access, use and management) and seasonal variations?
  - Which markets do people in the community access to sell products? How do people access these?
  - Which neighbourhoods (if any) are considered better or worse off than others in terms of income and livelihoods – does that influence land uses?
  - Are there issues with food security? Who do these issues affect, and how are they managed?
  - Labour and working conditions (i.e. Local requirements and practices) (are legal requirements on labour and working conditions being met?)
  - International migration / legal / illegal / underage workers/forced labour?
  - Is there any aspect on land ownership / use that is helping local sustainable economic development? Or limiting sustainable economic development? (e.g. particular use rights, lack of access for particular industries/types of land use, unsustainable land use types)?
- Natural Resources Use:
  - Discussion on where, who and how:
    - Sites used for agriculture – what are the water supplies (if any)?
    - Cultural practices – explain if there are natural resources used for cultural ceremonies/ practices?
    - Firewood – are there areas from where timber is sourced for firewood for household use or for commercial use?

Economic and Community Development Determinants

- Assessment of factors impacting on a sustainable local economy and community development?
- Level of access to water, sanitation, electricity, fuel, communication, community infrastructure, markets, health and education facilities and services?
- Road and traffic-specific questions:
  - Has public safety been an issue (speed, crashes, fatalties – people and/or livestock)?
  - Have market opportunities changed along with road development (if relevant)?

- General tendency of number of registered vehicles in your soum? Increasing or decreasing? And Why?
- How do you describe traffic volume in your soum in general if you compare it with other neighboring soums or aimags? Is it high or low, and Why?
- What is an average number of vehicles and trucks on daily basis that are going through your soum? Is it increasing or decreasing? And Why?
- In your opinion, what are their main purposes of vehicular travel through your soum?
- What is an average number of annual traffic accidents in your soum? Is it increasing or decreasing? And Why?
- Accessibility and quality of transport services?
- Access to and use of public transportation – most prevalent forms (air, bus, taxi, etc.)?

Human Rights and Security Context

- Awareness of any issues of conflict with/between community members e.g. regarding foreign investment, behavior of companies within communities, other issues of concern raised?
- Levels of crime, main criminal acts in the soum/aimag?
- Security issues of concern in the community?

4.3.11 Department of Agriculture and SMEs / Registration Officer

Livelihoods Context

- Land Use and Ownership
  - Land use and land ownership (use a map if possible)?
    - Description of land tenure, access, management activities?
    - Public, private, rented, special purpose – % of each land type?
  - Significant natural resources used – including for cultural or livelihoods purposes?
  - Describe nomadic herding prevalence?
  - Natural resources (access, use and management) and seasonal variations?
  - Which markets do people in the community access to sell products? How do people access these?
  - Which neighbourhoods (if any) are considered better or worse off than others in terms of income and livelihoods – does that influence land uses?
  - Labour and working conditions (i.e. Local requirements and practices) (and where any labour and working condition legal requirements are not met)
  - International migration/ legal/illegal/underage workers/forced labour?
  - Is there any aspect on land ownership/use that is helping local sustainable economic development? Or limiting sustainable economic development? (e.g. particular use rights, lack of access for particular industries/types of land use, unsustainable land use types)

- Crop production (if any):
  - Main types of crop and plot sizes (ha/HH)?
  - Harvest per hectare in good year and bad year?
  - Ownership: % of households that own a farm, have HH agricultural plots?
  - Agriculture calendar?
  - Are crops for HH consumption or sale? If for sale, to which markets and which crops?
  - Trend of crop production in the last ten years, and cause of any changes?
  - Main problem in crop or irrigation practices?
  - Opportunities for increase in crop production and irrigation practices?
- Herding / livestock production:
  - Type and number of animals?
  - Average number of animals by type owned per household?
  - Commercial farming of livestock?
  - Common animal feed type and practice?
  - Common animal disease?
  - Grazing areas description?
  - Migratory routes for livestock?
  - Water points for the animal?
  - Selling of livestock/livestock products/honey/beehives?
  - Main constraints in livestock husbandry, and changes in past 5 years?
  - Opportunities in livestock husbandry?
  - Any other information in this section?
- Food:

- Are there issues with food security? Who do these issues affect, and how are they managed?
  - Food security – are crop and livestock production for HH consumption or to supplement HHs?
  - Is local food supply sufficient and affordable to meet nutritional needs?
  - Are vulnerable (or any other) HHs supported to ensure adequate food supplies? If so, how? E.g. from NGOs, food stamps, other?
  - Any other additional information in this section?
- Natural Resources Use:
  - Discussion on where, who and how:
    - Cultural practices – explain if there are natural resources used for cultural ceremonies/ practices?

- Firewood – are there areas from where timber is sourced for firewood for household use or for commercial use?

Economic and Community Development Determinants

- Assessment of factors impacting on a sustainable local economy and community development?
- Level of access to water, sanitation, electricity, fuel, communication, community infrastructure, markets, health and education facilities and services?
- What services exist in the soum?
  - Car / wheel repair
  - Fuel stations
  - Canteens
  - Shops
  - Hotels
  - Supply of meat
  - Supply of milk
  - Supply of vegetables
  - Professional training capacities
  - Renting apartments and gers
  - Laundry
  - Bath and hair dressing

4.3.12 Hospital

Economic and Community Development Determinants

- Assessment of factors impacting on a sustainable local economy and community development?
- Level of access to water, sanitation, electricity, fuel, communication, community infrastructure, markets, health and education facilities and services?
  - Health
- Services:
  - Access to health services (and their capacity to support an influx) personal health practices and coping skills, Level of access of the population to health services?
  - Type of general and referral health services provided to the community in the regional study areas?
  - Social and psychosocial support networks?
  - Quality of health services provided by the health facilities?

- Number of health professionals by type in the regional and local study areas (mental and physical health)?

• Morbidity/mortality:

- Common causes of morbidity and mortality in the regional and local study areas (among children under five and people above 5 years of age)?

• Behaviours:

- Level of health seeking behavior of the communities in the regional and local study areas in modern health care facilities?
- Attitude towards and usage of the traditional health care services?
- Knowledge, attitude, and behavior on HIV or STDs, TB, malaria, and other communicable diseases among the community members?
- Level of satisfaction of the community to the health services provided?

• Nutrition:

- Level of nutritional status of children and women in particular and population in general?

• Traditional medicine:

- Existence of traditional and cultural practices (feeding and other) that affect the health status of the population in general and children and women in particular?

• Disease:

- What is the sanitation and hygiene (environmental and personal) practices of the community (use of toilet facilities, washing hands using soaps, water transportation, management and usage, etc.)?
- Magnitude of diarrhea and acute respiratory infection in the community?
- Communicable health risks, potential health risks that the project could create and ability to manage them (e.g. HIV/AIDs, STIs transmission, pressure on availability of health services)?

• Physical environment:

- Impact of the socio-cultural and economic setting of the community (sanitation, water supply, livelihood, housing, nutrition, transportation services to health facilities, etc.) towards the health status of the population?

• Challenges and recommendations:

- Challenges encountered in providing affordable, accessible, and quality health services in the regional and local study areas?
- Recommendations or any other comments to improve the adequacy and quality of the health services in the community?

• Soum health data:

- Health infrastructure and services?
- Health care systems, public and private?
- Health standards?

- Mortality and morbidity rates for adults and children?
- Common health problems?
- Data by Gender, by Urban / Rural?

• Health facilities:

- Who are the main providers of health services? (public/private?)
- Generally, how many people access public health services
- Generally, how many people access private health services
- How many health centres are in the area? Where are they?
- What is the patient capacity in each of these health centres?
- How many hospitals are in the area? Where are they?
- What is the patient capacity in each of these hospitals (hospital beds)?
- What level of care is provided in the health centres and hospitals (i.e. emergency care, maternal care, level of treatment for illness / disease, medicines / operations available)?
- How many doctors are there in the soum / aimag centre? In baghs?
- What is the doctor-patient ratio?
- How many nurses are there in the soum / aimag? In baghs?
- How many ambulances/paramedics?
- What is the area serviced by ambulances/paramedics?
- What is the level of knowledge/education about disease prevention and care?
- Who provides health education?
- How many people access health education facilities?

4.3.13 River Basin Authority and River Basin Committee

Socio-political Context and Relevant Institutions

• River Basins Authority and Committee Specific Questions:

- Goals and, priorities and mandate of the River Basin Authority and Committee?
- Governance structures and organisation, financing of River Basin Authority and Committee (Government / donor, etc.)?
- Linkages with the community governance structures and community involvement in River Basin Authority and Committee, resources available to River Basin Authority and Committee?
- Future plans? Key activities and achievements in past year? Key challenges?

• General Questions:

- Which are the key institutions and influencers in the soum / aimag / bagh?
- Do these organisations / individuals coordinate to support the community? If so, how?
- On which issues?

Economic and Community Development Determinants

- Assessment of factors impacting on a sustainable local economy and community development?
- Level of access to water, sanitation, electricity, fuel, communication, community infrastructure, markets, health and education facilities and services?
- What is the role of river basin management as an approach to sustainable water use (and in relation to community development)?

Economic Context

- Economic context:
  - Local and regional businesses and commercial structures?
  - Infrastructure supporting economic activity?
  - Government and other economic/industrial development plans for the area?
- Main economic activities of aimag / soum / bagh?
- Any other additional information in this section

Environment

- Key issues, concerns, risks about the environment in relation to exploration and open pit mining (explore exploration and open pit mining separately)?
- (Open question – if the following issues are mentioned - water, pollution, dust, arsenic, cyanide, Acid Mine Drainage – then probe understanding / perception of issues)?
- Are the issues / concerns you mentioned (for exploration and mining), past (historical), present, or future concerns?
- What are the opportunities for mining companies and River Basin Authority to collaborate / cooperate on environmental / water management (participatory water monitoring / awareness, etc.)?
- Knowledge of Erdene:
  - Understanding of Erdene's project
  - Key points of engagement with the River Basin Authority and Committee and Erdene?
  - Development projects, activities which Erdene should engage with for future collaboration?



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

B1 - Introduction

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
ESIA	Environmental and Social Impact Assessment
FGD	Focus Group Discussions
KII	Key Informant Interview

1. INTRODUCTION

This Chapter of the Khundii Gold Project (Project) Environmental and Social Impact Assessment (ESIA) provides environmental and social baseline information related to the Project Area of Influence (AoI). This baseline has enabled an assessment of the potential impacts of the Project to be undertaken and appropriate mitigation measures to be developed.

1.1 Approach and Methodology for Preparation of Baseline Assessment

Chapter A3: Methodology sets out the overall approach and methodology adopted for the preparation of this ESIA. This Chapter provides an overview on the development of the environmental and social baseline chapters and the coverage of the specific baseline chapters.

1.1.1 Overall Approach

In preparing the baseline information, a variety of data sources, including environmental and social study reports and supporting reference materials such as statistical data were obtained from government and third party research and monitoring work results.

Existing information has been reviewed and assessed for accuracy, consistency and validity and these studies are listed in the appropriate Chapters, where referenced.

All baseline Chapters have been developed according to the following structure to present the baseline findings consistently:

- Sources of Information. Ensuring that all data sources are explained and that key references are cited to give a clear appreciation of the origin of information used;
- Methodological Approach. Describing the methodological approach to establish baseline conditions;
- Project Area of Influence. Determining AoI specific to given impact areas;
- Baseline Conditions. Establishing baseline conditions, including any limitations of the assessment; and
- Conclusions.

1.2 Biophysical Environment Baseline

The environmental baseline chapters address the following topics in turn:

- B2: Climate and Air Quality;
- B3: Noise and Vibration;
- B4: Topography, Landscape, Geology and Soils;
- B5: Water Resources;
- B6: Biodiversity and Ecosystem Services; and
- B7: Waste.

1.2.1 Sources of Biophysical Environment Baseline Data

Environmental baseline data have been derived principally from the environmental field studies undertaken in 2016, 2017 and 2019 by Eco Trade LLC. The 2016 and 2017 studies covered

Tsenkher Nomin and Khundii licence areas and surroundings. The 2019 field survey covered, in addition to the two licenced areas, water exploration areas, haul road between the mining licenced areas, and areas along the proposed supply road between Shienjinst and the Project. Summaries and references of these studies are supplied within each baseline Chapters.

1.2.2 Baseline Data Collection Technique

The environmental baseline survey used field measurements and sampling to obtain baseline information on air quality, water, soil and vegetation. whereas search and observe methods used for fauna studies. Environmental baseline study areas included not only the licenced areas, but also potential AoI areas outside of the licenced areas.

Detailed information on data collection is provided in each baseline assessment Chapter.

1.3 Human Environment Baseline

The human environment baseline chapters address the following topics:

- B8: Population and Demographics;
- B9: Social Structures;
- B10: Economy;
- B11: Labour and Employment;
- B12: Social Infrastructure;
- B13: Land Use;
- B14: Cultural Heritage;
- B15: Community Health, Safety and Security, and
- B16: Traffic and Transport.

1.3.1 Sources of Human Environment Baseline Data

Social baseline data have been derived principally from the field studies undertaken in August 2019 by Sustainability East Asia LLC.

In addition, field studies undertaken in 2016, 2017, and 2019 by Eco Trade LLC provided source data. The 2016 and 2017 studies covered Tsenkher Nomin and Khundii licenced areas and surroundings, includes limited social data gathering. The 2019 field survey covered, in addition to the two licenced areas, water exploration areas, haul road between the mining licenced areas, and areas along the proposed supply road between Shinejinst and the KGP. Reference to these studies is made throughout the social baseline Chapters, where applicable.

In addition, reference is made in each Chapter to secondary data sources, including national statistics, population and housing censuses, official statistics from aimag and soum governor's offices, annual aimag, soum, and bagh reports, and available reports from other projects and programmes completed in the area, among others.

1.3.2 Baseline Social Data Collection Techniques

Of central importance in the approach and methodology applied in this study was the focus on broad participation in data collection. This was, principally, to reduce the risk of overstating one

impact over another, and to ensure that the Project's consequences are appropriately assessed or predicted by local communities.

Widely accepted and commonly-used primary data collection techniques for social study were used, as discussed below.

Appendix A6 – 1 provides the Plan for Data Collection and Stakeholder Engagement. Appendix A6 – 2 provides the Focus Group Discussion Guide and Key Informant Interview Guide, while and Appendix A6 – 2 provides a Summary of Focus Group Discussion and Key Informant Interview Findings.

1.3.2.1 Qualitative Techniques

Qualitative interview methods are used to provide insight into community social institutions and organisations, decision-making and leadership. They are also effective in verifying quantitative data. A variety of qualitative techniques were used for the Social Baseline Study:

- Focus Group Discussions: for understanding issues within a community, for example, with women, young people, social or cultural organisations, or minority groups);
- Key Informant Interviews: for understanding detailed or complex information from a knowledgeable source;
- Case Studies: for capturing detail from Focus Group Discussions and Key Informant Interviews.

The type of information gathered using qualitative methods included:

- Quality of life of the population;
- Important and relevant characteristics of social differentiation;
- Key social institutions and customary decision-making structures;
- Characteristics of social organisation;
- Natural resource management and land use;
- Relevant cultural sites;
- Livelihood systems;
- Social mobility and division of labour;
- Perceptions of development in the area;
- Perceptions of local development opportunities; and
- Perceived project impacts and mitigation options.

For qualitative sampling, the survey size was determined based on the topics or themes of interest in the survey in the relevant geographic area, and the potential pool of key informants and participants relevant to the themes.

A total of 28 KIIs were planned (12 each in Shinejinst and Bayan-Undur soums, and 4 in Bayankhongor aimag centre), and 28 conducted (13 in Shinijinst and 11 in Bayan-Undur soums, and 4 in Bayankhongor aimag centre). KIIs were held with a range of respondents, including government representatives, community leaders, and institutional representatives. In practice, more KIIs were able to be conducted than planned, as the survey team identified a number of

additional respondents who had specialist knowledge of topics or who represented key interests in the community. A summary of the KIIs conducted is provided below.

Table 1 KIIs Conducted as Part of the Social Baseline

Shinejinst KIIs	Bayan-Undur KIIs	Aimag level KIIs
Planned – 12 Performed - 13	Planned - 12 Performed -11	Planned - 5 Performed – 4
1. Soum Government Office (9 personnel) 2. Citizens Representive Khural 3. Secondary School 4. Soum Hospital 5. Soum Police	1. Soum Government Office (7 personnel) 2. Altai Uvur Gobi River Basin Committee 3. Secondary School 4. Soum Hospital 5. Soum Police	1. Aimag Social Policy Department 2. Aimag Statistical Office 3. Aimag Food and Agriculture Agency 4. Investment, Development Policy and Planning Department

Focus Group Discussions (FGDs) were used to gather common information on specific issues. Involving approximately 8-10 people in each, FGDs were organised in each soum covering a variety of issues: population, cultural heritage issues; employment, health, local governance and budget revenues; natural resources; businesses, income generation and education, with particular emphasis on local perceptions and concerns. Various techniques were employed by the facilitators to encourage discussion and ensure that all voices were heard in the FGDs. This included employing participatory techniques such as mapping, H-Form[1], Spider web diagram,[2] and breaking into smaller sub-groups to discuss key issues. FGDs were organised to ensure representation by a diversity of community members, with particular reference to inclusion of vulnerable groups, including women, elderly, and disabled, where possible. Women's involvement in the FGDs with herders was equal to men, and in the other two types of FGDs (Community and SMEs) held, was higher than men. The reason is that mostly women run the SMEs (shops and cafes) in the soum centre. Six FGDs were conducted in total, three in each soum (Shinejinst and Bayan-Undur soums) with:

- Community representatives (e.g. soum residents, women, elderly, young families).
  - Shinejinst soum: 12 participants, including 7 women.
  - Bayan-Undur soum: 11 participants, including 9 women.
- Small and medium enterprises (SMEs), (e.g. soum SME specialist, local business owners, cooperative members and loan staff of banks).
  - Shinejinst soum: 10 participants, including 6 women.
  - Bayan-Undur soum: 12 participants, including 5 women.
- Herders.
  - Shinejinst soum: 9 participants, including 5 women.

[1] H-form is a simple and structured way of bringing people together to take stock of progress, understand what is working well and not so well, and build a consensus on ways to improve the current situation.
[2] The spider web is a participatory diagrammatic tool for use in discussions to highlight differences in perspectives and prioritise the key themes raised in the discussion.

- Bayan-Undur soum: 8 participants, including 4 women.

1.3.2.2 Quantitative Techniques

Quantitative surveys establish baseline data for key social parameters that can later be used as indicators to measure social impacts.. Quantitative methods are commonly used to generate data on household composition and demography; livelihoods and occupations; levels of education and skills; sources and amounts of household income; household expenditure; household structures, land and other assets; soil, vegetation and land capability; access to health, education and other services; health indicators; and general trends.

In this instance, a household survey was used to fulfil quantitative surveying requirements. For quantitative sampling, participating households were selected based on the location of bagh, and the proportion of the bagh population in the total soum population. Once the number of households to be surveyed in the bagh was determined (sample population), participating households were selected randomly from this sample population.

The sample frame is based on the population and household data of the National Statistical Office of Mongolia (2018). All households of the two soums make up the sample population, so based on the data, the total sample population is 1,175 households[3].

Table 2 Quantitative Sampling Methodology

Soum	Number of Households	Population
Shinejinst soum	606	**2,607**
Bayan-Undur soum	569	2,448

The ESIA team determined that 5% of urban households and 10% of rural households located in the directly affected soums and baghs (sub-districts) of the sample, would provide an optimum representation in the study population. In addition, the team set out to survey all households located close to the Project site and alongside the road between the Project site and the main road as part of the household study.

A standard error of 0.05 percentage points and 95% of confidence level were accepted. In order to encounter clustering effect and to minimise non-sampling error, the study defined an actual sample size of 80 households.

Applying the location and population proportion criteria, baghs were selected for the sample frame as follows:

- Shinejinst soum: Soum centre (urban) and Idren bagh (rural); and
- Bayan-Undur soum: Soum centre (urban) and Urtin Gol bagh (rural).

Table 3 below describes the resulting sample frame for the quantitative survey.

Table 3 Social Study Sample Frame

Location	**Designation**		**Households**	**Population**	**Sample size**		**Total (planned)**	**Total (actual)**
					5%	10%		
Bayankhongor aimag								
Bayan-Undur *soum*								
	Urban		99	291	5		6	7

[3] Note updated population figures were acquired from local authorities during the fieldwork, and the updated population size is used throughout the Social Baseline Study.

	Rural		655	2,158				
		Idren bagh	112	433		11	12	20
Shinejinst *soum*								
	Urban		155	529	8		9	12
			598	2,139				
	Rural	Urtiin Gol bagh	267	902		27	28	23
Households near the Project**			25***				25	16
Total Household Questionnaires							80	78

*Note that Total HH Questionnaires = HH Near Project + HH in Rural Areas + HH in Urban Areas

** All settled / semi-settled households near the Project and Site Access Road to the Project site (within 20km radius were interviewed as part of the HH Survey (where possible).

***HH numbers located near to Project Site were estimated based on existing data, including allowance of 80% for additional potential households in the area due to nomadic herders and seasonal variation in their location.

1.3.2.3 Rationale for Difference between Planned and Actual Survey Samples

Originally, 80 households were planned to be surveyed using the Household Questionnaire, which included allowance for errors. The actual number of households surveyed was 78, which is not significantly different.

The breakdown of households interviewed differed slightly to the original plan. A greater number of rural households in Bayan-Undur soum) were interviewed than planned (20 vs. 12), whereas slightly fewer households were interviewed in Urtiin Gol bagh, Shinejinst soum than planned (23 vs 28). The difference can be explained by the prevailing circumstances and availability of participants during the research period. Furthermore, the survey team was able to conduct additional surveys in Shinejinst soum, upon confirming with authorities the whereabouts and numbers of nomadic / semi-nomadic households within 20km of the Project site and access road – there were fewer households than originally estimated. Thus, the decision was made that the field team would visit available households in Shinejinst, nearest to the KGP licence area.

1.3.2.4 Preparation and Testing

The field team was provided with an internal and external (i.e. including the Erdene Team) orientation session prior to commencing the field research. Key to the internal orientation session was discussion of the Communications Protocol, which provided direction on common responses to questions from community members, and guidance on effective communications in the field. In addition, the fieldwork materials were discussed to ensure all team members were comfortable with their roles in employing them.

The external orientation meeting discussed Sustainability's role vis-à-vis the accompanying Erdene team's role in the field. The ESIA team conducted the baseline study as independent consultants, with Erdene team members providing introductions and answering any questions about the Project and addressing any community questions raised about the Project. At this meeting, safety measures whilst in the field were discussed, and fieldwork logistics finalised.

Furthermore, testing of the Household Questionnaire was conducted internally prior to commencement of the formal survey program, in conjunction with review and familiarisation with

Questionnaire. The Household Questionnaire used was based on similar questionnaires used by Sustainability on similar projects in Mongolia and thus there was a high level of confidence in the integrity of the Questionnaire and the data generated.

1.3.2.5 Difficulties Encountered During the Collection of the Social Baseline Data

Any methodology used to collect baseline data has limitations, either due to data availability / accuracy or the techniques applied. A number of difficulties and limitations were encountered in conducting the social baseline study:

- Reluctance to participate on behalf of certain stakeholders. A few households declined to participate in the household survey.
- The survey team worked highly flexibly in the field, accommodating location and timing preferences of respondents, and was generally able to conduct the required KIIs, FGDs, and household surveys. However, there were a number of households that were not available or away at the time of the survey.

1.3.2.6 Methods of Data Analysis

Data analysis took different forms depending upon the nature of the baseline information. Themes and findings were identified from the household survey interviews, and these were triangulated with information provided by key informants and from focus group discussions.

Moreover, the secondary data and information from the aimag and soum level were analysed and presented to support the information collected during the field visits.

SPSS statistical software package was employed to process and analyse the primary data of the study. The key results were compiled and explored using a descriptive statistical method.

1.3.2.7 Quality Control

The objectives of data quality control are to collect data that:

- accurately reflect the reality of the population at a given point in time;
- represent the entire target population.by appropriately qualified personnel.

With respect to non-sampling error, including measurement error, selection bias, and non-responses, a number of strategies were employed to avoid this. The primary strategy was in comprehensive preparation and testing, including the development of a detailed Plan for Data Collection and Stakeholder Engagement which included interview guides for KIIs and FGDs. The Household Questionnaire and KII and FGD Guides were also subject to multiple reviews by Sustainability's local consultants to ensure that questions were locally appropriate and understandable. Moreover, the Household Questionnaire and KII and FGD guides utilised were based on successful questionnaires conducted for ESIA scopes of work in similar settings by Sustainability in Mongolia.

Measurement error was minimised through the conduct of "field edits" (quick examination of completed data Household Questionnaires) for quality assurance and quality control purposes and to ensure that any emerging fieldwork deficiencies could be remedied before turning into major quality problems. Another key aspect of quality control was the inclusion of an experienced survey researcher. She provided pre-fieldwork quality and data coding checks of the Household Questionnaire, and conducted the data entry and processing into SPSS.



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

B2 - Climate and Air Quality

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
EBRD	European Bank for Reconstruction and Development
ESIA	Environmental and Social Impact Assessment
EU	European Union
IFC	International Finance Corporation
GoM	Government of Mongolia
KGP	Khundii Gold Project
kPa	Kilopascal (measure of force per unit area)
MET	Ministry of Environment and Tourism
mJ/m^2	milliJoule per square metre
MNS	Mongolian National Standards
NAMEM	Mongolian National Agency for Meteorology and Environmental Monitoring
NO_2	Nitrogen Dioxide
PM_{10}	Particulate Matter of size less than 10 microns
$PM_{2.5}$	Particulate Matter of size less than 2.5 microns
SO_2	Sulphur Dioxide

2. CLIMATE AND AIR QUALITY

2.1 Introduction – Climate

This chapter describes the main climatic conditions of the Khundii Gold Project (KGP or the Project) region including air and soil temperature, precipitation, wind, humidity, changes in climate and extreme climatic events. The purpose of this Chapter is to establish the ambient or 'baseline' climate conditions in the Project region through the presentation of historical monitoring data that are considered to reflect the conditions before the commencement of construction and operation of the Khundii Gold Project.

2.1 Climate Baseline Characterisation Methodology

The methodological approach used to obtain climatic baseline condition of the study area and its vicinity included collection of data from Shinejinst and Bayan-Undur *soum* weather stations, which was then processed using statistical methods. Additional sources of data includes the results of field research done within the region by Eco Trade LLC.

This report uses observed meteorological data dated between 1980-2018 for Shinejinst *soum* and between 2000-2018 for Bayan-Undur *soum.* These weather stations are located about 70 - 80 km north-east and north of the Project site (see Figure 1).

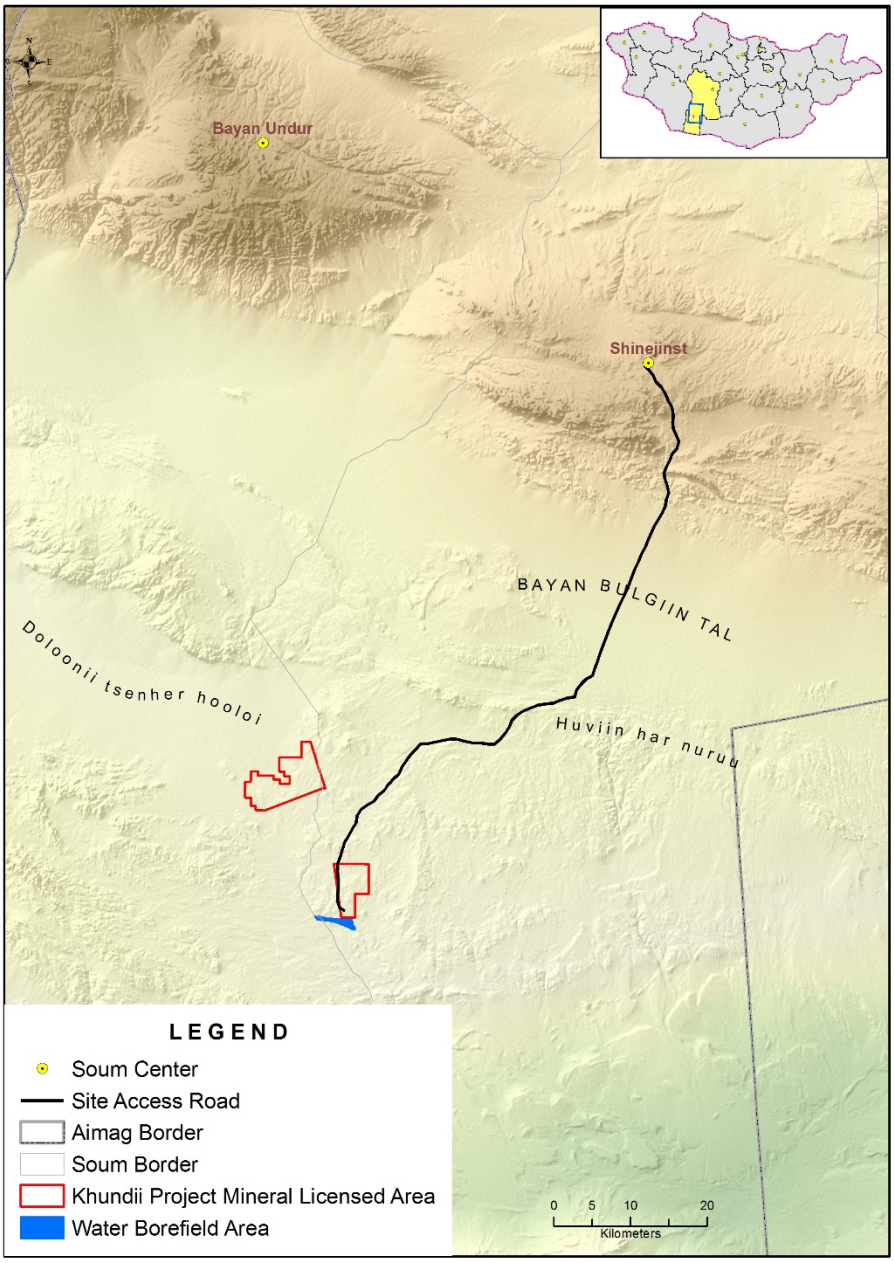


Figure 1 Locations of Weather Stations and Project Site

The meteorological data was sourced from the Mongolian National Agency for Meteorology and Environmental Monitoring (NAMEM).

The latest published Annual Environmental State Report (2018) and the Mongolian Second Assessment Report on Climate Change (2014) prepared by the Mongolian Ministry for Environment and Tourism (MET) are used for additional information and climate change projections in this Chapter. National and regional level reference climate reports (Namkhaijantsan 1999; Namkhaijantsan 2006) are also used for atmospheric pressure and solar radiation sections of this Chapter.

2.2 Baseline Conditions

2.2.1 Seasonal Variance

Mongolia is characterised by an extreme continental climate with long, cold winters and short summers, low annual precipitation and low humidity. Most annual precipitation falls during the summer months.

The Project Site and its surrounding area has an extreme continental climate similar to the rest of the country, with long, cold winters and short hot summers. Average air temperature drops to subzero between October and March.

The coldest winter months are between December and February during which the average temperature is around -15.8˚C in Bayan-Undur and -14.0˚C in Shinejinst *soum*. The historical lowest and highest observed temperatures during winter are between -35.9˚C and 8.2˚C as observed at the Bayan-Undur and Shinejinst weather stations. Winter is considered to last about 117 days, starting in November and ending in early March in the region.

In spring, from March through to May, there is an increase in temperature reaching an average of -0.1 to -1.2˚C in the region accompanied by higher wind speeds. The spring season can also exhibit rapid and extreme changes in the weather. The lowest and highest observed temperature range is between -30.6˚C in March and 27.3˚C in May.

The average temperature in summer months (June to August) reaches 15.1˚C in Bayan-Undur *soum* centre and 15.5˚C at Shinejinst *soum* centre. During the summer months, the historically observed lowest and highest temperatures ranged between -4.9 ˚C and 34 ˚C in the Project areas.

Air temperature drops drastically during the autumn months (September to October) with an average of 0.3˚C in Shinejinst *soum* centre and -1.5 ˚C in Bayan-Undur during this period. Absolute minimum and maximum temperatures fluctuate between -32.7 ˚C and 18.6 ˚C in the regions.

2.1.1 Sunshine and Solar Radiation

Total radiation in the Project region ranges between 5,326 to 5,363 mJ/m^2 on horizontal surface per year, increasing from north to south. Radiation varies between 194 and 307 mJ/m^2 in winter months when solar height is the lowest, but it gradually increases in May and June reaching 680-740 mJ/m^2 during this period (Namkhaijantsan 2001).

Total sunshine potential is about 3,200 to 3,300 hours per year in the region. Sunshine hours are subject to seasonal variation with 200 to 260 hours during winter months, but 320 to 340 hours in summer months. The actual sunshine hours are less than the potential due to various limiting factors such as geography and cloud cover in different seasons. Actual sunshine hours are between 57-65% of potential hours during summer, but it increases during winter reaching up to 65-70% of the total potential hours during this period (Namkhaijantsan 2001).

2.1.2 Air Temperature

The Project area annual average air temperature is around -0.4 ˚C in Bayan-Undur and 0.7˚C in Shinejinst. The regions average temperature ranges between 16.6 and 16.9˚C during the warmest month (July), while it drops to in the range of -15.7 to -17.8˚C in January, the coldest month of the year. Monthly absolute maximum, absolute minimum and average temperature values are presented in Table 1.

Table 1 Monthly Temperature Values in Khundii Project Areas

Air Temperature	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Shinejinst *soum* centre												
Absolute Maximum (˚C)	5.2	8.2	14.3	23.8	27.3	29.5	31	30.2	24.8	18.6	9.1	5.9
Average (˚C)	-15.7	-12.9	-6.9	1.8	8.8	14.5	16.9	15.0	8.6	0.4	-8.1	-13.5
Absolute Minimum (˚C)	-35.1	-35.3	-30.6	-24.6	-13.1	-3.6	2.1	-1.5	-10.7	-20.8	-32.7	-34.1
Bayan-Undur *soum* centre												
Absolute Maximum (˚C)	5.5	7.3	13.0	21.2	25.9	30.4	34.0	29.2	24.4	18.0	11.6	5.6
Average (˚C)	-17.8	-14.2	-8.3	0.9	7.8	14.2	16.6	14.6	7.3	-1.3	-9.9	-15.4
Absolute Minimum (˚C)	-35.9	-33.5	-28.4	-22.2	-12.6	-4.9	2.9	-2.0	-11.5	-23.4	-27.7	-39.5

Source: Shinejinst (1980-2018) and Bayan-Undur soums (2000-2018) weather station data

2.1.3 Soil Temperature

Annual mean soil surface temperature is 2.6°C. In summer, maximum temperature reaches 60.0°C and in winter the maximum lowest temperature reaches -42.3°C. Monthly average soil temperatures are presented in Table 2.

Table 2 Monthly Soil Temperature in Khundii Project Areas

Soil Temperature	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Shinejinst *soum* centre												
Absolute Maximum (˚C)	9.0	25.0	39.0	51.0	60.0	60.0	60.0	60.0	53.0	36.0	22.0	14.0
Average (˚C)	-18.1	-13.1	-5.7	4.9	13.8	20.4	22.3	19.4	11.6	1.4	-8.9	-15.6
Absolute Minimum (˚C)	-41.8	-39.0	-36.7	-30.7	-14.8	-9.0	-2.0	-5.0	-20.2	-30.9	-42.3	-42.0
Bayan-Undur *soum* centre												
Absolute Maximum (˚C)	10.0	20.0	38.0	44.0	53.0	58.0	62.0	58.0	48.0	38.0	24.0	10.0
Average (˚C)	-21.9	-17.1	-9.7	2.0	11.3	19.1	21.2	17.5	8.2	-2.3	-12.2	-18.7
Absolute Minimum (˚C)	-47.0	-40.0	-38.0	-26.0	-16.0	-8.0	0.0	-5.0	-15.0	-36.0	-33.0	-45.0

Source: Shinejinst (1980-2018) and Bayan-Undur soums (2000-2018) weather station data

2.1.4 Precipitation

The Project area is characterised by an arid climate with mean annual precipitation of approximately 122.7 mm in Shinejinst *soum*, and 111.7 mm in Bayan-Undur *soum* (see Table 3 for monthly and total precipitation). Most of the precipitation falls during the warmer months of the year in the form of rainfall, with about 80% of the annual precipitation during May - September.

Table 3 Total Annual Precipitation in Khundii Project Areas

Precipitation	Months												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	ANNUAL
Shinejinst *soum* centre													

Precipitation	Months												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	ANNUAL
Monthly Total Average (mm)	2.3	1.6	4.9	4.3	9.5	16.1	29.5	22.4	13.5	3.6	2.1	1.9	122.7
Bayan-Undur *soum* centre													
Monthly Total Average (mm)	2.3	2.6	6.1	5.4	9.9	23.5	28.8	20.0	13.9	4.6	2.0	3.6	111.7

Source: Shinejinst (1980-2018) and Bayan-Undur soums (2000-2018) weather station data

2.1.5 Atmospheric Humidity

The atmospheric humidity in the Project area varies considerably between spring and winter months. Average relative humidity at Shinejinst *soum* centre is about 46% during April and May, but it increases to around 67% during the winter months of December and January. Monthly average humidity, as recorded at the Shinejinst meteorological station in Shinejinst *soum* is presented in Table 4.

Table 4 Monthly Average Relative Air Humidity in Khundii Project Area

Humidity Parameter	Monthly Average Humidity Values (%)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Relative Humidity	67.0	63.0	54.5	46.8	45.7	49.2	53.4	54.0	51.3	54.6	62.0	66.5

Source: Shinejinst weather station data (1980 – 2018)

2.1.6 Wind Characteristics

Wind velocity is lowest during the winter months (December to February) with an average of 3.8 m/s. Wind speed increases during the spring months reaching 4.6 to 4.9 m/s in April and May. The strongest wind events occur starting from March to May, blowing mostly from the southwest and west directions. Average annual wind speed around Shinejinst and Bayan-Undur *soum* centres are 4.9 m/s and 3.7 m/s, respectively (Table 5).

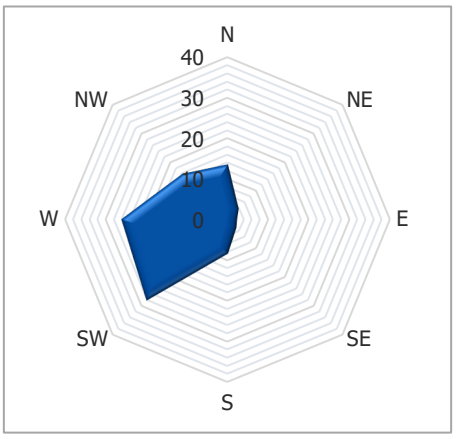
Table 5 Average Wind Velocity in the Khundii Project Areas

Wind Parameters	Months												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	ANNUAL
Shinejinst *soum* centre													
Monthly Average Wind Speed (m/s)	3.4	3.6	4.3	4.9	4.6	3.7	3.2	3.2	3.7	3.9	4.3	3.7	4.9
Maximum Observed Wind Speed (m/s)	28	24	28	32	28	24	20	26	24	24	30	24	26
Bayan-Undur *soum* centre													
Monthly Average Wind Speed (m/s)	3.2	3.5	4.1	4.5	4.2	3.2	3.0	3.2	3.5	3.8	4.1	3.5	3.7
Maximum Observed Wind Speed (m/s)	14	14	20	20	16	12	12	14	14	14	18	18	15.5

Source: Shinejinst (1980-2018) and Bayan Undur soums (2000-2018) weather station data

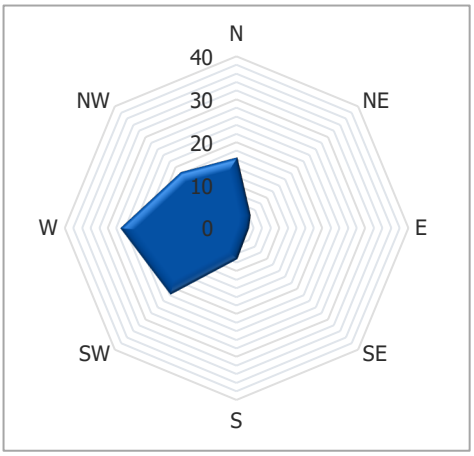
South-west to westerly winds are dominant in the Project area for most of the year. Nearly 40% of the wind blows from the west during the windy spring months of March – May. Westerly wind is still dominant (around 30%) during the summer months (i.e. June-August), but the frequency is

lower than in spring months. During autumn wind direction frequency is similar to spring, with wind blowing from westerly and south-westerly directions for most of the time (Figure 2). West and south-westerly winds are still prominent during the less windy winter months, but north-westerly winds increase during this time compared to other seasons. Observed long term wind direction data recorded at the Shinejinst *soum* weather station is shown in Figure 2 as representative wind direction of the area.

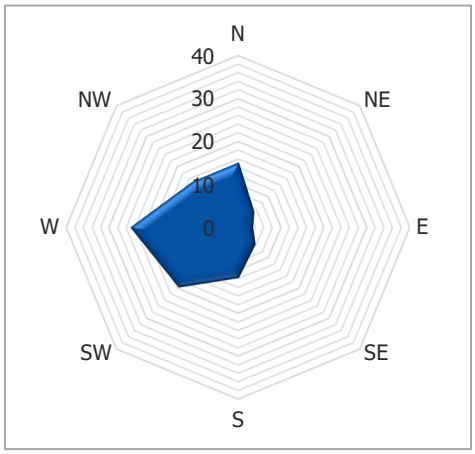


Numbers on the ring indicate percentage of wind occurrences for the given period

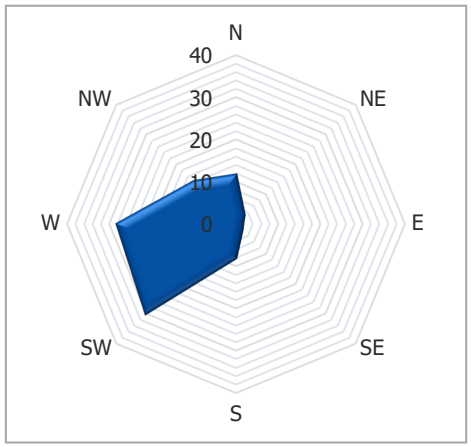
a) Yearly wind distribution



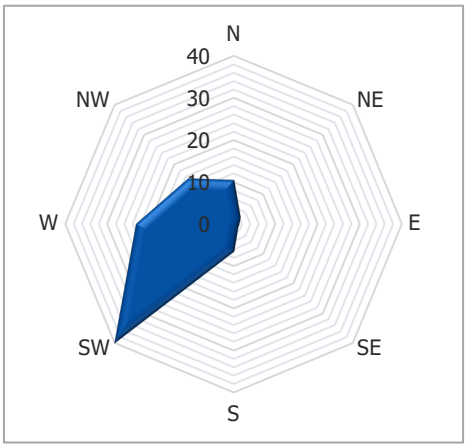
b) March – May Period



c) June – August period



d) September–November period



e) December – February period

Source: Shinejinst soum weather station data, 1980 to 2018.

Figure 2 Yearly and Seasonal Wind Direction Data of the Project Area

2.1.7 Atmospheric Pressure

The annual average air pressure in Shinejinst *soum* is about 902 kPa (Namkhaijantsan 1999). Atmospheric pressure is higher during cold winter months, compared to warm summer months such as June, July and August (Table 6).

Table 6 Monthly Atmospheric Pressure Values in the Khundii Project Area

Atmospheric Pressure	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average pressure	910	908	905	901	899	894	893	891	902	907	910	910

Source: Namkhaijantsan 1999

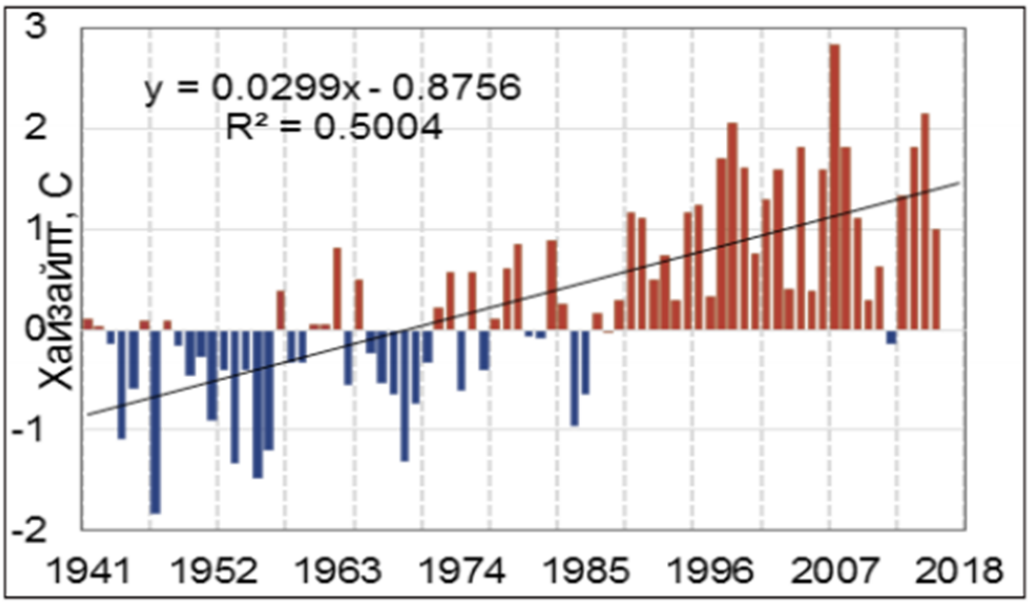
2.2 Climate Change

For the preparation of this baseline assessment, climate change projections have been sourced from the latest national climate change study *Mongolia Second Assessment Report on Climate Change (2014)* by the Ministry for Environment and Tourism of Mongolia.

2.2.1 Observed Climate Change

2.2.1.1 Air Temperature Change

Based on records from 48 meteorological stations distributed across the country, the annual mean temperature in Mongolia increased by 2.07°C from 1940 to 2013 (Figure 3). The warming intensity during the summer has also increased during this period. The warming trend intensity was higher in the mountainous regions compared to Gobi and Steppe regions of the country. The warmest 10 years of the last 74 years have all occurred since 1997.



(a) Source: Ministry of Environment and Tourism, 2017.
(b) Deviation from the multi-year average (1961 to 1990) of annual mean temperature average of the entire territory of Mongolia.

Figure 3 Average Temperature Trend in Mongolia for the Period 1940 to 2016

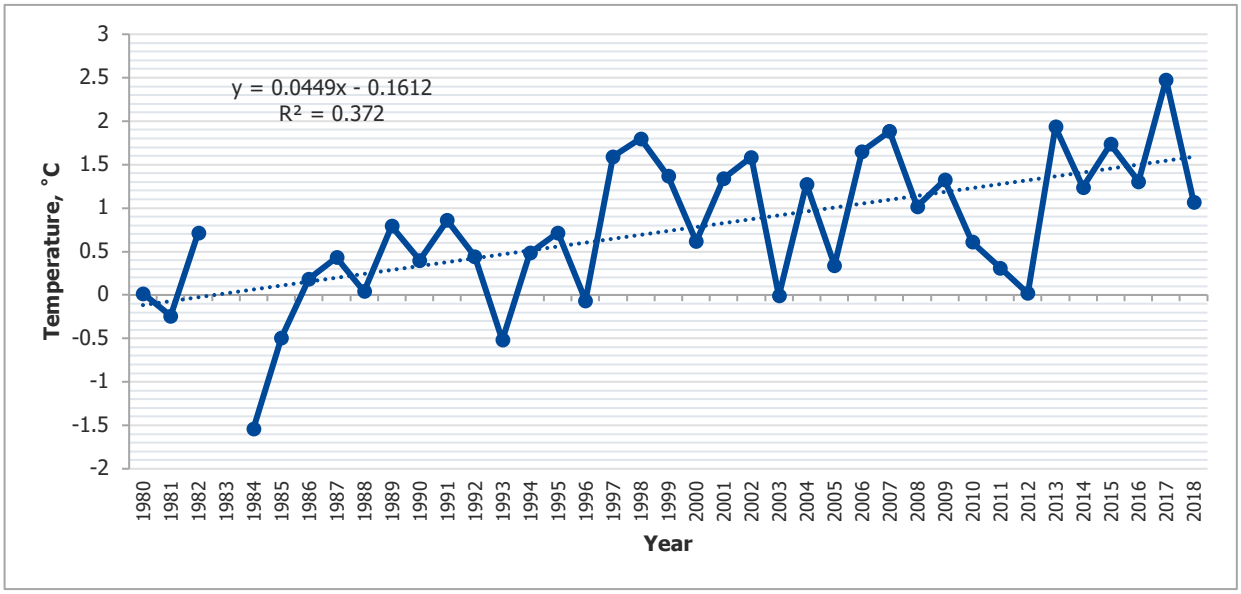
According to the MET (2014), "*when the value of the angular coefficient from the equation of multi-year linear trend of number of hot days is considered with the data between 1975 and 2007 when 64 meteorological stations worked in parallel, the results show five to eight days*

increase in 10 years in the eastern part of Mongolia as well as in the Great Lakes depression area and less rate of increase in the Altai, Khangai mountainous regions".

The number of hot days (days with temperature reaching 30°C) has increased by 5 to 8 days in 10 years in the eastern part of Mongolia. This rate is less pronounced in the western part of the country. The number of cold days (days with temperature dropping below -25°C) is decreasing.

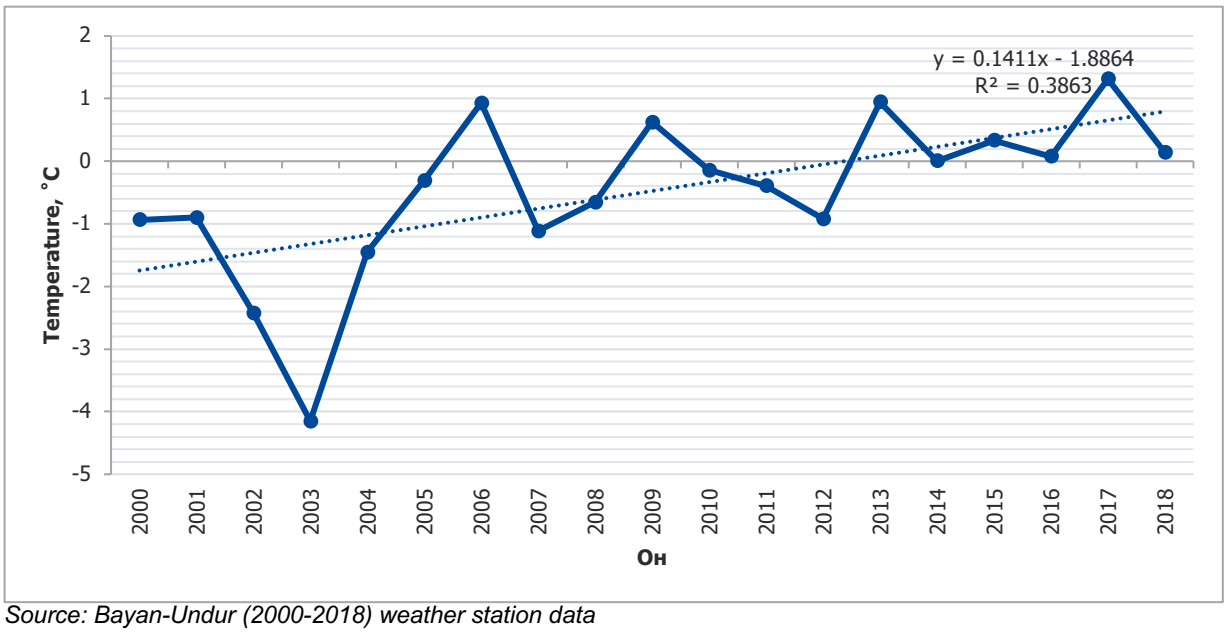
2.2.1.2 Average Temperature Changes in the Project Area

The average annual air temperature from 1980 to 2018 in this region shows that the average air temperature since 1980 has increased by 0.4°C per decade (Figure 4a). This trend is 1.1°C higher per decade than the average temperature increase observed in Mongolia since the early 1940s. Observed temperature from the Bayan-Undur *soum* station data between 2000 and 2018 indicate an even higher warming rate with an average of 1.4°C warming per decade (Figure 4b), however this needs to be interpreted with caution due to the limited data duration used.



Source: Shinejinst (1980-2018) weather station data

a) Average annual air temperature in Shinejinst *soum*, 1980-2018



Source: Bayan-Undur (2000-2018) weather station data

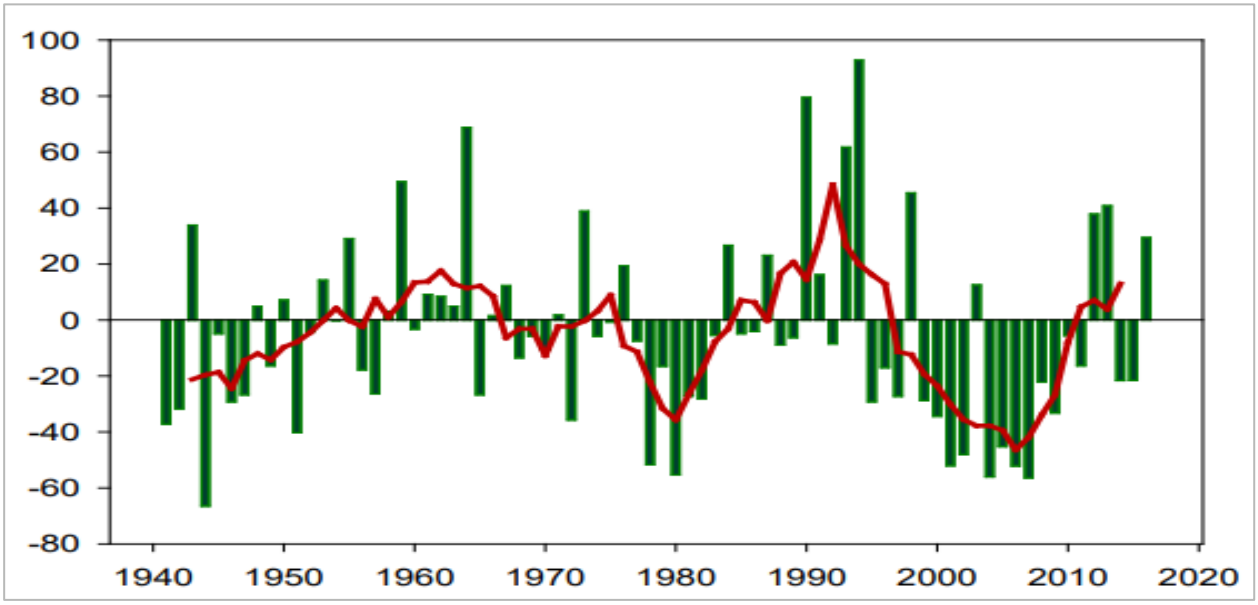
b) Average annual air temperature in Bayan-Undur *soum*, 2000-2018

Figure 4 Annual Average Temperature Trends for the Khundii Project Area

2.2.1.3 Changes in Precipitation

Linear trend analysis has been used to analyse the trends of the observed monthly mean data for precipitation in different seasons. Based on this analysis, approximately 92% of total precipitation was identified to fall in warmer seasons (late spring, summer and early autumn), with summer rainfall accounting for 70% of the annual precipitation (*Source: Ministry of Environment and Tourism, 2017.*

Figure 5



Source: Ministry of Environment and Tourism, 2017.

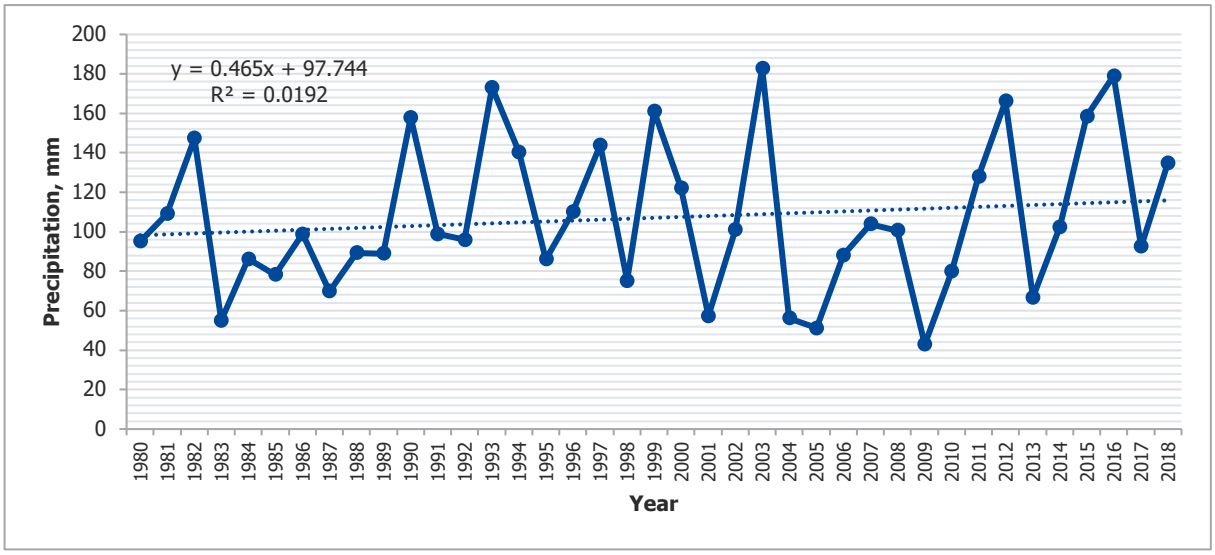
Figure 5 Multi-year Annual Precipitation in Mongolia (1940-2016)

Warm season precipitation has increased slightly in the Altai mountains, Gobi region and south-eastern parts of Mongolia since 1961, while it decreased for the rest of the country at an annual

rate of 0.1 to 2.0 mm/year. Winter precipitation, in the form of snow, has also increased gradually in the Altai mountains, Gobi region and south eastern parts of Mongolia since 1961 (MET 2014).

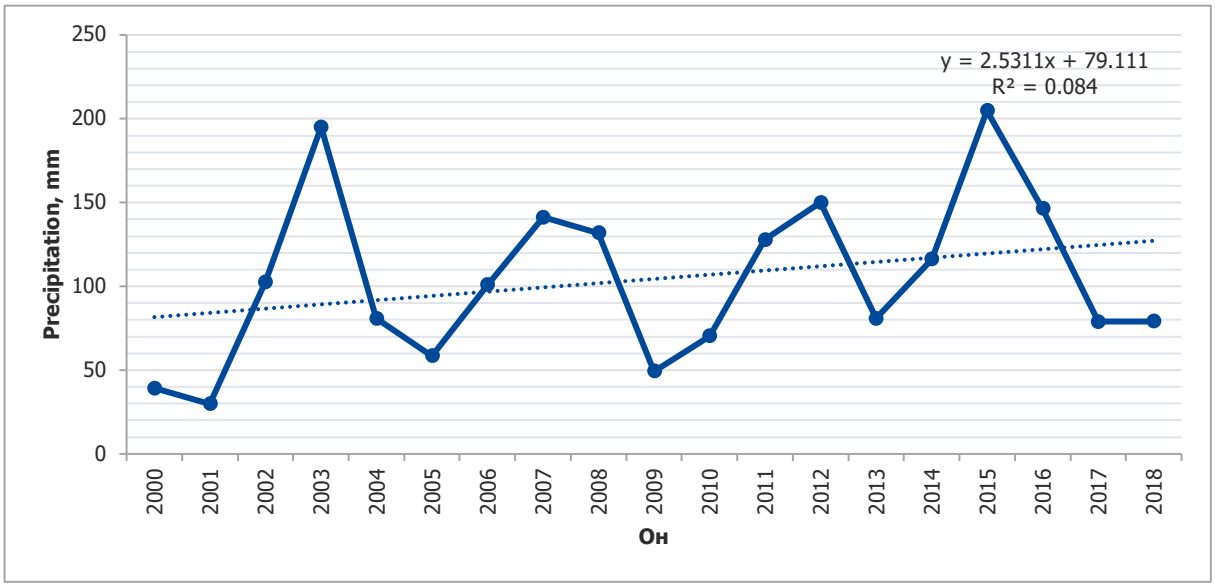
2.2.1.4 Annual Precipitation Change in the Project Area

Annual total precipitation shows significant year to year variation (Figure 6) in the Project area. Overall, the annual precipitation trend has been positive (i.e. increased over time) during the observation years at both weather stations in the Project area. However, the trend is less significant given the greater inter annual fluctuations in precipitation totals (Figure 6).



Source: Shinejinst (1980-2018) weather station data

a) Average annual precipitation in Shinejinst *soum*, 1980-2018



Source: Bayan Undur (2000-2018) weather station data

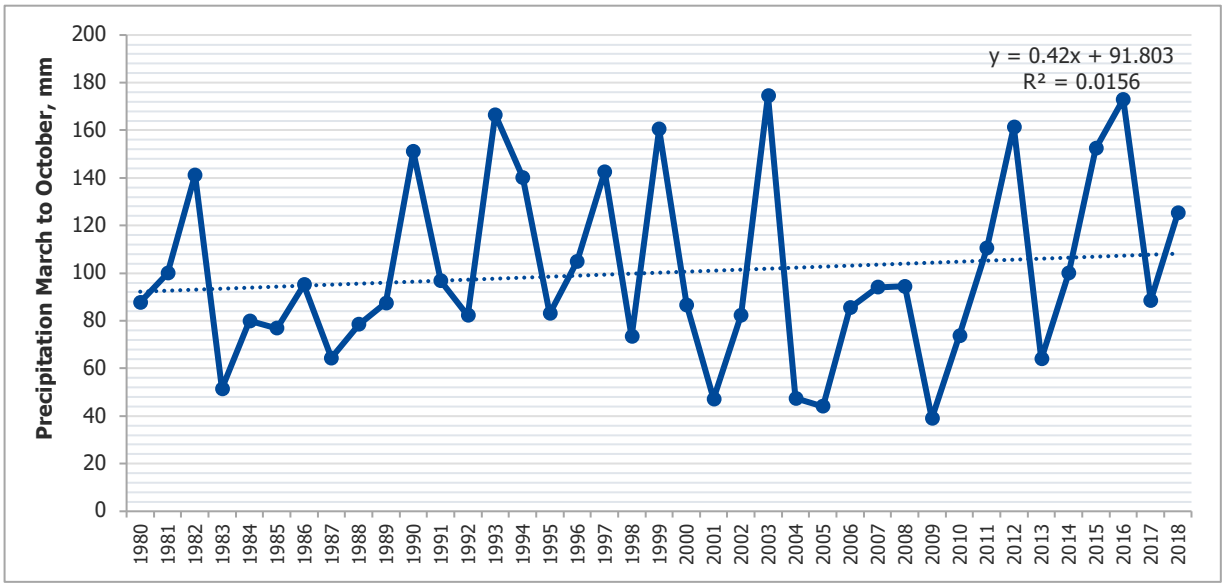
b) Average annual precipitation in Bayan-Undur *soum*, 2000-2018

Figure 6 Annual Total Precipitation Trend in the Project Area: a) Shinejinst; b) Bayan Undur

Changes in annual precipitation are primarily driven by the changes in warm season precipitation, as the warm season (approximately March to October) accounts for most of the annual

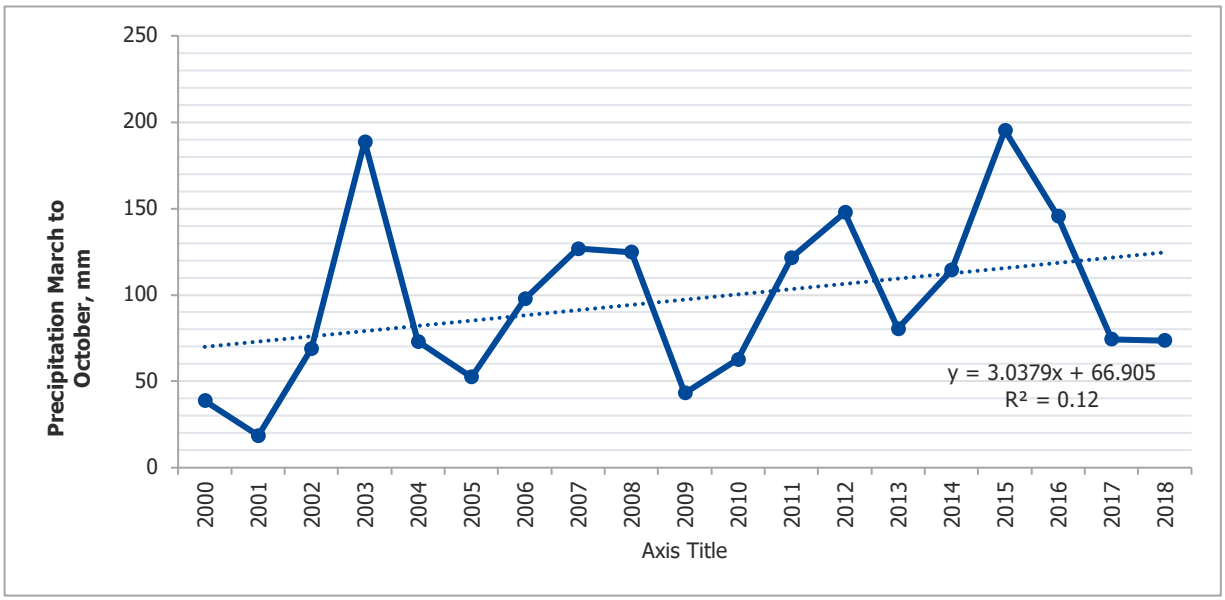
precipitation in Mongolia and for the Project area (see Figure 7 for variation in warm season months' precipitation).

Observed changes in the annual and seasonal precipitation in the Project area are in agreement with the overall observed changes in precipitation in the south-west of Mongolia since 1961 (MET 2014).



Source: Shinejinst (1980-2018) weather station data

a) Precipitation from March to October in Shinejinst *soum*, 1980-2018



Source: Bayan Undur (2000-2018) weather station data

b) Precipitation from March to October in Bayan-Undur *soum*, 2000-2018

Figure 7 Changes in Warm Season (March to October) Precipitation in the Project Area

In addition to the changes in annual total precipitation, the seasonal participation regime is changing across Mongolia, with more frequent flood events occurring over the years, causing greater damage to infrastructure and threatening livelihoods.

2.2.1.5 Climate Change Projections

In general, predictions are provided for the country as a whole and there is lack of downscaled climate change projections at a regional level in Mongolia.

The latest assessment report (MET 2014) on climate change identified changes likely to occur in Mongolia up to the year 2100. These anticipated changes are set out in Table 7. The winter temperature change is projected to increase between 2.1°C and 2.3°C by 2035, while further warming of 2.5°C to 6.0°C is expected by the end of the century in Mongolia. Summer temperatures are projected to increase by 2.1°C to 2.2°C by 2035, and likely to increase further by 2.5°C to 6.0°C in the next 80 years. A slight increase (i.e., 10% to 14%) is projected for winter precipitation in the next two decades, with more pronounced change by the end of the century with an expected 15% to 50% increase in winter precipitation. Summer precipitation is not expected to increase drastically over the coming decades, with a maximum projected increase of 8.7% by 2100.

Table 7 Seasonal Climate Change Predictions in Mongolia

Scenarios	Season	Time Frame 2016 to 2035		Time Frame 2081 to 2100	
		Temperature (°C)	Precipitation (%)	Temperature (°C)	Precipitation (%)
RCP 2.6	Winter	2.3	10.1	2.5	15.5
	Spring	2.3	9.2	2.4	11.7
	Summer	2.2	6.2	2.5	5.1
	Autumn	2.1	7.6	2.4	7.6
RCP 4.5	Winter	2.1	12.3	3.7	28.7
	Spring	2.0	7.8	3.4	17.4
	Summer	2.1	1.1	3.5	7.8
	Autumn	2.0	8.1	3.4	11.7
RCP 8.5	Winter	2.2	14.0	6.3	50.2
	Spring	2.2	9.8	5.6	28.6
	Summer	2.2	2.4	6.0	8.7
	Autumn	2.2	6.4	6.1	24.1

Source: MET, 2014.

2.3 Extreme Events

A range of other weather-related extreme events are considered in this section, namely dust storms, drought and the associated phenomenon of *dzud* (a hard winter following a summer drought which can devastate wildlife and livestock). Due to lack of detailed data locally, regional or nation-wide data are used for this assessment, with consideration for Project context.

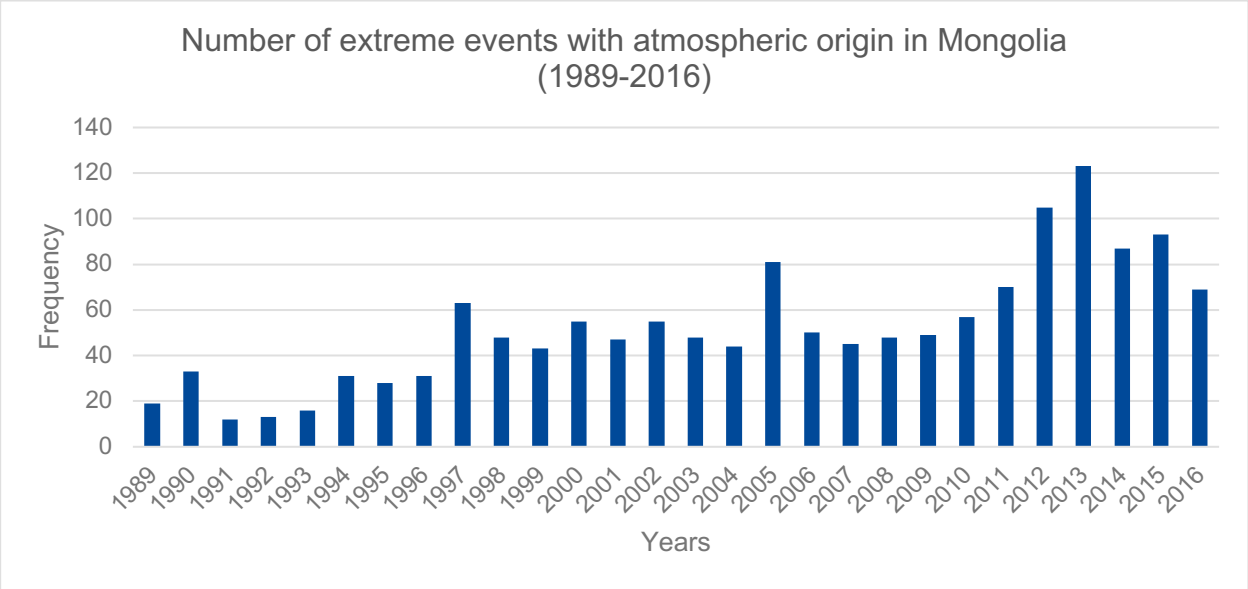
2.3.1 Droughts

Periods of low rainfall are common throughout Mongolia. Water and forage are the most important resources for livestock, so the drying up of surface and near-surface water sources and the resultant decline in forage resources for livestock directly impact livelihoods. A decline in these resources may greatly affect livestock conditions, milk production and ultimately herders' livelihood security.

Mongolia experienced its worst recorded droughts in the past 80 years in the summers of 1999 to 2002, which affected 50% to 70% of Mongolian territory. About 3,000 water sources, including 680 rivers and 760 lakes, dried up during these drought events, resulting in reduced animal food and weakened animals that were less equipped to cope with the subsequent extreme cold of winter (MET 2017).

2.3.2 Other Extreme Events

Drought, *dzud*, flood and wildfires are the most common natural disasters in Mongolia. Occurrences of most natural disasters in Mongolia are closely related to weather and climate conditions. As climate change intensifies, the frequency of natural disasters is also increasing. The number of extreme weather events doubled in Mongolia in between 2001 to 2016, compared to the years from 1990 to 2000 (Figure 8).



Source: MET, 2017.

Figure 8 Number of Hazardous and Dangerous Weather Events in Mongolia, 1989 to 2016

Natural disasters cause significant economic loss, and often human casualties, in Mongolia. Winters in late 2009 and in early 2010 and 2011 were extremely harsh for herding communities in Mongolia. According to the Government of Mongolia (GoM), in May 2010 up to 8.4 million head of livestock perished due to extreme weather conditions in 175 *soum*s of 18 provinces across Mongolia. Approximately 770,000 herders/individuals were affected, out of which 43,500 herders were left without any animals and 164,000 other families lost more than half of their livestock. The GoM indicated that more than 1,400 herder households relocated to urban areas during this period.

In 2018, nearly 90 occurrences of natural disasters were recorded in Mongolia. These disasters claimed 20 human lives and over ten thousand livestock and destroyed some infrastructure. A total economic loss due to the natural disasters reached 24.2 billion MNT in 2018 (MET 2018).

2.4 Climate Baseline Conclusions

The Project area is characterised by a dry, continental climate with extremes of temperature (high summer temperatures and cold winter temperatures). Hot summers with limited rainfall constitutes the area as dry and prone to land degradation. Dry conditions are prevalent, and much of the Gobi rangeland area creates dusty conditions. No permanent surface water was identified in the

Project area. The local water supply is entirely dependent on groundwater resources whose recharge is dependent on the limited precipitation in the region.

Over time, it is predicted that there will be an incremental increase in temperature; an increase which will likely result in increased evaporation and higher frequency of drought.

2.5 Air Quality

The Area of Influence (AoI) for air quality conditions has been defined as a 10 km area around the KGP site and a corridor along the main access road to the Project as shown in Figure 9.

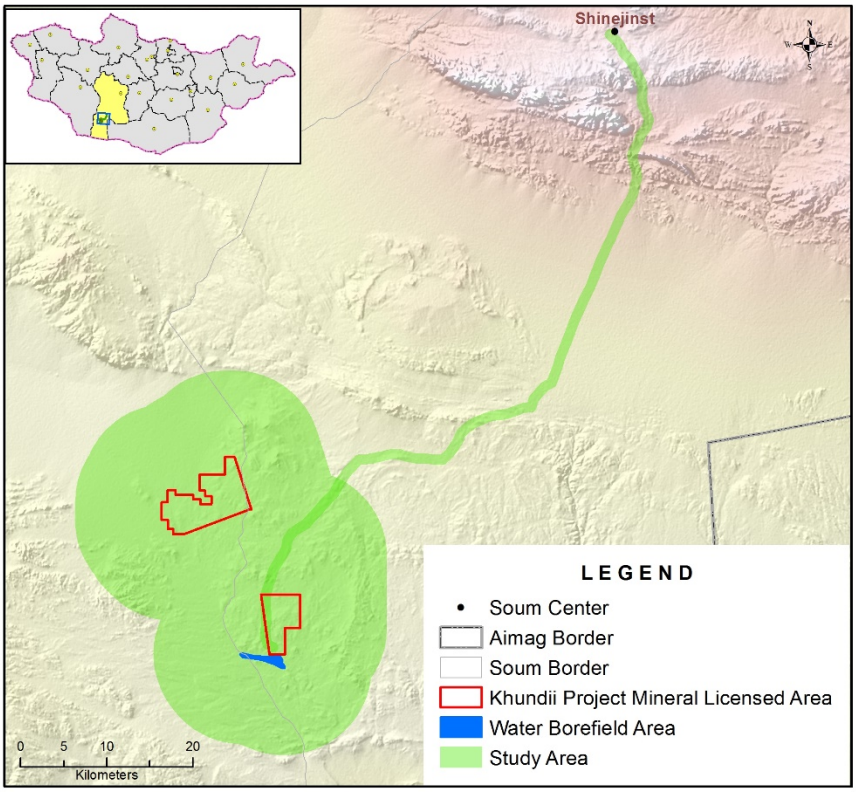


Figure 9 Khundii Gold Project Air Quality Area of Influence (AoI)

The ambient air quality within the AoI is unaffected by industrial or urban sources of emissions due to the sparse population of region and geographic isolation from significant population centres. The air quality in the region is mostly impacted by seasonal dust storms when soil conditions are dry which are eroded from strong wind events.

2.5.1 Sources of Baseline Data

Ambient air quality data has been obtained from two monitoring campaigns by Eco Trade LLC in 2017 and 2019 (see References section) undertaken in the Project area. Monitoring of particulates (PM_{10} and $PM_{2.5}$) was undertaken at five locations in 2016. Monitoring of particulates (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2) and nitrogen dioxide (NO_2) were taken at six locations in the region in 2019.

Baseline air quality data from continuous air quality monitoring will be established over a 3 month period to determine conditions before the commencement of construction and operation of the Project (see Chapter D1 *Air Quality Management Plan*). This additional baseline will be used to

assess the impact of the Project and present the impacts in terms of the existing ambient environment.

2.5.2 Ambient Air Quality Standards

The European Bank for Reconstruction and Development (EBRD) requires European Union (EU) limits to be achieved, unless there are more stringent local requirements. The International Finance Corporation (IFC) requires a comparison of standards between national and IFC Ambient Air Quality guidelines, with the most stringent to be achieved. In the absence of such standards, the use of EU standards is acceptable. There are no discrepancies between the IFC ambient air quality guidelines and the EU ambient air quality standards. The IFC guidance requires emissions from a single project not to contribute more than 25% of the applicable ambient air quality standards to allow additional, future sustainable development in the same airshed.

In summary, the ambient air quality standards to be used in this ESIA are:

- Mongolian Air Quality Guidelines (MNS 4585:2007);
- International Finance Corporation (IFC) Environmental Air Emissions and Ambient Air Quality Guidelines (2007); and
- EU Directives 2008/50/EU.

These are summarised in Table 8 below.

Table 8 Ambient Air Quality Standards

Pollutant	Averaging Period	EU Limit Value ($\mu g/m^3$)	Mongolian Limit Value ($\mu g/m^3$)	KGP Standard ($\mu g/m^3$)	Notes
SO_2	annual	20	20	20	-
	24-hour	125	50	50	-
	1-hour	350	-	350	EU not to be exceeded more than 24 times per year
	20-minute	-	450	450	-
NO_2	annual	30	40	30	-
	24-hour	40	50	40	For the protection of vegetation
	1-hour	200	-	200	EU value not to be exceeded more than 18 times per year
	20-minute	-	200	200	-
PM_{10}	annual	40	50	40	Allows natural sources to be taken into account
	24-hour	50	100	50	Not to be exceeded more than 35 times per year
$PM_{2.5}$	annual	20	25	20	-
	24-hour	-	50	50	-
Carbon Monoxide	8-hour	10,000	10,000	10,000	-
	1-hour	-	30,000	30,000	-

Sources:
(a) IEU air quality requirements from EU Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.
(b))Mongolian Values from MNS 4585:2016 Source: Mongolian Agency for Standardization and Meteorology (2016).

Notes:
(a) PM_{10} denotes particulate matter of less than 10 microns in diameter.
(b) $PM_{2.5}$ denotes particulate matter of less than 2.5 microns in diameter.
(a) Directive 2008/50/EU also includes target values for ozone. This pollutant will not be included in the assessment because it is not emitted directly into the atmosphere but is formed as a result of a series of complex chemical reactions. Information on the ambient concentrations of its precursors (in particular the large number of different natural and anthropogenic volatile organic compounds) is required to estimate concentrations. This information is not available for the area around the KGP Project, but concentrations of these ozone precursors in the region are expected to be low.

2.5.3 Existing Sources of Emissions

The project is very isolated, with no townships or industrialised activity in the region. The region surrounding the Project Site is subject to seasonal strong winds and the fine desert soils favour significant particulate generation. Naturally elevated ambient air concentrations of particulates are relatively common in the region.

2.5.4 Existing Sensitive Receptors

The Bayankhongor *aimag* region is one of the most sparsely populated areas globally, however, infrastructure to access south-western Mongolia's natural resources from China is developing rapidly. The nearest towns (*soum* centres) are Shinejinst and Bayan Undur, located 70 km northeast and 80 km to the north, respectively. Populations of Shinejinst and Bayan Undur *soums* were 2,449 and 2,668, respectively, in 2018. Population in the *aimag* is concentrated around the *soum* centres and to the north. Total population density is low and hasn't materially changed in the past 10 years. In Bayankhongor *aimag* the population density was 0.8 persons per square kilometre in 2018, an increase from 0.7 in 2010. At 0.8 persons per square kilometre it is the 6th least densely populated province in Mongolia.

Nomadic pastoral activity occurs in the region and there are known seasonal herder camps in the vicinity of the Project. The nearest known winter camps are located 1 to 2 km from to the south-west of the Project boundary. These camps are not continuously inhabited and lack permanent facilities but would be considered residential sensitive receptors for the purposes of determining air quality impacts.

2.6 Background Air Quality Data

2.6.1 Monitoring Results

2.6.1.1 Monitoring Campaign - 2016

Table 9 and Table 10 present monitoring results for PM_{10} and $PM_{2.5}$ measured during the 2016 monitoring campaign. Figure 10 presents the locations of the monitoring points in relation to the proposed pit operations and camp.

The results indicated that concentrations on the days of the monitoring for both PM_{10} and $PM_{2.5}$ were well below the relevant standards. It should be noted that monitoring was only completed for one day at each location. Ideally, ambient air quality monitoring is conducted continuously to account for changes in climatic conditions. It should be noted that this greenfield site – much like others in Mongolia and globally – is operated seasonally and sporadically, far from existing infrastructure and without the resources (people, security, equipment) to enable such continuous monitoring to date. However, additional pre-construction continuous air quality monitoring is stipulated in Chapter D1 *Air Quality Management Plan* and will be commenced once pre-development infrastructure is in place, including site security and electrical power source.

Table 9 Monitored 24-Hour Average Concentrations of PM_{10} in Area of Interest - 2016

#	Sampled date	24hr Av PM_{10} ug/m^3	EU Limit 24hr Av ug/m^3	MNS 4585:2016 24hr Av ug/m^3	IFC 2007 24hr Av ug/m^3
1	2016.05.30	4	50	100	50
2	2016.06.01	3			
3	2016.06.02	4			
4	2016.06.03	3			
5	2016.06.04	3			

Table 10 Monitored 24-Hour Average Concentrations of $PM_{2.5}$ in Area of Interest - 2016

#	Sampled date	24hr Av $PM_{2.5}$ ug/m^3	EU Limit 24hr Av ug/m^3	MNS 4585:2016 24hr Av ug/m^3	IFC 2007 24hr Av ug/m^3
1	2016.05.30	5	-	50	25
2	2016.06.01	3			
3	2016.06.02	5			
4	2016.06.03	1			
5	2016.06.04	3			

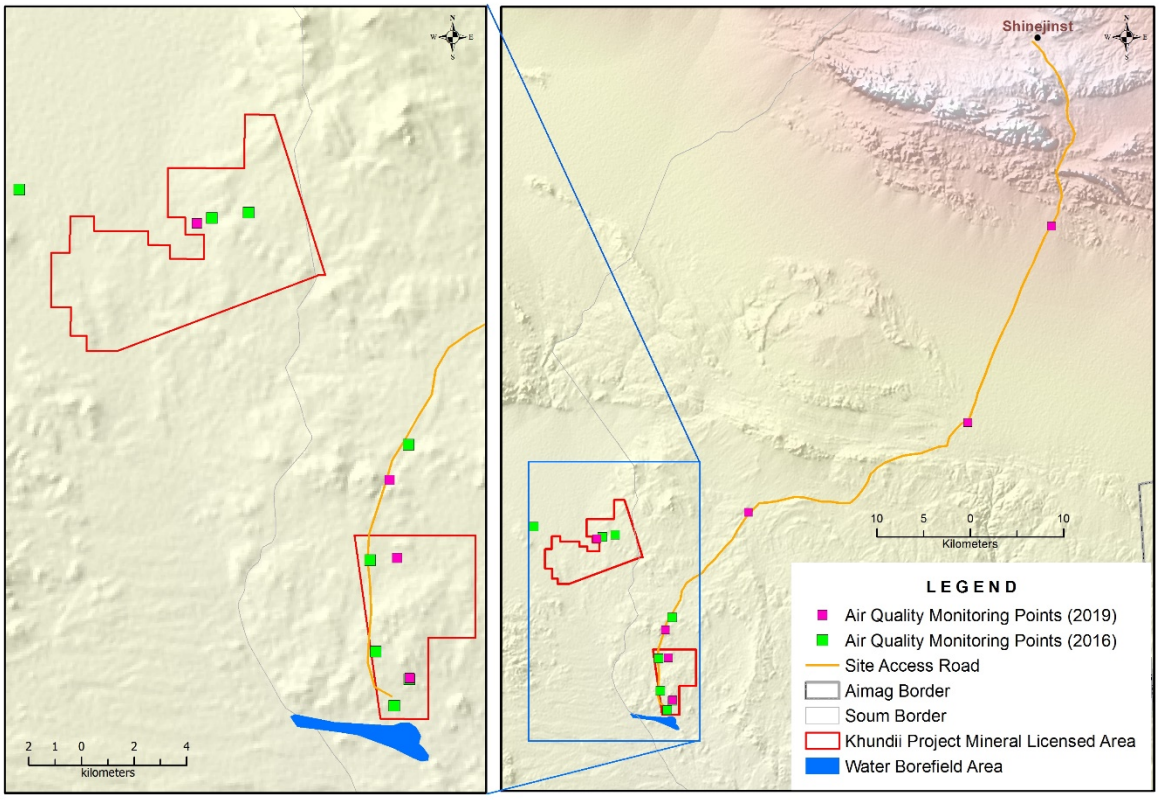


Figure 10 Locations of Monitoring in 2016 Monitoring Campaign

2.6.1.2 Monitoring Campaign - 2019

Monitoring of PM_{10} and $PM_{2.5}$, SO_2 and NO_2 undertaken in 2019 and measured at six locations (Figure 10) are presented in Table 11, Table 12, Table 13 and Table 14 respectively.

The results indicated that on the days of the monitoring concentrations of PM_{10} and $PM_{2.5}$ were well below the nominated standards. The NO_2 and SO_2 concentrations were below the standards but were more elevated than would be expected in a region with no significant sources of these pollutants. Again, similar to the 2016 campaign, monitoring was only completed for one day at each location. This data will be validated during the pre-development continuous air quality monitoring campaign as described in *D1 Air Quality Management Plan*.

Table 11 Monitored 24-Hour Average Concentrations of PM_{10} in Area of Interest - 2019

#	Sampled date	24hr Av PM_{10} ug/m^3	EU Limit Value ug/m^3	MNS 4585:2016 ug/m^3	IFC 2007 ug/m^3
1	Bayanbulag-Khoid Zakh	14	50	100	50
2	Bayanbulag-Khundii	17			
3	New camp ZU	1			
4	Along the road	4			
5	Open Pit ZU	0			
6	Bayanbulag-Khoid Zakh	3			

Table 12 Monitored 24-Hour Average Concentrations of $PM_{2.5}$ in Area of Interest - 2019

#	Sampled date	24hr Av $PM_{2.5}$ ug/m^3	EU Limit Value ug/m^3	MNS 4585:2016 ug/m^3	IFC 2007 ug/m^3
1	Bayanbulag-Khoid Zakh	4	-	50	25
2	Bayanbulag-Khundii	5			
3	New camp ZU	1			
4	Along the road	5			
5	Open Pit ZU	0			
6	Bayanbulag-Khoid Zakh	1			

Table 13 Monitored Average Concentrations of SO_2 in Area of Interest - 2019

#	Sampled date	Av SO_2 ug/m^3	EU Limit 1hr Average ug/m^3	MNS4585:2016 20 Minute Average ug/m^3	IFC 2007 10 Minute Average ug/m^3
1	Bayanbulag-Khoid Zakh	24	350*	450*	500*
2	Bayanbulag-Khundii	36			
3	New camp ZU	28			
4	Along the road	9			
5	Open Pit ZU	8			
6	Gun Zag well	104			

Table 14 Monitored Average Concentrations of NO_2 in Area of Interest - 2019

#	Sampled date	Av NO_2 ug/m^3	EU Limit 1hr Average Value ug/m^3	MNS 4585:2016 1hr Average ug/m^3	IFC 2007 1hr Average ug/m^3
1	Bayanbulag-Khoid Zakh	93	200	200	200
2	Bayanbulag-Khundii	93			
3	New camp ZU	96			
4	Along the road	102			
5	Open Pit ZU	98			
6	Gun Zag well	144			

2.7 Air Quality Baseline Conclusion

The project is very isolated, with no townships or industrialised activity in the region. The region surrounding the Project Site is subject to seasonal strong winds and the fine desert soils are a significant source of particulate generation. Ambient air particulate concentrations in the AoI are heavily influenced by climatic conditions. Naturally elevated ambient air concentrations of particulates are relatively common throughout the region especially during seasonal strong wind events that occur following the dry winter.

Ambient concentrations of SO_2 and NO_2 and other common pollutants are expected to be low or negligible due to the lack of local or regional emission sources. Short term air quality monitoring has been completed at the Project site in 2016 and 2019. However, given the sporadic and short-term nature of the monitoring undertaken to date Erdene is committed to undertake additional continuous monitoring to verify the baseline air quality conditions during the pre-development Project stage.

2.8 References

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

B3 - Noise and Vibration

April 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
dB	decibel, a unit used to measure the intensity of a sound
ESIA	Environmental and Social Impact Assessment
IFC	International Finance Corporation
MNS	Mongolian National Standard
MLA	Mine Licenced Area
WHO	World Health Organization

3. NOISE AND VIBRATION

3.1 Introduction

This Chapter of the Khundii Gold Project (Project) Environmental and Social Impact Assessment (ESIA) describes the baseline noise and vibration conditions at the Project's potential Area of Influence (AoI). The Project AoI for noise and vibration covers 5 km buffer areas from the Mineral Licenced Areas (MLA) during mine construction and operation, as shown in Figure 1. All major noise and vibration sources (i.e. mine and camp construction, operation of the open pit mine including blasting, processing plant activities) will be contained within limited areas within the MLAs.

Due to the absence of permanent sensitive receptors and limited traffic, the access road noise and vibration assessments are scoped out for this ESIA. There are no permanent noise and vibration sensitive receptors or sources along the KGP access road. Nomadic herders use the pastures along the access road, but the herder camps are not permanent. Herders move from one pasture area to another following forage availability between seasons or even within a season if needed. The KGP traffic is estimated to be a maximum of approimately 8 vehicles per day during peak construction period.

No other noise and vibration sensitive receptors are identified outside of the defined AoI.

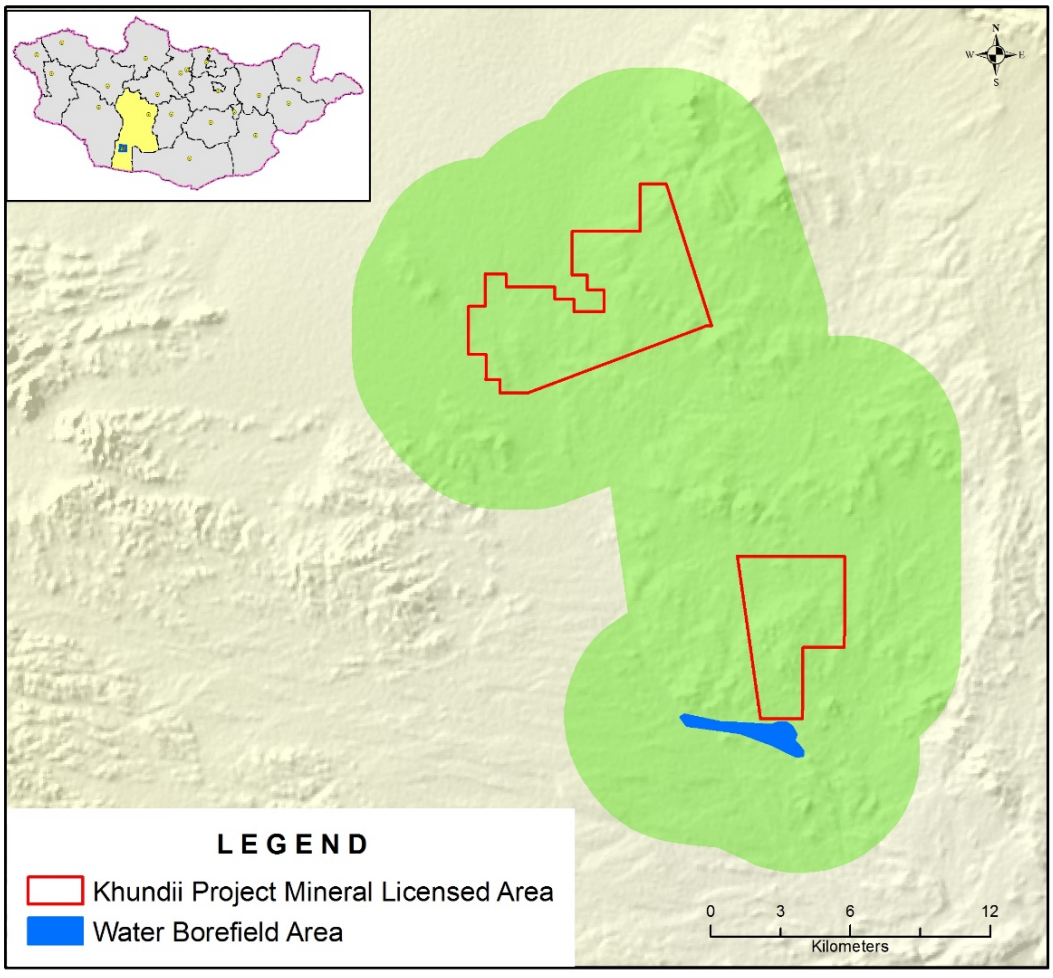

Figure 1 Khundii Project Noise and Vibration Area of Influence

3.2 Baseline Characterisation Methodology

3.2.1 Sources of Information

Existing noise and vibration conditions at the Project area have been characterised by review of information contained within the following reports:

1. Eco Trade LLC. 2017. Altan Nar Environmental and Social Baseline Study.
2. Eco Trade LLC. 2017. Bayan Khundii Environmental and Social Baseline Study.
3. Eco Trade LLC. 2019. Altan Nar Environmental and Social Baseline Study Update.
4. Eco Trade LLC. 2019. Bayan Khundii Environmental and Social Baseline Study Update.

No vibration levels were recorded during the above studies as there have been no Project induced vibration sources and sensitive receptors at the site thus far.

For the purpose of this ESIA, the existing reports listed above were reviewed to describe the baseline noise condition at the Project area. Additional sources relevant to the information included in this chapter have been referenced where appropriate.

3.2.2 Applicable standards

Mongolian national standard, "*MNS 4585:2016 General technical requirements. Air quality*", determined permissible levels of ambient noise (Table 1).

Table 1 Standard Thresholds for Ambient Noise Levels

Level of Noise	Average Time Base	Unit	Standard Permissible Limit
Day time (7 am - 10 pm)	16 hours	dB	60
Nigh time (10 pm - 7 am)	8 hours		45

For comparison, the World Health Organisation (WHO) and International Finance Corporation (IFC) Noise guideline levels are presented in Table 2.

Table 2 WHO and IFC Guideline Values for Community Noise in Specific Environments

	Environment	Guideline Value, LAeq [dB]	Time Base
WHO	Outdoor living area	50 (*Moderate annoyance, daytime and evening*) 55 (*Serious annoyance, daytime and evening*)	16 hours
	Industrial and commercial areas	70	24 hours
IFC	Residential; institutional; education	55 (daytime: 7 am-10 pm) 45 (night-time: 10 pm-7 am)	1 hour
	Industrial; commercial	85 (daytime and night-time)	8 hour

Noise levels above the standard thresholds are considered a potential threat to human health.

3.2.3 Noise Measurement

During the baseline environmental field work at the Project site, Eco Trade's team (2017 a, b; 2019 a, b) measured baseline noise levels using a MS6701 portable digital sound level meter[1] for 20 minutes at each site. Noise monitoring locations in the study areas are shown in Figure 2 below. Locations of the noise monitoring were selected as near potential sensitive receptors as

[1] Visit http://www.mastech-group.com/products.php?PNo=109 for more information on specifications.

possible, like the drilling camp area, proposed open pit areas, and proposed workers camp areas (Table 3).

Table 3 Noise Monitoring Locations and Descriptions, 2016 and 2019

Point ID	Description	Monitoring Year
TN-1	Proposed open pit area	2016
TN-2	Near herder household temporary camp	2016
TN-3	Drilling camp area	2016
HD-1	Proposed mine development area	2016
HD-2	Reference point	2016
HD-3	Proposed mine development area	2016
HD-4	Proposed mine development area	2016
HD-5	Reference point	2016
HD-6	Reference point	2016
HD-7	Proposed camp area	2019
HD-8	Along access road	2019
HD-9	Proposed open pit area	2019

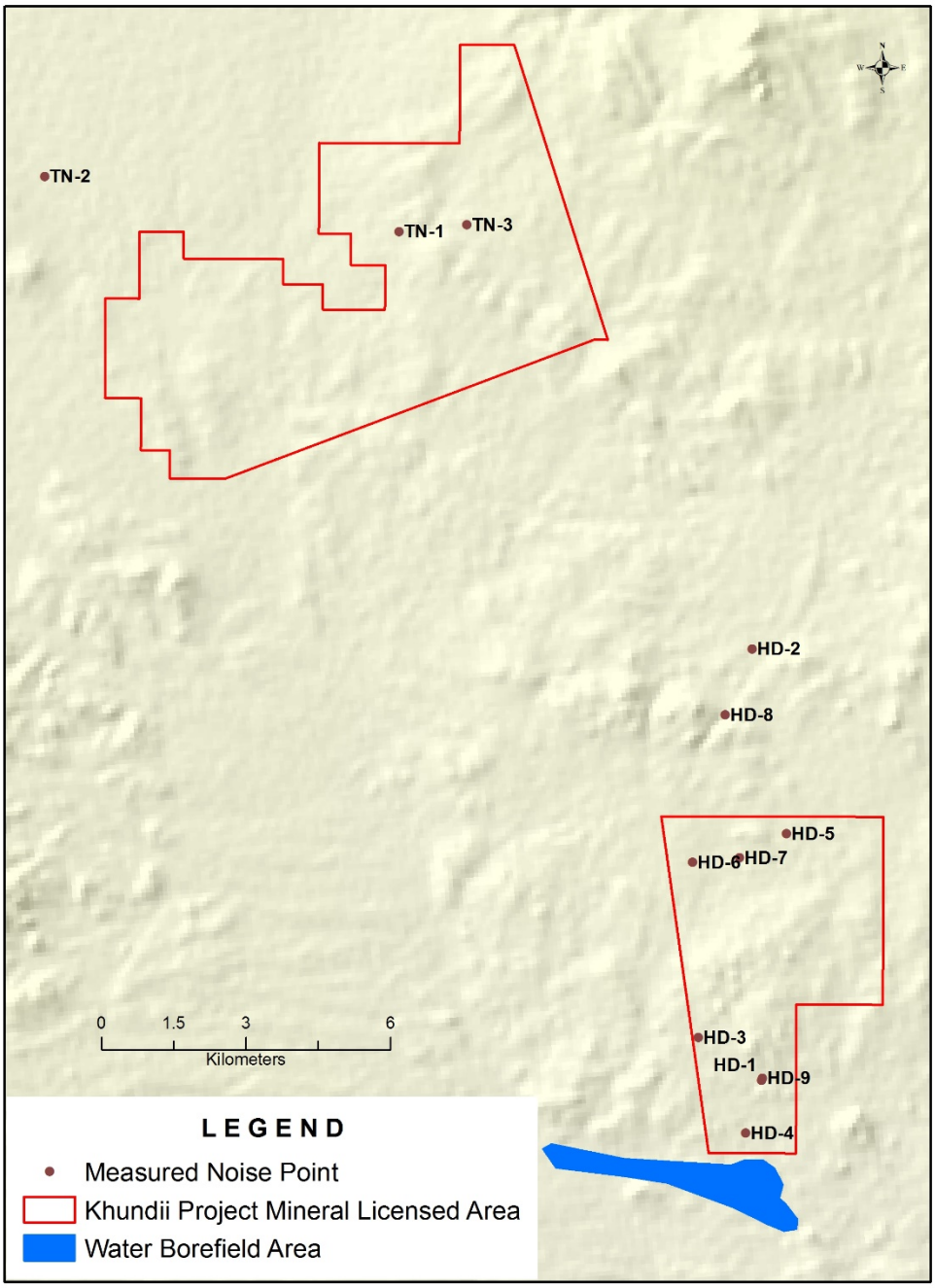

Figure 2 Noise Monitoring Locations

3.3 Baseline Noise and Vibration Conditions

To characterize the baseline noise levels and determine whether there were exceedances above the standard thresholds, the baseline study team compared the recorded noise levels against the noise standards in Section 3.2.2. Sources of noise and vibration were also identified.

3.3.1 Sources of noise

Both of the study areas, Khundii and Tsenkher Nomin licenses, are located in greenfield areas where wind is the main source of noise. There were no industrial activities around the Project

area and the nearest settlement in Shinejinst *soum* of Bayankhongor *aimag* is about 70 km away to the north-east.

Seasonal, temporary drilling activities and traffic were the only Project related noise sources within the study area in the past. The current temporary workers camp in Khundii MLA is the only permanent facility, but this facility is not a major noise source. The current temporary camp is expected to be replaced with a permanent camp at the HD-7 area (see Figure 2) once the Project construction commences.

No permanent herder camps were located around the Project area. The closest temporary herder camp (TN-2 location in Figure 2) was about 3 km north-west of the Tsenkher Nomin MLA in 2016, whereas there were no herders households within 45 km radius from the MLAs in 2019.

3.3.2 Measured Noise Levels

The noise levels measured at the Tsenkher Nomin and Khundii MLAs ranged between 35.0 and 49.5 dB with an average noise level of approximately 41 dB (Table 4). Among the noise monitoring points, the lowest noise level was measured at HD-7 (i.e. next to the site access road in Khundii MLA in 2019). The highest noise level of 49.5 dB was measured next to the drilling camp area in 2016 (TN-3 on Figure 2). Wind was the only source of noise during the measurements.

Table 4 Measured Noise Levels at Tsenkher Nomin Area

Name of the noise measurement point	Measured Noise Level
TN-1 (Proposed open pit area)	36.0 dB
TN-2 (Near herder household temporary camp)	40.0 dB
TN-3 (Drilling camp area)	49.5 dB
HD-1 (Proposed mine development area)	38.0 dB
HD-2 (Reference point)	39.5 dB
HD-3 (Proposed mine development area)	42.3 dB
HD- 4 (Proposed mine development area)	45.3 dB
HD- 5 (Reference point)	36.5 dB
HD-6 (Reference point)	48.7 dB
HD-7 (Proposed camp area)	42.4 dB
HD-8 (Along access road)	35.0 dB
HD-9 (Proposed open pit area)	36.1 dB

Differences in the measured noise levels were due to the varying wind speed during the measurement and background noise levels by vegetation cover under various wind speeds.

None of the noise levels measured during the baseline survey exceeded daytime noise level thresholds specified in the applicable Mongolian or international standards (See Section 3.2.2). However, it should be noted here that the noise measurements were taken for 20 minute intervals, while the standards are only applicable for average noise levels for at least an one-hour duration (see Table 1 and Table 2).

Average noise levels measured in 2016 and 2019 were similar with about 4 dB variation. This variation is likely due to the variations in wind speed, which was the main source of noise during these baseline studies.

3.4 Conclusions

The Project area is located in a greenfield area with no industrial or human settlements nearby. Wind is the main source of noise within the study area. The baseline noise levels within the study area were under the day-time noise levels thresholds recommended by Mongolian and International standards. No information was available for baseline vibration levels in the study areas, however, due to the remoteness of the Project site from any industrial development or human settlements, it is believed that the vibration level is within a natural range.

3.5 References

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SUSTAINABILITY EAST ASIA LLC

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ERDENE MONGOL LLC

B4 - Topography, Landscape, Geology, Soils and Seismicity Baseline

April 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
EBRD	European Bank for Reconstruction and Development
ESIA	Environmental and Social Impact Assessment
EU	European Union
IFC	International Finance Corporation
KGP	Khundii Gold Project

2. TOPOGRAPHY, LANDSCAPE, GEOLOGY, SOILS AND SEISMICITY

2.1 Introduction

This section of the ESIA Baseline presents the physical characteristics of the BK and AN licence areas. The key features covered are topography, landscape, geology, soils and seismicity.

2.2 Topography and Landscape

2.2.1 Overview

The Bayan Khundii license area occupies an area of 4,514 ha in the territory of Shinejinst *soum*, Bayankhongor *aimag*. The Altan Nar licence area covers an area of 4,668.64 hectares and it is also located in Shinejinst *soum*. Both Khundii and Altan Nar are in the Gobi sub-regional zone of the Central Asian region as defined by the Mongolian soil bio-climatic classification.

Climatically, the sites are in the northern part of the Altai Southern Gobi Desert region where the weather is dry and hot in summer with low precipitation. Strong winds and storms frequently occur during the spring and autumn season. The area experiences relatively warm winters compared to northern parts of Mongolia, with rare snowfalls.

In the Gobi-Altai subdivision, the landscape is predominated by Gobi low hills which are characterised by porous, rough surfaces. These hills have typically been eroded by water, temperature and wind to create gullies that can be intensely affected by backward and side erosion between hills, small dry channels, and the flat steppe existing between low hills.

Ephemeral watercourses originate from small hills in the north and merge with riverbeds that pass-through south-west of the area. The central part of this area is flat in terms of land surface. The southern part of the area where mineral exploration work has been conducted is called Khuren Tsav and is composed of knolls with an elevation between 1,250 to 1,300 m.

The topography and landscape of the region is shown on Figure 1 attached.

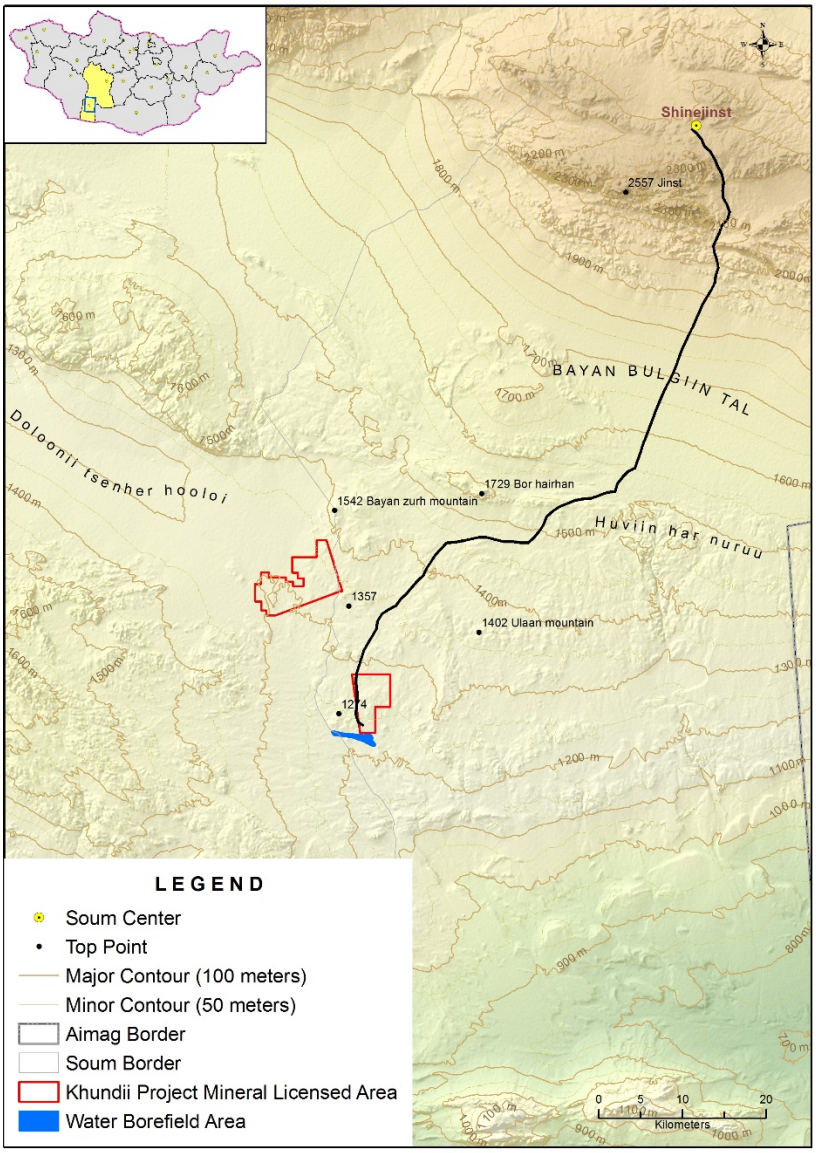

Figure 1 Regional Topography and Landscape of the Khundii Project Area

2.2.2 Local Site Context

The Bayan Khundii license area has an elevation which slowly decreases from north-east to south west. Over this 3 km distance the general fall is in the order of 10 m. The slope towards the south west is punctuated by hills which rise to 5 m above the general surface level. Site plans and layouts for the Bayan Khundi and Altan Nar sites have been prepared by Erdene (refer to Figure 2). The Bayan Khundi site plan shows the following elements in relation to landscape:

- Consolidation of the main mining related components at the southern end of the lease area;
- Within this mining project area, the various components are set between the low hills and hillocks. This provides some screening of the plant and associated operations on the immediate landscape; and
- The accommodation camp is some 5km to the north so is visually separated from the Project area.

There are no perennial streams and rivers existing in the project area, due to the landscape and climate of the region. Some ephemeral river beds cross the project area but there is no permanently available surface water. Although surface water is rare, floods may occur.

2.3 Geology

2.3.1 Geological Setting

The Project is located within the Trans Altai Terrane, part of the Central Asian Orogenic Belt along the southern margin of Mongolia, including the border with China. This region is host to the Oyu Tolgoi copper-gold porphyry mine to the east and the Tian Shan Gold Belt to the west. The Trans Altai Terrane is located immediately south of the Main Mongolian Lineament that separates the dominantly Precambrian and Lower Paleozoic terranes to the north from the dominantly Upper Paleozoic terranes to the south. The Trans Altai Terrane consists mostly of Middle Paleozoic volcanic, sedimentary and metasedimentary rocks that were intruded by Middle Paleozoic calc-alkaline and alkaline plutons.

2.3.2 Bayan Khundii

The bedrock geology of the Khundii license area is dominated by a sequence of Devonian and/or Carboniferous volcanic (andesite, andesite porphyry) and pyroclastic rocks (ash, lapilli, and block and ash tuffs). These were intruded by Carboniferous intrusions, with these rocks unconformably overlain by Jurassic volcanic and sedimentary units. All rocks in the region are overlain by unconsolidated sediments of Quaternary or Recent age.

Bayan Khundii is a low sulphidation epithermal gold deposit. Gold mineralization is associated with: combtextured quartz veins; multi-stage quartz-chalcedony-adularia-hematite/specularite veins; quartzhematite/specularite breccias; angular hematite/specularite veinlets; disseminations (commonly associated with hematite/specularite) and fracture fillings that are hosted by an intensely altered (quartz-illite) sequence of pyroclastic rocks.

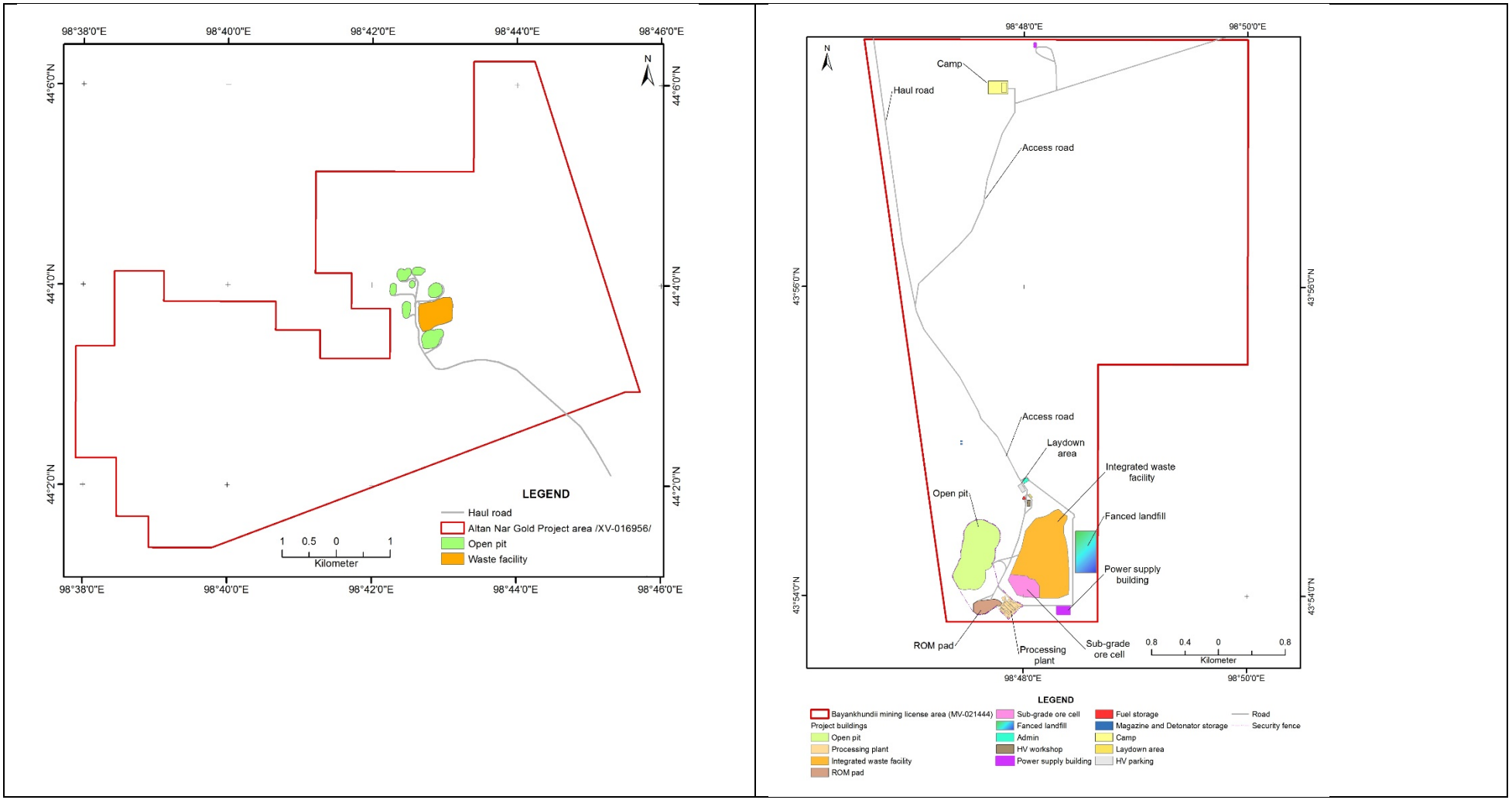

Figure 2 Bayan Khundii and Altan Nar Site Plan

Except for very minor, finely-disseminated pyrite in a few drill holes, Bayan Khundii is devoid of sulphide minerals. The presence of disseminated hematite/specularite with rare remnant pyrite and hematite/specularite veins and veinlets are interpreted as hypogene in origin, having formed as part of the widespread quartz-illite alteration and gold mineralizing event. Gold mineralization is present in numerous sub-parallel, NW-SE trending, SW-dipping zones that have been traced up to 200 m along strike. These zones include very high-grade veins and breccias over a centimetre to meter scale with gold grades exceeding 15 g/t, and up to 2,200 g/t, over 1 m intervals.

Enveloping these higher-grade zones, are lower grade mineralization zones in the 0.1 to 2 g/t gold range that can extend for significant widths. The widest interval intersected to date was in the Midfield Zone where a 149 m interval averaged 2.1 g/t gold.

Bayan Khundii was discovered in 2015 when surface rock-chip samples of gold-bearing quartz veins were collected at the Striker and Gold Hill zones. The initial sampling results were followed by geological, geochemical, geophysical, and trenching work and a 15-hole (695 m) maiden drilling program in the second half of 2015. The 2016 drilling program, which included 81 drill holes totalling 10,645 m, confirmed strike and down-dip extensions of mineralized zones at the Striker and Gold Hill zones. In addition, drilling beneath the Jurassic aged cover rocks resulted in the discovery of the Midfield Zone, approximately 170 m northeast of Striker. Drilling has concentrated on these primary locations within a zone approximately 1.6 km x 1.3 km. Up to the drilling cut-off date (29th June 2018) Erdene drilled 255 holes, including 12 extended re-drills, over 42,670m, and excavated 22 trenches totalling 1,060 m. There is no evidence of modern exploration or production on the license, other than what has been undertaken by Erdene.

2.3.3 Altan Nar

The Altan Nar deposit is hosted by a series of Devonian to Carboniferous shallow-dipping trachy-andesite and andesite tuff units that were intruded by several but volumetrically minor, late stage porphyritic dykes.

Trachy-andesite rocks dominate to the north of the Discovery Zone whereas tuffaceous rocks are the dominant lithology to the south of the Discovery Zone. Rhyolite and rhyodacite rocks are the dominant lithologies in the western part of the license. Based on the available exploration data, the gold-polymetallic mineralisation appears to be structurally controlled within a large (5.6 km by 1.5 km) NNW-trending zone.

The presence of NE/SW-trending and lesser N/S-trending quartz breccia zones with associated white mica alteration within this zone, suggests the principal factor controlling the distribution of mineralisation was structure, with steeply-dipping breccia zones providing locii or conduits for fluids. Depth of burial during the mineralizing event is presumed to also be a controlling factor for deposition of gold and base metals.

Altan Nar is an intermediate sulphidation epithermal style gold-silver-lead-zinc mineralized deposit, which has similar characteristics to the carbonate-base metal gold deposits. These characteristics include a moderate Ag:Au value (5-8:1), high base metal concentrations, epithermal quartz textures and abundant gangue minerals which are dominated by Ca-Fe-Mn-Mg carbonate minerals. These styles of mineralization have close magmatic relationships, often being associated with porphyry deposits. This style of gold mineralization represents the most prolific style of gold mineralization in the southeast Asia region and includes Kelian, Porgera and Anatok, and elsewhere in the world, Fruta del Norte, Cripple Creek and Montana Tunnels and

Rosia Montana and in Mexico five of the world's top silver producers including Penasquito. They are often associated with breccia pipes (diatremes) and can extend vertically for greater than 1 kilometre.

Erdene drilled 125 surface holes totalling 19,565.2 m and excavated 42 trenches totalling 3,151 m between 2011 and 2018, concentrated within a zone approximately 5.6 km x 1.5 km. There has been no previous production from the area, although Erdene identified what appear to be some small pits excavated centuries ago.

2.4 Geochemical Characteristics of Bayan Khundii and Altan Nar

The geochemical characteristics of the deposits differ quite significantly. There is a clear distinction between the geology of Altan Nar which has higher sulphides and higher arsenic as opposed to Bayan Khundii which exhibits low sulphides but still relatively high arsenic.

2.5 Soils

2.5.1 Overview

According to Mongolian soil-geographical regions, the Bayan Khundii and Altan Nar licenses and their surrounding areas are included in Ingen Huuvur-Ligiin subdivision of the Mongolian western division of the Gobi region (Figure 3 – see below).

In this region, the bedrock which forms the soil is proluvial, diluvial-proluvial derived gravelly light silty and sandy sediment and all layers of the soil have gravelly and stony composition. Desert grey brown, extra-arid desert borzon soil and playa soil are mainly distributed in the region.

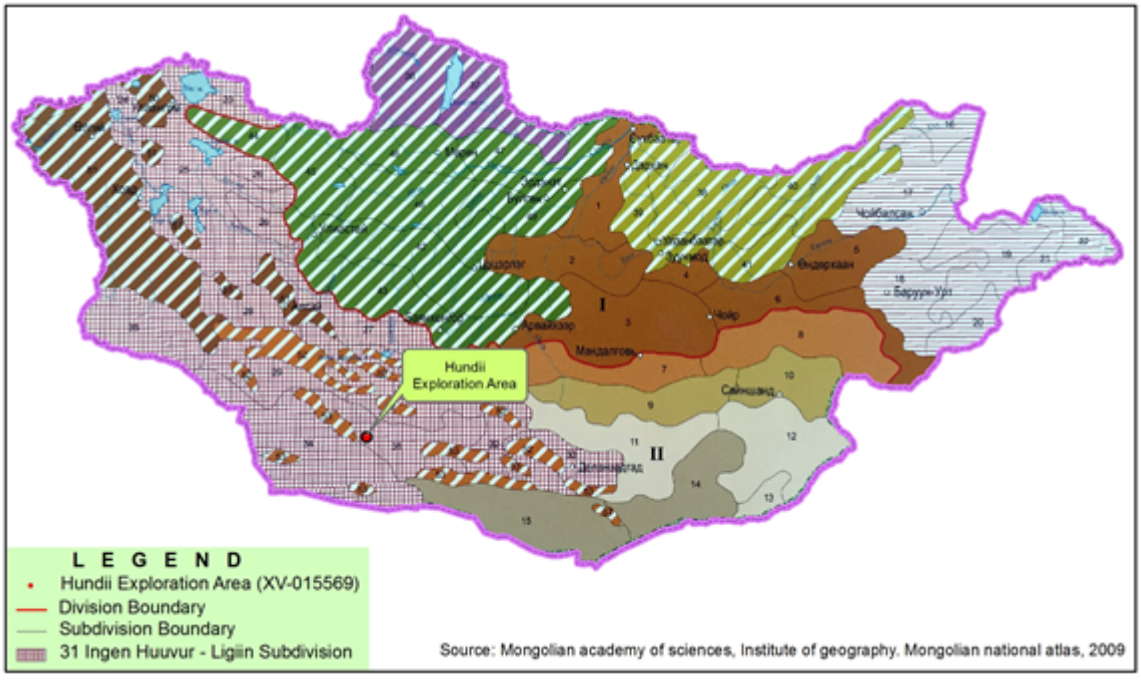

Figure 3 Mongolian soil - geographical region

2.5.2 Soil Survey

Field surveys to identify the soil coverage in the Bayan Khundii and Altan Nar license areas were conducted between May 28 and June 04, 2016 by Eco Trade LLC (2017 a;b).

The field surveys identified four types of soil within the Khundii and Altan Nar license areas including:

- typical desert grey brown soil;
- grey brown soil with gravel and stone soil;
- ravine soil; and
- playa soil.

Soil distribution, morphological description and laboratory analysis results of the above soil types distributed through the exploration site are given detailed consideration in the sections below.

2.5.3 Typical Desert Grey Brown Soil

Typical desert grey brown soil is dominated by shrub and shrubby plants, with 5-10% vegetation cover. It is formed in extra arid climate conditions, such as the Gobi Desert region. The vegetation biomass resource is very small, and there is almost no humus content due to high mineralization in the organic residue of the region. This type of soil is spread in the hill escarpments, small hills and convex surfaces of the dry erosion channels between them. Two key vegetation species are typically found – Bunge (*Zygophyllum xanthoxylon)* and Saxaul *(Haloxylon ammodendron)*.

Moderately rounded stone particles with size of 0.5-1.0 cm and 5-15 cm sized stones are evenly distributed on the ground surface.

A presentation of this soil type shown in Figure 4 below.

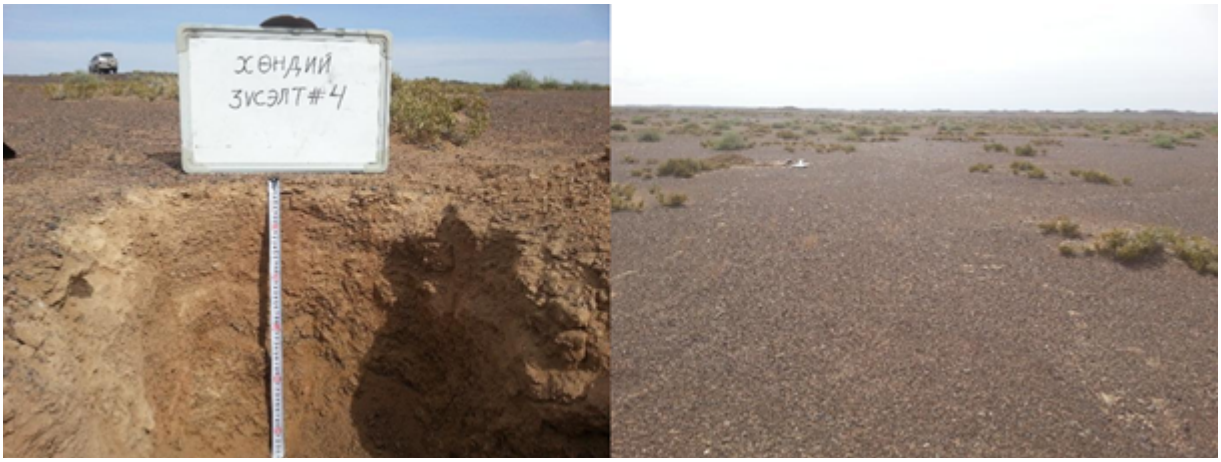

Figure 4 Profile and Surface Expression of Desert Grey Brown Soil

2.5.4 Grey Brown Soil with Gravel and Stone

Grey brown soil with gravel and stone is distributed on top of the small rocky hills. In this soil, vegetation cover is sparse and dominated by saxual and bunge.

Mostly 5-20 cm sized stones are evenly distributed on the ground surface.

A representation of this type is shown in detail in the following Figure 5.



Figure 5 Profile and Surface Expression of Grey Brown Soil With Gravel and Stone

2.5.5 Ravine Soil

Proluvial and Aeolian derived sediments exist in layers throughout various sizes of dry erosion channels and ravines occupying the slopes of the depression of small hills and inter-hill valleys like a network. Soil formation on them is barely observed. Sediments which are different from each other in their particle composition and gravel content exist in layers, and the distinction between layers is not very clear.

As a representation of this soil type, morphological description of the profile is shown in Figure 6.

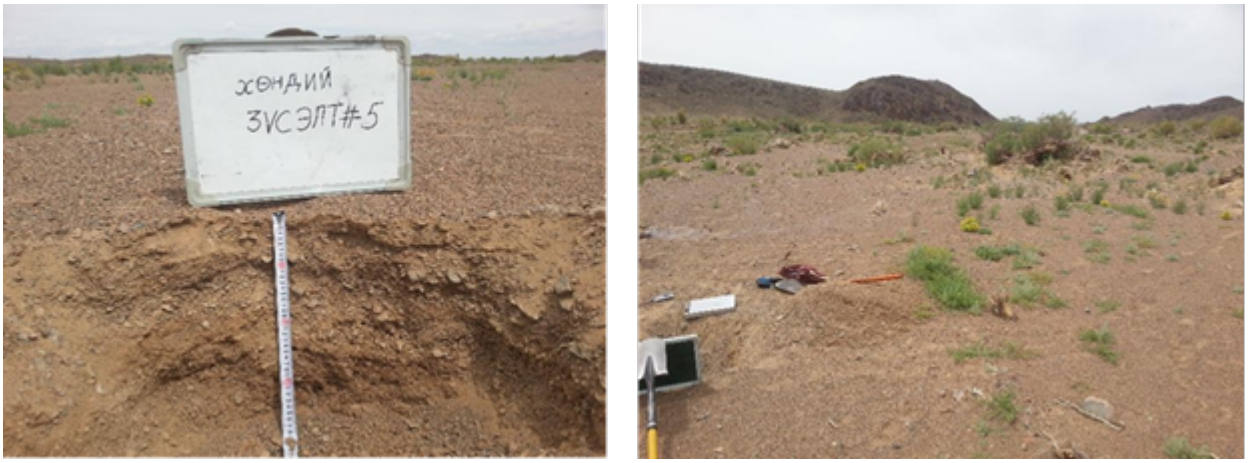

Figure 6 Profile and Surface Expression of Ravine Soil

2.5.6 Playa Soil

Typical desert grey brown soil is spread in the aggradation of hill escarpments, small hills and convex surfaces of the dry erosion channels between them. During summer time when precipitation events are abundant, fine dust particles and alluvium transported by rainfall or flood water are accumulated. Playa soil occurs in small ponds north and west of the exploration area.

2.5.7 Soil Quality and Current Disturbance of the Soil Cover

Soils were disturbed during the process of drilling and excavation for the detailed exploration work conducted near Khuren Tsav and the Silver Vein display of the eastern part of the Bayan Khundii exploration site.

In addition to this detailed mineral exploration has been conducted, unimproved dirt roads, temporary herder camps and the effects of grazing are evident (primarily camels and goats). Generally, the land is not negatively affected or degraded by human settlement or technical operations. Herder families inhabit very sparsely and seasonally in this area and tend to self-manage negative effects on soil quality.

However, soils in the region are significantly eroded from prevailing strong winds. Also, as evidenced in Photographs 1 to 3 above, there is a lack of soil structure on the Project site including low humous content and very low moisture retention capacity.

The four soil types identified in the Bayan Khundii and Altan Nar exploration sites are spread across the hill escarpments, the small hills and convex surfaces of the dry erosion channels. In the exploration areas and in the surrounding territories, only 105 mm of precipitation falls per year and soil temperature reaches 112°C. Climatic conditions, the extreme hot or coldness, and humidity which continues consistently with the four seasons, have conditioned the unique features of desert soil in this exploration area. The soils are fragile and will require attention in the construction management framework.

2.5.8 Soil Chemistry – Elevated Heavy Metals

The 2016 soil survey undertaken by Eco Trade (2017a;b), reported on some laboratory analysis undertaken of three samples in relation to naturally occurring heavy metals in the soils on the site. The key output from this analysis was that the arsenic and molybdenum content in the samples were above the permissible levels stated in the national standard for pollutant content in sandy soil - MNS 5850:2008 (Soil quality - Permissible level of soil pollutants). Additionally, copper in two of the samples was above the permissible level.

Molybdenum content was reported as twice the standard's hazardous level in the two samples taken from near the ore body and from just inside the survey area. For the other sample, the arsenic, copper, molybdenum, mercury, and lead content were all above the permissible levels stated in MNS 5850:2008, and the content of arsenic was equal to the dangerous level of the standard.

It is concluded from these analysis results that the natural occurrence of heavy metals in the soils is high and heavy metal transition in the soils is low.

2.6 Seismicity

According to the MSK-64 macro seismic intensity scale, the Project area belongs to the 8-scale seismic zone with frequency of once in 10,000 years (Figure 7). The southeast side of the Mongol Altai range where 8 and higher scales of earthquake are possible, is located to the south of the Ikh Bogd range active fault.

The Mongol Altai range is a relatively active zone, with several serious earthquakes and seismic occurrences since 1905. On August 10, 1931, an earthquake with a scale of 8 caused a 189 km long surface rupture. On December 4, 1957, an 8.1 scale earthquake in the Gobi-Altai range

caused a 270 km long rupture. Since 1990, over 20 earthquakes which could be identified as significant (above the scale of 5) were recorded.

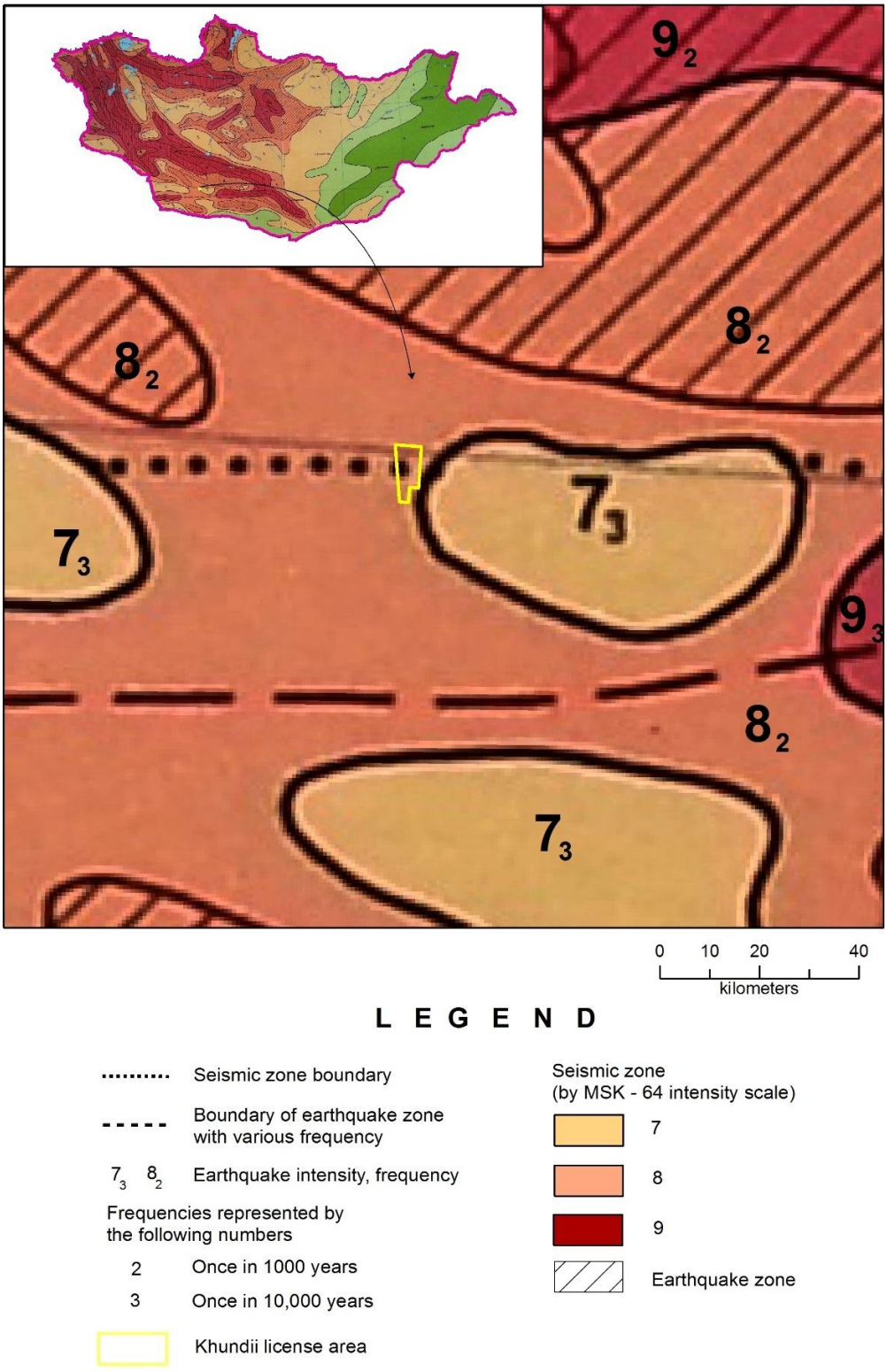

Figure 7 Seismicity in the Khundii Project Area

2.7 Conclusions

2.7.1 Topography and Landscape

There are no sensitive landscape features within the Project Sites. Overall, topography and landscape sensitivity are low. Local herders who may graze sporadically and seasonally in and around the Project area comprise the main receptors to changes in views in the area.

2.7.2 Geology

The geology is complex but overall, the sensitivity of the geology in environmental terms is considered low in relation to the construction and development of the Project Site. Seismic activity is also considered to be low risk.

2.7.3 Soils

Soil is generally poorly developed and formed beneath sparse vegetation cover. The soil is also susceptible to natural erosion and freeze and thaw conditions. The Project will impact the soil through construction and other related activities. Pollution would not be retained by the soil due to its permeable nature and low organic content.

It has been established that the soils contain elevated levels of heavy metals that are naturally occurring. A management approach whereby ongoing sampling is undertaken during any groundbreaking should ensure that contamination will not result in or create ongoing impacts.

2.8 References

Eco Trade LLC. 2017. Altan Nar Environmental and Social Baseline Study.

Eco Trade LLC. 2017.Bayan Khundii Environmental and Social Baseline Study.

Mongolian Academy of Sciences, Institute of Geography, 2009. Mongolian National Atlas.

RPM Global. January 2019. Technical report for the preliminary economic assessment of the Khundii Gold Project.



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

B5: Water Resources

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Appendix A: Hydrogeological Bore Logs and Cross Section of Khuren Tsav and Bosgyn Sair Borefields

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Acronyms and Abbreviations

AoI	Area of Influence
a.s.l	above sea level
AN	Altan Nar/Tsenkher Nomin Area
BK	Bayan Khundii Area
ESIA	Environmental and social impact assessment
km	Kilometre
L/s	Litres per second
KN	Khundii
RoI	Radius of influence
TDS	Total dissolved solids

5. WATER RESOURCES

5.1 Introduction

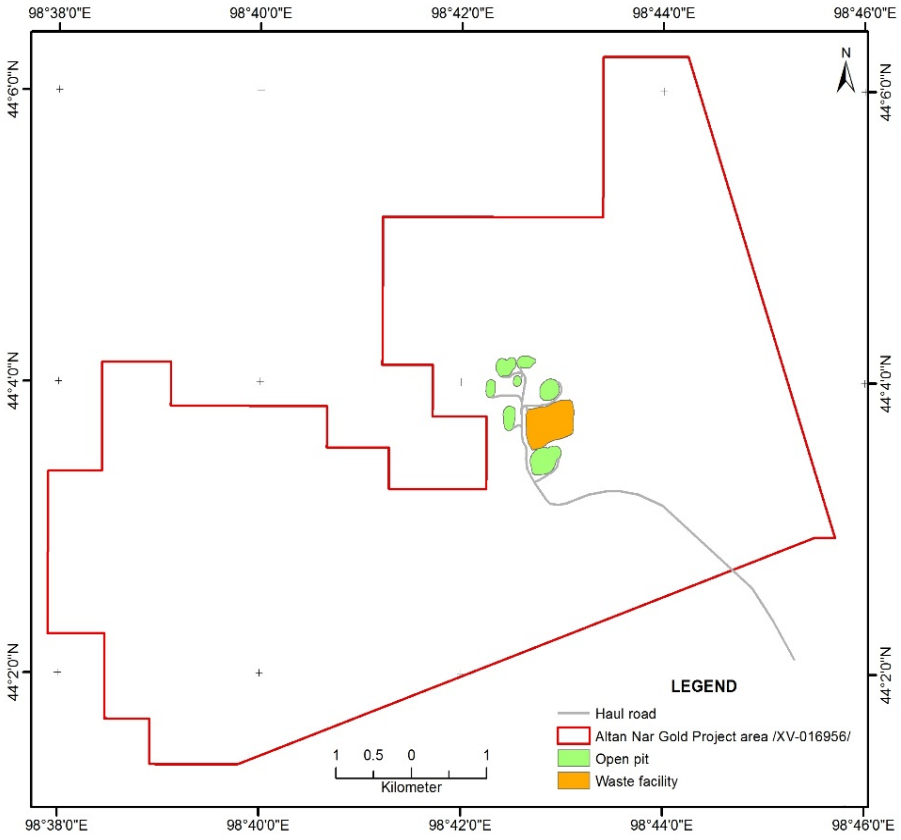
This Chapter of the Khundii Gold Project (Project) Environmental and Social Impact Assessment (ESIA) describes the baseline conditions for water resources at and surrounding the Project Site and the Khuren Tsav and Bosgyn Sair basins, which will provide the raw water supply for the Project, located approximately 1-3 km to the south of the Bayan Khundii (BK) Site.

This Chapter considers the general scarcity of water in the Gobi Desert and discusses this in a regional context. It describes the characteristics of surface water and groundwater resources across the Project Area of Influence (AoI) and provides necessary information to assess potential impacts to water resources associated with the Project activities.

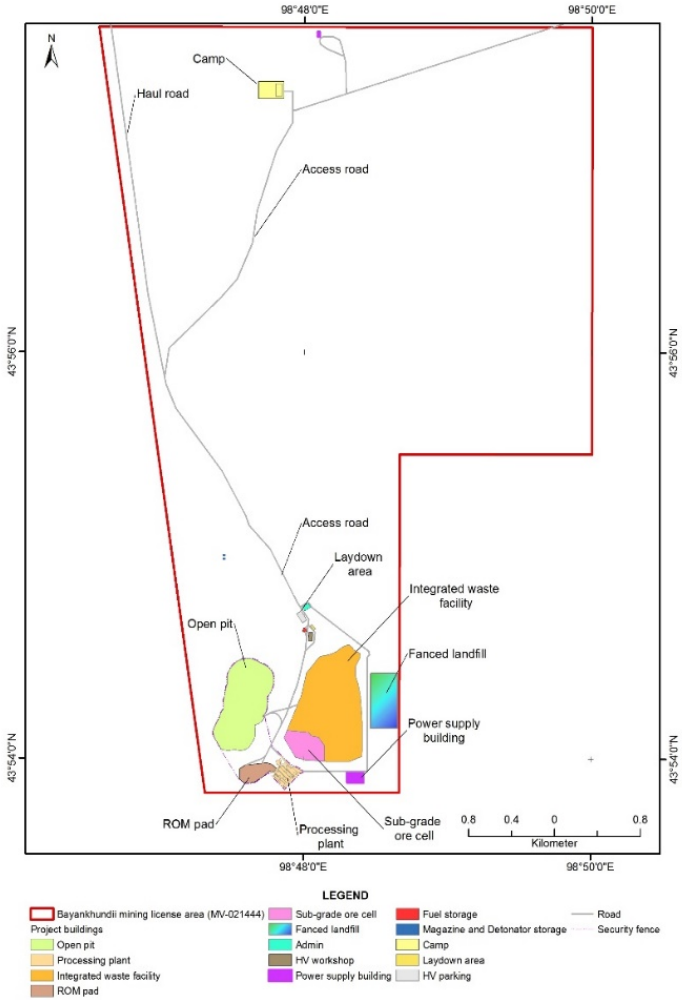
The Project AoI encompasses the BK and Altan Nar (AN) Sites, the Khuren Tsav (KT) and Bosgyn Sair (BS) borefields, water supply pipeline and distribution line and covers the geographical extent of the Project's potential impacts on sensitive water resource receptors and as such includes the following:

- The ephemeral watercourse systems passing through and downstream of the Project Site;
- Shallow groundwater beneath and downstream of Project Site and within a pumping Radius of Influence (RoI) adjacent to the BK Pit;
- Access road routes where they cross surface drainage features; and
- The Project water supply drawn from the Khuren Tsav and Bosgyn Sair borefield and a pumping RoI.

Figure 1 presents the planned mines at Altan Nar and Bayan Khundii licenced areas.



a)



b)

Figure 1 Mine Site Plans a) Tsenkher Nomin, b) Khundii

5.2 Baseline Characterisation Methodology

Baseline data for this Chapter have been obtained primarily from the following reports:

- RPMGLOBAL NI 43-101 Technical Report for the Preliminary Economic Assessment of the Khundii Gold Project, Erdene Resources Development Corp, 4 February 2019;
- Environmental and Social Baseline Survey Report for Khundii MLA (2017) by Eco Trade;
- Environmental and Social Baseline Survey Report (2017) for Tsenkher Nomin MLA by Eco Trade;
- Hydrogeological report for Doloonii Tsenkher basin (2017) by Okhi Us;
- Hydrogeological data review and report summary for Khuren Tsav aquifer (2019).
- ROMA, 2020. *Hydrogeological Review for the Bayan Khundii Gold Project*. Version 0. Unpublished Internal ERD Report (ROMA, 2020).

The baseline information for the Khundii basin has largely been obtained via exploration and assessments completed through 2016 to 2017. Investigations comprise exploration drilling, test bore construction and aquifer testing, further assessing the water supply potential of the KT and BS aquifers for the Project water supply.

Interpretations of the hydrogeological strata of the exploration bores and hydrogeological cross section of the Khuren Tsav and Bosgyn Sair bore fields annexed to this report as an additional information (Appendix A).

5.3 Scope

Water resources considered in this baseline chapter include surface water features such as ephemeral watercourses across the Project Site and the borefields, aquifers within the region of the Project Site, confined to semi confined aquifers overlying deeper fractured rock aquifers within the KT and BS borefields. Groundwater in shallow aquifers surrounding the Project Site and the KT and BS basins may be used by local communities and herders. Raw water extracted from the KT & BS borefield will be transferred to the southern extent of the Project Sites via a pipeline.

5.4 Climate

The Project area is subject to the extreme climate of the continental Gobi Desert region, with four seasons much like the other territories of Mongolia. Orographic conditions and local micro wind affect the air current formation and creates a drier micro region where precipitation and humidity are relatively low, with hot summers and cold winters. Cloudiness, precipitation, and snow cover are generally low. Absolute low temperature reaches -37.4°C and absolute high temperature reaches 44.9°C. Annual mean temperature is around 0.7°C. Work on the property can be conducted year-round, with only short curtailments occurring during storm or strong wind activity which can result in sandstorms (Tetra Tech, 2019).

The region has mean annual precipitation of 105 mm. According to Mongolian dryness index (P/Eo) geographical distribution, humidity index of this region ranges between 0.14-0.3. Total winter precipitation is 5.7 mm or accounts for 6% of annual precipitation. There is a 1 in 50-year chance that the maximum amount of 50 to 60 mm precipitation falls within a single day, resulting in cloudbursts, flooding and lightning. In summer, rain falls in 15 to 20 days, lightning strikes occur in 5 to 10 days, lasting for about 35 hours in total.

Daily intensive precipitation events may cause *dzud* (i.e. harsh winter in Mongolian) in winter or rain-wash of soil cover that degrades soil fertility or flooding, causing hardship to herders; and road and transport activities generally. Heavy sleet always causes issues with road transport during spring and autumn in this region. Based on observations over the last 36 years, the most intense precipitation event of 59 mm/day occurred in July 27, 1996. This figure is equal to 60% of average yearly precipitation of this region. Snow cover is usually 1 to 5 cm thick, with a mean density of 0.22 to 0.27 g/cm^3 and a reserve wetness of about 5 to 8 mm. This won't always serve as a significant water supply for vegetation as the moisture from snow melt is short term and evaporation rates are high, so dry and arid conditions continue in spring.

5.5 Regional Groundwater Use

Water is scarce in the Gobi region of Mongolia, an area approximately 350,000 km^2 which supports a combined population of approximately 177,000. However, increasing industrial and urban development will increase demand on this desert area's water resources, particularly given the low rainfall. The future water use demand in the entire south Gobi region is projected to increase to between 48.4 and 109.4 million m^3/year by 2021, compared to a 2010 baseline of 23.4 million m^3/year depending on economic growth scenarios (2030 Water Resources Group, 2014). The Asian Development Bank projects about 108.2 million m^3/year water use demand by 2025 (Asian Development Bank, 2014).

Surface water is limited in extent and, outside of the brief flow events in the ephemeral rivers following a significant storm, is restricted to small isolated springs. Shallow groundwater has traditionally been the main source of water for the herders and their animals and where shallow enough, can also be exploited by larger wildlife. This shallow groundwater also locally supports small stands of groundwater dependent vegetation.

The Project water supply is to be sourced from a borefield within the Khuren Tsav (KT) and Bosgyn Sair (BS) area accessing the confined to semi confined aquifer of the Trans Altai Terrain (TAT). The TAT is a series of Devonian to Early Carboniferous intermediate volcanic and volcaniclastic rocks, minor felsic (rhyolite) volcanic and volcaniclastic rocks, and sedimentary units including sandstone, conglomerate and minor limestone. These have been intruded by a series of Devonian and Carboniferous calc-alkaline and alkaline granitoid plutons.

The proposed borefields (KT and BS) are anticipated to provide the required Project water demand.

5.5.1 Herder Wells

In the Bayan Khundii (BK) survey area herder families inhabit very sparsely and seasonally as the site is in the Gobi-desert region with low precipitation rate. The BK area has four herder wells within 5 km radius of the survey area named, Maikhan, Khuren tsav, Khooloi and Unnamed well-2 (Figure 2) which could be impacted by groundwater abstraction for dewatering or water supply..

Groundwater elevations as reported in *Okhi-Us, 2017* within hand dug herder wells across the water resources AoI have been summarised as follows:

- Khuren Tsav – 2.0m BGL;
- Hand well south of Doloonii – 1.12m BGL;
- Maikhan hand well – 1.16 m BGL; and
- Gun Zag's hand dug well – 2.35 m BGL.

Suul Tolgoi N and S measured static water levels of 35.0 m BGL and 37.06 m BGL respectively and are drilled wells installed to depths of 63.0m BGL and 61.0 m BGL.

Initial water quality results for samples taken from Quaternary deposits in the dry river channels and herder's wells showed some heavy metals at concentrations exceeding the relevant standard, (Eco Trade, 2017a) which reflects regional data regarding naturally occurring elevated concentrations of metals and other potential toxic elements in soil and groundwater throughout the region (Nemer and Tuinhof, 2010). The background naturally occurring elevated heavy metal content for the BK area will be considered when analysing herder well water quality data (Eco Trade, 2017b).

In the Altan Nar (AN) area herder families also inhabit very sparsely and seasonally due to the low productivity of pasture and low precipitation rate. The AN area has three water wells within a 5km radius of the survey area named, Suul tolgoi, Hooloi and Unknown Well-2..

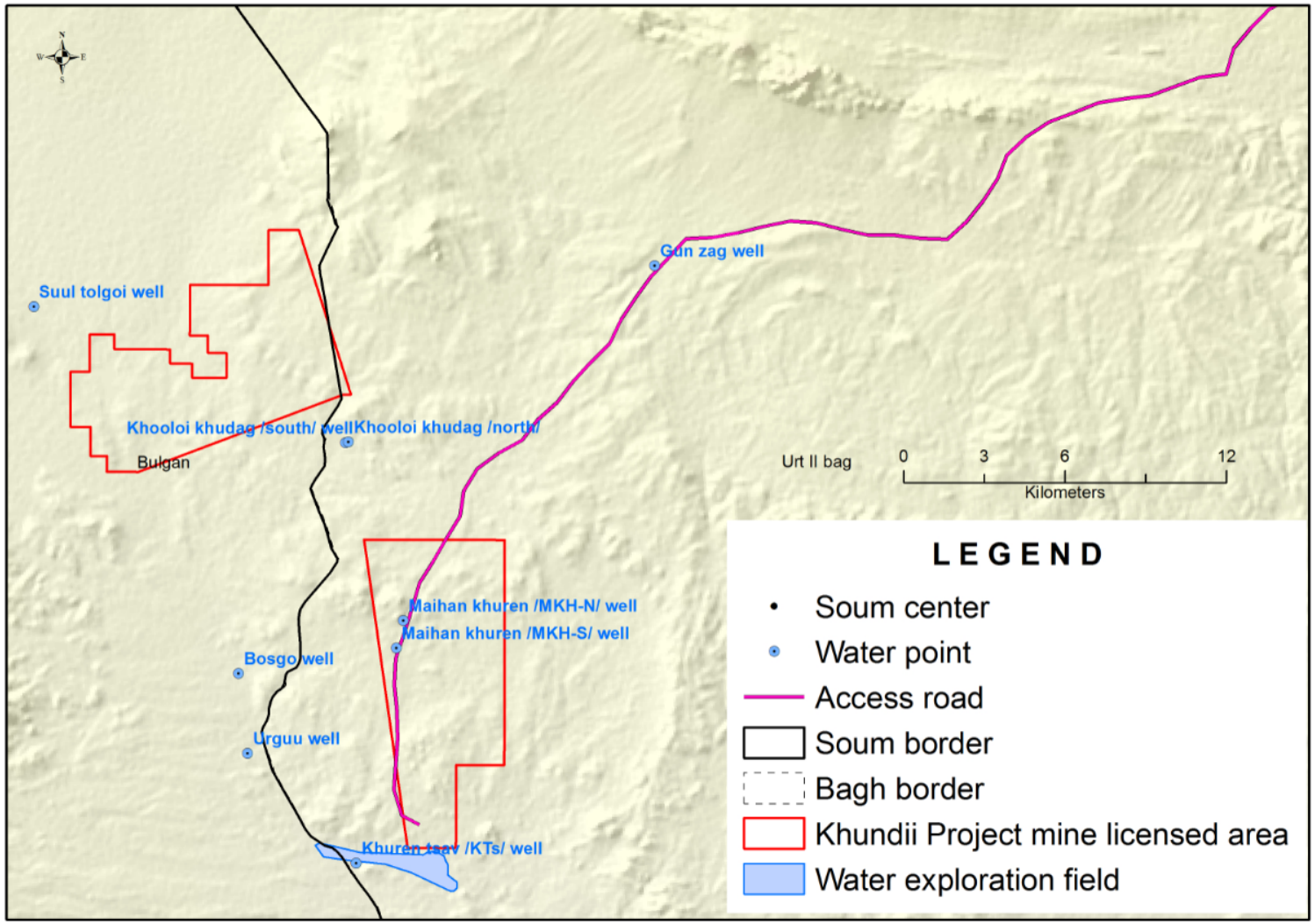


Figure 2 Locations of the Water Exploration Field, Camp Well and Herder Wells

5.6 Hydrogeological Setting

5.6.1 Geomorphology

The mine and surrounds are characterized by low hills with rock outcrops and lower plains of unconsolidated sediments, with fresh rock generally occurring from or very near to surface and very little to no soil profile (ROMA, 2020).

The elevation of the proposed mine area is between 1220 to 1290 m a.s.l (meters above sea level). The KT-BS wellfield, between 2 to 7 km to the south and outside the proposed mine boundary, is situated within the lowest point of the Bosgot Gashuun floodplain. The north-eastern area of the well field comprises tributaries originating from the south of Bor Khairkhan (1729 m a.s.l) which slopes from the north-east and drains in a south-westerly direction (Okhi-Us, 2019). The proposed wellfield is between 1,190 to 1,235 m a.sl.

5.6.2 General Geology of Eastern Trans Altai Terrain

The oldest rocks in the eastern TAT comprise a series of Devonian to Early Carboniferous intermediate volcanic and volcaniclastic rocks, minor felsic (rhyolite) volcanic and volcaniclastic rocks, and sedimentary units including sandstone, conglomerate and minor limestone. Bedding orientations in sedimentary and volcanic units are predominantly northwest trending throughout the eastern TAT, paralleling the regional structural trends (RPM Global, 2019).

The volcanic and sedimentary rocks were intruded by a series of calc-alkaline and alkaline granitoid plutons (Devonian and Carboniferous in age) ranging in composition from granodiorite, granite, plagiogranite and syenite, and in texture from fine to coarse-grained seriate to equigranular with minor pegmatite. Some small (<5 km2) Carboniferous age gabbro intrusions are present and are thought to represent the most mafic end-members of the intrusive suites. Late-stage and predominantly post-mineralization dykes cross-cut all pre-existing rocks and range in composition from microdiorite to granite, syenite and lamprophyre with some dykes potentially pre- or syn-mineralization (RPM Global, 2019).

There are several NW-SE trending sedimentary basins throughout the eastern TAT. These basins were in-filled by Late Paleozoic, Mesozoic ad Cenozoic aged sedimentary sequences, including Carboniferous, Permian and Jurassic aged coal bearing strata and overlying, unconsolidated, Quaternary age sediments. The origin of these sedimentary basins is generally thought to be associated with widespread extensional tectonics resulting in the development of large graben structures during the Mesozoic Era. Basin margins cut across all Devonian and Carboniferous rocks including both volcanic sedimentary map units and granite intrusions (RPM Global, 2019).

5.6.3 Bayan Khundii Area

The project area is generally flat lying, windy, and has no year-round surface water bodies. The combination of limited seasonal precipitation, high summer temperatures, high evaporation potential, and precipitation occurring predominantly during the warmest period of the year, results in limited water being available to recharge the groundwater (Tetra Tech, 2019).

Bedrock is close to surface. The bedrock geology of the BK license area is dominated by a sequence of Devonian and/or Carboniferous volcanic (andesite, andesite porphyry) and pyroclastic rocks (ash, lapilli, and block and ash tuffs). These were intruded by Carboniferous intrusions, with these rocks unconformably overlain by Jurassic volcanic and sedimentary units. All rocks in the region are overlain by unconsolidated sediments of Quaternary or Recent age (RPM Global, 2019). There are sub-vertical faults and fracture zones throughout the proposed mine location.

Summary of BK hydrogeological conceptual model:

- The groundwater system receives limited, if any, annual recharge locally. Recharge may occur at a more regional scale at higher elevations.
- groundwater flow is predominantly within the fractured bedrock. Intact bedrock is relatively low porosity and will have a low hydraulic conductivity.
- hydraulic gradients were not measured but are assumed to be a generally subdued replica of the relative flat topography with the water table approximately 10 m below ground surface.
- the generally flat topography and lack of surface water bodies means that the open pit may well have a large radius of influence.

The hydrogeology investigation in the BK deposit area consisted of drilling a total of three holes (BKHGD-01, 02, and 03) to a depth of 150 m bgs. BKNGD-01 targeted the “block structure” while both BKNGD-02 and 03 targeted the “tectonic fault zone” (Okhi-Us, 2017). Only BKHGD-02 was pump tested as it was the only hole which encountered a productive fracture zone. Okhi-Us reported hydraulic conductivity results were 0.047 m/day (5.4 $x10^{-7}$ m/s) for the drawdown portion of the test and 0.036 m/day (4.2$x10^{-7}$ m/s) for the recovery portion of the test (Okhi Us, 2017).

They show that the fractured aquifer zone in BKNGD-02 (54.14 to 67.75 m bgs) has an estimated hydraulic conductivity of 2.2 $x10^{-6}$ to 2.9 $x10^{-6}$ m/s. The full hole length has an estimated hydraulic conductivity of 2.4 $x10^{-7}$ m/s (Okhi Us, 2017).

The geology of the BK area (Source: *RPM Global 2019*

Figure 3) is dominated by a sequence of Devonian and/or Carboniferous volcanic (andesite, andesite porphyry) and pyroclastic rocks (ash, lapilli, and block and ash tuffs), intruded by Carboniferous deposits, unconformably overlain by Jurassic volcanic and sedimentary units. All rocks in the region are overlain by unconsolidated sediments of Quaternary or Recent age (RPM Global, 2019).

Carboniferous volcanic rocks include several texturally distinct units of intermediate composition including andesite, porphyritic andesite and basalt. A unit of block and ash tuff is the dominant lithology in the west-central part of the area. Pyroclastic rocks, that are host to and restricted to the immediate area surrounding the BK mineralization, are interpreted to be Middle-Upper Devonian in age, possibly belonging to the Baruunhuurai Formation that is part of a large area of undifferentiated Devonian units to the south and west of the license area. Pyroclastic rocks include lapilli and ash tuff, with also welded tuff with very minor block and ash units. Fine grained Devonian andesite to the northeast of Bayan Khundii was intruded by a series of dacite porphyry plugs which are also interpreted as Devonian (RPM Global, 2019).

Carboniferous granitoid rocks intrude both the Devonian and Carboniferous volcanic and pyroclastic units and have a wide range in composition from least-evolved medium and coarse-grained diorite, monzodiorite, monzonite and granodiorite, to the most evolved phases of fine-grained granite, granite porphyry, syenite and quartz syenite (RPM Global, 2019).

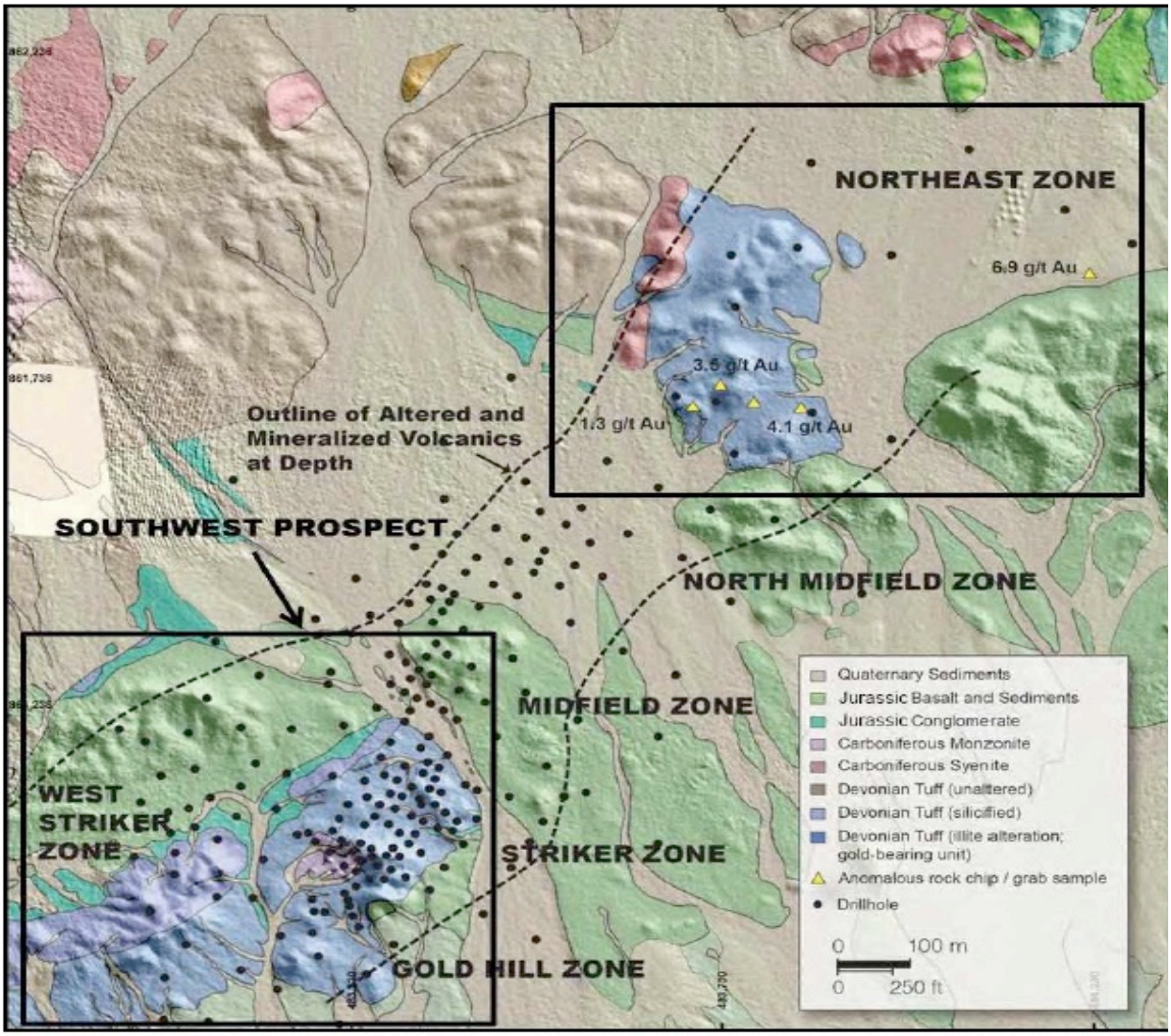
Most Jurassic volcanic rocks are present in the southern part of the license area and consist mostly of basalt (commonly amygdaloidal) units. In addition, a Jurassic sedimentary unit, consisting of a basal conglomerate and overlying red to red and white mottled sandstone and siltstone, occurs in the southern part of the license area where it disconformably underlies the

Jurassic volcanic rocks. Jurassic lithologies have been observed to unconformably overly the older Devonian and Carboniferous lithologies (RPM Global, 2019).

Unconsolidated Quaternary to recent sediments are present throughout the area with a large area of colluvial-dominated sediments north of the Bayan Khundii area. Alluvial sediment-filled stream channels are present throughout the area and overlie all Devonian, Carboniferous, Jurassic and Quaternary rocks and sediments. These 'stream' channels are mostly dry, however, flash flooding associated with episodic storm events have recently been observed to deposit additional alluvial sediments. Several faults were inferred in the area and cross-cut, or form contacts of, Carboniferous intrusive and volcanic map units. Faults do not appear to offset Quaternary or Recent sediment deposits; however, some inferred faults form the contacts with older Devonian, Carboniferous or Jurassic lithologies (RPM Global, 2019).

Ephemeral water courses extending across the BK Site and the KT-BS borefields are presented in Figure 8, which also presents the close proximity of herder wells to these ephemeral drainage lines. These drainage channels are anticipated to play an important role in the replenishment of shallow aquifers utilised by herder communities and groundwater dependant ecology.

Hydrogeologically the area will be low productivity as primary porosity and associated hydraulic conductivity are low, with most porosity developing due to fracturing associated with structural deformation and other post depositional processes. This area is essentially a fractured rock hydrogeological terrain. There is little available information on the occurrence and characteristics of fractured rock aquifers in the region. Limited groundwater resources have been identified at faulted basin margins and surrounding crystalline volcanic and cemented sedimentary units. As with most aquifers of this nature, the extent of resources tends to have a high degree of uncertainty, and most groundwater exploration drilling has not focused on these areas. Where fractured rocks have been intersected, resources are predominantly fresh, but of limited storage and low yields. Fractured rock aquifers may or may not be in hydraulic connectivity with basin aquifers and are not considered to be of great value for large scale groundwater exploration (ERM and Sustainability East Asia LLC, 2010).



Source: RPM Global 2019

Figure 3 Geology of the Bayan Khundii Area

5.6.4 Altan Nar Area

Three hydrogeological testing bores were drilled an installed within the AN deposit, one of which produced water (BKHGD-02) which was installed with PQ drilling rods to a total depth of 150 m bgs. An aquifer pumping test was conducted by Oki-Us on 15 September 2018 at BKHGD-02. A single stage pumping test was undertaken for approximately 3 hours with yield of 0.68 l/s. Aquifer testing in the AN deposit was analyzed by Tetra Tech. This aquifer test analysis estimated a hydraulic conductivity of 1.4 $x10^{-6}$ m/s. The full hole length hydraulic conductivity was calculated to be 3.4 $x10^{-7}$ m/s.

Based on Tetra Tech's analysis of the pumping tests, the following interpretations were made:

- The high conductivity zones encountered have a hydraulic conductivity in the range of 10^{-6} m/s.

- Only one of three holes drilled in the BK deposit produced measurable water quantities. Similarly, only one of three holes drilled in the AN deposit produced measurable water quantities. Consequently, groundwater flow is primarily within the rock fractures with the intact rock, and fracture networks with limited interconnectivity, having a relatively low hydraulic conductivity.

The Altan Nar (AN) area includes a package of predominantly andesite flows (referred to as 'Sequence A') dominate the east-central part of the area (Figure 4). These rocks are interpreted to be a steeply dipping volcanic sequence that was intruded by sub-parallel, NW-trending granite porphyry and fine-grained granite intrusions interpreted to be sills, or possibly laccoliths. These intrusions are up to 250 m in width with maximum length of 6 km. Several narrow, NW-trending granitic dykes (<100 m in width) that are similar in composition to the large granite intrusion along the eastern margin of the license, intrude the andesite rocks near the AN area. A few isolated, narrow (10-100 m wide), NW-SE and NE-SW trending trachy dykes intrude the andesite rocks. Widespread development of hornfels textures was noted in the andesite rocks, presumably resulting from contact metamorphism related to the large granite sills or laccoliths (RPM Global, 2019).

The geology of the central and western portion of the area consists mostly of a sequence of volcanic flows and tuffaceous rocks of andesite composition (referred to as 'Sequence B'), with subordinate rhyolite, rhyodacite, andesite tuff, and green-coloured andesite. Satellite images for this portion of the license indicate Sequence B volcanic rocks lack the well-developed lineaments and topographical features noted above for the Sequence A rocks (RPM Global, 2019).

Bedding orientations for the Sequence B volcanic rocks, obtained from 2017 oriented core drilling, indicate these volcanic units strike to the northwest and dip at approximately 20-30 degrees to the northeast. Intrusive rocks are much less abundant in the west and central parts of the license and include a small granodiorite plug (approximately 200 by 300 m) near the southern license boundary, and several variably-oriented trachy-andesite and rhyolite dykes (generally <50 m wide and up to 1 km in length) (RPM Global, 2019).

Valleys throughout the AN area are underlain by unconsolidated Quaternary sediments. The pattern and distribution of various facies of Quaternary deposits reflects paleodrainage systems that were developed along bedrock features including faults and lineament ridges. The abundance and patterns of distribution of Quaternary sediments differs significantly over the Sequence A and B volcanic rocks (RPM Global, 2019).

Sequence A andesite and granite rocks are cross-cut by a series of narrow (generally 50 to 200 m wide) regularly spaced (approximately 0.5 to 1.0 km) paleo-drainage valleys that are interpreted to reflect subparallel, NE-trending bedrock faults. Quaternary deposits and paleo-drainage patterns over Sequence B rocks in the western and central parts of the license are much more abundant than over Sequence A rocks and have more randomly oriented drainage systems. A few narrow NE-SW and N-S oriented Quaternary deposits in the east-central part of the license may reflect extensions of bedrock structures developed over Sequence A rocks (RPM Global, 2019).

Hydrogeologically the area will be low productivity as primary porosity and associated hydraulic conductivity being low, with most porosity developing due to fracturing associated with structural deformation and other post depositional process, with the exception of the Quaternary deposits. The deposits will be typified by higher primary porosity and higher hydraulic conductivities (RPM Global, 2019). Drawdown may propagate from the deeper fractured rocks into the Quaternary

sediments but only where drawdown occurs in unconfined areas or areas with shallow deep connectivity due to permeable fractures/faults.

There is little available information on the occurrence and characteristics of fractured rock aquifers in the region. Limited groundwater resources have been identified at faulted basin margins and surrounding crystalline volcanic and cemented sedimentary units. As with most aquifers of this nature, the extent of resources tends to have a high degree of uncertainty, and most groundwater exploration drilling has not focused on these areas. Where fractured rocks have been intersected, resources are predominantly fresh, but of limited storage and low yields. Fractured rock aquifers may or may not be in hydraulic connectivity with basin aquifers and are not considered to be of great value for large scale groundwater exploration (ERM and Sustainability East Asia LLC, 2010).

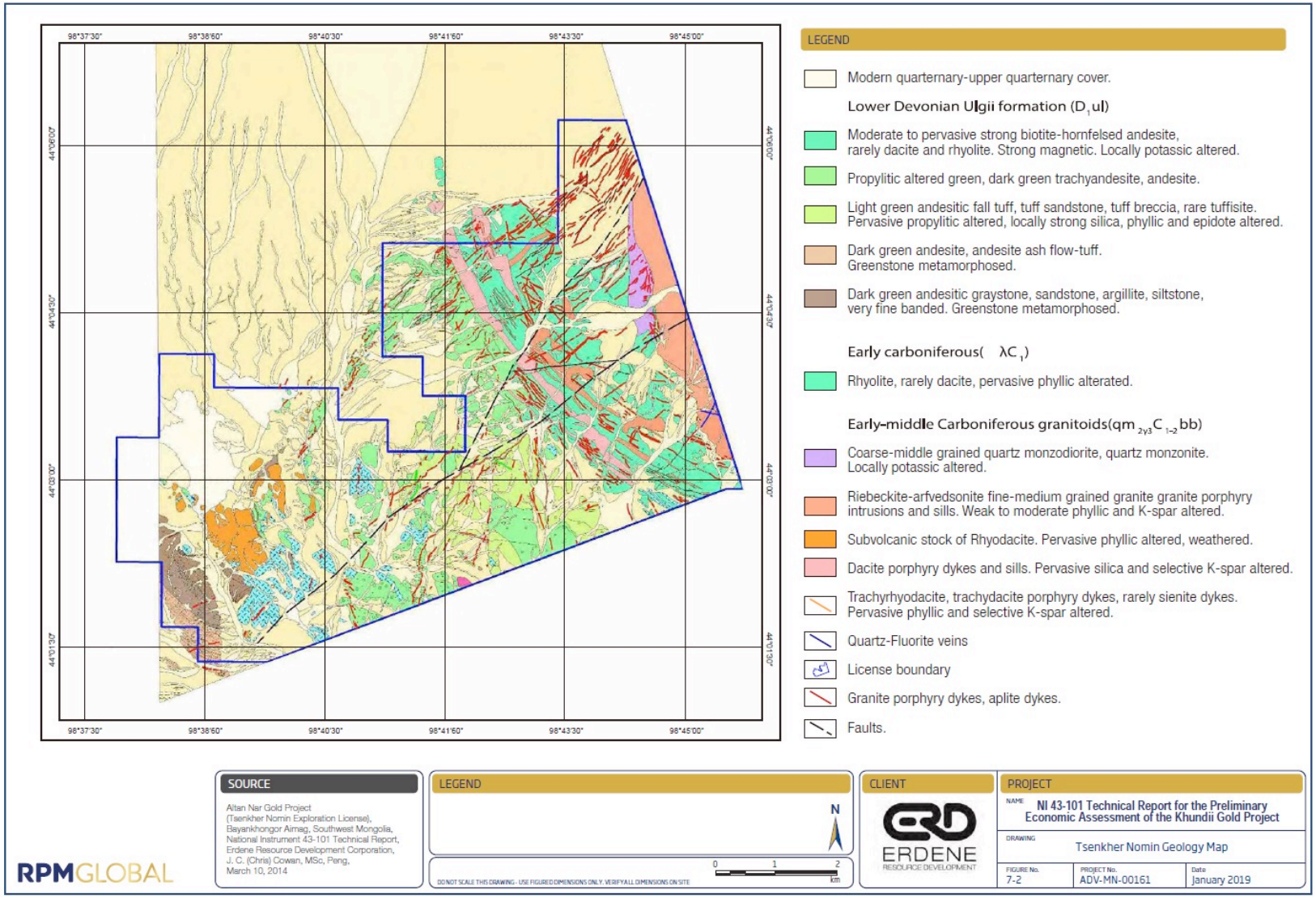


Figure 4 Geology of the Altan Nar Area (RPMGlobal, 2019)

5.6.5 Doloonii Tsenkher Borefield

In terms of providing a supply of water for mining activities the areas immediately around the BK-AN deposits are not prospective as presented above. The closest area to the gold deposits which has groundwater potential is Bayan Khundii, Doloonii Tsenkher Valley. This is one of the NW-SE trending sedimentary basins throughout the eastern TAT. These basins were in-filled by Late Paleozoic, Mesozoic and Cenozoic aged sedimentary sequences, including Carboniferous, Permian and Jurassic aged coal bearing strata and overlying, unconsolidated, Quaternary age sediments. The more volcanoclastic-sedimentary nature of this basin makes it much more prospective as an area of groundwater supply, compared the fractured rock aquifer areas near the mine sites (Okhi Us, 2017).

Sedimentary sequences in the region have been studied during previous mineral and groundwater exploration. The lower most sequences of the sedimentary basins are typically of Upper Jurassic to Lower Cretaceous age and comprise conglomerates, sandstones, mudstones, clays and minor volcanics. These basement sedimentary sequences have been identified as low yielding and their use as groundwater supply is limited. Upper Cretaceous basin sequences in the region have yielded the most potential for groundwater supply. The distribution of these potentially water bearing units is varied; however, where these formations have been intersected during exploration drilling, they have been identified as aquifer units. Groundwater quality is typically fresh to slightly brackish (Okhi Us, 2017).

The initial prospecting program identified two potential water-bearing units located within approximately 7km of south and southeast of the BK deposit. The Bayan Khundii area is located at 2.5-10.0 km from the Bayan Khundii hard rock gold deposit, and the Doloonii Tsenkher Khooloi is located at 3.5-35.5 km from the Altan Nar deposit (Okhi Us, 2017).

After drilling and aquifer testing the southern water target area was found not to contain significant water resources capable of contributing to a water resource for industrial and mining use. However, the northern target area, as outlined in the reference map, was determined to have an available resource of approximately 10 L/s. This understanding was derived from 12 holes and limited aquifer testing information.

5.6.6 Khuren Tsav and Bosgon Sair Borefields

KT and BS borefield aquifer (Figure 5) testing analysis on the Erdene supplied constant rate production well testing data was undertaken by Ramboll. This data was processed for analysis via the Cooper and Jacob straight line derivation of the Theis equation and plotted. Constant rate testing data was supplied for five wells. From these studies an overall average aquifer transmissivity estimate of 25.5 m^2/d was established.

The response of the aquifer to pumping was consistent with that of a confined aquifer to leaky, semi-confined aquifers with apparent barrier boundary responses. The water supply borefield is located in an area of basin infill, hosted in the fractured rock aquifer. As such, there may be unconfined systems throughout and have barrier (edge of basin infill) and recharge (fracture/fault hydraulic conduit) boundaries. The fractured rock (host rock) aquifer in particular may also have significant anisotropy (different hydraulic conductivity in different directions). This will cause the drawdown from all sources to propagate preferentially along the direction of highest hydraulic conductivity and be reduced in the direction of lowest hydraulic conductivity which could affect drawdown predictions associated with the proposed groundwater abstraction regime.

In the FT and BS Basin infill area, the water producing zone is typically 30+m deep and overlain by likely confining or partially confining lithologies. For the drawdown in the confined aquifer in the basin infill area to propagate to the shallow groundwater aquifers supporting herders and any groundwater dependant ecology there needs to significant regional and shallow-deep connectivity. It is considered more likely that the basin infill aquifer will have hydraulic boundaries that will limit the drawdown propagation outside of basin infill. This occurrence would negate the ability of the drawdown to propagate outside of the basin infill area but would increase the drawdown in the basin infill areas substantially.

Tetra Tech provided a preliminary water-supply assessment of the KT and BS borefields for the Project (Tetra Tech, 2019). From this assessment it was established that in April 2019, out of 12 boreholes drilled, five boreholes produced water yielding between 2 L/s to 4 L/s. From this data it was inferred that the groundwater reserves within the KT and BS aquifers were in the order of 14.5 L/s, based on inferred aquifer dimensions and the projected life of the mine (Okhi-Us 2019).

As previously established, the water requirements from the KT and BS aquifers are in the range of 7 L/s. If these water use estimates are accurate, the inferred groundwater reserves in the KT and BS aquifers could provide water for the Project (Tetra Tech, 2019).

5.6.7 Bayan Khundii Borefield

Four productions wells within the KT-BS wellfield (BKW16, 21, 30, 44) in combination with the old and new camp wells are identified as the source of the initial water supply for the project (Okhi-Us, 2019). Each of the four production wells have an existing adjacent shallow groundwater monitoring well (<10m). A summary of the known production wells and associated monitoring boreholes are shown in Table 1.

Table 1 - Current production wells and associated groundwater monitoring boreholes (Okhi-Us, 2019)

Borehole	E	N	Elevation	Location	Date Drilled	Borehole Depth	Drilled Diameter	Permanent Casing Depth	Permanent Casing Dia.	Installation Depth	Installation Dia	Water-bearing lithology	Water bearing Lithology	GWL
	WGS84 UTM Zone		RL			(m bgl)	(mm)	(m)	(mm)	(m bgl)	(mm)	(m bgl)	(Okhi-Us, 2019)	m RL
Production Wells														
BKW16	480415.0	4860323.0	1215.3	West KT-BS wellfield	Jun-19	92	219	12.0	219.0	12 - 84	159	15.4 - 88.3	C1	1212.0
BKW21	483347.0	4859575.0	1217.0	East KT-BS wellfield	Aug-19	66	219	12.0	219.0	12 - 60	159	15.7 - 59	P1	1206.2
BKW30	481110.0	4860198.0	1212.3	West KT-BS wellfield	Aug-19	90	219	24.0	219.0	30 - 84	159	50 - 78	C1	1208.1
BKW44	480910.0	4860466.0	1216.1	West KT-BS wellfield	Sep-19	90	219	12.0	219.0	12 - 90	159	45 – 87.4	C1	1207.6
Monitoring Wells														
BKW16_M	480420.2	4860320.4	1215.3	West KT-BS wellfield	Jun-19	50	150	-	-	5 - 50	110	-	C1	?
BKW21_M	483350.7	4859584.0	1216.8	East KT-BS wellfield	Aug-19	50	150	-	-	5 - 50	110	-	P1	1206.0
BKW30_M	481117.5	4860200.0	1212.4	West KT-BS wellfield	Aug-19	50	150	-	-	5 - 50	110	-	C1	?
BKW44_M	480911.7	4860472.0	1216.2	West KT-BS wellfield	Sep-01	50	150	-	-	5 - 50	110	-	C1	1207.7
Camp Wells														
HUDAGK (new camp well?)	484245.0	4866669.0	1276.3	New camp	Sep-19	102	219	18	219	30 - 60	159	36 - 56	C1	1261.7
HUDAG2	482626.0	4867909.0	1283.4	Near old camp well	Sep-19	100	150	18	159	10 - 90	110	19.05 – 84.0	C1	1264.3
Old camp well - Maikhan Khuren	482623.0	4867906.0	1283.3	Old camp	Oct-19	?	?	?	?	?	?	?	C1	?

Source: ROMA, 2020


Target
14.5 l/sec
BKW-33 79m; 0.1 l/sec
BKW-32 91m; 0
BKW-31 91m; 0.1 l/sec
BKW-16
BKW-20 92m; Good water
BKW-20
BKW-30 (well-4) 90m; 3.6 l/sec
BKW-37 91m; 0.1 l/sec
BKW-15 103m; 2.5 l/sec
BKW-36 102m; in progress
BKW-01 72.7m; 0.9 l/sec
BKW-35 85m; 0
BKW-06 149.4m; 0.8 l/sec
BKW-07
BKW-27 163m; 0
BKW-18
BKW-09(Well-2)
BKW-25 91m; 0
BKW-28 60m; 0
BKW-22 80m; 0
BKW-13 (Monitoring)
BKW-21(Well-3)
BKW-19 134m; 0.3 l/s
BKW-05 129.7m; 0.5 l/sec
BKW-29 80m; 0
BKW-10 121m; 0
Water exploration hole 2019
Target 1
Major fault
Ground water exploration area

5.6.8 Water Quality

Groundwater samples were taken from the wellfield and camp wells, one borehole within the proposed pit and from herder wells in the surrounding area. The samples were tested for a range of parameters. All sample results were generally elevated in salinity, hardness, and some heavy metals including arsenic, molybdenum and copper relative to national drinking water standards (ROMA, 2020).

Table 2 presents the groundwater analytical results, where bold indicated elevated above MNS National Guidelines 0900:2018 and shaded indicates elevated above World Health Organisation drinking water quality guidelines.

Table 2 - Current production wells and associated groundwater monitoring boreholes (Okhi-Us, 2019)

Well name		BKHGD-02	BKW9	BKW21	BKW16	BKW30	BKW36	BKW44	New Camp	Tsagaan Hudag
Analyte	Unit	Pit	East Khurentsav		West Khurentsav					(old camp)
pH		7.17	7.49	7.13	7.34	6.92	6.61	7.58	8.25	7.96
EC	µS/cm	**11,756**	**2,208**	**2,687**	**8,717**	**5,936**	**13,945**	**5,182**	**2,631**	**3,500**
TDS	ppm	5,878	1,103	1,263	4,097	2,790	9,064	3,109	1,578	2,109
Cl	mg/l	**1,157.3**	188.0	234.3	**2,591.5**	**1,384.5**	**5,058.8**	**681.6**	237.9	**447.3**
SO_4	mg/l	**2,750.0**	**505.0**	**556.0**	400.0	**505.0**	**641.0**	**1,355.0**	**781.0**	**874.0**
HCO_3	mg/l	122.0	128.1	128.1	164.7	79.3	85.4	140.3	54.9	115.9
Na,K	mg/l	**1,348.0**	199.3	180.0	**1,133.7**	**329.4**	**2,140.0**	**520.1**	**454.4**	**459.0**
Ca	mg/l	**555.1**	**147.3**	**194.4**	**511.0**	**641.3**	**1,022.0**	**441.9**	72.1	**232.5**
Mg	mg/l	**69.9**	25.5	**35.9**	**115.5**	**54.7**	**158.1**	**62.0**	11.6	17.0
NH_4	mg/l	0.0	0.0	0.0	0.0	0.0	**5.0**	0.0	**1.8**	0.7
As	mg/l	**0.013**	**0.048**	-	**0.032**	**0.013**	-	0.007	-	0.002
Sr	mg/l	**11.070**	**1.215**	-	**9.580**	**12.185**	-	**6.517**	**1.713**	**1.713**
Ni	mg/l	0.006	<0.0003	-	**0.034**	0.041	-	**0.025**	<0.00017	0.002
Mn	mg/l	**0.129**	0.032	-	<0.005	**0.253**	-	0.006	<0.005	<0.005
Pb	mg/l	<0.01	<0.005	-	-	0.016	-	<0.005	<0.005	<0.005
F	mg/l	**1.290**	-	-	-	-	-	-	**2.120**	-
Na	mg/l	-	150.0	-	**1,810.0**	**850.0**	-	**744.0**	**459.0**	**462.0**
bold	MNS National Guidelines 0900:2018									
	WHO Edition F. Guidelines for drinking-water quality. WHO Chronical 2011; 38: 104-8									

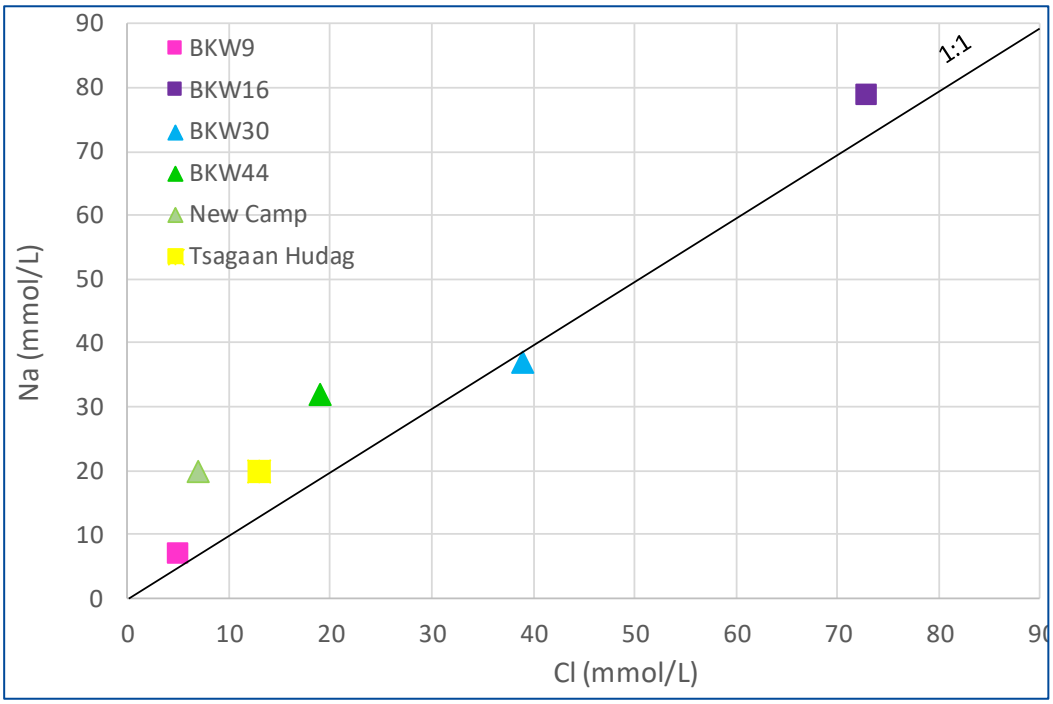
Source: ROMA, 2020

Piper diagrams were used to evaluate the geochemical evolution of groundwater to further understand the source, groundwater flow and hydraulic connectivity between sampling points. Figure 7 presents a piper diagram summarising the water quality results.

Water quality of the pit borehole (BKHGD-02) indicated saline-sodium chloride water type, with near neutral pH and some elevated heavy metals including arsenic. Hematite and minor specularite were noted in the veinlets hosting the visible gold within the Bayan Khundii pit indicating oxidizing conditions suggesting the mineralized fluids may have interacted with meteoric waters (ROMA, 2020).

Groundwater from the eastern KT-BS wellfield (BKW9 and 21) are relatively less saline, or fresher, with similar 'mixed' chemical compositions with relatively higher sulfate concentrations. These eastern wellfield samples, show linear Na:Cl relationship (in mmol/L) shown in Source: *ROMA, 2020*

Figure 6, and are considered in hydraulic continuity, as observed during pumping tests (ROMA, 2020).

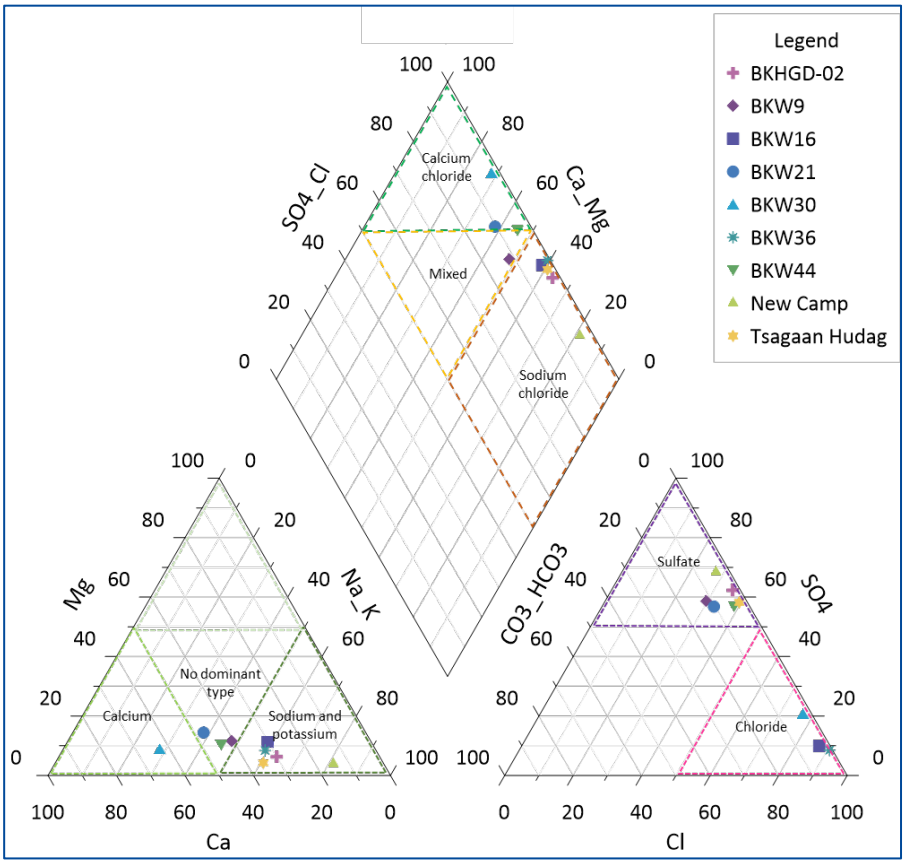


Source: ROMA, 2020

Figure 6 Relationship between Na and Cl in groundwater samples.

Groundwater quality of the western KT-BS aquifer recorded more saline waters with various types. The relationship with Na and Cl from the western samples is above the 1:1 seawater dilution line indicating an additional source of sodium (or a depletion of chloride, which is unlikely). This, in addition to various pH values, indicate their evolution may differ from the eastern side of the wellfield. Further BKW30, although in the western side of the wellfield, has its own induvial geochemical signature. This borehole is the lowest in elevation, was situated on the 1:1 linear relationship line and may represent a mixing of various groundwater types plus an influence of meteoric recharge due to its lower EC/TDS concentrations (.

Groundwater from the various wells tested including those proposed for the camp, exceed WHO and Mongolian drinking water guidelines for salinity, hardness, chloride, sodium, sulfate, calcium, ammonium, fluorine, arsenic, manganese, antimony, ammonium and strontium. Reverse osmosis treatment plants are planned at the process plant for use at the plant and mine site facilities and separately at the permanent camp for domestic use.



Source: ROMA, 2020

Figure 7 Piper diagram of water quality samples

5.7 Surface Water

The Project is located within the southern part of the Central Asian Internal Drainage basin. This is a closed basin in the largest drainage basin in Mongolia (Batnasan 2004) with no outflow to the ocean. Almost all watercourses in the southern part of this basin are ephemeral in nature and remain dry for most of the year. The region has mean annual precipitation of 105 mm, most of which falls as rain during storm events in the warm summer season. Runoff from bedrock outcrops and surface water flows are only likely to occur following a significant rainfall event of approximately 20 mm or more. The amount of rainfall required to generate surface flows will depend on the intensity of the rainfall, duration, slope and surface runoff capacity.

Satellite images depict the area where runoff creates temporary streams and rivers originating from the surrounding higher hills down into valleys and basins. Flow direction is dependent on topography and within the proposed pit area would drain down to the south-southwest. 70% to 80% of the surface water flow events usually occur during the months of July and August (ROMA, 2020).

As these surface flows are short-lived and unpredictable, the flows are of limited use to the local population and wildlife (other than their importance for the recharge of shallow aquifers). Depending on the topography, these surface flows often have a heavy sediment load, and can travel at relatively high speeds down the valleys from the area of rainfall. Their potentially unexpected nature can make them a hazard, trapping domestic livestock and wildlife and posing a danger to people and infrastructure.

The region's mean annual precipitation is 105mm and during 1981 to 2010 the average annual precipitation was less than 60mm on average over a period of between 15 to 20 days (Tetra Tech, 2019) and usually during the warmer months (April to September). There is a one in 50-year chance that the maximum amount of 50 to 60mm may fall within a single day (Tetra Tech, 2019). Annual evaporation for the region is estimated at 2,900 mm/year (Tetra Tech, 2019).The KT-BS wellfield generally slopes from the north-east down to the south-west into an existing wide ephemeral river which passes through the Doloony Tsenkher valley to the north, traversing north-east to south-west approximately 7km to the south of the site. No surface water has been noted or recorded within any of the available investigations or reports (ROMA, 2020).

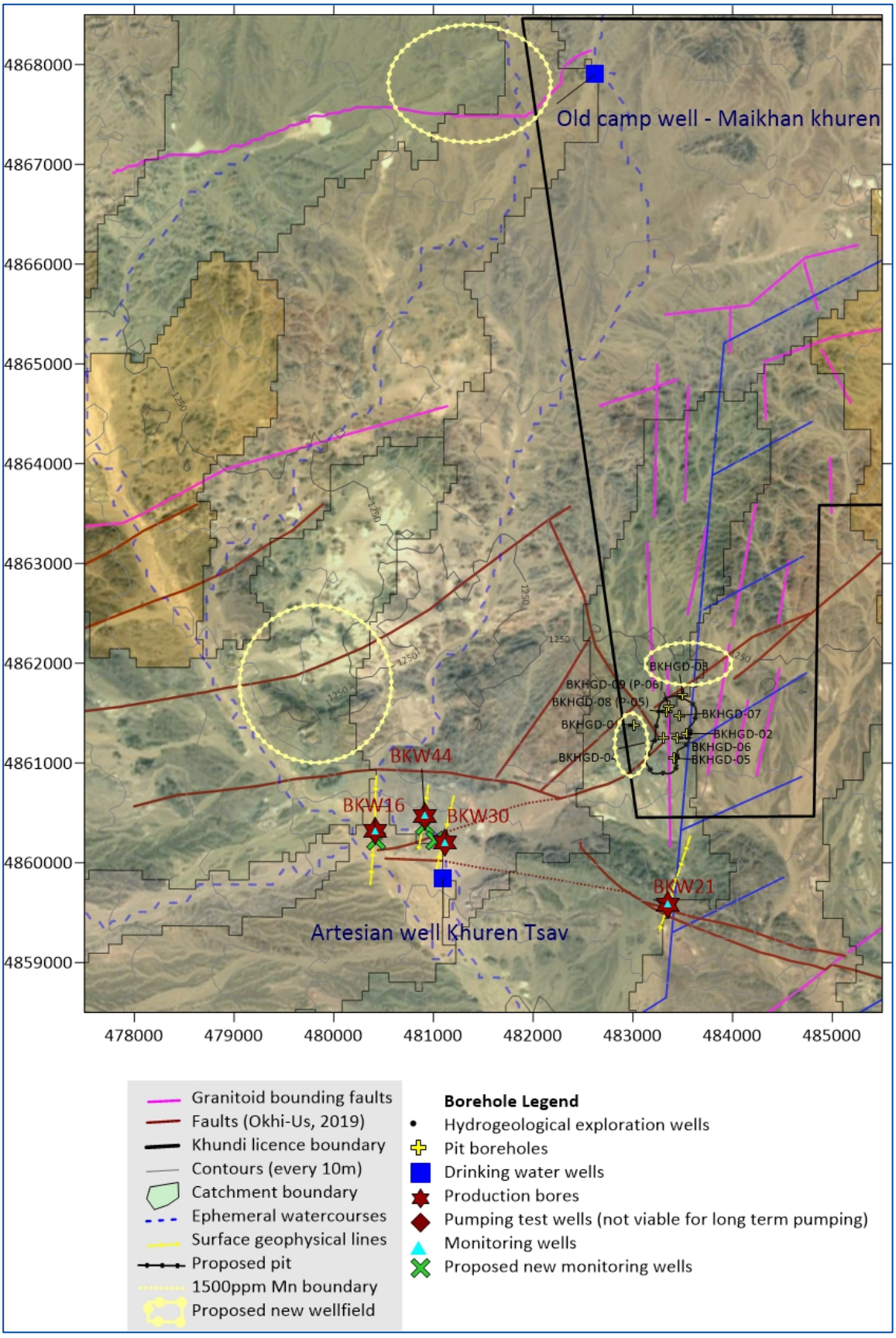
Site surface water modelling is planned to be undertaken in the next phase of the project studies to support the site civil design (Tetra Tech, 2019).

5.7.1 Bayan Khundii

No perennial streams and rivers exist in this region due to its landscape and climate. Some ephemeral riverbeds cross the project area. There is no permanently available surface water, hence water use is not discussed. The landscapes topography lowers from northeast to southwest, with ephemeral drainage taking source from and crossing the survey area directed southwest. Hills and dry riverbeds have no definitive names due to low population density in and around the survey area. The BK area is shown in oblique aerial photography in Figure 9 (Eco Trade 2017a).

The widest ephemeral river course which crosses the survey area originates from the western slope of the Bor Khairkhan mountain located 23 km northeast of the survey area at an elevation of 1,729m a.s.l., and from mountains north of the survey area. This typically dry riverbed reaches a maximum width of approximately 200 m, runs through the north-western part of the survey area, merging with riverbeds in the southwest that direct seasonal flow from the Doloonii Tsenkher valley into Shargiin Gobi to the southeast. Flow in the riverbed predominantly occurs during summer rainfall flood events, with the frequency depending on soils, landscape and precipitation (Eco Trade 2017a).

Figure 8 presents the ephemeral water courses across the Khundii project area, extending south to the KT-BS borefields.



Source: ROMA, 2020

Figure 8 Ephemeral Watercourses (ROMA, 2020)

Due to potential for contamination of surface water and riverbeds near the mine sites in the event of runoff, sediments of the river bed were sampled at three locations, two in the same dry river bed in the BK survey area and one to the west. These were analysed for heavy metal content. Arsenic and molybdenum content in two samples in the BK area were above the permissible level stated in the national standard for pollutant content in sandy soil. Copper was also above the permissible level in one sample from inside the BK area. The samples suggest the presence of the ore body is naturally elevating copper and molybdenum content in soils (Eco Trade 2017a).

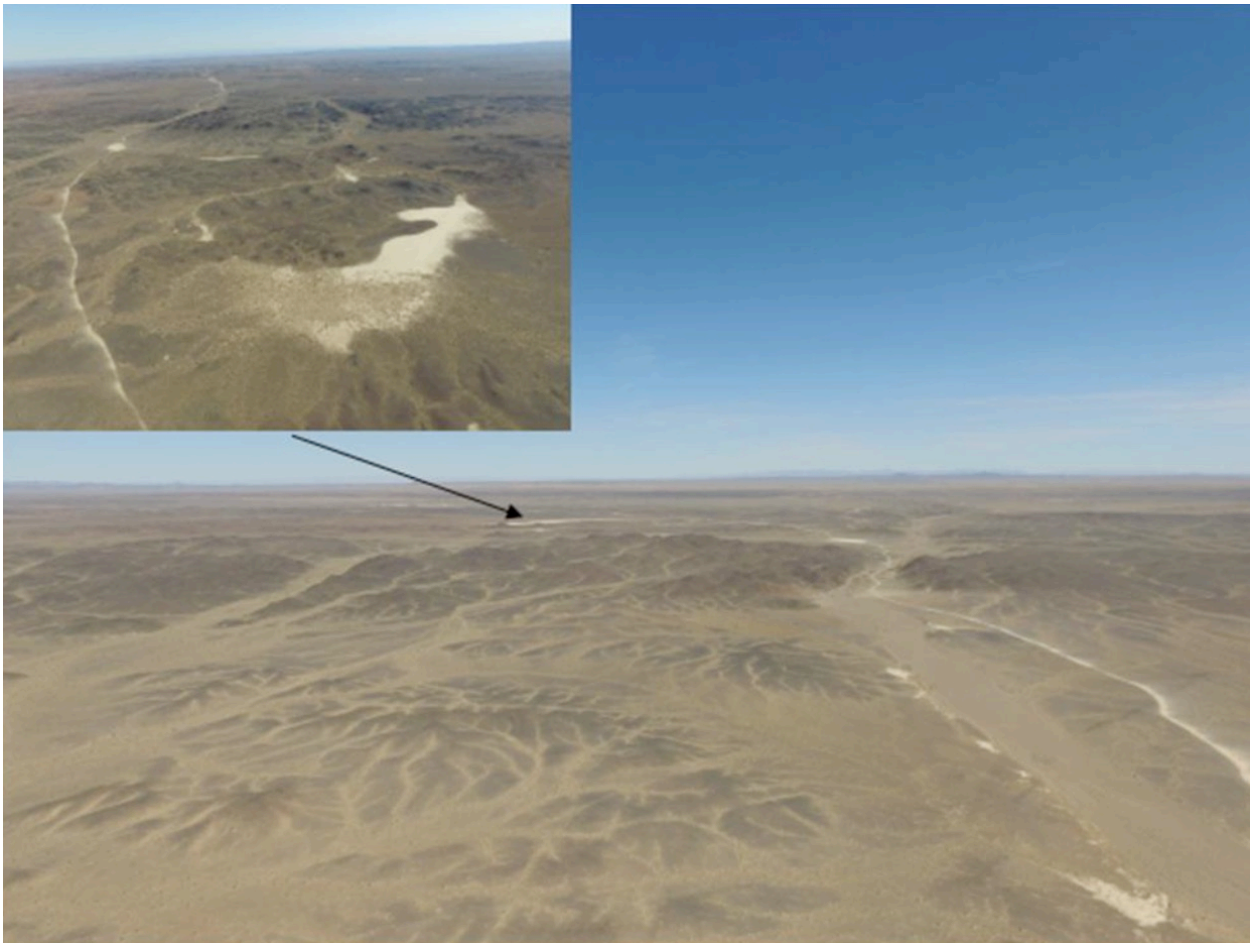


Figure 9 Bayan Khundii Exploration Area Oblique Aerial Photography

5.7.2 Altan Nar

No perennial streams and rivers exist in this region due to its landscape and climate. Some ephemeral riverbeds cross the project area. There is no permanently available surface water, water use is not discussed. This region does not have any permanent flow of streams and rivers, but four ephemeral saline lakes are located in the survey area. These and typically dry riverbeds that cross the project area are shown in oblique aerial photography, Figure 10.

The main river courses that cross the area originate in the northeast from the sides of Bayan Zurkh Mountain (1,543m a.s.l.) flowing to the southwest. River courses also originate in the north from the eastern sub-mountains of the Khalbiin Mountain (1,603m a.s.l.) and flow to the south. When ephemeral flows occur in the riverbeds, they flow into salty, seasonal lakes, located in the western part of the survey area. Water that flows into these lakes originate from the northern sub-mountains of the Edren ridges in the south, the eastern sub-mountains of the Khalbiin Mountain in the north and Bayan Zurkh Mountain in the northeast. When large flows occur in these

ephemeral rivers, they discharge into the Shargiin Gobi. The widest of the dry riverbeds that cross along the survey area reaches a maximum width of approximately 160 m (Eco Trade 2017b).

As a river course crosses through AN license area, surface water flows might transport pollutants during mining activity in future with potential to contaminate land surface, sub-surface, soil, surface water, and soil water. To provide baseline data two samples were taken from sediment of this dry riverbed and tested for heavy metals. Arsenic and molybdenum content in these soils were above the permissible level for the pollutant content in sandy soil in the national standard, suggesting the presence of the ore body is elevating arsenic and molybdenum content in nearby soils (Eco Trade 2017b).

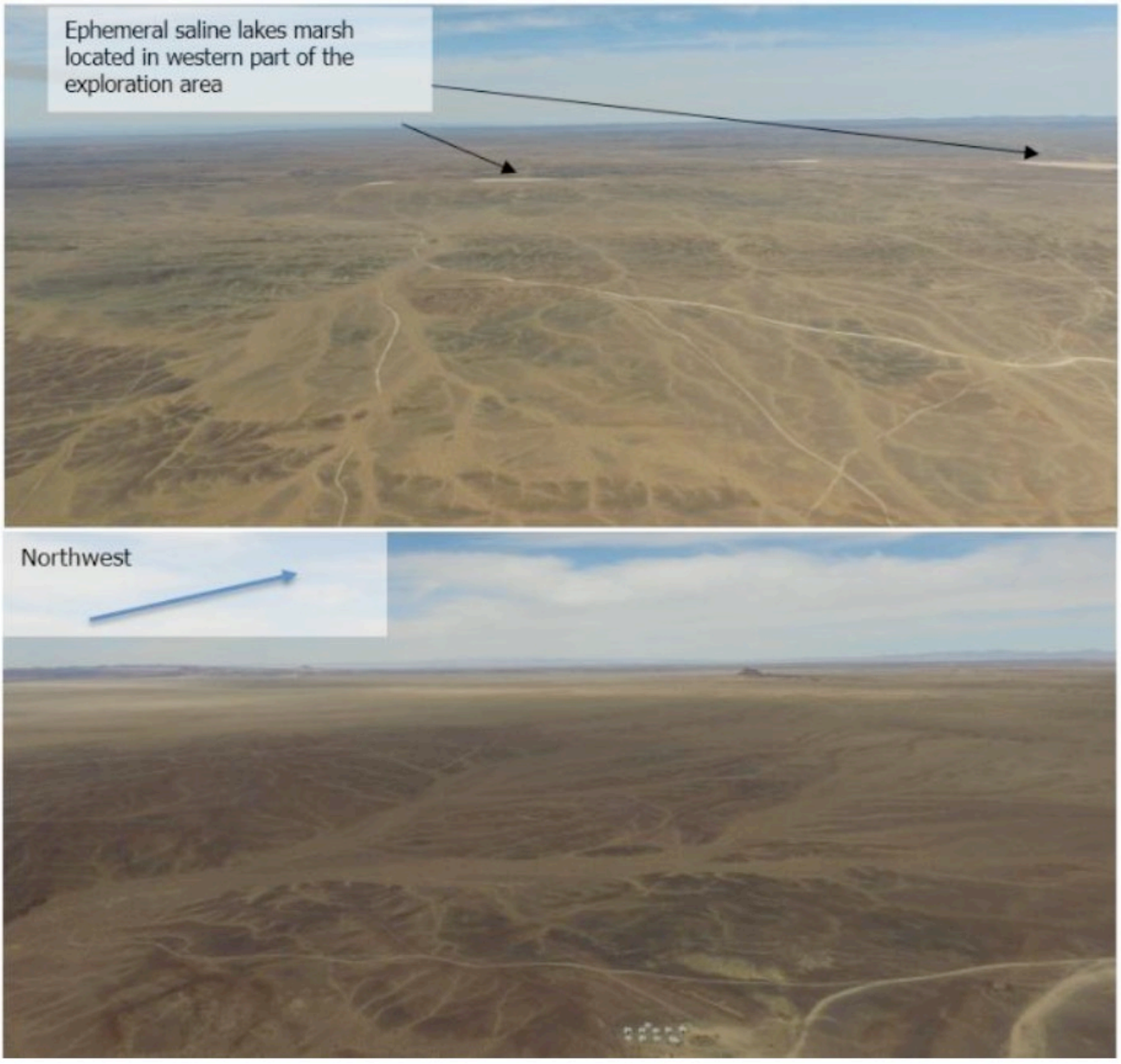


Figure 10 An Exploration Area Oblique Aerial Photography

5.8 Conclusions

An assessment of the AoI associated with water supply activities has been undertaken, the results of which are presented in *Chapter C5 Water Resources Impact Assessment*.

5.8.1 Hydrogeological regime

A summary of the projects conceptual hydrogeological model based on reanalyses and previous work by Okhi-Us (2019) and Tetra Tech (2019) was provided in ROMA, 2020:

- Shallow ephemeral related aquifers are locally present and typically fresher due to recharge from irregular precipitation and subsequent runoff.
- Deeper brackish to saline groundwater aquifers are present within the bedrock across the project area at an approximate depth of 1,216mRL (~10.0 mbgl) within the pit area, at 1,261mRL (~14.6mbgl) at the new camp area, at 1,264mRL (~19.0mbgl) at the old camp area, and between 1,206mRL and 1212mRL (3.3 to 10.8m) in the KT-BS wellfield.
- Geochemistry and flow tests indicate the bedrock aquifers are localised and constrained to flow within discrete fracture sets.
- It is expected that the bedrock aquifers are vertically stratified due to increasing salinity and density with increasing depth.
- The fractured bedrock aquifers are typically low yielding, highly varied and unreliable hydraulic responses. Hydraulic conductivities are considered typically within the range of 1E-06 m/s.
- Hydraulic gradients are likely to be to the south to southwest from the areas of higher elevation in the north. They are assumed to flatten out and generally subdue in the relatively flat topographic areas, particularly the KT-BS borefields.
- The lateral and vertical extent of both the shallow fresh and deeper bedrock brackish/saline aquifers is not fully defined based on available data.

Water supply assessment of the KT and BS borefields established that five boreholes produced water yielding between 2 L/s to 4 L/s from the sedimentary basin aquifers within the Khuren Tsav-Bosgon Sair Borefield is able to support a groundwater supply of 10 L/s, sufficient to meet the project water demand of 7 L/s.

Herder wells are in shallow Quaternary sediments in ephemeral drainages with limited to no connectivity to fractured rock aquifers but some potential for connectivity to the sedimentary basin aquifers. Given the sedimentary basin aquifers are believed to be confined to semi confined, this is likely to reduce the potential for drawdown impacts to propagate to sensitive receptors dependant on shallow groundwater resources.

Water balance and pit-lake formation studies have predicted a groundwater pit inflow estimate of approximately 33 m^3 per day. From these studies the potential formation of a pit lake, approximately 35 m deep has been estimated, which is predicted to reach equilibrium approximately 38 years following the cessation of mining activities (Tetra Tech, 2019).

Based on studies undertaken to date, groundwater occurrence in the fractured rock aquifers at the BK and AN Sites appears limited, however will require management during each phase of the project, including the potential for dewatering requirements adjacent to open pits.

5.8.2 Surface Water

Although surface water is rare, floods do occur and it is important that future work includes surface water flood predictions, which may require a management strategy. Site surface water modelling will be undertaken in the next phase of the project to support the site civil design (Tetra Tech, 2019).

Ephemeral surface water flows are likely to be an important resource for the replenishment/recharge of shallow groundwater utilised by herder communities and groundwater dependant ecology.

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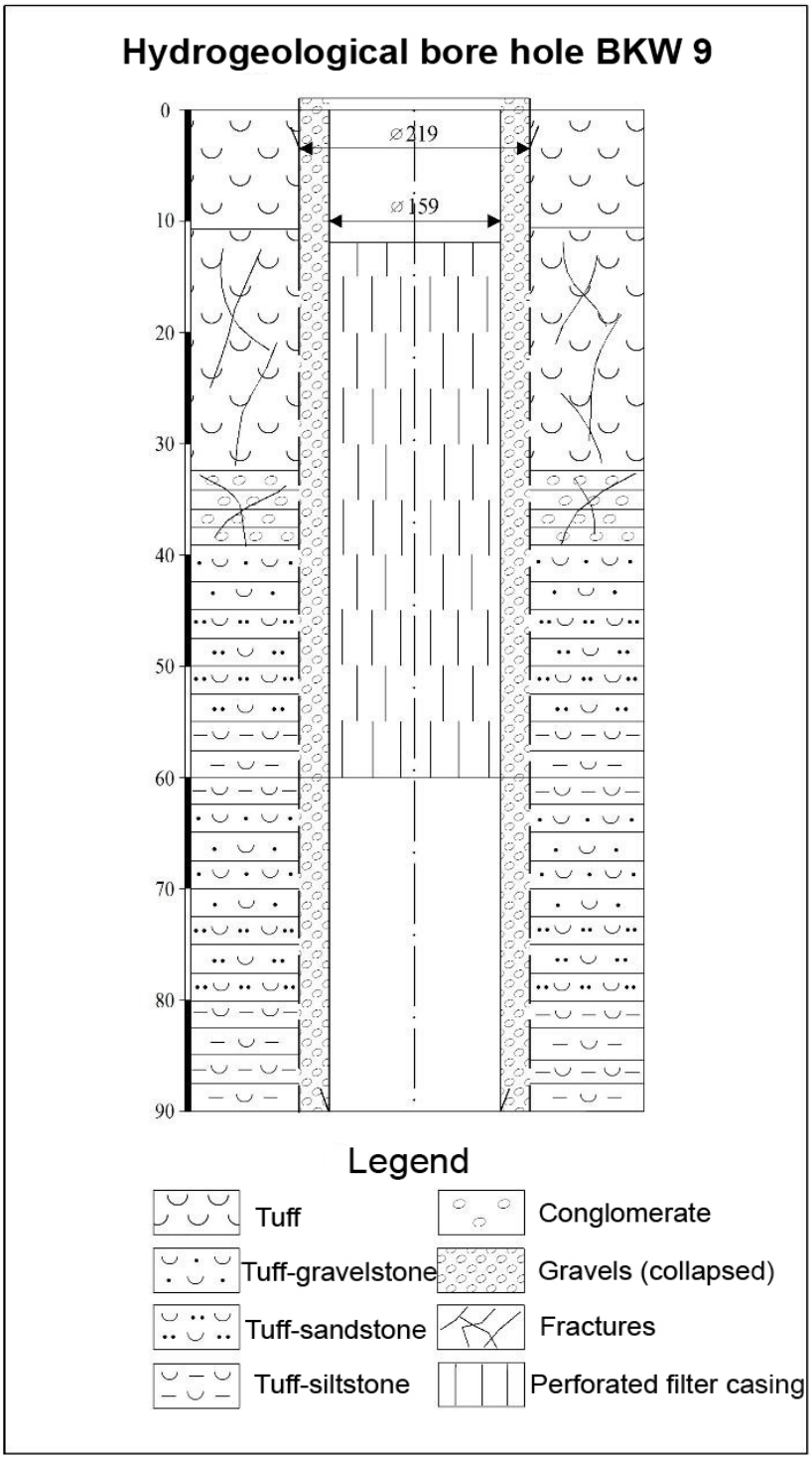
Appendix A: Hydrogeological Bore Logs and Cross Section of Khuren Tsav and Bosgyn Sair Borefields

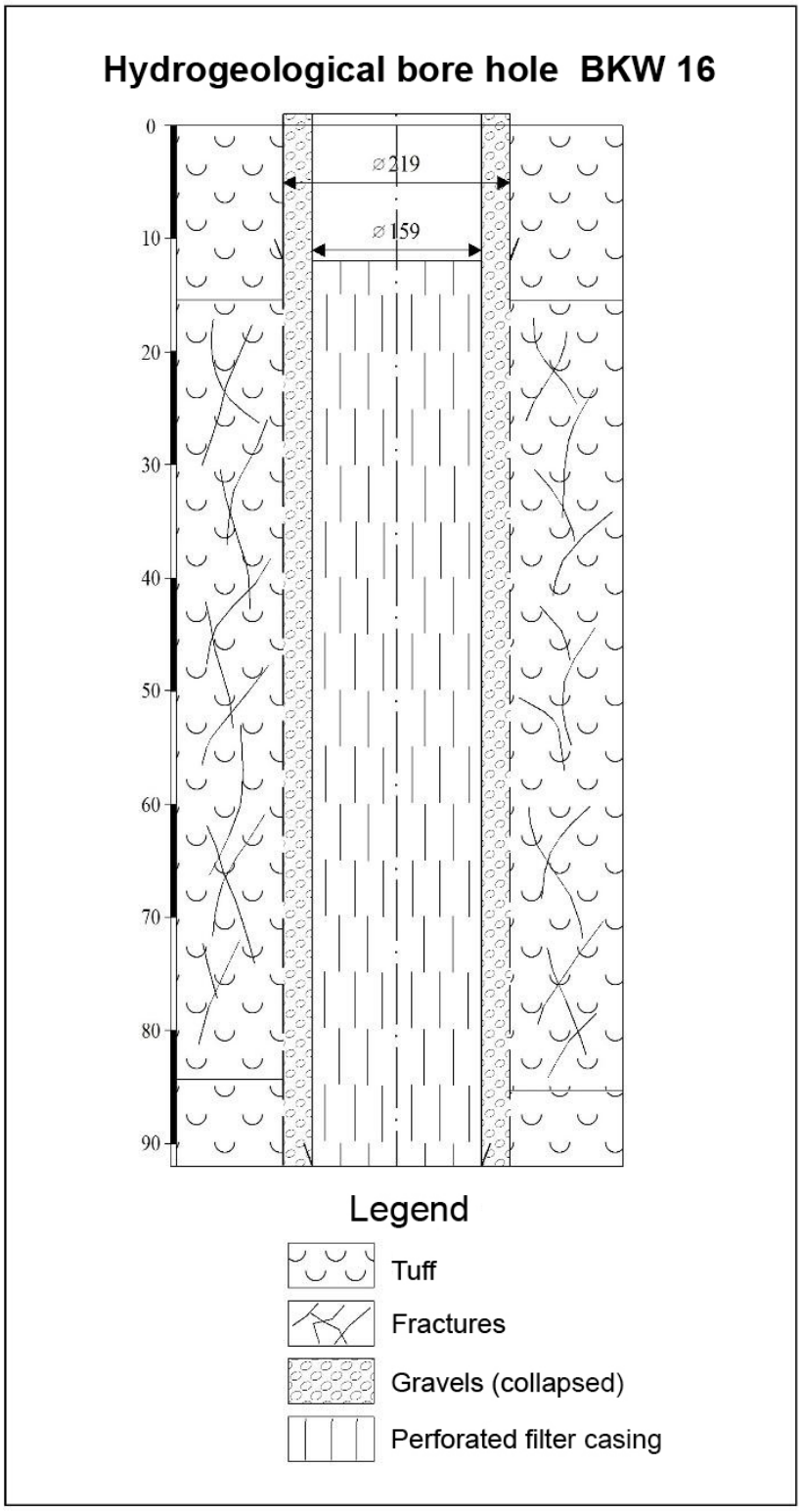
Hydrogeological bore logs

The following figures present the hydrogeological strata at depth as logged for the five production wells developed at the Khuren Tsav-Bosgyn Sair borefield.



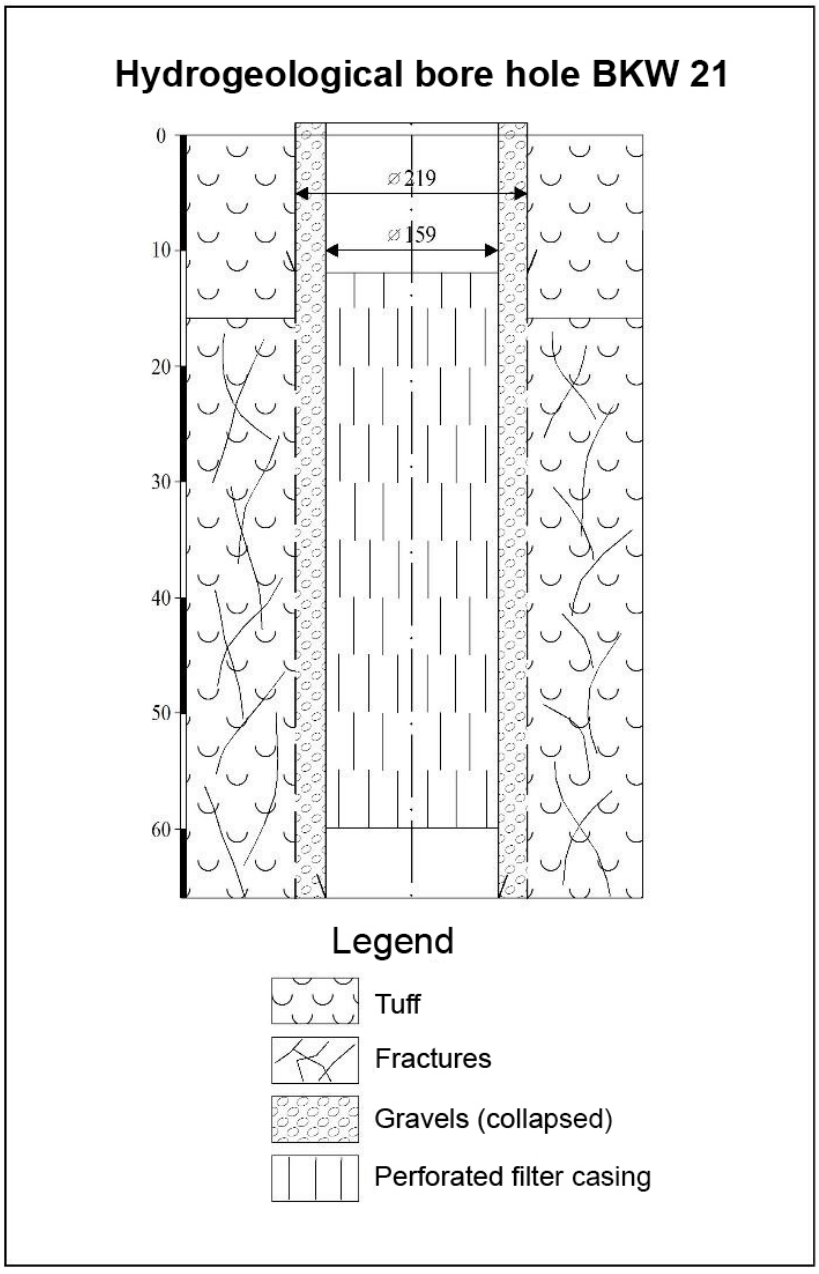
Source: Okhi Us LLC, 2020

Figure B5-11 Hydrogeological bore log, BKW-09



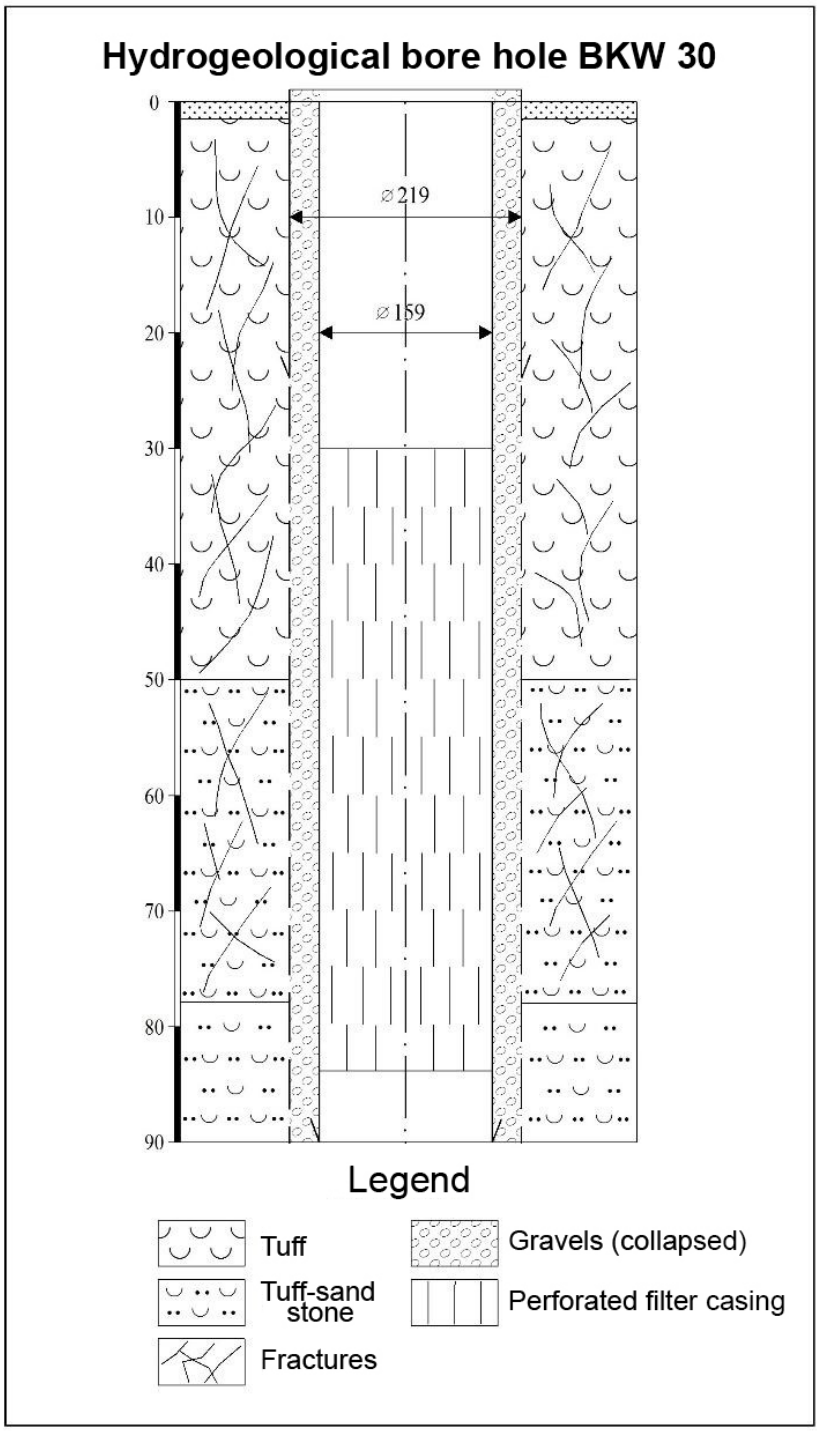
Source: Okhi Us LLC, 2020

Figure B5-2 Hydrogeological bore log, BKW-16



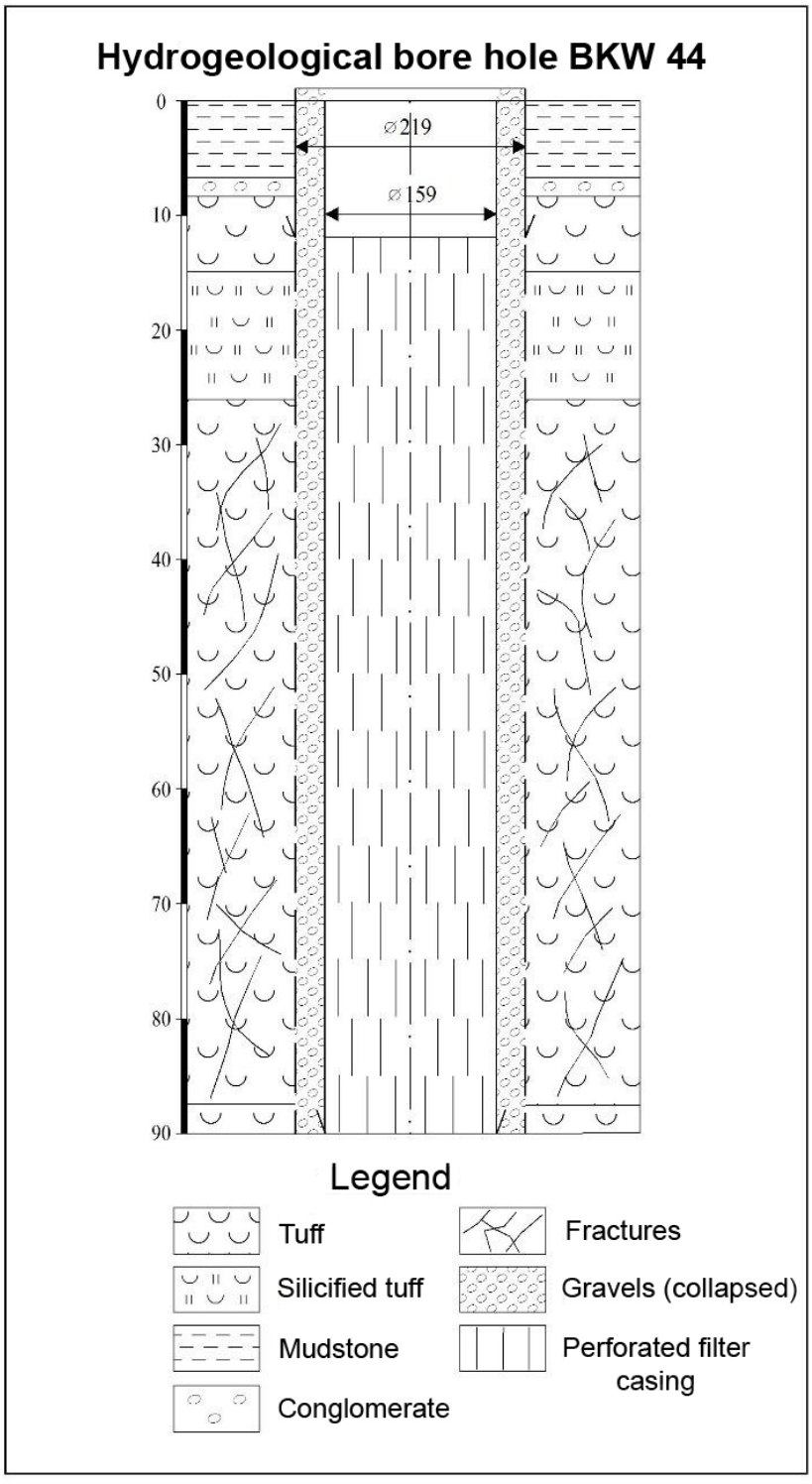
Source: Okhi Us LLC, 2020

Figure B5-3 Hydrogeological bore log, BKW-21



Source: Okhi Us LLC, 2020

Figure B5-4 Hydrogeological bore log, BKW-30

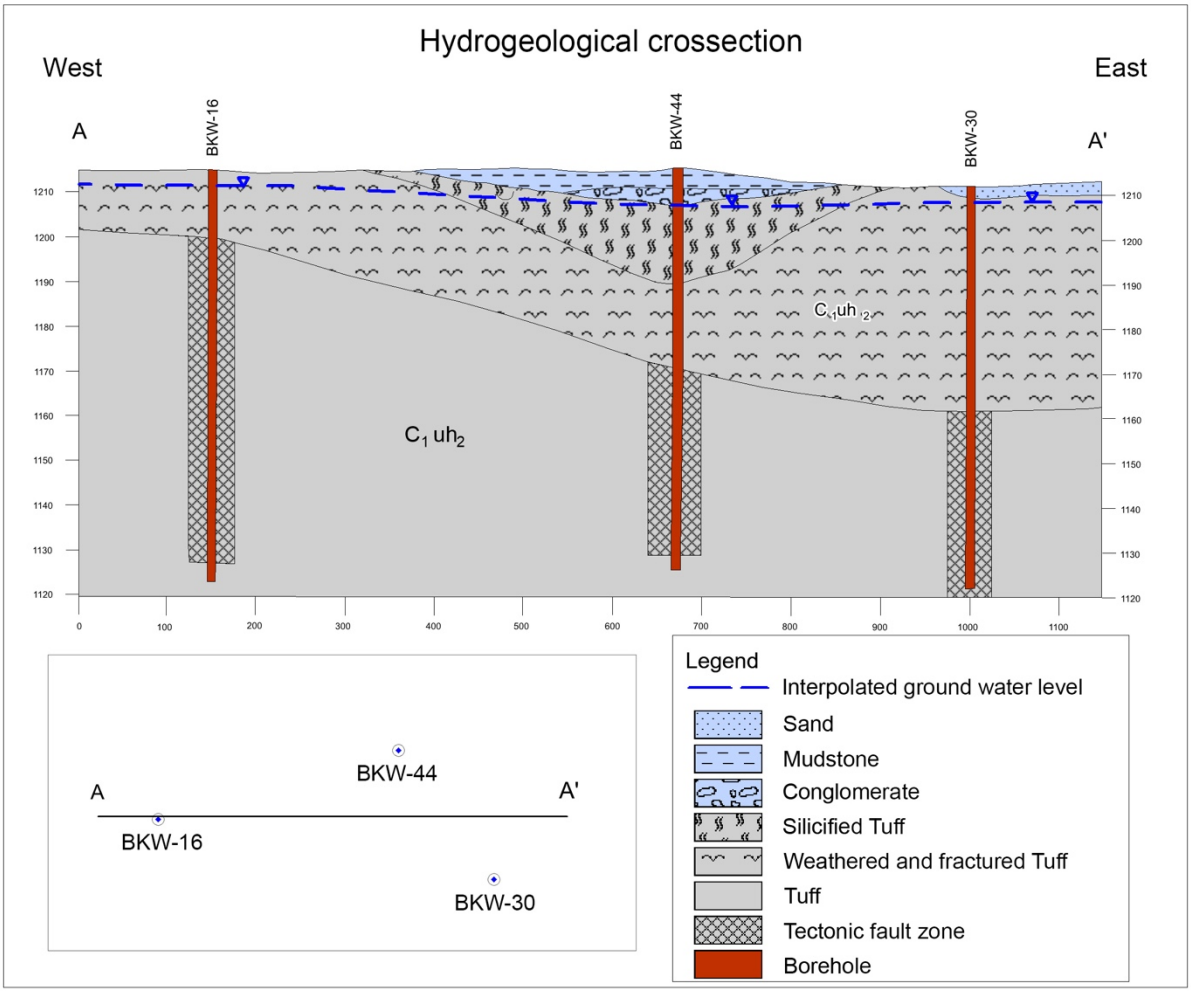


Source: Okhi Us LLC, 2020

Figure B5-5 Hydrogeological bore log, BKW-44

Hydrogeological cross-section

The following figure represents the hydrogeological interpretation for the primary Khuren Tsav-Bosgyn Sair aquifer.



Source: Okhi Us LLC, 2020

Figure B5-6 Hydrogeological cross section of Khuren Tsav-Bosgyn Sair Aquifer



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

B6 - Biodiversity Baseline

May 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
DEIA	Detailed Environmental Impact Assessment
EBRD	European Bank for Reconstruction and Development
GGSPA	Great Gobi Strictly Protected Area
GGSNP	Gobi Gurvan Saikhan National Park
IUCN	International Union for Conservation of Nature
MET	Ministry of Environment and Tourism
MLA	Mineral License Area
PR	Performance Requirement

6. BIODIVERSITY AND ECOSYSTEM SERVICES

6.1 Introduction

This Chapter of the Khundii Gold Project (the Project) ESIA describes the baseline status of biodiversity and key ecosystem services within the Project Area of Influence (AoI). The Project AoI for biodiversity baseline was defined as below (Figure 1):

1. 10 km buffer area from the Tsenkher Nomin and Khundii Mineral Licenced Area (MLA).
2. 500 m buffer area for the proposed haul road between the Altan Nar deposit within the Tsenkher Nomin MLA and Bayan Khundii deposit within the Khundii MLA.
3. 10 km buffer area from the water exploration field in south of the Khundii MLA.
4. 500 m buffer area from the site access road between Shinejinst *soum* and Bayan Khundii MLA.

The AoI was determined with respect to the planned activities during the mine construction, operation and closure phases.

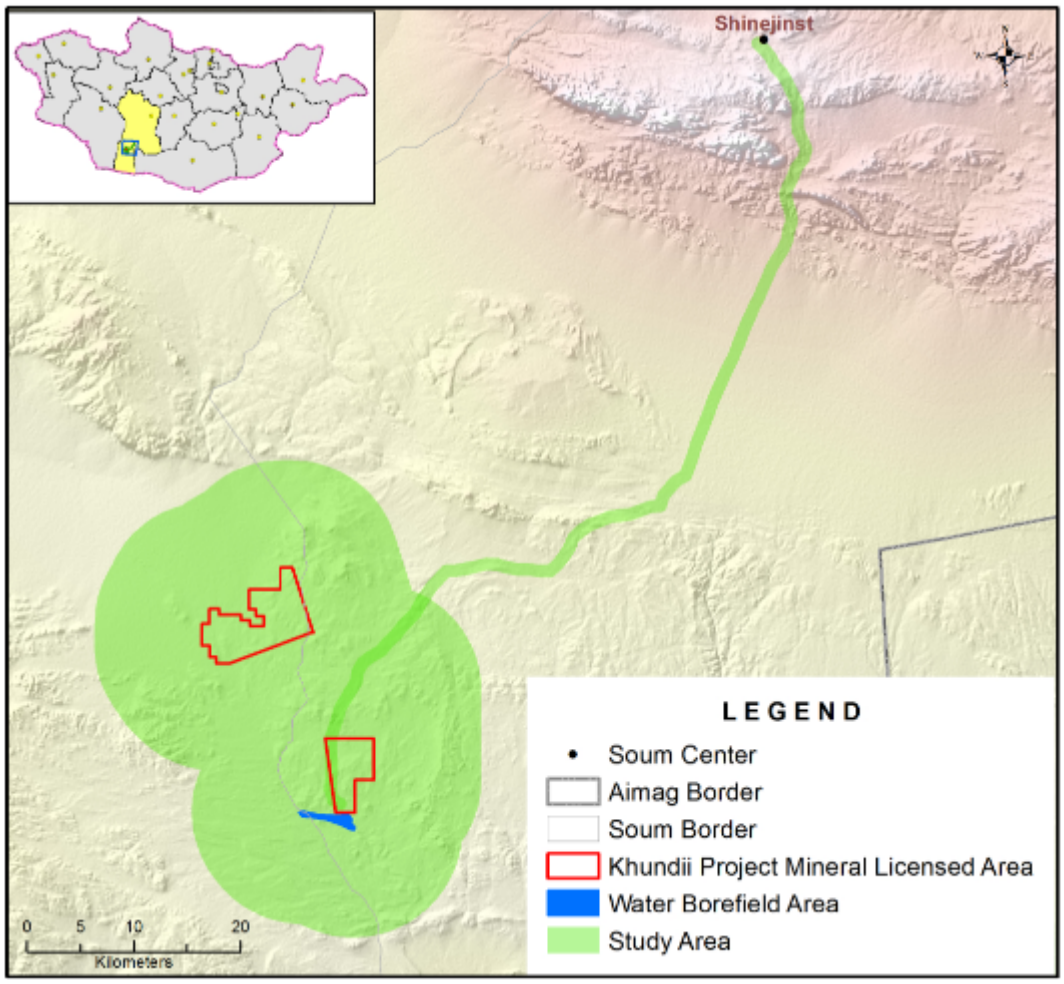


Figure 1. Khundii Gold Project Area of Influence

The goal of this chapter is to provide a description of the biodiversity features for the Khundii Gold Project AoI for the purposes of assessing any potential impact and identification and design of

mitigations that will protect these biodiversity features. Also, the chapter is designed to facilitate evaluation of the Project compliance with the applicable provisions of Lender requirements on biodiversity (i.e. EBRD's PR6), particularly regarding the designation of Critical Habitat.

6.2 BASELINE BIODIVERSITY CHARACTERISATION METHODOLOGY

The baseline information presented in this chapter is primarily based on environmental baseline survey data collected by Eco Trade LLC in 2016 (28 May - 04 June), 2017 (17 – 23 July), and 2019 (11-19 June) for the Project AoI areas. Description of the used data is shown below.

1. Environmental and Social Baseline Survey Report for Khundii MLA (2017) by Eco Trade
2. Environmental and Social Baseline Survey Report (2017) for Tsenkher Nomin MLA by Eco Trade
3. Khundii MLA Environmental Baseline Survey Report Update (2019) by Eco Trade
4. Tsenkher Nomin MLA Environmental Survey Report Update (2019) by Eco Trade
5. Rare flora species information by Erdene Mongol LLC since 2018.

Publicly available data sources and reference studies have also been used for this assessment (see References Section).

6.2.1 Vegetation Survey Method

The following 31 vegetation plots (Figure 2) were sampled for the vegetation baseline assessment:

- 8 plots in Khundii MLA;
- 3 in Tsenkher Nomin MLA;
- 15 in Water exploration field;
- 3 along the site access road; and
- 2 along the planned haul road between Altan Nar and Bayan Khundii deposit areas.

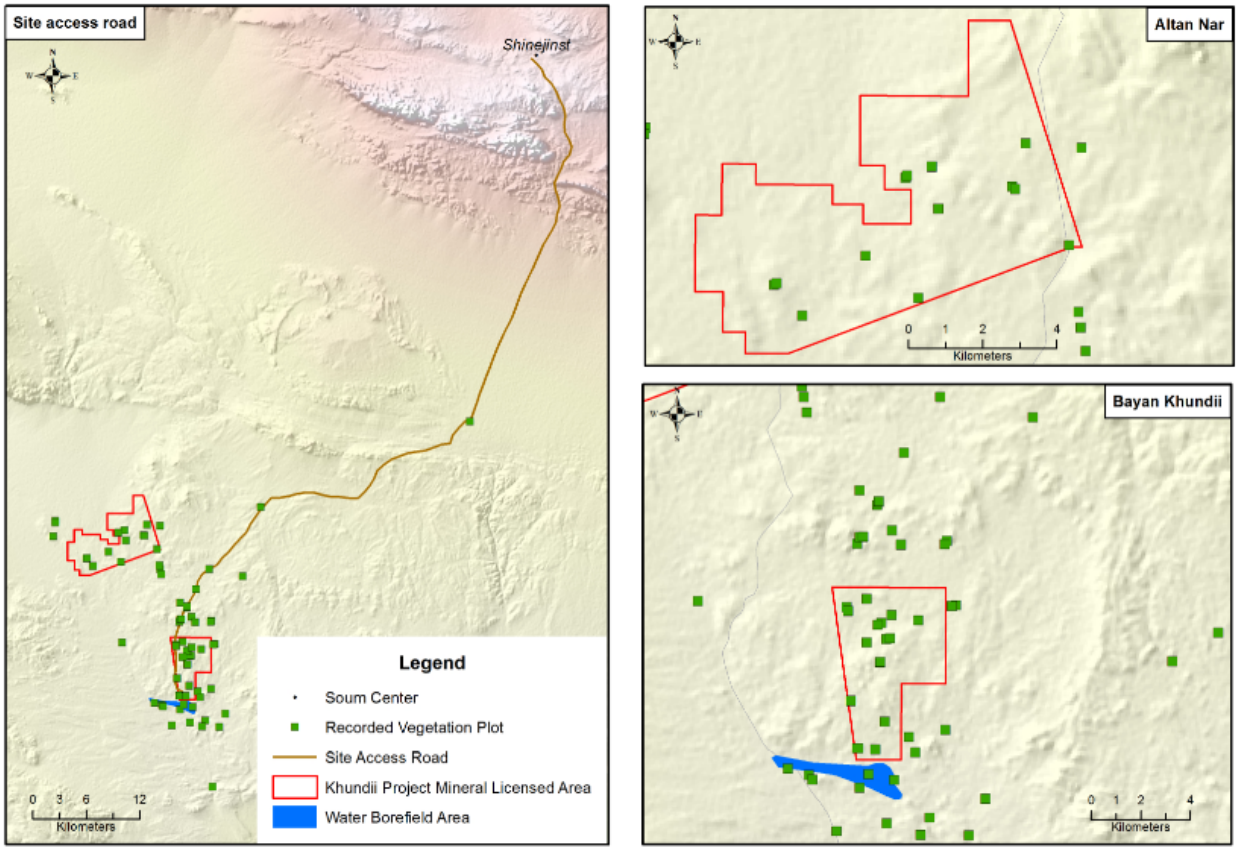


Figure 2 Location of the Vegetation Survey Plots

Eco Trade's field team used 10 m x 10 m (100 m^2) survey plots to study plant species representative of the vegetation communities in the study areas. Smaller, 1 m^2 (1 m x 1 m) plots nested within the 100 m^2 plots were used to determine vegetation biomass.

At each vegetation sampling sites, the following parameters were recorded to describe the vegetation baseline conditions:

- Coordinates of the sampling plots;
- Plant species photos;
- Condition of the plant species by B. J. Keighery (1994) method;
- Plant species diversity;
- Plant species abundance by Drude's (2004) scale;
- Percentages of vegetation coverage, weathered plant and bare ground; and
- Vegetation biomass from the 1 m x 1 m area nested within the larger 100 m^2 plot by Ramenskii (1971) method.

In addition to the survey plots, Eco Trade's field team undertook detailed rare plants survey in 2019 by walking through the direct mine development footprint areas (i.e. camp, and mine

construction, and proposed mine pits and waste rock dumps) to identify and record rare plant species. Rare plant survey tracks are shown in the Figure 3.

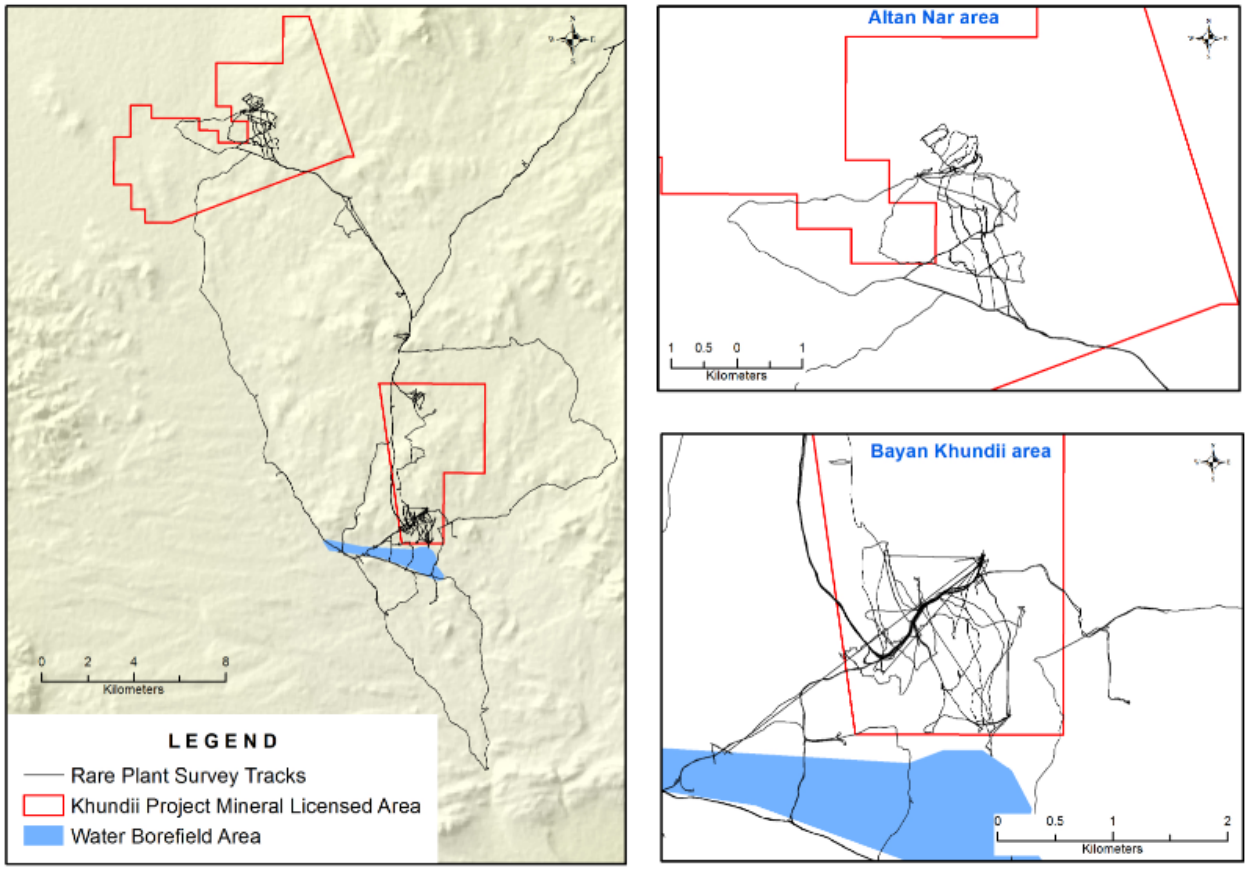


Figure 3 GPS Tracks for Detailed Rare Plants Survey for Mine Footprint Areas, 2019

Identified plant species were checked against the key reference materials, such as the International Union for Conservation of Nature (IUCN) and Mongolian Red List of Plants (2012), Mongolian Rare Plants list as approved by the Mongolian Government (2015) and Mongolian very rare plant species list included in the Mongolian Law on Natural Plants (1995) to determine the species conservation status. Vegetation units were described based on the dominant species present.

6.2.2 Fauna Survey Method

Initial fauna baseline surveys for the Project area were undertaken in May-June 2016 and June 2017. The 2019 field survey areas included the water exploration field and areas along the planned haul road between Altan Nar and Bayan Khundii deposits, in addition to the MLAs.

The fauna baseline field surveys were undertaken by observation of species by driving and walking in the study areas, and investigation animal tracks, droppings and rodent burrows for potential occurrences of wildlife in the study areas. All observed species locations and abundances were recorded and photographs were taken for documentation. In addition to the direct observation, Eco Trade's survey team collected oral information from local community members regarding regional fauna.

Small mammals were surveyed during night-time by driving and using spotlight as most of the small mammals in the area are nocturnal. Small mammal survey tracks mostly covered the daytime mammal survey areas for large mammal and bird observation.

6.2.3 Use of Secondary Data Sources

The KGP biodiversity baseline data were collected during three field surveys, in 2016, 2017, and 2019 respectively, over the last four years during the growing season in the Project AoI. The growing season was selected to capture plant species diversity in the Project area. However, the use of limited biodiversity data collected over a limited time window has a potential to misrepresent the baseline conditions or miss out other significant biodiversity information.

To address the potential shortcomings, the ESIA team used additional sources to supplement the baseline data collected from the field study. These additional information sources included available reference studies (please see the Reference section) at the regional level and consultations with Mongolian biodiversity experts. All supplementary information from the secondary sources included in this Chapter and in the Critical Habitat Assessment were screened for their reliability and robustness. After the screening, flora and fauna species that may occur in the Project AoI have been included in the baseline assessment as a conservative approach to capture potential diversity. Therefore, given the Project's limited scale and impact footprint, it is considered that the baseline data used in this assessment is fit-for-purpose. Nevertheless, given the inclusion of certain species that have not been observed at the site, additional localized survey and observation of the Project's potential area of impact is recommended during the pre-construction phase of the Project.

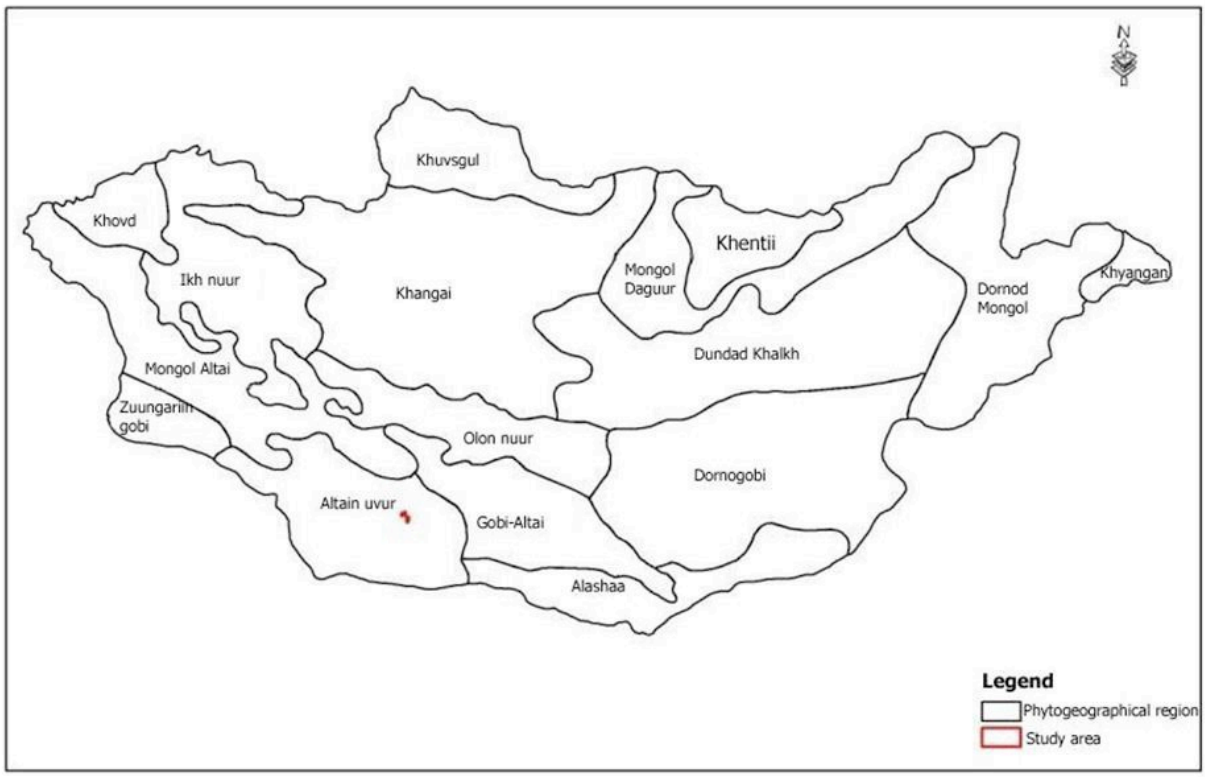
6.3 Baseline Conditions

6.3.1 Flora

6.3.1.1 Phytogeographic and Ecoregional Setting

The botanical geography of the project area lies within the Altay mountain Inner Gobi Desert circle (Figure 4). The common geographic distinction within this circle is rocky desert with sand pebbles both carried and eroded by water from neighbouring mountains. A number of small natural springs (Zuunmod, Ingen Khuuvur, Naransevstein, Ekhiin Gol, Shar Hulsnyi, Khatansuudliin, Toli, Elst Myangan, Ekhen Zulganay, Khutsyin Shand, Zamyin Bilgekh) and oasis in the region distinguish the Altay mountain Inner Gobi circle from other desert geographies in Mongolia. In addition to the surface water points, the region is characterized by accumulated sand hillocks in valleys, marshes with highly saline soil, and land surface comprised of dry pebbles. The Altay Inner Gobi Desert circle makes up 5.72 percent of the landmass of Mongolia.

The vegetation of the region is largely comprised of diverse associations of low, drought and cold tolerant shrubs, perennial grasses and forbs, and annual plants. The plant associations largely reflect patterns of geology, geomorphology, and drainage, which affect soil structure, depth, chemistry, and moisture availability. Trees are absent over much of the landscape, but can be found in areas where substrate conditions allow for greater soil moisture or where shallow groundwater can be tapped primarily along drainage channels. Vegetation cover is generally low and lichen crusts are important in maintaining soil organic matter and preventing erosion. Similar to other southern Gobi regions in Mongolia (Wehrden et al. 2009), flora species diversity in this region is 'generally poor' (i.e. relative low numbers of species), with endemics being 'few in number' and the greatest diversity in mountainous areas.



Source: Grubov (1982)

Figure 4 Phytogeographic Regions of Mongolia

6.3.1.2 Characteristics of Study Area

Dry valleys, vegetation poor rocky hills and desert and desert-like environment plants species are characteristics of the Project area (Figure 5). Common vegetation species grow in the study area include:

- Brittle budara (*Illinia regelii);*
- Yellow beancaper *(Zygophyllum xanthoxylon);*
- Sympegma *(Sympegma regelii);*
- *A*jania *(Ajania fruticulosa);*
- *A*nabasis *(Anabasis brevifolia);*
- *G*olden peashrub (*Caragana leucophloea);*
- Central Asian Asterthamnus *(Asterothamnus centrali-asiaticus);*
- *A*lmond *(Amygdalus pedunculata);*
- Gobi needlegrass *(Stipa gobica);*
- Needlegrass *(S.glareosa);*
- Mongolian leek *(Allium mongolicum);* and
- Leek (*A.polyrrhizum).*

Vegetation species occur on flatter areas in the region include:

- Saxaul (*Haloxylon ammodendron);*

- Mongolian calligonum *(Calligonum mongolicum);*
- Joint fir *(Ephedra przewalski);* and
- Dzungarian reaumuria *(Reaumurea soongarica).*

Plants not common in the region occur in places with adequate soil moisture. These groundwater dependent species include:

- Common reed (*Phragmites communis);*
- Euphrates poplar *(Populus diversifolia);* and
- Salt cedar *(Tamarix ramosissima).*

Moreover, annual plants such *as s*haggy-leaved Bassia (*Bassia dasyphylla),* Chenopodium album *(Chenopodium album),* Halogeton *(Micropeplis achnoidea),* Salsola pestifer *(Salsola pestifera)* and Mongolian bugseed (*Corispermum mongolicum)* grow depending on the amount of precipitation in a given year.

a)



b)



Figure 5 General landscape views of a) Khundii and b) Tsenkher Nomin Mine Licenced Areas

6.3.1.3 Summary of Plant Species Survey

To date vegetation surveys undertaken for the study areas show sparse vegetation cover for all areas. A total of 55 different species of plants belonging to 36 genus and 21 families have been recorded by the surveys by Eco Trade and Erdene Mongol LLC (Table 1). All recorded species names and conservation status are presented in Appendix 1.

Table 1 Study Area Vegetation Species Richness

Observed number of plant family, genus and species	Khundii	Tsenkher Nomin	Water Expl. Field	Site Access Road

Family	19	14	19	21
Genus	36	30	20	23
Species	48	38	26	28

6.3.1.4 Plant Functional Groups

The surveys identified six types of plant species. The most common type of plants, by their functional group, were forbs/herb (41%), shrubs (24%), and sub-shrubs (17%), graminiod (10%) and woody (7%) type plants. Only two types of semi-parasitic plants (1%) have been identified by vegetation studies to date Table 2.

Table 2 Plant Functional Groups and Species Occurrences in the Study Area

Functional Group	**Tsenkher Nomin**	**Khundii**	**Water Expl. Area**	**Site Access Road**
	Number of Species Found			
Forb/Herb	16	21	8	13
Shrub	9	13	7	5
Sub-shrub	6	7	6	5
Graminoid	4	5	2	3
Woody	3	3	2	2
Semi-parasitic		1	1	

Nearly all of the plant species were perennial (83%) with annuals (14%) and biennial (3%) plants taking a small percentage of the total observed plant species.

6.3.1.5 Classification of Vegetation Community

A total of 15 different vegetation communities (Table 3) have been identified during the baseline studies in 2016, 2017 and 2019. Vegetation communities are named starting with the most dominant species followed by second and third dominant species, and so on.

Table 3 Vegetation Communities

Vegetation Community	**Areas of Occurrence**
Zygophyllum xanthoxylon- Ephedra przewalskii-Sympegma regelii	Valley between the rolling hills with brown soil and gravel cover in southern and northern part of the Khundii area and along the dry riverbed areas in the water exploration area
Haloxylon ammondendron-Ephedra przewalskii-Tamarix ramosissima	Sandy soil with gravel surface cover in central part of Khundii area stretching from east to west
Zygophyllum xanthoxylon-Ephedra przewalskii.	Valleys between hills in central and eastern part of the Khundii area, Water exploration field, Site access road corridor

Vegetation Community	Areas of Occurrence
Sparsely distributed Haloxylon ammondendron-Zygophyllum xanthoxylon	This community is distributed along levelled valley in northern part of the Khundii area
Sympegma regelii-Ephedra przewalskii	*A*rea between central and western part of the Khundii area
Zygophyllum xanthoxylon-Ephedra przewalskii - Haloxylon ammondendron	Sandy soil with gravel cover in the Khundii area except in the eastern part. Young saxaul trees are growing in these areas in large numbers. Semi-shrubs such as *Tamarix ramosissima, Ephedra przewalskii, Sympegma regelii* and *Reaumurea soongorica* grow within this community depending on environmental parameters such as elevation and soil salinity
Haloxylon ammodendron-Tamarix ramossima- Reaumuria soongorica - Salsola passerine	Along the dry river bed that runs west of the water exploration field to the south
Ephedra przewalskii-Reaumuria soongorica- Nitraria sibirica	Area along the dry riverbed in the Water Exploration area
Haloxylon ammodendron - Reaumuria soongorica - Salsola passerine - Nitraria sibirica	
Sparse Stipa-Anabasis	Along the site access road
Zygophyllum xanthoxylon - Stipa – Anabasis	
Haloxylon ammondendron-Ephedra przewalskii.	Tsenkher Nomin MLA
Zygophyllum xanthoxylon - Haloxylon ammodendron - Artemisia pectinata	
Haloxylon ammondendron	This vegetation community is common along the haul road between Tsenkher Nomin and Bayan Khundii MLAs.
Haloxylon ammondendron - Reaumuria soongarica.	

Phytocenotic characteristics of the main vegetation communities identified in the study areas are provided in Appendix 2.

General views of selected vegetation communities in the study area are shown in Figure 6.



a) *Haloxylon ammondendron-Zygophyllum xanthoxylon*



b) *Zygophyllum xanthoxylon-Ephedra przewalskii*



c) Zygophyllum xanthoxylon-Ephedra przewalskii-Sympegma regelii



c) *Zygophyllum xanthoxylon-Ephedra przewalskii /Haloxylon ammondendron*

Figure 6 Different Vegetation Communities in the Study Area

6.3.1.6 High Conservation Value Plant Species

No IUCN listed rare plants species (i.e. NT - Near Threatened, VU - Vulnerable, EN - Endangered, or CR - Critically Endangered) were observed within the study areas. However, three plant species listed as EN, one species listed as VU in the Mongolian Red List have been found in the study areas.

In Mongolia, plant species rareness is also determined legally by the 'rare' or 'very rare' species designation, which is required by the Mongolian Law on Plant (1995). Eight plant species listed as very rare or rare by the Mongolian Government have been found in the study areas. Among the very rare designated species, four of them are also listed as EN or VU in the Mongolian Plant Species Red List, while the others (i.e. spotted arnebia (*Arnebia guttata*), Central Asian Asterthamnus (*Asterothamnus centrali-asiaticus Novopokr)*, acanthus oxytrope (*Oxytropis aciphylla*) and poplar species (*Populus diversifolia)* are not included either in the IUCN or Mongolian Red List (Table 4).

Table 4 High Conservation Value Plant Species

Vegetation Species	**Conservation Status**
Desert living cistanche (*Cistanche deserticola Ma)*	EN (Mongolian Red List) Very rare (Mongolian Law on Plant)
Potanin's bean caper *(Zygophyllum potaninii*)	EN (Mongolian Red List) Very rare (Mongolian Law on Plant)
Mongolian almond (*Amygdalus mongolica*)	EN (Mongolian Red List) Rare (Mongolian Law on Plant)
Brittle budara (*Iljinia Regelii (Bge.) kor.ex Shishk)*	VU (Mongolian Red List) Very rare (Mongolian Law on Plant)
Spotted arnebia (*Arnebia guttata*)	Very rare (Mongolian Law on Plant)
Central Asian Asterthamnus *(Asterothamnus centrali-asiaticus Novopokr)*	Very rare (Mongolian Law on Plant)
Euphrates Poplar (*Populus diversifolia)*	Very rare (Mongolian Law on Plant)
Acanthus oxytrope (*Oxytropis aciphylla*)	Rare (Mongolian Law on Plant)

Potanin's bean caper and brittle budara were recorded in all study areas, but the Mongolian almond and desert living cistanche were observed growing in the Khundii and Tsenkher Nomin MLAs. Locations of these high conservation plant species are shown in Table 7.

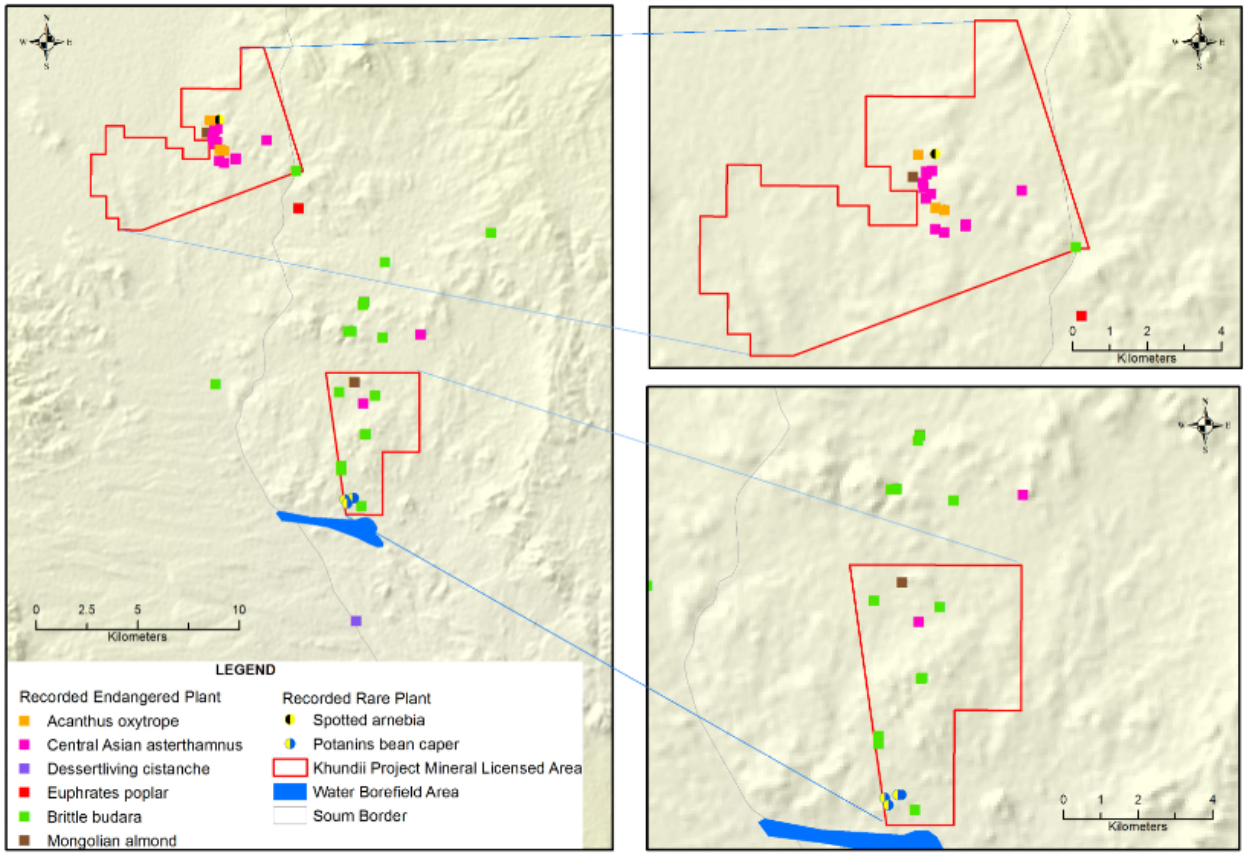


Figure 7 Locations of High Biodiversity Value Plant Species

Field photos of some of the priority plant species are shown in Figure 8.



a) Desert living cistanche



d) Central Asian Asterthamnus



b) Brittle budara



e) Potanin's bean caper



c) Acanthus oxytrope



f) Mongolian almond

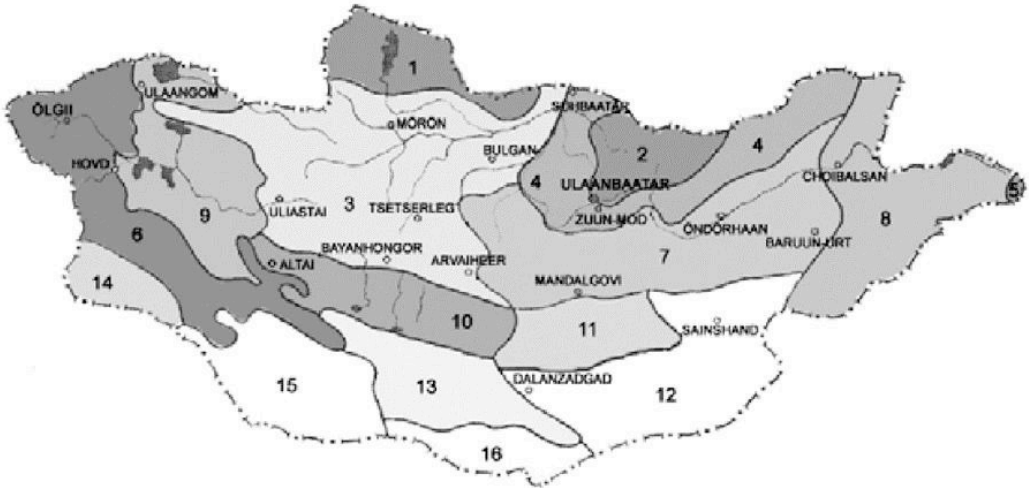
Figure 8 Priority Plant Species Found Within the Study Area

6.4 Baseline Conditions – Fauna

6.4.1 Zoogeographic Region

The fauna of the Gobi region is diverse, with many widespread species typical of the Central Asian and Near Eastern deserts. The low human population density and high degree of isolation of the southern Gobi region of Mongolia has resulted in the survival of many threatened species that are much rarer in neighbouring countries, making the South-West Gobi a region of interest for fauna conservation.

According to the geographical zonation of wildlife in Mongolia, the Khundii Gold Project area is situated within the Trans Altai Gobi Desert Range zone (Figure 9).



Source: Tsegmid (1969)

Note; 1-Hövsgöl Mountain Range, 2-Khentii Mountain Range, 3-Khangai Mountain Range, 4- Mongol Daguur Steppe, 5- Ikh Hyangan Mountain Range, 6-Mongol Altai Mountain Range, 7-Middle Halh Steppe, 8-Eastern Mongolia, 9- Great Lakes Depression, 10-Valley of the Lakes, 11-Northern Gobi, 12-Eastern Gobi, 13-Govi Altai Mountain Range, 14-Dzungarian Gobi Desert, 15-Trans Altai Gobi Desert, 16-Alashan Gobi Desert.

Figure 9 Geographical Subdivision of Wildlife in Mongolia

6.4.2 Regional Fauna Species

Regional mammal species reported to occur in the broader Trans Altai Gobi Desert geographic region (refer to Figure 9), which overlaps with the Part A of the Great Gobi Strictly Protected Area (GGSPA) include snow leopard (*Uncia uncia*), khavtgai camel (*Camelus ferus*), goitered gazelle (*Gazella subgutturosa*), argali (*Ovis ammon*) and siberian ibex (*Capra sibirica*), volf (Canis lupus), asiatic wildcat (*f. Lybica ornata*), thick-tailed pygmy jerboa (*Salpinogotus crassicauda*), zaisan mole vole (*Ellobius tancrei*) and pallas cat (*Otocolobus manul*) (TNC 2014).

However, **none** of the above regional mammal species, except the goitered gazelle, is known to inhabit in the KGP area or was observed during the field baseline studies.

The Gobi region supports habitat for a variety of reptile species due to its arid environment and landscape. Common reptile species in the broader region include Mongolian toad, (*Bufo raddei*), tuva toad headed agama (*Phrynocephalus versicolor*), multi-ocellated racerunner (*Eremias multiocellata*), even-fingered gecko (*Alsophylax pipiens*), mongol gurvel (Eremias argus), Gobi lizard (*Eremias przewalskii*), slender racer (*Coluber spinalis*), steppe rat snake (*Elaphe dione*) and gloydius halys (*Gloydius halys*) (TNC 2014).

6.4.3 Summary of Fauna Species Found Within the Study Area

To date environmental baseline surveys for the Khundii Gold Project study areas have found two species of insects, eight species of mammals, six species of reptiles and 23 species of birds in the study areas. See Appendix D for all fauna species found in the study area during the baseline surveys.

6.4.4 Insects

The Mongolian large branchiopod fauna is comprised of taxa from four zoogeographical groups: species widespread in the Palaearctic and partially in the Nearctic, species probably native to Asia, species originating in East Asia, and localised-endemics distributed primarily in the steppe region of central Mongolia.

The KGP environmental baseline survey in 2016 found black-veined white *(Aporia crataegy)* in Khundii area. The identified insect species are not listed as high priority species by the IUCN, Mongolian Red Lists, and/or by Mongolian regulations.

6.4.5 Fish

No fish species have been identified in the Project study areas.

6.4.6 Amphibians

The only amphibian known to occur within the Mongolian Gobi region is the Mongol bakh (*Strauchbufo (Pseudepidalea) raddei*), listed as a species of Least Concern by the IUCN and the Mongolian Red List.

The Mongol bakh is associated primarily with permanent springs in Gobi, where they breed in early spring. No such habitats have been identified in the Khundii Project study area under this assessment.

6.4.7 Reptiles

Reptiles play a critical role in the maintenance and functioning of an ecosystem (Munkhbaatar et al. 2011) because reptiles are the main food source for some predatory mammals, birds, and large invertebrates including spiders. They are also important predators of insects (Bhanotar and Bhatnagar 1976). In Mongolia, reptile species diversity is naturally low and highly adapted to the country's harsh climate. The majority of the reptile species of Mongolia are mainly distributed in the Gobi region with warmer and more arid climate.

The environmental baseline surveys (in 2016, 2017 and 2019) identified five species of reptiles in the study areas. The Tuva toad-headed agama (*Phrynocephalus versicolor*) was the most abundant and frequently occurring species throughout the study areas. The other observed reptile species were slender racer (*Coluber spinalis*), gobi naked-toed gecko (*Cyrtopodion elongatus*), multi-oscillated racerunner (*Eremias multiocellata*) and Przewalski's wonder gecko (*Teratoscincus przewalskii*). The steppe ribbon racer (*Psammophis lineolatus*) was reported to occur in the Project area, but it was not observed during the field study.

Locations of the observed reptiles are shown in Figure 10.

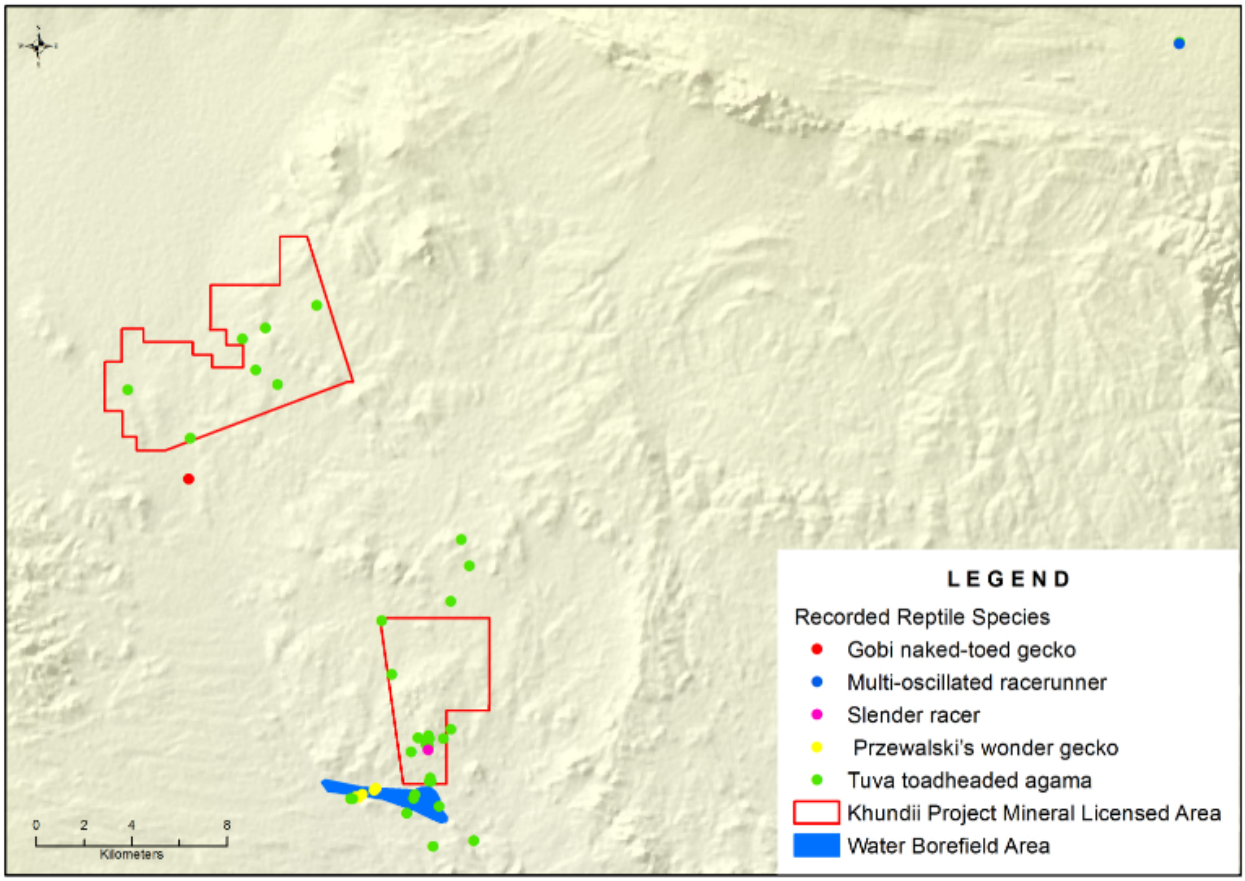


Figure 10 Locations of Observed Reptiles

None of the reptile species found in the study area are listed in the IUCN Red List. Among the reptile species found, *Cyrtopodion elongatus* (Figure 11) is listed as VU in the Mongolian Red List. *Teratoscincus przewalskii* and *Coluber spinalis* are listed NT in the Mongolian Red List.



a) ***Phrynocephalus versicolor*** b) ***Cyrtopodion elongatus***

Figure 11 Common *Phrynocephalus versicolor* (a) and *Cyrtopodion elongatus* (b) species

6.4.8 Birds

The environmental baseline studies recorded a total of 23 species of birds in the study area. Two of the observed bird species were *Chlamydotis undulata* (Figure 12) listed as VU in the both IUCN

and Mongolian Red Lists and *Podoces hendersoni* (Figure 12) listed as VU in the Mongolian Red List. *Chlamydotis undulata* is also designated as very rare by Mongolian Law on Fauna, whereas the *Podoces hendersoni* is categorised as a rare bird by the regulation. All other bird species were LC category both in the IUCN and Mongolian Red ListsSee Appendix D).



a) Chlamydotis undulata



b) Podoces hendersoni

Figure 12 Priority Bird Species Found During the Baseline Field Survey: a) *Chlamydotis undulata* b) *Podoces hendersoni*

Locations of the observed bird species are shown in Figure 13.

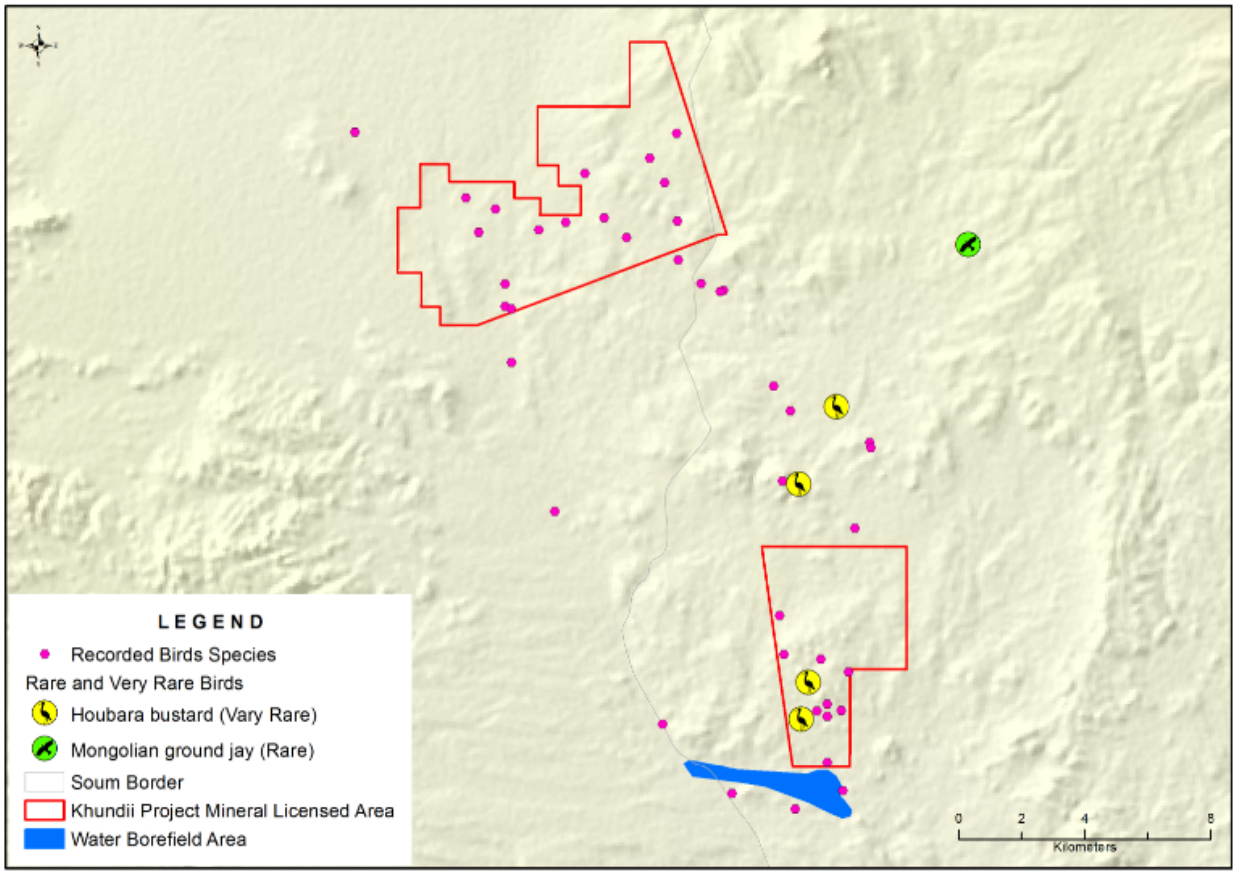


Figure 13 Locations of the Bird Species Observed

6.4.9 Mammals

A total of eight mammal species (two large and six small) were observed during the baseline survey (See Appendix D).

One of the two large mammals species observed was black tailed gazelle (*Gazella subgutturosa*) listed as VU in both IUCN and Mongolian Red List. Black-tailed gazelle species distribution is scattered throughout a large territory in Mongolia, and the density of population is low. At the moment, Great lake depression, Valley of the lakes, Zuungaryin Gobi, Altay Inner Gobi, Dornod Gobi and Alashaa desert regions have the most number of gazelle species.

The other large mammal observed was corsac fox (*Vulpec Corsac*) listed as NT in Mongolian Red List, but LC in the IUCN Red List.

All other small mammals are evaluated as LC both by the IUCN and Mongolian Red List.

Figure 14 shows locations of the mammal species found within the study area.

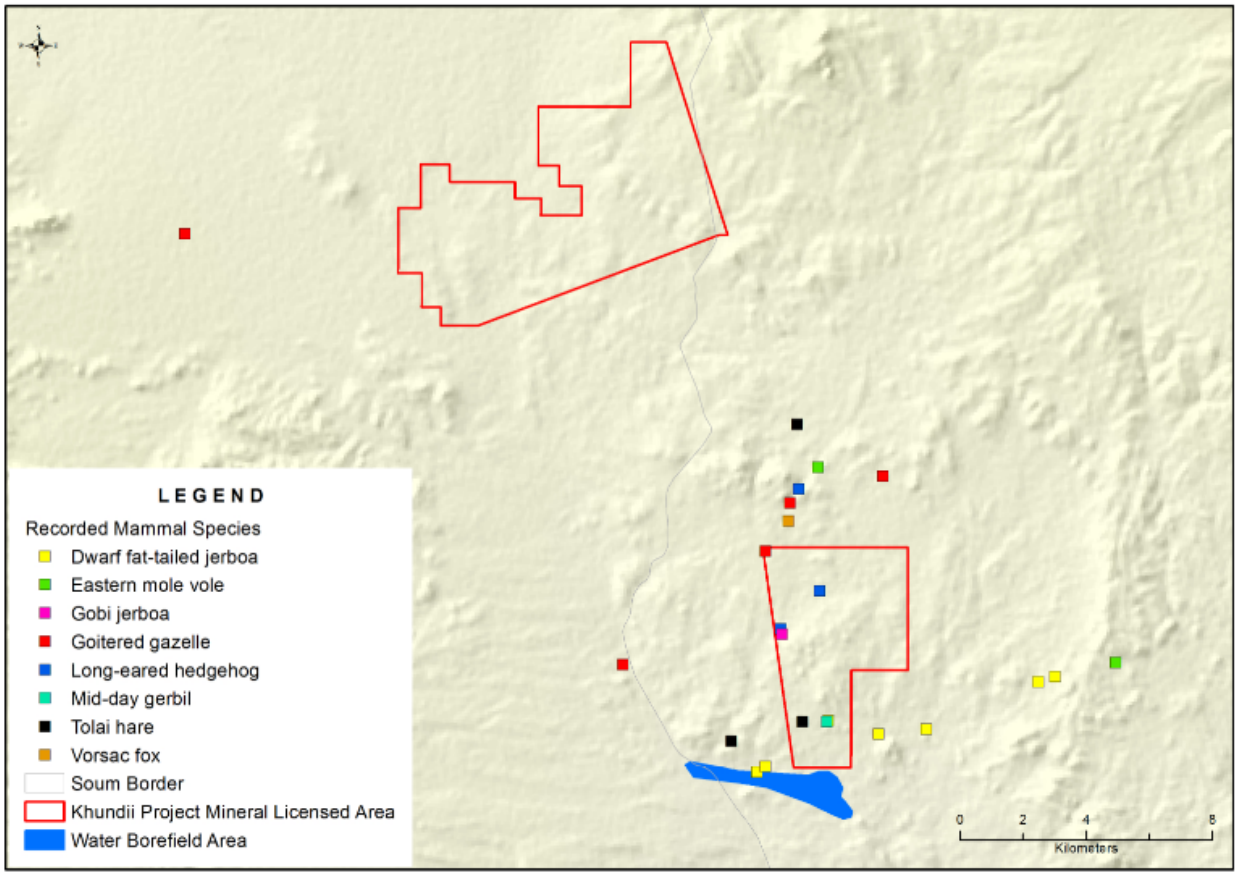


Figure 14 Locations of Mammal Species

6.5 Legally Protected and Internationally Recognised Areas

6.5.1 Nationally Protected Areas Near the Khundii Gold Project

This section provides a discussion on the various legally protected and internationally recognised areas in the region where the Khundii Project operates.

The Law on Special Protected Areas recognises four main categories of nationally protected area. These are 1) Strictly Protected Areas, 2) National Parks, 3) Nature Reserves and 4) Monuments.

Strictly Protected Areas are areas in which natural conditions are very well preserved, and where human use is severely restricted. National Parks are areas in which natural conditions are relatively well preserved, and which have historical, cultural, scientific, educational, and ecological importance. Nature Reserves comprise areas protected for the conservation, preservation and restoration of ecological, biological, palaeontological or geological features. Monuments are areas protected for the purposes of preserving natural heritage and historical and cultural sites.

The Khundii Gold Project area and the access roads do not overlap or include any legally protected or internationally recognised areas. However, there are several nationally or locally protected areas surrounding the Khundii Gold Project. These include the Great Gobi Strictly Protected Area (GGSPA) Part A to the south-west, the Gobi Gurvan Saikhan National Park to the east, the Tost-Toson Bumbiin Nuruu Nature Reserve in the south-east. In addition to the state protected areas, three locally protected areas, i.e. Bor Khairkhan, Nogoon Tsav and Idrengyn Nuruu, are located around the Project site. Additional information of the protected areas and their locations are provided in **Error! Reference source not found.** and Figure 15.

Table 5 State and Locally Protected Areas in the Project Region

Protected Area	Designation year	Reasons for Protection	Area (ha)	Distance to Khundii Project Site
Part A. Great Gobi Strictly Protected Area	1995 by Mongolian Parliament resolution	To protect habitat for rare fauna species and fragile ecosystem of region	6,469,025	27 km
Gobi Gurvan Saikhan National Park	1993 by Mongolian Parliament resolution	To protect habitat for rare fauna species and fragile ecosystem of region	2,697,171	48 km
Tost-Toson Bumbii Nuruu Natiral Reserve	2016 by Mongolian Parliament resolution	To protect natural ecosystem, cultural heritage, and habitat for endangered biodiversity species	743,058	80 km
Bor Khairkhan in Shinejinst *soum*	2007 by *soum* Government decision	Natural and cultural history reservation	9,362	17 km
Nogoon Tsav in Shinejinst *soum*	2008 *soum* Government decision	Under 'other' category	85,737	33 km
Idrengyn Nuruu in Bayan Undur *soum*	2008 *soum* Government decision	Flora, fauna and water resources reserve area	302,288	Borders with the MLAs

Source: https://www.eic.mn

6.5.1.1 Part "A" of the Great Gobi Strictly Protected Area

The presence of important populations of threatened biodiversity has led to the creation of the Great Gobi Protected Area in two parts (A and B) located along the Mongolian-Chinese border in the south-west of Mongolia in 1975. The Protected Area status was upgraded to Strictly Protected Area in 1991 by Mongolian Parliament. The GGSPA was included in the World Network of Biosphere Reserves in 1991.

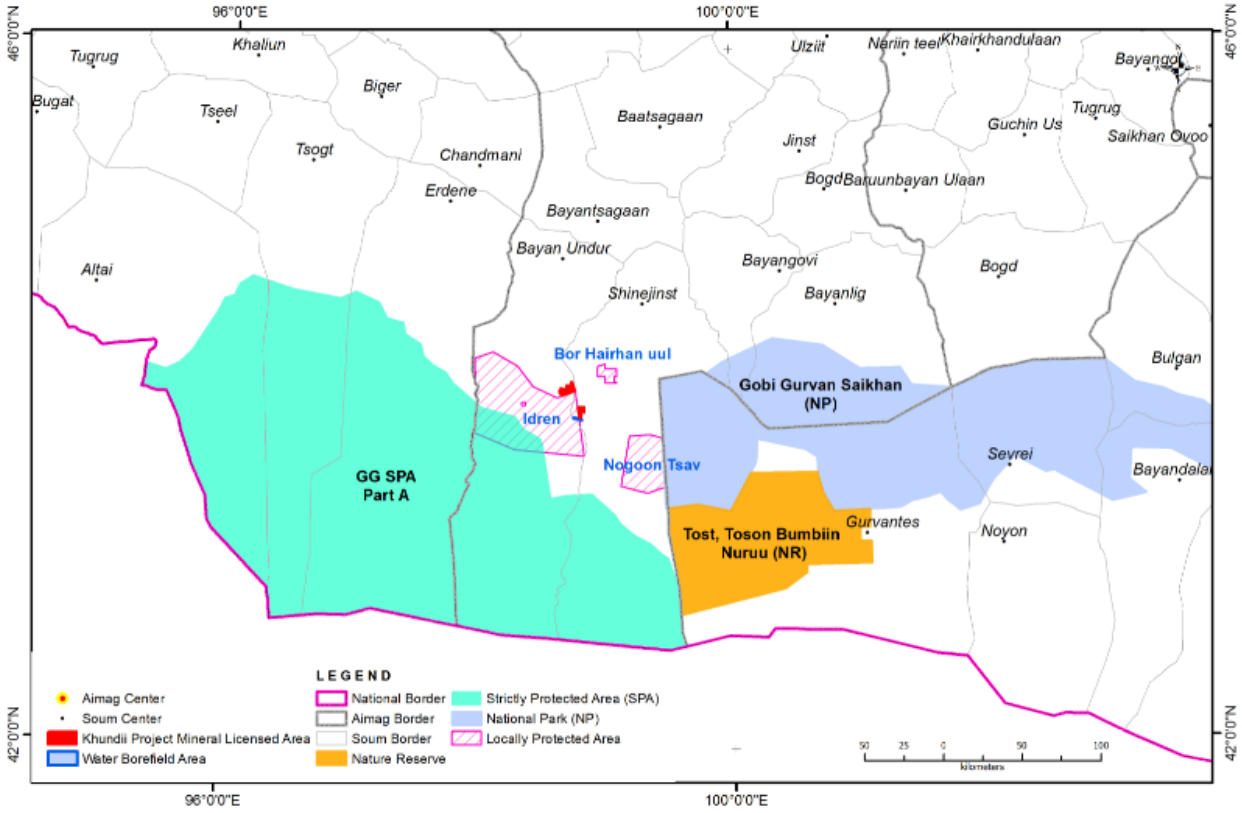


Figure 15 Locations of Protected Areas in the South-West of Mongolia

The GGSPA has rich biodiversity with around nearly 400 species of vertebrates, two species of amphibians, 281 species of birds and 91 species of mammals in its territory. The GGSPA is home to endangered animals, such as Gobi bear (*Ursus arctos gobiensis*), wild camel (*Camelus ferus*), wild ass (*Equus hemionus*), goitered gazelle (*Gazella subgutturosa*), snow leopard (*Uncia uncia*), argali (*Ovis ammon*), and siberian ibex (*Capra sibirica*) which are of high conservation status.

Over 400 species of vascular plants have been recorded within the GGSPA, approximately 40 of which are medicinal plants. Flora species in the GGSPA also include a range of rare species such as *Amygdalus pedunculata*, *Populus diversifolia*, *Cynomorium soongaricum*, *Allium*, *Ajania, Ephedra, Artemisia and Oxytropis* species.

The Khundii Gold Project is located about 27 km northeast of the GGSPA Part A.

6.5.1.2 Gobi Gurvan Saikhan National Park

The Gobi Gurvan Saikhan National Park (GGSNP) protection initiated in 1965 by taking the Yolyn Am canyon under the state protection. Since 1965, coverage of the national park expanded progressively by adding more areas in 1993, 1995 and 2000. With these expansion the current GGSNP are reached a total of 2,7 mln ha. The GGSNP include a range of ecosystems including mountains, valley, dry steppe, semi-desert and desert areas that support a diverse range of biodiversity species. Nearly one-fifth of the park is covered with saxaul forest. Over 290 species of vascular plants has been recorded within the park with over 90 species of native plants in the region. Fauna species for this national park include rare and endangered mammals such as argali (*Ovis ammon*), siberian ibex (*Capra sibirica*), snow leopard (*Uncia uncia*), goitered gazelle (*Gazella subgutturosa*), marbled polecat (*Vormela peregusna*), beech marten (*Martes foina*), eurasion lynx (*Lynx lynx*) and asiatic wildcat (*f. Lybica ornata*).

The Khundii project area is located about 48 km west of the Gobi Gurvan Saikhan National Park.

6.5.1.3 Locally Protected Areas near the exploration area

"Locally Protected Area" is an area protected by an *aimag* or *soum* government to conserve areas of natural landscape, unique formation, of high significance in terms of history, culture, and tourism, and to ensure proper use of natural resources. There are nine locally protected areas in Shinejinst, while Bayan Undur *soum* has taken five areas under local protection. The Idrengyn Nuruu protected area lies next to the Project area, while the Bor Kharikhan and Nogoon Tsav areas are located 17 km and 33 km from the MLAs (Figure 15).

The Idrengyn Nuruu area was taken under local protection in 2008 by Bayankhongor aimag authorities after Erdene was granted the KGP exploration licences in 2006. During the course of this ESIA study in 2019, the Mongolian Ministry of Environment and Tourism (MET) officially confirmed that there were no overlaps or conflicts with the Project MLA and legally protected areas.

As listed in the protected area database (https://www.eic.mn. Accessed 05 Sep 2019) the Bor Khairkhan mountain protection term is expired in June 2017. Protection terms are not defined for the Nogoon Tsav and Idrengyn Nuruu protected areas.

6.6 Internationally Recognised Areas

There are no Internationally recognised areas for biodiversity conservation. The closest Important Bird Area (IBA) is Ikh Bogd Mountain, about 160km north-east of the Project site. No Ramsar Convention or World Heritage sites are within the Project Area of Influence.

6.7 Critical Habitat Determination

Critical Habitat Assessment (CHA) for KGP ESIA identified critical habitats for six mammal, one reptile species and areas of high priority for systematic conservation planning. The critical habitat features and assessment justifications are provided in Table 6. The CHA study also identified 17 different species of plants, two mammals species, three birds species, three reptile species and two habitats as Priority Biodiversity Feature under the EBRD's PR6 requirements. List of the priority biodiversity features, and their assessment justifications are provided in Table 7.

Table 6 Khundii Gold Project Critical Habitat Assessment Summary

Biodiversity Feature	Critical Habitat Criteria (EBRD PR6 - Paragraph 14)	Assessment Justification
Mammal		
Camelus bactrianus	ii. Habitats of significant importance to endangered or critically endangered species	IUCN **CR** species Mongolian Red List **EN** species
Equus hemionus		Mongolian Red List **EN** species
Uncia uncia		Mongolian Red List **EN** species
Ovis ammon		Mongolian Red List **EN** species
Ursus arctos gobiensis	iii. Habitats of significant importance to endemic or geographically restricted species	Mongolian Red List **CR** species
Gazella subgututurosa	iv. Habitats supporting globally significant	Listed as VU on both the IUCN and Mongolian Red List

Biodiversity Feature	Critical Habitat Criteria (EBRD PR6 - Paragraph 14)	Assessment Justification
	(concentrations of) migratory /congregatory species	Rare species by Mongolian regulation
Reptile		
Cyrtopodion elongatus	iv. Habitats of significant importance to endemic or geographically restricted species	Known habitat meets restricted Range criteria of 50,000 km^2
Habitat		
Great Gobi Strictly Protected Area Part A, Gobi Gurvan Saikhan National Park, Tost, Toson Bumba Nature Reserve, and the Nomingiin Gobi and Edrengiin Nuruu recommended areas for legal protection	i. Highly Threatened or Unique Ecosystems	Areas determined to be of high priority/significance based on systematic conservation planning carried out by government bodies, recognised academic institutions and/or other relevant qualified organisations (including internationally recognised NGOs)

Table 7 Priority Feature Biodiversity

Biodiversity Feature	Critical Habitat Criteria (EBRD PR6. Paragraph 12)	Assessment Justification
Plants		
Amygdalus Mongolica	ii. Vulnerable species	**Rare** species by Mongolian regulation
Amygdalus pedunculata		**Rare** species by Mongolian regulation
Arnebia guttata		**Very Rare** species by Mongolian regulation
Asterothamnus centrali-asiaticus		**Very Rare** species by Mongolian regulation
Cistanche deserticola		**Very Rare** species by Mongolian regulation
Cynomorium soongaricum		**Rare** species by Mongolian regulation
Ephedra equisetina Bunge.		**Very Rare** species by Mongolian regulation
Iljinia Regelii		**Very Rare** species by Mongolian regulation
Incarvillea potanini Batal.		**Very Rare** species by Mongolian regulation
Oxytropis acanthacea		**Very Rare** species by Mongolian regulation
Oxytropis mongolica Kom		**Rare** species by Mongolian regulation
Peganum harmala L		**Very Rare** species by Mongolian regulation
Phragmites communis		**Rare** species by Mongolian regulation
Populus diversifolia		**Very Rare** species by Mongolian regulation
Saussurea involucrata Bip		**Very Rare** species by Mongolian regulation
Stellaria dichotoma L		**Rare** species by Mongolian regulation
Zygophyllum Potaninii Maxim.		**Very Rare** species by Mongolian regulation
Mammal		
Vormela peregusna	ii. Vulnerable species	IUCN VU species Mongolian Gov't designated **Rare** species
Capra sibirica		Mongolian Gov't designated **Rare** species

Biodiversity Feature	Critical Habitat Criteria (EBRD PR6. Paragraph 12)	Assessment Justification
Birds		
Falco cherrug	ii. Vulnerable species	IUCN **EN** species
Chlamydotis undulata		**Very Rare** species by Mongolian regulation
Podoces hendersoni		**Rare** species by Mongolian regulation
Reptile		
Coluber spinali	ii. Vulnerable species	**Rare** species by Mongolian regulation
Eremias multiocellata		**Rare** species by Mongolian regulation
Phrynocephalus versicolor		**Rare** species by Mongolian regulation
Habitat		
Saxaul forest	vi. Ecological structure and functions needed to maintain the viability of priority biodiversity features	Ecological structure and functions needed to support the **Very Rare** *Cistanche deserticola* species
Amygdalus Mongolica habitat		Ecological structure and functions needed to support the **Rare** *Podoces hendersoni* species

6.8 Summary of Biodiversity Baseline

The Khundii Project is located in an extreme continental environment with arid climate. The ecology of the Project area is characterised by desert and steppe vegetation typical of the south Gobi region of Mongolia with some high value biodiversity species.

A total of nine plant species legally recognised as ‘rare’ or ‘very rare’ were recorded in the AoI. The fauna species in the area are common in the region. The baseline survey recorded eight mammal species in the area. Goitered gazelle, listed as vulnerable (VU) in the IUCN and Mongolian Red List, was observed during the survey as the region is within this species distribution range. Small mammals are generally nocturnal. Due to the absence of permanent surface waters, no fish species are known to be present in the Project AoI. Reptile diversity is relatively low, but reptile occurrence is common. This taxonomic group provides important food resources for predatory birds and mammals. Out of the total of six reptile species found, two of them (slender racer and Gobi naked-toed gecko) were found to be legally recognised as ‘rare’ by Mongolian legislation. Bird diversity is relatively high with 23 species of birds observed, most of which were common species. Only two birds (houbara bustard and Mongolian ground jay) were found to be of high conservation values according to the IUCN and Mongolian Red Lists. No Important Bird Areas exist in the Project AoI.

6.9 References

Appendix to law on natural plants – "List of very rare plant species" (https://www.legalinfo.mn/annex/details/2?lawid=76&fbclid=IwAR2tIQFn5-K5e7RVLUai2jw9VsMzmLZefrScPO_jrL-SpYpDSG3sj7MnQJ8).

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Appendix A: List of Plant Species Recorded During Field Study

#	Scientific Name	English Name	Functional Group	Life Type	IUCN	Regional Red List	Mongolian Legal Status	Tsenkher Nomin	Khundii	Water Expl. Area	Site Access Road
1	*Achnatherum splendens (Trin.) Nevski.*	Chee-grass	Graminoid	Perennial							✓
2	*Ajania fruticulosa*	Ajania	Shrub	Perennial				✓	✓		
3	*Allium Mongolicum Rgl.*	Mongolian leek	Forb/Herb	Perennial	LC			✓	✓	✓	✓
4	*Allium polyrrhizum Turcz. Ex. Rgl.*	Leek	Forb/Herb	Perennial					✓		✓
5	*Amygdalus Mongolica Maxim.*	Mongolian Almond	Shrub	Perennial		EN	Rare		✓	✓	
6	*Amygdalus pedunculata*	Almond	Shrub	Perennial					✓		
7	*Anabasis brevifolia C.A.Mey*	Anabasis	Sub-shrub	Perennial				✓	✓		✓
8	*Arnebia fimbriata Maxim*	Grayhairy arbenia	Forb/Herb	Perennial					✓		✓
9	*Arnebia guttata Bge.*	Spotted Arnebia	Forb/Herb	Perennial		LC	Very rare	✓	✓		
10	*Artemisia frigida Willd.*	Prairie sagewort	Sub-shrub	Perennial				✓	✓	✓	✓
11	*Artemisia pectinata*	Sagewort	Forb/Herb	Biennial				✓	✓	✓	✓
12	*Artemisia xerophytica*	Wormwood	Sub-shrub	Perennial						✓	
13	*Asterothamnus centrali-asiaticus Novopokr.*	Central Asian Asterthamnus	Shrub	Perennial		LC	Very rare	✓	✓	✓	
14	*Atraphaxis pungens (M.B) Jaub. Et Spach*	Goats wheat	Forb/Herb	Perennial					✓		✓
15	*Bassia dasyphylla Fisch ex Mey*	Shaggy-leaved Bassia	Forb/Herb	Annual				✓	✓	✓	✓
16	*Calligonum mongolicum Turcz*	Mongolian calligonum	Shrub	Perennial				✓	✓	✓	✓
17	*Cancrinia discoides (Ldb.) Poljak.*		Forb/Herb	Perennial				✓			
18	*Caragana Leucophloea Pojark.*	Golden peashrub	Shrub	Perennial					✓		
19	*Chenopodium album*	Siberian saltbush	Forb/Herb	Annual					✓	✓	
20	*Cistanche deserticola Ma.*	Dessertliving Cistanche	Semi-prasitic	Perennial		EN	Very rare		✓	✓	

#	Scientific Name	English Name	Functional Group	Life Type	IUCN	Regional Red List	Mongolian Legal Status	Tsenkher Nomin	Khundii	Water Expl. Area	Site Access Road
21	*Cistanche salsa* C.A.Mey	Broomrape	Forb/Herb	Perennial				✓			
22	*Convolvulus Ammanii Desr.*	Ammonis Bindweed	Forb/Herb	Perennial				✓			
23	*Convolvulus fruticosus Pall.*	Bindweed	Forb/Herb	Perennial				✓	✓		✓
24	*Convolvulus Gortschakovii Desr.*	Bindweed	Forb/Herb	Perennial					✓		
25	*Corispermum mongolicum*	Mongolian bugseed	Forb/Herb	Annual				✓	✓		
26	*Dontostemon Integrifolius C.A.Mey*	Dontostemon	Forb/Herb	Perennial				✓	✓		✓
27	*Echinops Gmelinii*	Globethistle	Forb/Herb	Annual				✓	✓		
28	*Ephedra Przewalskii Stapt.*	Joint fir	Shrub	Perennial	LC			✓	✓	✓	✓
29	*Eurotia ceratoides (L.) C.A.Mey.*	Winterfat	Shrub	Perennial				✓		✓	✓
30	*Goniolimon speciosum (L.) Boiss.*	Dwarf statice	Forb/Herb	Perennial					✓		
31	*Halogeton glomeratus*	Saltlover	Graminoid	Annual				✓	✓		
32	*Haloxylon ammodendron C.A.Mey*	Saxaul	Woody	Perennial				✓	✓	✓	✓
33	*Iljinia Regelii (Bge.) kor.ex Shishk*	Brittle budara	Sub-shrub	Perennial		VU	Very rare	✓	✓	✓	✓
34	*Kalidium foliatum (Pall.) Moq.*		Sub-shrub	Perennial				✓			
35	*Lagochilus ilicifolius Bge.*	Lagochilus	Forb/Herb	Perennial				✓	✓		✓
36	*Micropeplis arachnoidea*	Halogeton	Forb/Herb	Perennial					✓		
37	*Nitraria sibirica Pall.*	Siberian nitrebush	Shrub	Perennial				✓	✓	✓	
38	*Oxytropis aciphylla*	Acanthus oxytrope	Shrub	Perennial			Rare	✓	✓		✓
39	*Phragmites communis*	Common reed	Graminoid	Perennial					✓		

#	Scientific Name	English Name	Functional Group	Life Type	IUCN	Regional Red List	Mongolian Legal Status	Tsenkher Nomin	Khundii	Water Expl. Area	Site Access Road
40	*Populus diversifolia*	Euphrates Poplar	Woody	Perennial			Very rare	✓	✓		
41	*Ptilagrostis Pellotii (Danguy.)*	False needlegrass	Graminoid	Perennial				✓	✓		
42	*Ptilotrichum canescens C.A.Mey*		Sub-shrub	Perennial				✓	✓	✓	✓
43	*Reaumuria soongarica (Pall.) Maxim.*	Dzungarian reaumuria	Sub-shrub	Perennial				✓	✓	✓	✓
44	*Rheum nanum Sievers*	Rhubarb	Forb/Herb	Perennial				✓	✓	✓	✓
45	*Salsola collina*		Forb/Herb	Annual				✓	✓	✓	✓
46	*Salsola Laricifolia Turcz. e Litv*	Boyalych saltbush	Shrub	Perennial				✓	✓		
47	*Salsola passerina Bge.*	Gray sparrow saltbush	Sub-shrub	Perennial					✓	✓	
48	*Salsola pestifera*		Forb/Herb	Annual				✓	✓	✓	✓
49	*Stipa glareosa P.Smirn*	Needlegrass	Graminoid	Perennial				✓	✓	✓	✓
50	*Stipa gobica Roshev*	Gobi needlegrass	Graminoid	Perennial				✓	✓	✓	✓
51	*Sympegma Regelli Bge.*	Sympegma	Shrub	Perennial					✓		
52	*Tamarix ramosissima Ldb.*	Salt cedar	Woody	Perennial	LC			✓	✓	✓	✓
53	*Zygophyllum Potaninii Maxim.*	Potanins Beancaper	Forb/Herb	Perennial		EN	Very rare	✓	✓	✓	✓
54	*Zygophyllum Rosovii)*	Beancaper	Shrub	Perennial					✓		
55	*Zygophyllum xanthoxylon (Bge.) Maxim*	Yellow beancaper	Shrub	Perennial				✓	✓	✓	✓

Appendix B: Observed Vegetation Community Characteristics

Vegetation Community Name	Location of Sample Plots	Species in the 100 m^2 plot	Species abundance	Coverage (%) within 100 m^2 plot	Coverage (%) within 1 m^2 plot	Above ground biomass (g/m^2)
Zygophyllum xanthoxylon-Ephedra przewalskii-Sympegma regelii	HD-1	*Zygophyllum xanthoxylon* *Calligonum mongolicum* *Reaumuria soongarica* *Ephedra przewalskii*	Sp Sp Sp Sp	Vegetation cover-40 There is no litter cover Bare ground -60	Vegetation cover -30 There is no litter cover Bare ground -70	64.45
	HD -2	*Zygophyllum xanthoxylon* *Ephedra przewalskii Iljinia Regelii*	Cop1 Cop1 Rr<1	Vegetation cover -35 Litter cover -15 Bare ground -50	Vegetation cover -30 Litter cover -30 Bare ground -40	17.36
	HD-6	*Haloxylon ammodendron* *Ephedra przewalskii* *Zygophyllum xanthoxylon*	Sp Sp Sp	Vegetation cover -10 Litter cover-10 Bare ground -80	Vegetation cover -20 Litter cover-20 Bare ground -60	36.5
	WE-11	*Zygophyllum xanthoxylon* *Ephedra przewalskii* *Reaumuria soongorica*	Sol Sol Sol	Vegetation cover-25 Litter cover-25 Bare ground- 50	Vegetation cover-30 There is litter cover Bare ground- 70	104.47
	WE -12	*Ephedra przewalskii* *Reaumuria soongorica* *Chenopodium album*	Sol Sol Sol	Vegetation cover-30 There is no Litter cover Bare ground- 70	Vegetation cover-35 There is litter cover Bare ground- 65	44.35
	WE -13	*Ephedra przewalskii* *Reaumuria soongorica* *Zygophyllum xanthoxylon* *Calligonum mongolicum*	Sol Sol Sol Sol	Vegetation cover-30 Litter cover-30 Bare ground- 40	Vegetation cover-30 Litter cover-30 Bare ground- 40	18.39
Sparsely distributed Haloxylon ammondendron-Ephedra przewalskii-Tamarix ramosissima	HD-4	*Ephedra przewalskii* *Iljinia Regelii* *Haloxylon ammodendron* *Tamarix ramosissima*	Sp Sp Sp Sp	Vegetation cover -40 There is no litter cover Bare ground -60	Vegetation cover -40 There is no litter cover Bare ground -60	61.58
Zygophyllum xanthoxylon-Ephedra przewalskii	HD-3	*Ephedra przewalskii* *Zygophyllum xanthoxylon*	Sp Sp	Vegetation cover -30 Litter cover -20 Bare ground -50	Vegetation cover -40 Litter cover -0 Bare ground -60	107.62
	Camp Area in Khundii	*Zygophyllum xanthoxylon* *Ephedra przewalskii* *Oxytropis aciphylla*	Sp Sp Sp	Vegetation cover -15 Litter cover 5 Bare ground -70	Vegetation cover -20 There is no litter cover Bare ground -80	16.02
	WE -1	*Ephedra Przewalskii* *Zygophyllum xanthoxylon*	Sp Sp	Vegetation cover-20 Litter cover-10 Bare ground 70	Vegetation cover-25 Litter cover-25 Bare ground 50	61.16
	WE -2	*Ephedra Przewalskii* *Reaumuria soongorica*	Sp Un	Vegetation cover-20 Litter cover 5	Vegetation cover-20 There is no litter cover	54.27

Vegetation Community Name	Location of Sample Plots	Species in the 100 m^2 plot	Species abundance	Coverage (%) within 100 m^2 plot	Coverage (%) within 1 m^2 plot	Above ground biomass (g/m^2)
		Zygophyllum xanthoxylon	Sol	Bare ground- 75	Bare ground- 80	
	WE -3	*Zygophyllum xanthoxylon* *Reaumuria soongorica* *Calligonum mongolicum* *Ephedra Przewalskii*	Sp Sp Sp Sp	Vegetation cover-40 There is no Litter cover Bare ground- 60	Vegetation cover-30 There is no litter cover Bare ground- 70	127.73
	AR-1	*Ephedra Przewalskii* *Zygophyllum xanthoxylon*	Sp Un	Vegetation cover-40 There is no litter cover Bare ground- 60	Vegetation cover-30 There is no litter cover Bare ground- 70	16.8
Sparsely distributed Haloxylon ammondendron-Zygophyllum xanthoxylon	HD-5	*Ephedra przewalskii* *Zygophyllum xanthoxylon* *Haloxylon ammodendron* *Calligonum mongolicum* *Iljinia Regelii*	Sp Sp Sp Sp Sp	Vegetation cover -40 Litter cover-10 Bare ground -50	Vegetation cover -35 Litter cover 5 Bare ground -60	19.49
Sympegma regelii-Ephedra przewalskii	HD-7	*Ephedra przewalskii* *Zygophyllum xanthoxylon* *Haloxylon ammodendron* *Atraphaxis pungens* *Iljinia Regelii*	Sol Sp Sp Sp Sol	Vegetation cover -15 Litter cover-15 Bare ground -70	Vegetation cover -40 There is no litter cover Bare ground -60	36.50
Zygophyllum xanthoxylon-Ephedra przewalskii - Haloxylon ammondendron	HD-8	*Ephedra przewalskii* *Zygophyllum xanthoxylon* *Haloxylon ammodendron* *Iljinia Regelii*	Sp Sol Un Sol	Vegetation cover -40 There is no litter cover Bare ground -60	Vegetation cover -40 There is no litter cover Bare ground -60	117.88
Haloxylon ammodendron-Tamarix ramossima-Reaumuria soongorica, Salsola passerina	WE -4	*Reaumuria soongorica* *Haloxylon ammodendron*	Sp Sp	Vegetation cover-20 Litter cover- 20 Bare ground- 60	Vegetation cover-25 There is no litter cover- Bare ground- 75	16.49
	WE -5	*Tamarix ramossima* *Zygophyllum xanthoxylon* *Reaumuria soongorica*	Sp Sp Cop1	Vegetation cover-30 Litter cover- 10 Bare ground- 60	Vegetation cover-20 Litter cover- 20 Bare ground- 60	17.34
	WE -6	*Haloxylon ammodendron* *Reaumuria soongorica* *Nitraria sibirica* *Calligonum mongolicum* *Bassia dasyphylla*	Cop1 Sp Sp Sp Sp	Vegetation cover-60 There is no litter cover Bare ground- 40	Vegetation cover-20 There is no litter cover Bare ground- 80	10.56

Vegetation Community Name	Location of Sample Plots	Species in the 100 m^2 plot	Species abundance	Coverage (%) within 100 m^2 plot	Coverage (%) within 1 m^2 plot	Above ground biomass (g/m^2)
Ephedra przewalskii-Reaumuria soongorica-Nitraria sibirica	WE -8	*Reaumuria soongorica* *Calligonum mongolicum* *Ephedra Przewalskii*	Sol Sol Sol	Vegetation cover-25 Litter cover-25 Bare ground- 50	Vegetation cover-25 There is no litter cover Bare ground- 75	10.31
	WE -9	*Reaumuria soongorica* *Calligonum mongolicum* *Ephedra Przewalskii* *Zygophyllum xanthoxylon* *Nitraria sibirica*	Sol Sol Sol Sol Sol	Vegetation cover-25 Litter cover-25 Bare ground- 50	Vegetation cover-20 Litter cover-20 Bare ground- 60	11.04
	WE -10	*Reaumuria soongorica* *Ephedra Przewalskii*	Sol Sol	Vegetation cover-15 Litter cover-15 Bare ground- 70	Vegetation cover-20 Litter cover-20 Bare ground- 60	8.00
	WE -14	*Ephedra przewalskii* *Haloxylon ammodendron* *Calligonum mongolicum* *Artemisia xerophytica*	Sol Sol Sol Sol	Vegetation cover-40 There is no Litter cover Bare ground- 60	Vegetation cover-20 There is no Litter cover Bare ground- 80	2.68
	WE -15	*Zygophyllum xanthoxylon* *Calligonum mongolicum*	Un Sp	Vegetation cover-30 Litter cover-15 Bare ground- 55	Vegetation cover-30 Litter cover-15 Bare ground- 55	2.91
Haloxylon ammodendron - Reaumuria soongorica - Salsola passerine - Nitraria sibirica	WE -7	*Haloxylon ammodendron* *Reaumuria soongorica* *Nitraria sibirica*	Sp Sp Sp	Vegetation cover-30 Litter cover-10 Bare ground- 60	Vegetation cover-30 Litter cover-10 Bare ground- 60	3.57
Sparse Stipa-Anabasis	AR-2	*Stipa gobica* *Anabasis brevifolia* *Artemisia frigida*	Cop1 Sp Cop2	Vegetation cover-40 Litter cover 5 Bare ground- 55	Vegetation cover-35 Litter cover 5 Bare ground- 60	11.0
Zygophyllum xanthoxylon - Stipa- Anabasis	AR-3	*Anabasis brevifolia* *Stipa gobica* *Zygophyllum xanthoxylon*	Cop2 Sol-1 Un	Vegetation cover-10 Litter cover 10 Bare ground- 80	Vegetation cover-10 There is no litter cover Bare ground- 90	10.88
Haloxylon ammondendron-Ephedra przewalskii	TN-1	*Haloxylon ammodendron* *Oxytropis aciphylla* *Ephedra Przewalskii* *Eurotia ceratiodes* *Bassia dasyphylla*	Sol Sp Sp	Vegetation cover-15 Litter cover 5 Bare ground- 80	Vegetation cover-10 There is no litter cover Bare ground- 90	22.52

Vegetation Community Name	Location of Sample Plots	Species in the 100 m^2 plot	Species abundance	Coverage (%) within 100 m^2 plot	Coverage (%) within 1 m^2 plot	Above ground biomass (g/m^2)
		Asterothamnus centrali-asiaticus *Echinops Gmelinii* *Stipa glareosa* *Calligonum mongolicum* *Zygophyllum Potaninii* *Ptilotrichum canescens*				
Zygophyllum xanthoxylon-Haloxylon ammodendron-Artemisia pectinata	TN- 2	*Eurotia ceratiodes* *Ephedra Przewalskii* *Asterothamnus centrali-asiaticus*	Sol Sp Sol	Vegetation cover-30 Litter cover-10 Bare ground- 60	Vegetation cover-30 Litter cover-10 Bare ground- 60	27.38
	TN-3	*Haloxylon ammodendron* *Artemisia pectinata* *Zygophyllum xanthoxylon*	Sp Sol Sp	Vegetation cover-30% Litter cover-30 Bare ground- 40	Vegetation cover-20 Litter cover-20 Bare ground- 60	20.21
Haloxylon ammondendron	HR-1	*Haloxylon ammodendron*	Sp	Vegetation cover-15 Litter cover-20 Bare ground-65	Vegetation cover-15 There is no litter cover Bare ground-85	16.20
Haloxylon ammondendron-Reaumuria soongarica	HR-2	*Haloxylon ammodendron* *Reaumuria soongarica*	Sp Un	Vegetation cover-35 Litter cover - 5 Bare ground-60	Vegetation cover-30 Litter cover - 5 Bare ground -65	16.20

Appendix C: Priority Plant Species Locations

Priority Species	Conservation Status		Coordinates		Abundance
Mongolian almond *(Amygdalus Mongolica)*	EN (MRL)	Rare (MLD)	Khundii: 43°57’21’’	98°47’37.1’’	Sp
Spotted arnebia *(Arnebia guttata Bge)*	LC (MRL)	Very Rare (MLD)	Tsenkher Nomin: 44°4.0’18.0’’	98°42’37.4’’	Sp
Central Asian Asterthamnus *(Asterothamnus centrali-asiaticus Novopokr)*	LC (MRL)	Very Rare (MLD)	Water Expl. Area 43°51’0.75’’ 43°52'37.8’’ 43°48’32.0’’	98°47’41.9’’ 98°49'41.8’’ 98°50’08.4’’	
			Tsenkher Nomin: 44°4’3.6’’ 44°4’2.8’’ 44°3’17.3’’ 44°3’15.4’’ 44°3’9.9’’ 44°3’43.4’’ 44°3’12.8’’ 44°3’39.5’’ 44°3’48.5’’ 44°3’53.2 44°4’0.4’’ 44°3’29.4’’	 98°42’33.2’’ 98°42’26.5’’ 98°43’14.4’’ 98°43’13.5’’ 98°42’47.9’’ 98°42’32.4’’ 98°42’37.3’’ 98°42’2.6’’ 98°42’23.4’’ 98°42’22.1’’ 98°42’27’’ 98°42’48.5’’	Cop2
Desert living cistanche *(Cistanche deserticola Ma)*	EN (MRL)	Very Rare (MLD)	Khundii: 43°59’28.4’’ 43°59’28.4’’	98°47’58.1’’ 98°47’58.1’’	Sp
			Water Expl. Area 43°51’0.75’’ 43°52'37.8’’	98°47’41.9’’ 98°49'41.8’’	Sp
Brittle budara *(Iljinia Regelii (Bge.) kor.ex Shishk)*	VU (MRL)	Very Rare (MLD)	Khundii: 43°55’0.67’’ 43°58’41.7’’ 43°59’28.4’’ 43°56’59.8’’ 43°55’57.4’’ 43°53’55.0’’	 98°47’9.0’’ 98°47’29.7’’ 98°47’58.1’’ 98°48’22.3’’ 98°48’0.12’’ 98°48’05.7’’	Sp
			Water Expl. Area: 43°55’0.67’’	 98°47’9’’	Sol
			Tsenkher Nomin: 480574 483142 490165	 4877380 4869484 4874332	Sp
Acanthus oxytrope *(Oxytropis aciphylla)*		Rare (MLD)	43°57’20.9’’	98°47’36.9’’	Sol
			Tsenkher Nomin: 44°4’17.2’’ 44°3’31.3’’ 44°3’29.4’’	 98°42’16.6’’ 98°42’37.8’’ 98°42’48.5’’	Cop1
Euphrates Poplar *(Populus diversifolia)*		Very Rare (MLD)	44°1’57.8’’	98°45’33.7’’	Sp
Potanins Beancaper	EN (MRL)	Very Rare (MLD)	43°54’16.3’’ 43°54’16.2’’	98°47’36.6’’ 98°47’32.7’’	Sp

Priority Species	Conservation Status		Coordinates		Abundance
(Zygophyllum Potaninii Maxim)			43°54'13.5'' 43°54'7.4'' 43°54'20.8'' 43°58'35.6''	98°47'16.5'' 98°47'21.1'' 98°47'29.2'' 98°47'24.7''	
			44°3'29.4''	98°42'48.5''	Sp

Note: MRL – Mongolian Red List, MLD- Mongolian Legally Designated

Appendix D: Observed Fauna Species

#	Scientific Name	English Name	IUCN Red List	Regional Red List	Mongolian Legal Status	Tsenkher Nomin	Khundii	Water Expl. Area	Site Access Road
Mammals									
1	*Allactaga bullata*	Gobi jerboa	LC	DD		✓	✓		
2	*Ellobius tancrei*	Zaisan mole vole	LC	LC		✓	✓		
3	*Gazella subgutturosa*	Black-tailed gazell	VU	VU	Rare	✓	✓		
4	*Hemiechinus auritus*	Long-eared hedgehog	LC	LC		✓	✓	✓	✓
5	*Lepus tolai*	tolai hare	LC	LC		✓	✓	✓	
6	*Meriones meridianus*	Mid-day jird	LC	LC		✓	✓		
7	*Pygerethmus pumilio*	Dwarf fattailed jerboa	LC	LC			✓	✓	
8	*Vulpes corsac*	Corsac fox	LC	NT		✓	✓		
Reptiles									
1	*Coluber spinalis*	Slender racer		NT	Rare		✓		
2	*Cyrtopodion elongatus*	Gobi naked-toed gecko		VU	Rare	✓	✓		
3	*Eremias multiocellata*	Multi-oscillated racerunner	LC	LC			✓		✓
4	*Phrynocephalus versicolor*	Tuva toad headed agama		LC		✓	✓	✓	✓
5	*Psammophis lineolatus*	Steppe ribbon racer	NE	LC			✓		
6	*Teratoscincus przewalskii*	Przewalski's wonder gecko		NT			✓	✓	
Birds									
1	*Bucanetes mongolicus*	Mongolian finch	LC	LC		✓	✓		
2	*Buteo hemilasius*	Upland buzzard	LC	LC		✓	✓		
3	*Buteo rufinus*	Long-Legged Buzzard	LC	LC		✓	✓		
4	*Calandrella cheleensisf*	Asian short-toed Lark	LC	LC		✓	✓		
5	*Chlamydotis undulata*	Houbara bustard	VU	VU	Very rare		✓		✓
6	*Corvus corax*	Common raven	LC	LC			✓	✓	
7	*Cuculus sp*	Cuckoo				✓	✓		
8	*Emberiza buchanani*	Grey necked Bunting	LC	LC			✓		✓
9	*Eremophila alpestris*	Horned lark	LC	LC			✓		✓

#	Scientific Name	English Name	IUCN Red List	Regional Red List	Mongolian Legal Status	Tsenkher Nomin	Khundii	Water Expl. Area	Site Access Road
10	*Falco sp.*	Falcon				✓	✓		✓
11	*Fulica atra*	Common coot	LC	LC			✓	✓	
12	*Lanius isabellinus*	Rufous-tailed Shrike	LC	LC		✓	✓		
13	*Milvus migrans*	Black kite	LC	LC			✓		
14	*Motacilla citreola*	Citrine wagtail	LC	LC			✓		
15	*Motacilla flava*	Yellow wagtail	LC	LC		✓	✓		✓
16	*Oenanthe deserti*	Desert wheatear	LC	LC		✓	✓	✓	
17	*Oenanthe isabellina*	Isabelline wheatear	LC	LC		✓	✓		
18	*Oenanthe oenanthe*	Northern wheatear	LC	LC			✓		✓
19	*Oenanthe pleschanka*	Pied wheatear	LC	LC			✓		✓
20	*Podoces hendersoni*	Mongolian ground jay	LC	VU	Rare	✓	✓		✓
21	*Sturnus cineraceus*	White cheeked starling	LC	LC		✓	✓		
22	*Syrrhaptes paradoxus*	Palla's sandgrouse	LC	LC		✓	✓		
23	*Upupa epops*	Eurasian hoopoe	LC	LC		✓	✓		
Insects									
1	*Aporia crataegy*	Black-veined white				✓	✓		



SUSTAINABILITY
EAST ASIA LLC

ERDENE MONGOL LLC

B7 - Waste

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
ESIA	Environmental and Social Impact Assessment
MLA	Mineral Licenced Area

7. WASTE

7.1 Introduction

This Chapter of the Khundii Gold Project (the Project) Environmental and Social Impact Assessment (ESIA) considers existing waste generation, waste disposal infrastructure and waste management practices within the Project Area of Influence (AoI). The following areas (Figure 1) have been considered as the Project AoI for waste during the Project construction and operation phases:

1. Khundii and Tsenkher Nomin Mineral Licensed Areas (MLA)
2. Haul road linking Altan Nar open pits and Bayan Khundii process plant
3. Water exploration field south of Bayan Khundii

The AoI was determined with respect to the planned mining activities and potential sensitive receptors. Sensitive environmental and human receptors are those that have the potential to be impacted by inappropriate management of waste streams. Potential sensitive receptors from waste generation and disposal could include groundwater, soil, mine camp residents, and local herders temporarily camping in the AoI.

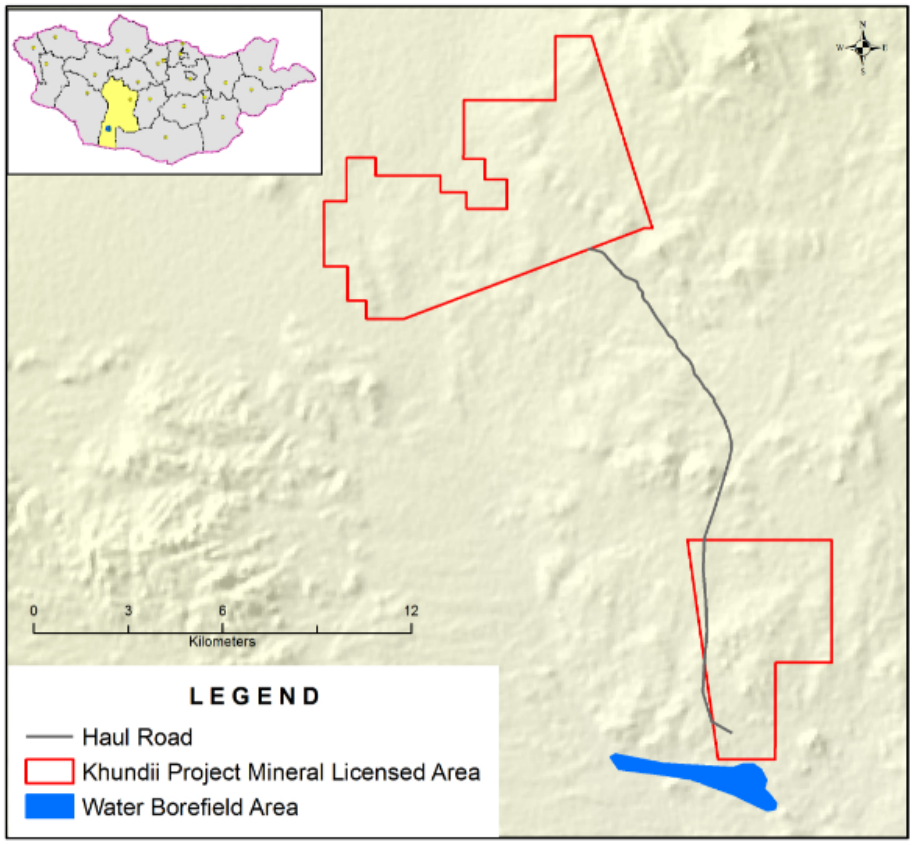

Figure 1 Khundii Gold Project Waste Area of Influence

For the purpose of this Chapter, waste is defined as solid and liquid residues and effluents generated within the Khundii Gold Project Area of Influence. This chapter covers mineral, non-mineral, hazardous and non-hazardous waste. Atmospheric emissions are discussed in detail in *Chapter B2: Climate and Air Quality* and is therefore not repeated here.

7.2 Baseline Characterisation Methodology

A number of existing reports that provide information on the potential impact and management of waste inside the Khundii Gold Project AoI and the surrounding area have been reviewed and references to these are made within this ESIA where appropriate. The primary sources of this information are:

- Environmental and Social Baseline Survey Report for Khundii MLA (2017) by Eco Trade;
- Environmental and Social Baseline Survey Report (2017) for Tsenkher Nomin MLA by Eco Trade;
- Khundii MLA Environmental Baseline Survey Report Update (2019) by Eco Trade;
- Tsenkher Nomin MLA Environmental Survey Report Update (2019) by Eco Trade; and
- RPM Global. 2019. Technical Report for the Preliminary Economic Assessment of the Khundii Gold Project.

7.3 Baseline Conditions

7.3.1 Current Waste Generation

No mineral or mine waste has yet been generated at the site. The area surrounding the Bayan Khundii deposit was converted into a mining license in 2019. The Altan Nar deposit was registered with the Mongolian government in 2019 and in the process of being converted to a mining license at the time of this assessment.

7.3.1.1 Non-mineral Waste Streams

As mine construction activities have not commenced the existing waste streams at the MLAs are limited to the following:

- Solid domestic waste from the temporary camp in Khundii MLA:
    - Generic household waste;
    - Food packaging;
    - Plastic bottles for drinking water; and
    - Food waste.
- Wastewater:
    - Domestic wastewater from exploration camp
    - Wastewater from rock sample cutting saw

7.3.1.2 Mineral and Hazardous Waste Streams

As construction and mining activities have not commenced there are no mineral or hazardous waste streams currently generated or stored within the Project AoI. Limited amount of hazardous waste from the exploration drilling operations (i.e. drilling lubricants and waste oil) has been transported to Ulaanbaatar for recycling.

7.3.2 Current Waste Disposal Facilities

As the Project Site construction has not commenced, the required waste disposal infrastructure for the Project has not been developed.

Currently, there are no engineered waste disposal or processing facilities at the temporary exploration camp. A simple waste pit has been excavated at the site for domestic solid waste disposal, in accordance with the soum government issued permission. Wastewater from the camp bathroom and kitchen is disposed to an underground effluent leaching pit located adjacent to the camp bathrooms.

In addition to the landfill and effluent leachate pits, the temporary exploration camp is equipped with a simple drop field latrine backup facility. The field latrine is utilised by the limited number of camp residents (i.e. 4-5 Security guards on rotational basis) during winter when the leachate pits are not operational due to the sub-zero temperature in the region.

The nearest settlements from the Project site are Shinejinst and Bayan Undur *soums* of Bayankhongor *aimag,* located approximately 70 km and 80 km, respectively, to the north-east and north of site. Currently, these *soums* have no engineered waste processing facilities, and all domestic waste is disposed in landfills. The *soum* hospitals have limited capacity incinerators for medical waste.

7.3.3 Current Waste Management Practice

7.3.3.1 Camp solid domestic waste

The temporary exploration camp within the Khundii MLA houses 4 - 5 security guards permanently on a rotational basis, and a maximum of 40 people during 3 - 4 months of the seasonal exploration drilling and technical programmes per year. Currently, the camp's solid waste is segregated into plastics (mostly plastic bottles for drinking water) and landfill waste (mostly generic domestic waste and food packaging) (Figure 2). Plastic bottles are collected at the site and shipped back to Ulaanbaatar for recycling by the camp service provider. All other solid domestic wastes from the camp are landfilled in a simple non-engineered landfill pit dug at the Khundii temporary exploration camp (Figure 3). As of June 2019, there were no accumulated wastes of any type at the camp.



a) b)

Figure 2 Generic Waste Segregation Bins at Khundii Camp: a) recycling bins and b) Plastic Bottle

Currently, the solid waste streams at the Khundii temporary exploration camp are not tracked through systematic waste inventory system. Consequently, the amount of solid waste has been

estimated using the waste generating rate of 0.625 kg per day/per person solid waste. This rate was established in Mongolia based on actual waste amounts generated during summer and winter months in residential camp areas in Ulaanbaatar (JICA, 2007).

The total residents at the current temporary camp were estimated to be 3625 man/day, based on an average of 5 security personnel for 365 days and 15 technical personnel for 1800 man/days for four months per year. Using this estimation method, the total solid waste from the exploration camp is estimated at 2,265 kg annually.



Figure 3 Waste Pit Currently for Temporary Exploration Camp

Starting in 2019, organic waste, mostly vegetable and fruit scraps, from the camp kitchen has been collected and dried for use within an onsite recycling initiative, namely compost generation trials for potential rehabilitation work. This initiative is in the early stages of trial, and currently no compost has been produced.

7.3.3.2 Wastewater

Wastewater generated by the Khundii camp is minimal due to the small number and seasonal presence of camp residents. However, wastewater volume increases during the drilling programme due to the increased number of camp residents as well as additional water volume required for the rock cutting saw. Table 1 outlines estimated wastewater disposal volumes throughout 2018 and 2019. The figures in Table 1 are based on the actual water amount supplied for camp use and the Mongolian Government approved water use norm per person for conditions considered similar to the KGP temporary camp (MET, 2015).

Table 1 Camp Water Consumption in 2018 and 2019

Months	Estimated Amount (m^3)
April 2018 (actual)	30.0
May 2018 (actual)	119.5
June 2018 (actual)	82.0
September 2018 (actual)	173.0
April 2019 (actual)	104.0
All other months between Jan 2018 and September 2019 (estimate)	85.5*

* *Estimated by the 30L/per person/per day norm approved by MET (2015) and camp residents numbers*

Currently there is no wastewater treatment facility at the temporary exploration camp. The effluent wastewater is discharged to the underground seepage pit adjacent to the ablution block via a buried pipeline. Used water from the rock cutting saw is also disposed in a separate underground leachate pit. Neither waste stream has been characterized as hazardous. This practice is not prohibited by the current Mongolian Law on Waste (2017). It is common practice in Mongolia to use such temporary leachate facilities in remote places like the KGP exploration camp.

As the KGP progresses into the Construction phase, the Project plans to install and operate an engineered wastewater treatment plant that meets the applicable Project standards.

7.4 Existing Sensitive Receptors

Sensitive receptors include groundwater resources that have the potential to be impacted by inappropriate management of waste streams. In addition, the health and amenity of occupants within the Project Area of Influence could be affected by inappropriate management practices. More specifically, the following existing sensitive receptors may be impacted by the construction and operation of the proposed Khundii Gold Project:

- Groundwater;
- Soils;
- Local ecosystems;
- Site occupants; and
- Local communities and Nomadic herders within the Project AoI.

7.5 Conclusions

There is limited waste currently generated within the Khundii Gold Project Area. The main waste streams include generic domestic solid and effluent wastes from the temporary exploration camp located within the Khundii MLA. Wastewater from the rock cutting saw and a limited amount of oils and lubricants from drilling equipment are the only non-domestic waste streams generated at site. Currently, there are no industrial or hazardous wastes disposed at site, as the mine development has not commenced.

There are no engineered solid or liquid waste processing facilities at the mine site or nearby *soum* centres. Erdene and its camp service providers collect and recycle plastics containers. In addition to the recycling, Erdene also initiated a compost making trial from food scraps at site.

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

Erdene Mongol LLC

B8 - Demography

March 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

LLC	Limited liability company
FGD	Focus Group Discussion
GER	Gross Enrolment Ratio
KGP	Khundii Gold Project
KII	Key Informant Interview
MSIS	Mongolian Statistical Information Service
NSO	National Statistical Office
PAP	Project Affected People
SPSS	Statistical Package for the Social Sciences
UNICEF	United Nations Children's Fund
USSR	Union of Soviet Socialist Republics
WHO	World Health Organization

Glossary

aimag	The Provincial unit of administration in the territory of Mongolia
soum	Sub-province area; The second level of administration in the territory of Mongolia
bagh	Sub-division of soum; The third level of administration in the territory of Mongolia
dzud	Mongolian term for summer drought followed by a severe winter, generally causing serious loss of livestock

1. DEMOGRAPHY

1.1 Introduction

This section discusses demographics in the Project area of influence, including the main characteristics of the population, the age-gender structure, urban and rural population dynamics, migration, literacy, education, ethnicity and religion.

1.2 Baseline Characterisation Methodology

1.2.1 Sources of Information

Primary Data Collection

Several sources were used to develop the demography baseline Chapter. Erdene commissioned Sustainability to conduct primary data collection in support of this baseline study. Data collection included the completion of Key Informant Interviews (KIIs) and Focus Group Discussion (FGDs) with local community members, and a Household Survey conducted in the Project area in August 2019. See Chapter B1 Introduction for further information on primary data collection.

In addition, as part of the environmental and social baseline study conducted to meet Mongolian national requirements, in 2016, a team of researchers from Eco Trade LLC conducted a survey in the Project area, including interviews with herder households. This Chapter also draws upon the findings of this survey.

Secondary Data Collection

Secondary data sources consulted in the development of this Chapter include international and national statistics, population and housing censuses, official statistics from *aimag* and *soum* governors' offices, and annual *aimag*, *soum* and *bagh* level reports, among others. A full reference list is provided in Section 1.11.

1.2.2 Methodological Approach

The methodological approach employed to obtain the demography baseline included the completion of a statistically representative household survey in the Project area of influence, the data from which were analysed using the Statistical Package for the Social Sciences (SPSS). Furthermore, Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) were also conducted to explore and identify issues related to demography and population at the *aimag*, *soum*, and *bagh* levels. See Chapter B1 Introduction for further description on the social baseline methodology employed.

1.2.3 Project Area of Influence

The area of influence has been defined as Bayankhongor *aimag* as the macro-level social and economic impact of construction and operation of the KGP may affect receptors at the *aimag* level. Sub-areas within the Bayankhongor *aimag* include Shinejinst and Bayan-Undur *soum*s, and specifically their *soum* centres, and Urtiin gol and Idren *bagh* (the *bagh*s within which the KGP is located). The KGP will intersect with these *soum*s and particularly at the *bagh* level, which may experience both direct and indirect environmental and social impacts from construction and operation of the KGP.

1.2.4 Applicable Standards

There are no directly applicable national standards in relation to demography. Demography and population sub-topics are referenced throughout the EBRD's Performance Requirements on

Environmental and Social Sustainability (PRs). The PRs are discussed in depth in Chapter A2 Policy and Legal Framework.

1.3 Population and Migration

Bayan-Undur is the largest *soum* by area in the *aimag*, followed closely by Shinejinst *soum* as the second largest. They are the most southerly, and among the least densely populated *soum*s of the *aimag*. The total population of Bayan-Undur was ranked as 13th in Bayankhongor *aimag*, while Shinejinst ranked 15th in 2018. As of 2019 in Shinejinst *soum* there were a total of 2,449 people in 754 households. The population of Bayan-Undur *soum* in 2018 was 2,668 people, and 753 households. At the *bagh* level, Urtiin gol *bagh* within Shinejinst *soum* had 902 people within 267 households, while Idren *bagh* in Bayan-Undur *soum* had 433 people within 112 households. Both *soum*s had similar birth and mortality rates, with the Shinejinst birth rate per 1,000 persons being 24.1 while mortality rate is 5.3. In Bayan-Undur, the birth rate per 1,000 persons is 24.9, while mortality rate is 4.5.

Table 1 below shows that there has been a gradual decrease in the number of female-headed households and people with disabilities in Shinejinst *soum* over the last decade. However, in Bayan-Undur, these demographics have slightly increased. In terms of living arrangements in rural areas, children are more likely to live with their parents. However, most herder families who have school-aged children often live separately during the school year (September to June), so that the wife and children live in the *soum* centre to attend school, and the husband stays to herd in pastureland.

Table 1 Household Information by *Aimag*, and *Soum*, 2018

Types	Bayankhongor	Shinejinst			Bayan-Undur		
	2018	2010	2015	2018	2010	2015	2018
Number of households	26,600	689	712	754	709	721	753
Number of female headed households	3,947	131	155	48	61	72	78
Number of people with disability	3,322	92	83	37	97	108	112

(Bayankhongor Statistical Office 2018a)

For the Household survey, 51 households in Shinejinst *soum*, and 27 households in Bayan-Undur *soum* were surveyed. 76.6% of respondents were male, and 23.45% female. Within Bayan-Undur *soum*, 8 households were located in Idren *bagh*, and within Shinejinst *soum* 36 households were located with Urtiin gol *bagh*. These two *bagh*s are within the direct area of influence for the Project. Of all the households surveyed, 97.4% (or 76 HHs) were native-born residents of their *soum*. Most residents have lived in their current location for many years, as shown in Figure 1 below. Over 85% have lived in their current home for 11 years or more. The mean number of people in a household was 3.82, with 9% of households reporting only one person living in a household. The largest group of respondents (28.2%) had 4 people in a household, with the maximum number being 8 people living in one household.

In discussing migration issues during KIIs, there are mixed opinions on how many people move to the *aimag* centre or Ulaanbaatar. The general consensus is that in- and out- migrations are not significant, and the population is slowly increasing. Shinejinst KIIs noted that there are cases of young people coming back to the *soum* to care for their parents, while Bayan-Undur KIIs indicated

that herders in the *soum* often employ assistant herders from neighbouring *soum*s and *aimags,* which contributes a small number of in-migrants. KIIs and FGDs also explored perceptions of migrants, and most respondents advised that migrants are generally viewed positively and welcomed within local communities. As migration into the two *soum*s is relatively insignificant, common issues and impacts of migrants competing for jobs and services, among others, were not raised by any respondents.

Of the households interviewed as part of the Household Survey, 74% were herders and the rest were based in the *soum* centres. Permanent locations of herder households vary by season, but general patterns can be seen. During winter, spring and summer just under 80% of residents live more than 26 kilometres from their *soum* centre. During autumn approximately 72% of residents live more than 26 km from the *soum* centre. This increase in residents living closer to the *soum* centre in autumn may be related to start of the school year or selling of agricultural products after harvest.

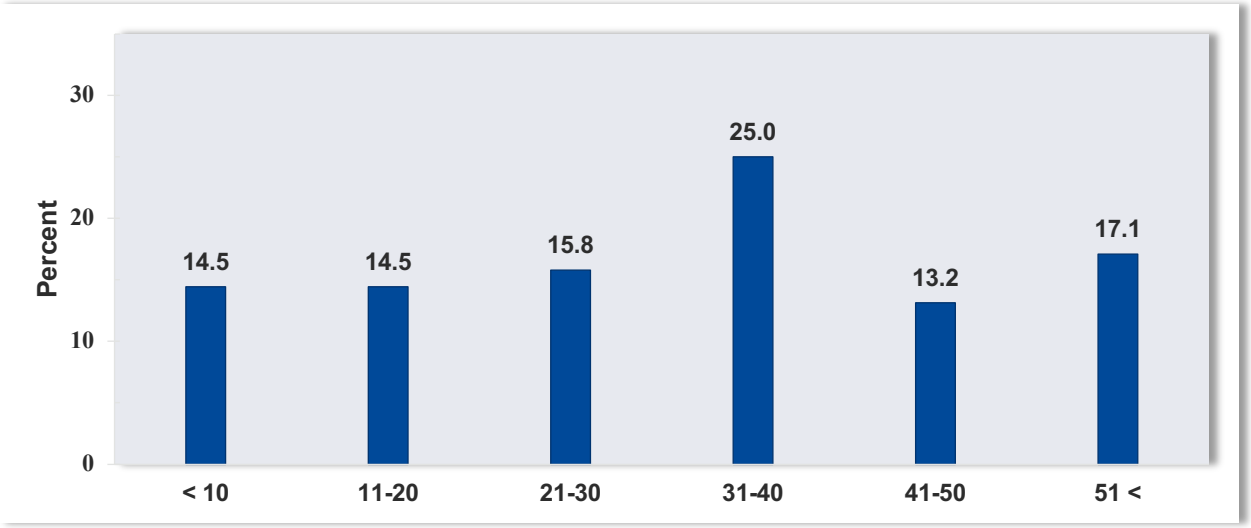
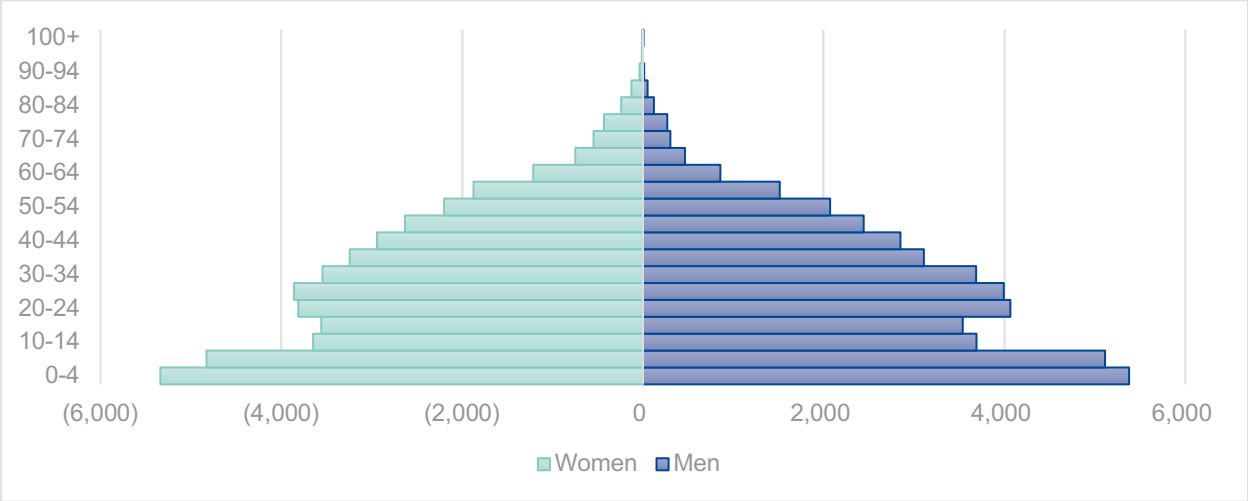


Figure 1 Years Individual Households Have Lived in Their Current Location, in Years

1.4 Age and Gender

Mongolia comprises a relatively young and economically active population. Two thirds of the population are of legal working age at the national level. Youth aged 20-29 and children aged 0-4 years are the largest age groups at the national level. In Bayankhongor *aimag*, a similar pattern holds, although children aged 0-9 are the largest age group in the *aimag*, followed by youth aged 20-29. This can be seen in Figure 2 which shows the population pyramid for Bayankhongor *aimag* in 2018.



Source: Bayankhongor Statistical Office 2018a

Figure 2 Population Bayankhongor *Aimag*, by Age and Sex

The age structure of Bayankhongor *aimag* is 31.7% children aged 0-14, 62.2% are working age (15-59), and the remaining 6.1% are the elderly aged over 60. Similarly, in Bayan-Undur and Shinejinst *soums*, the working age population accounts for 63.2% and 60.9% respectively. In both *soum*s, the largest age group is children aged 0-4. Both *soum*s have highlighted challenges related to providing sufficient educational facilities and training to the large child and youth populations.

> *"Within Shinejinst and Bayan-Undur soums, schools are at over-capacity and have to teach lessons in two shifts. There are no high schools, so families must spend money to send their children to the aimag centre for further education. This leads to lower education levels for some children, and less employment opportunities."*
>
> FGD in Bayan-Undur *soum*

The dependency ratio in Bayankhongor *aimag* is shown in Table 2, compared to the whole of Mongolia. The table shows the number of dependents (aged below 15 or over 64 years) per 100 working age population. The true dependency ratio is likely higher than recorded, as much of the population aged 15-24 are financially dependent while pursuing education, and pregnant mothers or caregivers also contribute to the number of dependents in the population (NSO 2016).

Table 2 Dependency Ratio in Bayankhongor *Aimag* (per 100 working age people)

Location	Age type	2016	2017	2018
Bayankhongor *aimag*	Child	46.2	47.1	49.1
	Elders	5.7	5.8	5.9
Total in Mongolia	Child	45	45.9	48.3
	Elders	5.8	6.1	6.3

Source: Mongolian Statistical Information Service, 1212.mn

The latest national population and housing by-census (conducted in 2015) reports that the sex ratio (number of males per 100 females) in Bayankhongor *aimag* reached 97.8, a decrease of 3.2 points from the previous census conducted in 2010. The sex ratio drops significantly as age increases. This can be explained by the higher death rate of males compared to females. In Mongolia as a whole, the sex ratio in rural areas is higher than the national average, as more females than males are migrating from rural to urban areas (NSO 2016). This occurs as families often send their daughters to study in *aimag* centres or Ulaanbaatar, while sons stay to help the

family earn an income. Within Bayankhongor *aimag* the sex ratio is fairly even, and no respondents spoke of a preference to send females over males to urban areas for further education.

In the past five years, Bayankhongor *aimag* has seen an increase in both marriages and divorces. In the *aimag*, 80.8% of women who gave birth were married in 2018, an increase from 79.1% in 2014. This was lower than the national average in 2018, where 87.1% of women who gave birth were married. Shinejinst *soum* saw an increase in marriages and very small increase in divorces in 2018, while Bayan-Undur *soum* saw a small decrease in marriages, and a divorce rate of 0. Despite the low number of divorces in official statistics, representatives in both *soum*s mentioned concerns over growing divorce rates. The representatives speculated that families separating during the school year (to divide household duties between childcare close to school, and caring for livestock further away) contributed to growing divorce rates. It is interesting to note that official statistics from 2018 show that 70.7% of households in Bayankhongor *aimag* defined the woman as the head of the household (the person responsible for household decision-making), (MSIS 2019). This may attest to the role men play in tending livestock and income generation (often remotely), while women remain largely responsible for the household. Gender roles are discussed further in the following Chapter B9 Social Structures.

The Household Survey found that in the Project area of influence the majority of households are still comprised of nuclear family units (over 65 of 78 households), with very few single parent families (one male-headed and three female-headed single parent families). According to a soum official, there are a total of 77 mothers with children under 18 without a spouse, of which 18 belong to Urtiin Gol bagh. Those single parent families in the Project area of influence are considered vulnerable to potential impacts of the Project. This was corroborated in a KII in Shinejinst *soum* in which it was noted that women-headed households are particularly vulnerable and lack sustainable income sources. In this KII it was noted that there are also several child-headed households in the *soum*, and these households are extremely vulnerable. Women-headed households were also reported as particularly vulnerable in Bayan-Undur, tending to live below the poverty line and having few sources of sustainable income.

1.5 Vulnerability in the Population

As noted above, a key focus in the social baseline is to understand vulnerability and patterns thereof in the Project area of influence. Vulnerability was also a major theme discussed and explored in the KIIs and FGDs.

It is noted that Shinejinst *soum* has registered 30 very poor and/or vulnerable households. A KII in Shinejinst *soum* identified that these households are provided with food stamps, and their school-age children are assisted with uniforms, books, and stationery. While the number of households living below the poverty line in Bayan-Undur could not be established, a KII in the *soum* indicated the number as relatively stable over the past few years. The same support programs in Shinejinst *soum* are provided to vulnerable households in Bayan-Undur *soum*. In addition, it was reported that in Bayan-Undur vulnerable households are supported by a goat restocking programme.

A KII in Shinejinst *soum* identified 70 people with disabilities, including 12 children with mental disabilities. The same figures could not be established for Bayan-Undur. The Household Survey asked respondents about disability within their households, and it was found that out of the 77 households (of 78 surveyed) that provided a response, 10 had a person with disabilities, and 3

households had 2 disabled members. This is consistent with World Health Organisation statistics of disability prevalence within the world population which is about 15% (WHO 2011).

Older persons are also considered vulnerable. As of 2018, there were 193 and 226 people aged above 55 years in Shinejinst and Bayan-Undur soum respectively. Urtiin gol bagh has 67 and Idren bagh has 24 older persons. There is an elders' association in both Shinejinst and Bayan-Undur *soum*, that facilitates social gatherings and provides support to older persons. The associations mainly organise social events and monthly gatherings; and usually older persons residing in the soum centre are involved in the activities. However, the associations are reported to lack a specific place or building to accommodate gatherings and funding sources to finance events.

In sum, vulnerability in the Project area of influence is largely made up of single parent households (of which female headed households are particularly vulnerable), people with disabilities, and older persons. Vulnerability of herder households in the Project is discussed in Chapter B13 Land Use.

1.6 Education and Literacy

The transition period in Mongolia in the 1990s presented a major challenge for the education sector to maintain the high levels of educational attainment and literacy that had been achieved under a centrally planned system. The economic difficulties of the early transition years had a negative impact on the maintenance of school facilities, delivery of school inputs and overall provision of education services. Key issues in the current Mongolian education system are (i) poor quality and relevance of the current curriculum for primary and secondary education, ((ii) inadequate teaching qualifications and skills, (iii) lack of consistent education standards (iv) weak learning and teaching environments in schools, and (v) supply-driven vocational education for youth. However, in spite of the challenges, Mongolia has a literacy rate of over 97%, with over 90% of the population attending secondary school (UNICEF 2012). Among youth aged 15-24 years, men have a literacy rate of 98% and women a literacy rate of 99% (UNICEF 2016). As of 2010, Bayankhongor had a literacy rate of 96.7% for youth aged 15-24.

The Household Survey revealed that 99% of respondents are educated, while the remaining 1% are illiterate or do not have an education. Out of the total number of households surveyed, 10% have a primary education, 25% have a general education (finished at grade 6-9), 39% have a secondary education, and approximately 8% have a vocational qualification, with the remaining 16% having higher (tertiary) education. As Figure 3 illustrates, the population in the Project area of influence is generally well educated (combined population having secondary education or above is over 50%).

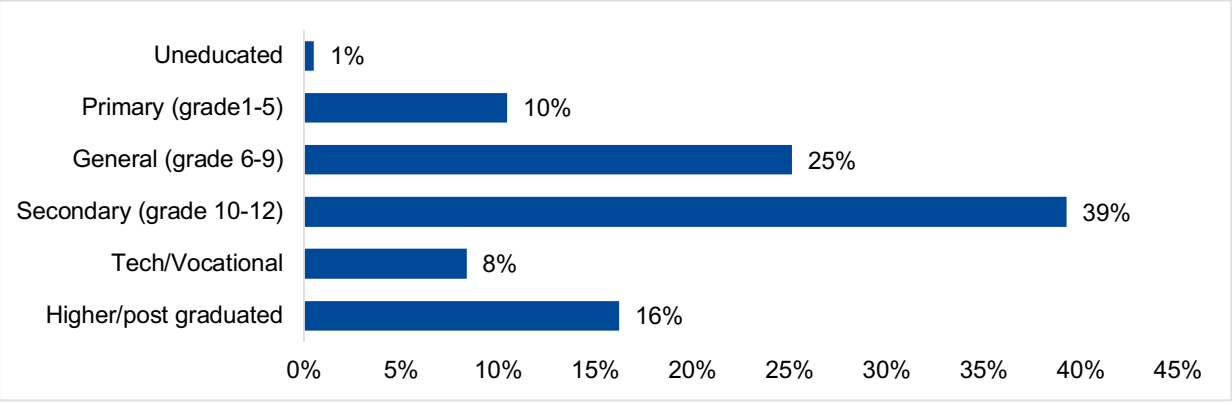
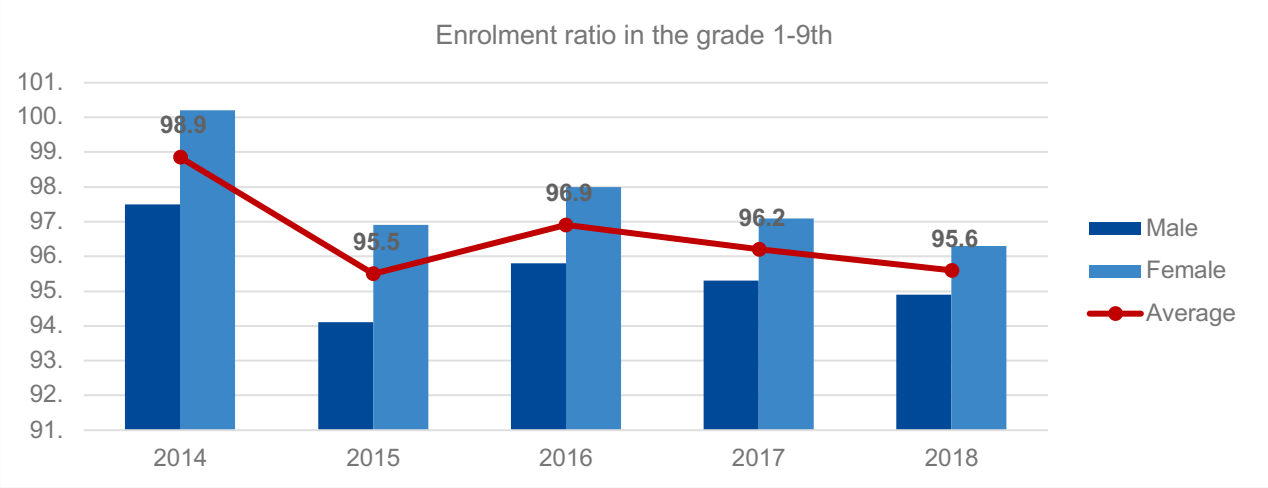


Figure 3 Education Levels in the Project Area of Influence

Source: Mongolian Statistical Information Service, 1212.mn

Figure 4**Error! Reference source not found.** shows the gross enrolment ratio (GER) in grades 1 to 9 for the last five years in Bayankhongor *aimag*, separated by male and female attendance. The GER in Bayankhongor aimag has been above 95% over the period and girls' attendance has been consistently higher than boys' attendance. In 2014, the GER among females and males exceeded 100%, which can be explained by cases of girls and boys being enrolled when they are older than their peers as sometimes occurs in rural areas. However, since 2015, such cases have not been reported.



Source: Mongolian Statistical Information Service, 1212.mn

Figure 4 Enrolment Ratios in Secondary education in Bayankhongor Aimag, 2014-2018

The number of children in pre-school institutions increased from 6,360 in 2014 to 7,836 in 2018. According to Bayankhongor *aimag*, 90% of children under the age of 6 are enrolled in kindergarten, while 99% of children between the ages of 6 and 18 are provided with education services.

Within Bayankhongor *aimag* there are 42 kindergartens, 29 public schools and 1 private school. As of 2018, there were 16,794 students enrolled in the 30 elementary schools. In 2018, there were 886 full-time teachers in Bayankhongor *aimag*, 80% of whom were female. There were also 474 kindergarten teachers, 98% of whom were female. Within the *aimag* centre itself there are 8 schools (various levels), a vocational training college and a National University of Commerce and Business. Further details on educational infrastructure, including programmes offered, state of facilities, and others, are provided in Chapter B12 Social Infrastructure.

Student dropout rates are low in Bayankhongor *aimag*, at around 0.01%. By the end of October 2018, there were 31 dropouts recorded in the *aimag*. This included 21 students who did not attend school at all for reasons of disability (most receive non-formal education at home), while 10 dropouts occurred between grades 2 and 9. The most common reason for dropping out is to assist family with herding livestock, according to local sources. At the primary education level, the sex ratio of students is 1:1, but the percentage of female students tends to increase in later years, to 58% of students in grades 6-9, and 60% in grades 10-12. Upon completing secondary school, there are limited opportunities to obtain tertiary education in the *aimag* for students.

In May of 2019 a centre for youth employment services was opened in the *aimag*'s Labour and Welfare Service Agency with the financial assistance of the Swiss Agency for Development and Cooperation (SDC). Of the over 1,800 citizens actively searching for jobs in the *aimag*, 60% are in the age group of 15-34 (Munkhzhul 2019). Services at the centre are targeted at youth who

have recently graduated, and who have little work experience. It will provide training every 4 weeks, teaching skills such as networking, making contact with potential employers, and coaching on successful interview strategies, among others (SDC, 2017).

> "*The aimag implemented a scholarship program, and 250 students have been awarded scholarships so far. Companies operating in the aimag should invest or promote activities for children's future, especially for their education and health*."
>
> KII, Bayankhongor *aimag*

Shinejinst *soum*:

KIIs and FGDs provided the following information about education at the *soum* level. Within Shinejinst *soum* there is no high school, and education is only offered for grades 1-9. There is one school, that has a capacity of 320 students. In 2018 there were 384 students attending the school, 52% of which were female and 48% male. The over-capacity at the school means that lessons are run in two shifts. The largest problem for the school is a lack of classrooms, as the number of children in grades 1-5 is increasing, consistent with the large proportion of 0-9 age children noted in the total population. Children of herding families attend school in the *soum* centre and stay in the school dormitory. However, herder adolescents tend to have poor education levels within the *soum*, and it is noted that there are some cases of illiteracy. The few cases of dropout in the *soum* are related to students wanting to help their family with herding livestock. Students who wish to pursue further studies past grade 9 must travel to a nearby *soum* or the *aimag* centre, which has financial and emotional costs for families. The general sense in the *soum* is that it is difficult to attract qualified teachers, and so the level of education and quality thereof for students suffers.

Shinejinst *soum* officials highlighted that Shinejinst *soum* was highly regarded for its excellent mathematics teaching by the aimag and even at a national level in mathematics Olympiads, which resulted in many engineers and economists in the past. However, nowadays the teaching quality of mathematics education has worsened due to a lack of qualified teachers. As soum officials reported, 80% of teachers are young and have been teaching for less than 10 years.

> *Even though parents' participation and contribution to school activities is relatively good, there are still many improvements to be made. Motivating teachers is difficult and not much has been done to retain good teachers, although it is essential for the soum to do so. Therefore, The Teachers' Development Program has been prepared and will be reviewed by the soum CRK. The soums, such as Bayan-Ovoo, where mining is well developed, are taking measures to motivate and retain teachers. For instance, an incentive of (3 or 10 million MNT) is given to those teachers every year, who have stayed in the soum for 5 years and performed well. The same approach is included in the proposed program.*
>
> KII, Shinejinst *soum*

As of 2018, there were around 30 illiterate people in the *soum*, but officials plan to involve at least 2-3 people in informal education services each year.

It was noted in FGDs that there is a lack of extra-curricular development programs, such as training to build soft skills and personal development for youth and adolescents within the *soum*. Opportunities for youth in the *soum* are limited, although recently local graduates tend to return back to their *soum* or the *aimag* for work. The most common reason for returning home is to stay close to family. There are some youth who remain unemployed, and there is a desire to develop programmes and/or training to assist this group to obtain sustainable employment.

> *"A survey of the soum school graduates is done every year. Last year, of the 40 graduates in total, over 20 went to the vocational training college in the aimag centre, some continued to study in the 10th grade, while there are some children who chose to become herders."*
>
> KII, Shinejinst *soum*

Bayan-Undur *Soum*:

Education in the *soum* is perceived to be of a low-quality, as it is difficult to attract and retain good teachers. Bayan-Undur *soum* has no high school, and basic education in the *soum* goes to grade 9, although the *soum* is considered fully literate. The school accommodates 87-88% of the school age children in the *soum*, while the remaining children enrol in schools in other areas such as the *aimag* centre. The school has a capacity of 320 students, but 420 students were enrolled in 2018. To accommodate all of the pupils the lower grades study in two shifts. There are 25 teachers at the school, of which 23 are female. The *soum* has a history of very low dropouts.

After graduating primary school, pupils may continue to study high school in Bayankhongor *aimag* or enrol in vocational college. Similar to Shinejinst *soum*, some pupils (about 5%) are employed as herders after they graduate from primary school. There are no programs for youth in the *soum*. FGDs with herders and the general community expressed the need for a high school in the *soum*, or a vocational school to train youth. There is a lifelong educational centre in the *soum* to help educate residents who have literacy issues.

1.7 Ethnicity

There are around 20 different ethnic groups in Mongolia. Ethnicity is not usually a source of tension in Mongolia. The main ethnic group in Mongolia is the Khalkha (around 85%), which is dispersed throughout the territory of Mongolia. Groups can generally be placed in four culturally distinct clusters, including the Khalkha-Mongols, the Western Mongols or Oirats, North-eastern Mongols (including Buriats), and Turkic speakers (including Kazakhs, Khotod, Tuvinians). Linguistically, Mongolia is quite homogenous, with around 90% of the population speaking one of several similar Mongolian language dialects, and predominately Khalkha Mongol which aligns with the predominant Khalkha ethnic group.

> The term *khalkha* has been used at least since the mid-sixteenth century to refer to the nomads of the traditional Mongol heartland of high steppes and mountains. In the twentieth century, they occupied most of the central and the eastern areas of the country. *Khalkha* Mongol is the standard language; it is taught in schools and is used for all official business. The written language is based on the *khalkha* of the Ulaanbaatar region, and when Mongol script was replaced by a Cyrillic alphabet between 1941 and 1946, the Russian Cyrillic was modified to suit the phonetic structure of *Khalkha* (Worden & Savada 1989).

According to the 2015 By-Census, Bayankhongor *aimag* contains only a small proportion of the main ethnic groups. Bayankhongor *aimag* accounts for 3.3 percent of the total number of Khalkhs living in Mongolia, 0.1% of Kazakhs, 0.2% of Torguuds, 0.1% of Sartuul, and 1.4% of Khorchin. Khalkhs make up more than 99% of the population living in Bayankhongor *aimag*. The population is very homogenous, as illustrated by the statistics collected in 2015.

There are very few foreign citizens living in Bayankhongor *aimag*. In 2015 there were a total of 10 foreign citizens residing in the *aimag*, accounting for 0.1 percent of the population (NSO 2016:34).

1.8 Religion

Traditionally, Mongolians practiced Shamanism, a set of beliefs which conceived of the world as an organic whole with particular reference to the "clear blue sky". However, Tibetan Buddhism gained popularity after it was introduced in the 13th century. At the beginning of the 20th century, Mongolia had hundreds of Buddhist monasteries. After the 1921 People's Revolution installed a socialist regime in the country, religious practice was prohibited, and political purges in the 1930s nearly destroyed the extensive system of monasteries in the country. Under communist rule, atheism was promoted, monasteries were closed, and shamanistic knowledge and practices were largely lost. From 1945 to 1990, only one monastery (Gandan in Ulaanbaatar) was allowed to operate. The democratic reform that started in the 1990s encouraged freedom of religion, and well over 100 monasteries have since reopened. Kazakh Muslims were also allowed to practice Islam, and there is a minority of Sunni Muslims in the far western regions of Mongolia, most of whom are ethnic Kazakhs. Shamanistic practices have also been recouped and rediscovered during the past few decades.

The last census conducted in 2010[1] found that only approximately 60% of the population aged 15 and over identify as having a religion or faith. Half (53%) of the population identified as Buddhists. More females are religious in comparison to males (higher by 8.5%). The Household Survey found that 94.9% of those interviewed practice some form of religion or faith. The Household Survey indicates a much higher prevalence of religion than the 2010 census results. Given the much larger sample size of the census, it is not possible to state whether this represents a trend in Mongolian society towards greater religious identification. An increase in religious identification may be interpreted in the context of greater religious freedom and rebuilding of Buddhist (and other) religious worship sites since the 1990s (as noted above). The majority of respondents (92%) practice Buddhism, as shown in Figure 5 below. All respondents find it acceptable for other people in their community to practice an alternative religion, indicating a high level of religious tolerance.

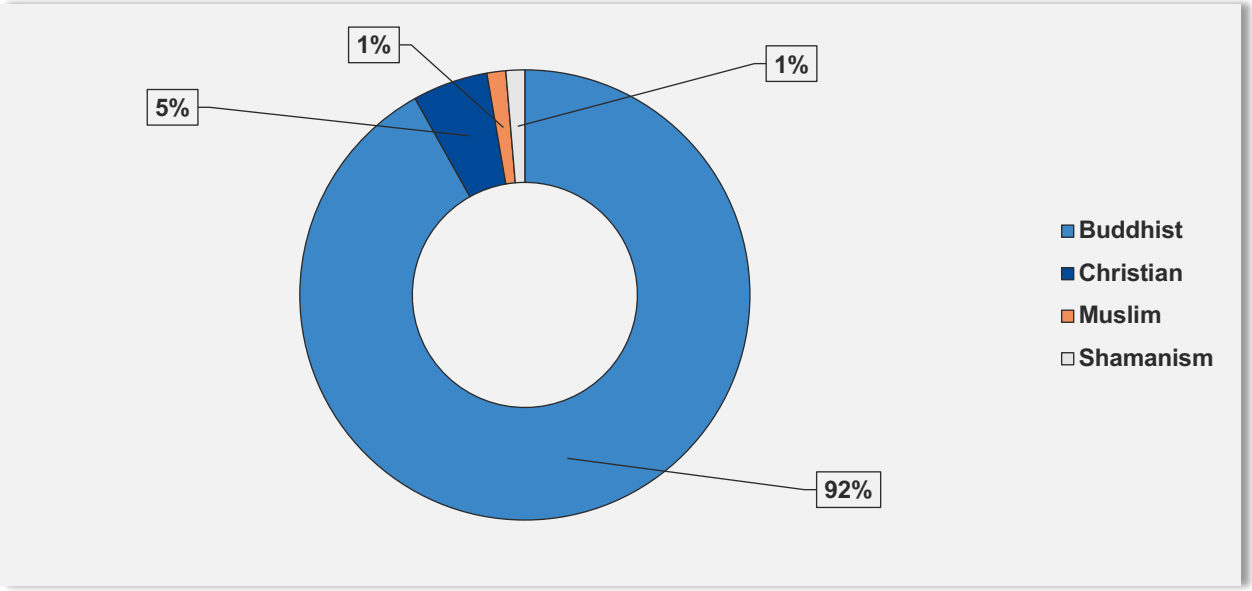


Figure 5 Religions Practiced in the Project Area of Influence

[1] 2010 Census has most recent results, as 2015 By-Census did not cover religion.

In 2018, there was a sudden and marked increase in students studying at Buddhist schools and colleges in Bayankhongor *aimag*. Previous years had enrolment of less than 20 students in Buddhist schools, and only 4 students in 2017. In 2018, there was an increase to 81 students studying at Buddhist schools (MSIS 2019). The reason for the sudden increase in students is not known. The Luvsandanzanjantsan Studies Centre located in Bayankhongor *aimag* promotes the works of high lama Choijil Luvsandanzanjantsan (1639-1704), as well as activities for conservation of religion and the environment (Chimedsengee et al. 2009). The centre brings together monastic heads, scholars and scientists. No other religious schools are currently attended by students, the latest being 10 students studying at a Christian school in 2014.

There are two well-known monasteries located within or close to the *aimag* capital. A small monastery at the base of a sacred hill in the middle of the town centre houses around 10 resident monks, while the larger Lamyn Gegeenii Gon Gandan Dedlin Khiid monastery located 30 km outside of the centre houses around 50 monks (Monasteries of Bayankhongor 2015). Further, Amarbuyant Monastery, a functioning Mahayana Buddhist monastery with a permanent residential population of monks, is located approximately 30 km south of the Bayan-Undur *soum* centre and 50 km from Shinejinst *soum* centre (see also Chapter B14 Cultural Heritage). In 2018, Bayankhongor *aimag* had 8 Buddhist temples with 56 monks, and 3 Christian churches with no pastors or missionaries officially registered. The number of religious buildings has remained fairly steady, although in 2009 there were 11 Buddhist temples with 117 monks and only one Christian church with 4 pastors or missionaries in the *aimag* (MSIS 2019).

In 2018, there were no statistics at all related to Christianity, Islam or other religions officially registered in Bayankhongor.

1.9 Project Affected People

Project Affected People (PAP) are defined as the social groups and/or communities whose characteristics, including vulnerability and means of sustaining livelihoods, will be affected directly or indirectly by actions associated with the construction, operation and/or closure and decommissioning of a Project. People and communities that may be affected by population changes caused by the KGP development are:

- Residents of all Shinejinst and Bayan-Undur *soum*s, but predominantly, those living in the *soum* centres; and
- Residents of Urtiin gol *bagh* and Idren *bagh* in Shinejinst and Bayan-Undur *soum*s, respectively.

Also, in the context of population and demography, the following types of people are considered as being potentially vulnerable to Project impacts:

- Single parent households (of which female headed households are noted to be particularly vulnerable);
- People with disabilities, and
- Older persons.

1.10 Conclusion

A number of key demographic themes and issues emerged through the Social Baseline Study.

- There is minimal migration into or out of the *aimag*. Any migration that does occur is perceived positively, as it is a sign people are seeking opportunities within the *aimag*.
- A number of vulnerable groups in the Project area of influence were identified, specifically single parent households (of which female headed households are noted to be particularly vulnerable), people with disabilities, and older persons. These groups and individuals are known to *soum*-level authorities and there are existing (but limited) programmes to support them.
- The Household Survey revealed that 99% of respondents are educated. Of these, 10% have a primary education, 25% have a general education (finished at grade 6-9), 39% have a secondary education, and approximately 8% have a vocational qualification, with the remaining 16% having higher (tertiary) education.
- There are some unique issues in Bayan-Undur and Shinejinst *soum*s. They are both sparsely populated, with no educational facilities past the 9th grade. The key challenge in these areas is in providing vocational, educational, economic opportunities and workspaces for youth. Both *soum*s have a large population of children under the age of 10. The high proportion of young adults (20 – 29) are also a concern, with many individuals interviewed expressing concern over high rates of unemployment and lack of opportunities without further development in their *soum*.
- Citizens of Bayan-Undur and Shinejinst *soum*s may be less equipped to take advantage of any economic / employment opportunities presented. Poor access to education has long-term ramifications, not only on the lives of children themselves, but on poverty eradication, human development and economic progress of broader communities.

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

Erdene Mongol LLC

B9 – Social Structures

March 2019

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Appendices

Appendix A: Additional Data

Acronyms and Abbreviations

ADB	Asian Development Bank
CRK	Citizens Representative Khural
CSO	Civil society organisations
CWGP	Civil Will-Green Party
DP	Democratic Party
EITI	Extractive Industries Transparency Initiative
FGD	Focus Group Discussion
GDP	Gross Domestic Product
IMF	International Monetary Fund
IOM	International Organisation of Migration
IRIM	Independent Research Institute of Mongolia
JICA	Japan International Cooperation Agency
KGP	Khundii Gold Project
KII	Key Informant Interview
LCA	Local Cooperation Agreement
LCDV	Law to Combat Domestic Violence
LGBTI	Lesbian, Gay, Bisexual, Trans-sexual, and Inter-sex
LLA	Local Level Agreement
LLC	Limited liability company
MERIT	Mongolia: Enhancing Resource Management through Institutional Transformation
MNT	Mongolian National Tugrik (currency)
MPP	Mongolian People's Party
MPRP	Mongolian People's Revolutionary Party
MSIS	Mongolian Statistical Information Service
NSO	National Statistical Office
PAP	Project Affected People
SDV	Sustainable Development Vision
SGK	State Great Khural
SME	Small and Medium Enterprise
SPSS	Statistical Package for the Social Sciences
UN	United Nations
UNICEF	United Nations Children's Fund
USA	United States of America
WEF	World Economic Forum

Glossary

aimag	The Provincial unit of administration in the territory of Mongolia
soum	Sub-province area; The second level of administration in the territory of Mongolia
bagh	Sub-division of soum; The third level of administration in the territory of Mongolia
Myangat herder	A herder with more than 1,000 head of livestock and considered as affluent

1. SOCIAL STRUCTURES

1.1 Introduction

This Section presents the social structures, including changes, trends and current circumstances thereof at a national level compared to Bayankhongor *aimag*, Shinejinst and Bayan-Undur *soum*s, and Idren and Urtiin Gol *bagh*s. The content of the chapter specifically addresses social structures and functions, political structures, socio-political involvement of citizens, voters' evaluation of elected political leaders, formal and informal decision-making processes, structures of social welfare and access thereto, women in society, and attitudes to outsiders.

1.2 Baseline Characterisation and Methodology

1.2.1 Sources of Information

Primary Data Collection

Several sources were used to develop the social structures baseline chapter. Erdene commissioned Sustainability to conduct primary data collection in support of this baseline study. Data collection included the conduct of KIIs and FGDs with local community members and a household survey conducted in the Project area in August 2019.

Additional sources include previous studies undertaken in support of the Project, including the social baseline reports conducted to meet Mongolian national requirements in 2017 (Eco Trade LLC 2017a & b).

Secondary Data Collection

Secondary data sources include national statistics, population and housing censuses, official statistics from *aimag* and *soum* governors' offices, annual *aimag*, *soum* and *bagh* level reports, and available reports on projects and programs in the Project area. These sources are referenced as applicable throughout the Chapter, and a full reference list is provided in Section 1.12.

1.2.2 Methodological Approach

The methodological approach employed to obtain the social structures baseline included the conduct of a statistically representative household survey in the Project Area of Influence, the data from which was analysed using the Statistical Package for the Social Sciences (SPSS) and subsequent information presentation. Furthermore, Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) were also conducted to explore and identify issues related to social structures at the *aimag*, *soum*, and *bagh* levels.

See Chapter B1 for further description on the social baseline methodology employed.

1.2.3 Project Area of Influence

This Chapter provides a description of social structures within the KGP Project area of influence. The area of influence has been defined as Bayankhongor *aimag* as the macro-level social and economic impact of construction and operation of the KGP may affect receptors at the *aimag* level. Sub-areas within Bayankhongor *aimag* include Shinejinst and Bayan-Undur *soum*s, and specifically their *soum* centres, and Urtiin gol and Idren *bagh* (the *bagh*s within which the KGP is located). The KGP will intersect with these *soum*s and particularly at the *bagh* level, which may experience both direct and indirect environmental and social impacts from construction and operation of the KGP.

1.2.4 Applicable Standards

There are no directly applicable national standards in relation to social structures. Topics related to social structures are referenced throughout the EBRD's Performance Requirements on Environmental and Social Sustainability (PRs). The PRs are discussed in depth in Chapter A2 Policy and Legal Framework.

1.3 Social Structures and Functions

1.3.1 Political History

From the Mongolian revolution in 1921, until the emergence of the democratic movement and the fall of the Soviet Union in the 1990s, the Government of Mongolia was modelled on the Soviet system and was led by the Mongolian People's Revolutionary Party (MPRP), the Communist Party. The 1990 democratic revolution enabled a multiparty system of governance to be established in Mongolia, making it the first country in Asia to transition from communism. The 1990 Constitutional amendment paved the way for the creation of opposition parties, a legislative body, and the office of the President. The Mongolian People's Revolutionary Party (MPRP) won 85% of seats in the first multiparty elections in 1990, while the Democratic Party (DP) failed in winning a majority until 1996.

There have been 7 parliamentary elections held in Mongolia since 1992 and the Mongolian People's Party (formerly MPRP) took power 4 times (1992, 2000, 2008, and 2016), while the Democratic Party (DP) has been in power twice (1996 and 2012). A coalition of these two parties ran the government after the election of 2008. Of the 7 presidential elections held in Mongolia since 1993, the MPP candidate has won 3 times, and the DP candidate has won 4 times.

Currently, from among 33 registered political parties[1], the key political parties in Mongolia are (Sant Maral Foundation 2019):

- MPP (formerly, MPRP);
- DP (formed through a merger of democratic revolutionary parties in 2000);
- Mongolian People's Revolutionary Party (a new MPRP, established in 2010 by a breakaway faction of the MPP);
- Civil Will-Green Party (CWGP), established in 2000; and
- National Labour Party of Mongolia, established in 2011.

1.3.2 Governance Systems

Mongolia is a parliamentary republic in which representatives of the Great Khural (the national Parliament) are elected for 4 years by a direct popular vote. There are 76 seats in the Great Khural, and presidential elections take place every 4 years. The 4th Constitution of Mongolia was adopted in 1992, which restructured the legislative branch of the government by creating a unicameral parliamentary legislature. The Constitution contains six chapters: Sovereignty of the State, Human Rights and Freedoms, Structure of the State, Administrative and Territorial Units, The Constitutional Court, and Amendment to the Constitution. The Government is comprised of the Executive, Judiciary, and Legislature, the powers and election processes for which are presented in Table 1.

[1] Political parties officially registered with the Supreme Court of Mongolia (Supreme Court of Mongolia 2019)

Table 1 Power and Election Processes of Government Bodies

	Description	Main Powers	Election Process	Election Cycle
Executive	The Cabinet is the highest executive body of Mongolia and is headed by the Prime Minister.	President is mostly a ceremonial role, but serves as the head of State for Mongolia. The prime minister appoints the governors of the 21 *aimag*s of Mongolia and the governor of the capital.	President is elected by absolute majority vote through a two-round system and prime minister is elected by parliament.	4 years
Judicial	The constitution provides for a Judicial General Council to select all judges and protect their rights. The Supreme Court is the highest judicial body. Justices are nominated by the Judicial General Council, confirmed by Parliament and appointed by the President.	Highest judicial body.	Supreme Court judges are nominated by a Judicial General Council, and then confirmed and appointed by the President.	Life appointment
Legislative	The Parliament of Mongolia is referred to as the State Great Khural, which is the highest organ of state power. Parliament confirms the appointment of the Prime Minister and Cabinet ministers.	Draws new laws in conjunction with the Government and decides on their introduction, approves the yearly budget, and has the power to declare war.	The unicameral State Great Khural has 48 members directly elected from 26 electoral districts, while 28 members are proportionally elected based on a party's share of the total votes.	4 years

Governance of administrative and territorial units of Mongolia is organised by a combination of the principles of self-government and central government. The self-governing bodies at the *aimag* (province), *soum* (district), and *bagh* (sub-district) levels are called Citizens Representative Khurals (CRKs). Representatives of the CRKs of *aimags,* the capital city, and soums are elected for a term of four years. The competencies of *soum* and district CRKs include "the right to discuss and make a decision on any economic, social and organisational matters other than those matters legally defined within the powers of the President, State Great Khural, Government, ministry and agency, CRKs of higher level and other competent State authorities and officials" (MCRK 2019). The functions assigned to *aimag* and *soum* CRKs include:

- approving, reviewing, and evaluating the Governor's activities;
- monitoring and evaluating the Governor's implementation of legislation and resolutions passed by the CRK;
- discussing, approving, and amending budgets; establishing and providing oversight of Local Development Funds;

- coordinating local socio-economic development strategies with regional strategies;
- imposing fees and tariffs within the limits of the law;
- approving land-use management plans and measures for environmental protection; and
- exercising local property ownership rights.

1.3.3 Current Government

The current parliament members were elected in the seventh Parliamentary election in June 2016, in which the MPP won an 85% majority with 65 seats, DP nine seats, MPRP one seat and an independent candidate (Javkhlan Samand) one seat. After the parliamentary election, the MPP appointed the Prime Minister (Erdenebat Jargaltulga) and formed the Government Cabinet.

Reflecting Mongolia's Sustainable Development Vision 2030[2], the MPPs election platform and Government objectives for 2016 – 2020 were 1) to overcome economic difficulties within a short period of time ensuring macroeconomic stability 2) to develop a sustainable economy based on diversified domestic production and 3) to increase the country's GDP to upper-middle income country status (State Great Khural 2016).

Today Mongolia has a per capita GDP of US$ 3,710 (2018) and is classified as a lower middle-income country. The real GDP per capita in 2015 more than doubled its level since 1990 (World Bank 2018:11). Between 2011 and 2013, Mongolia had one of the fastest growing economies in the world, with GDP growth rate of 17%, mostly due to a boom in foreign direct investment in mining. After a significant decline between 2012 and 2015, growth has been recovering since 2017 and reached 6.9 % in 2018, making Mongolia the second highest growth economy in the Asia Pacific Region (ADB 2019).

The key challenges for Prime Minister Erdenebat's cabinet included dealing with a fiscal crisis and handling debt unsustainability that was inherited from the previous government. His government took extensive measures to stabilise the economy from the International Monetary Fund (IMF). However, the government only lasted one year, as their performance was criticised by the public and they eventually fell from power in a no-confidence vote (Asia Nikkei 2019).

This government cabinet was succeeded by the current cabinet (Prime Minister Khurelsukh Ukhnaa) in October 2017. His cabinet made the government's priority to achieve macroeconomic stability and overcome public debt instability. The government has been implementing an Economic Recovery Program, in conjunction with an Extended Fund Facility for Mongolia from the IMF, and other financing partners, including World Bank, Asian Development Bank, Japan, and Korea (IMF 2018).

[2] The government of Mongolia adopted Mongolia's Sustainable Development Vision 2030 (SDV) in February 2016, and it reflected the global SDG2030s into national and sub-national policies. The SDV was built on a consensus of the major political parties in the hope of ensuring development policy continuity. Mongolia's SDV has 4 goals, 44 targets and 20 key results indicators and is accompanied by an Action Plan. It highlights the importance of "every person's participation in sustainable economic growth processes" and "everyone's equal benefit from gained revenues" (State Great Khural, 2016).

1.3.4 Voting in Bayankhongor

Historically, voting patterns in Bayankhongor *aimag* show that *aimag* citizens mostly vote for the two major parties (the MPP and the DP), reflecting national patterns, with higher representation of the Democratic Party for both Presidential (Table 2) and Parliamentary elections (Table 3).

Table 2 Last Four Presidential Election Results, 2005, 2009, 2013 and 2017

Candidates	Nominating parties	Cast votes			
		National level		Bayankhongor level	
		Number	%	Number	%
2005					
N.Enkhbayar	MPRP	497,491	53.4	16,986	49.5
M.Enkhsaikhan	Motherland-democratic coalition	186,646	20.1	6,480	18.9
B.Erdenebat	Motherland-party	105,497	11.3	3,071	8.96
B.Jargalsaikhan	Republican party (RP)	128,784	13.8	7,730	22.5
2009					
Ts.Elbegdorj	DP	562,718	51.2	20,422	50.2
N.Enkhbayar	MPRP	520,948	47.4	20,197	49.6
2013					
Ts.Elbegdorj	DP	622,794	50.9	20,377	47.2
B.Bat-Erdene	MPP	520,380	42.5	17,900	41.4
N.Udval	New MPRP	80,563	6.5	4,233	9.8
2017					
Kh.Battulga	DP	611,226	50.6	23085	65.7
M.Enkhbold	MPP	497,067	41.1	11944	33.5
Blank choice	NA	99,494	8.2	676	1.8

Particularly for Parliament elections, Bayankhongor *aimag* had been dubbed the "Blue Spot" (meaning supporters of the DP who are referred to as "Blue", whereas supporters of the MPP are referred to as "Red"). However, in 2016, the MPP won the *aimag*- and national-level elections in Bayankhongor.

Table 3 Elected Parliament Members from Bayankhongor *Aimag*, 2004-2016

Winners	Nominating parties	Number	%
2004 (majoritarian)			
Constituency#7	G. Zandanshatar (MPRP)	8104	59.6
Constituency#8	Ts. Jargal (Motherland and Democratic Union Coalition)	6205	52.3
Constituency#9	Kh. Battulga (Motherland and Democratic Union Coalition)	6704	56.8
2008 (proportional)			
Constituency#3	G. Zandanshatar (MPRP)	19,895	51.5
Constituency#3	B.Batbayar (DP)	17,717	45.8
Constituency#3	Kh. Battulga (Motherland and Democratic Union Coalition)	21,122	54.7
2012 (proportional)			
Constituency#3	Kh. Battulga (DP)	21,552	56.4
Constituency#3	D. Ganbat (DP)	17,748	46.4
Constituency#3	G. Zandanshatar (MPP)	15,175	39.7
2016 (majoritarian)			
Constituency#7	G. Zandanshatar (MPP)	7138	50.4
Constituency#8	M. Bilegt (MPP)	6845	48.0
Constituency#9	L. Eldev-Ochir (MPP)	7900	49.1

At the *soum* level, both Shinejinst and Bayan-Undur *soum*s have 21 Citizens' Representative Khural (CRK) representatives. Of which 15 are from MPP and 6 are from the DP in Shinejinst, and 13 are from MPP and 8 are from the DP in Bayan-Undur *soum*.

Table 4 Citizens' Representative Khural Seats at the *Aimag* and *Soum* level

***Soum*s**	**MPP**	**DP**
2008		
Bayankhongor *aimag*	17	14
Shinejinst	8	13
Bayan-Undur	9	12
2016		
Bayankhongor *aimag*	25	16
Shinejinst	15	6
Bayan-Undur	13	8

Despite an increasing number of voters, voter participation in Mongolia has been decreasing since 1992. As evidenced in Table 5, voter turnout in the parliamentary election in 1992 was 97.05%, and since then the rate has dropped consistently, down to only 74.3% in 2016 (General Election Commission of Mongolia 2019). In Bayankhongor *aimag*, and similar to the national level, voter participation has dropped steadily since 1992, though it has been always slightly higher than the national average. However, this pattern is not unique to Bayankhongor, as voter turnout in rural areas is generally higher than in urban areas in Mongolia. This decreasing voter participation can be explained by a number of factors such as waning confidence of the voters in political parties due the high turnover of politicians and governments, and poor implementation rate of the parties' election programs. Political interest among young voters has also diminished. A study conducted by the General Election Commission shows that the most inactive voters are young people, while middle and senior aged people tend to be the most active voters (The Mongolian Observer 2019).

Table 5 Voter Participation, 1992, 1996, 2000, 2004, 2008, 2012 and 2016

Year	**National Level**		**Bayankhongor *Aimag***	
	Number of Registered Voters	**Voter Participation (%)**	**Number of Registered Voters**	**Voter Participation (%)**
1992	1,085,129	95.6	39,702	96.1
1996	1,147,260	92.1	41,311	96.1
2000	1,247,033	82.4	44,919	88.3
2004	1,329,798	81.8	45,007	84.7
2008	1,542,617	76.5	48,500	80.8
2012	1,836,548	67.3	53,548	72.0
2016	1,911,407	74.3	55,609	79.9

Source: The Mongolian Observer 2019

According to the Household Survey conducted in support of this Social Baseline Study in August 2019, at the national level, a large majority of household's report that they do not support any political parties. The most support amongst surveyed households was recorded for the Democratic Party, although only 22 of 78 households indicated any kind of support towards it (see Figure 1). A similar pattern emerged at the local level, with most households not supporting any party. The most commonly supported party at the local level is once again the Democratic Party, with 25 of 78 households showing strong or somewhat support.

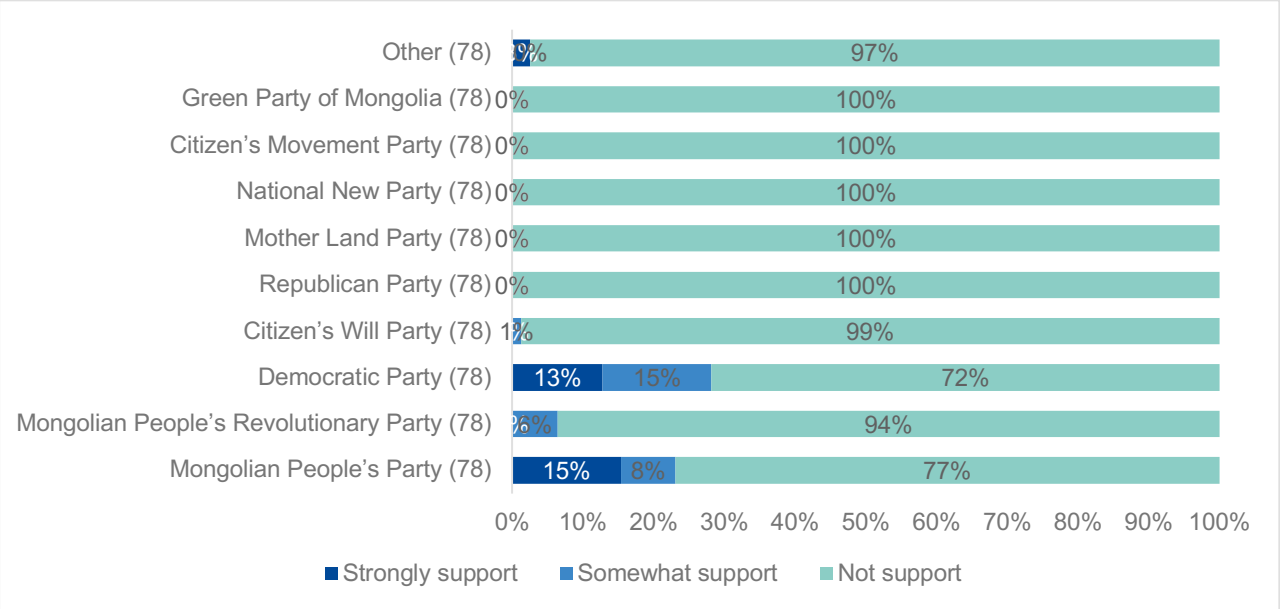

Figure 1 Support for Political Parties at the National Level

When voting, 41% of households report voting based on the individual quality of the candidates, while 39% indicate they vote based on the candidate's platform. Only 8% report voting based on the political party's platform and development policies. One of the key reasons for local community lack of political interest and civic participation is because there is reportedly little to no political information to this end from the *soum* authority to the public. Furthermore, in some jurisdictions, *bagh* meetings are reported to have been convened only when an election happens, and, consequently, ongoing community interest and participation in politics is not fostered. Additionally, there is a sense in the local community that public participation in politics is just tokenistic, and there is thus, very low trust in local authorities. Trust is further limited as community members feel that no measures are taken to involve local vulnerable groups in politics (FGD, Shinejinst).

1.4 Government Institutions

The primary administrative division at the local level in Mongolia is the *aimag*, or province (Figure 2). At this level, Government institutions mirror those at the national level (Mongolian Government Website 2019). The central head at all levels of local Government is the Governor. Governors are the representatives of the State and directly report to their respective higher-level Governors. The Governor of the *aimag* and city is nominated by the respective CRK and appointed by the Prime Minister. The Governor's Office in each *aimag* consists of the following departments in addition to Governor and Vice Governor: State Administration Department; Legal Department; Production, Trade, Agriculture and Environmental Department; Financial and Economic Policy Department; and Social Policy Department. In addition, there are numerous agencies under the Governor, such as those responsible for Environment and Agriculture.

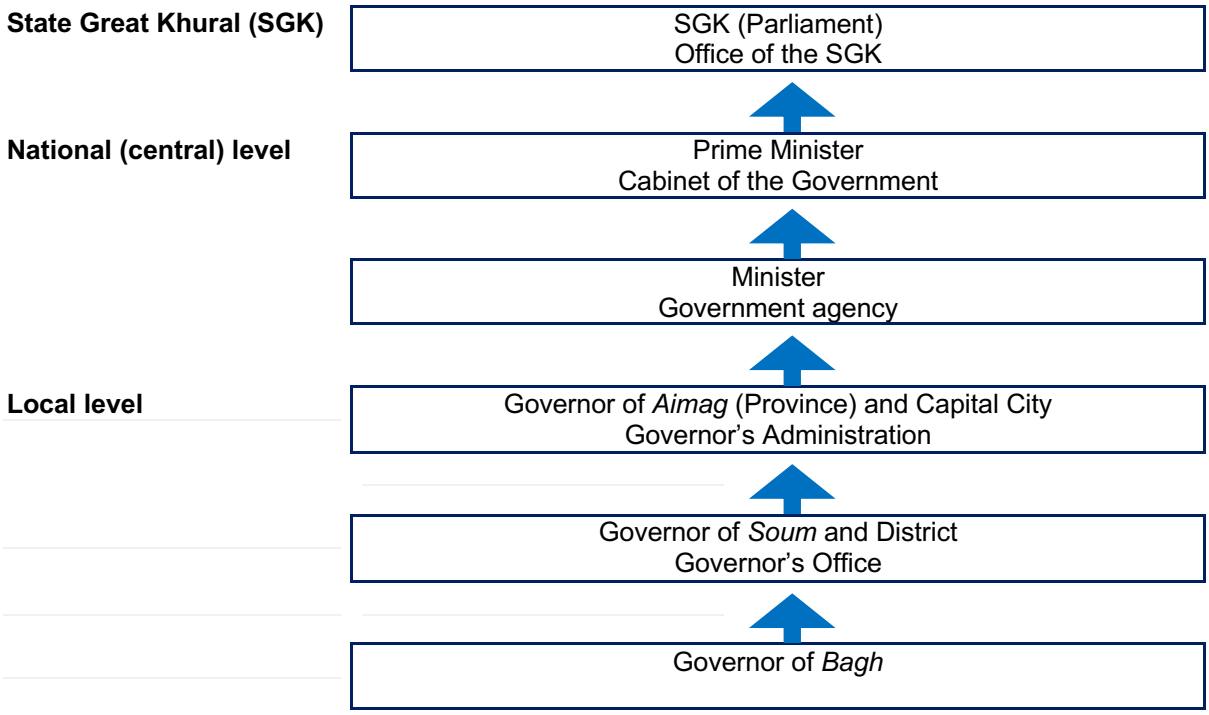

Figure 2 Government Structure

The second administrative division is the *soum*, or district. There are a total of 330 soums in 21 provinces, and 9 districts in Ulaanbaatar. Of the total soums, 52% administer up to 3,000 people, 30% administer 3,000-5,000 people, 8.5% administer 5,001-7,000 people, and 9.7% administer over 7,001 people. On average, each *soum* across Mongolia administers approximately 5,000 people. Most *soum*-level funding is allocated from the national Government. *Soum* Governor's offices are limited to a maximum of 5-10 people, including: the Governor; Vice Governor; Head of Governor's Office; Social Development Officer (education, health care); Agriculture and Environmental Officer; Social Care Officer (poverty reduction, employment and social care); and Operations Officer.

The third and lowest level of administration in Mongolia is the *bagh*, or sub-district. There are 1,575 *bagh*s in 330 soums, and 152 sub-districts in 9 districts in Ulaanbaatar. The majority of *bagh*s (1,397) are located in rural areas. On average, *bagh*s administer around 250 households (Integrated Website of CRK Mongolia, 2019). This level consists of a *bagh* Governor, a Civic Registration Officer, and Section Leaders. The Governor's responsibilities are outlined in legislation. A *bagh* has its own budget, which is regulated by the Budget Law and Law on Government Offices. However, the *soum* Government Office has the power to manage the budget and the *bagh* usually administers only its maintenance costs, pensions, and the budget for providing prizes for the best workers, best citizens and best taxpayers.

"… Citizens submit their votes to soum governors through their elected representatives. The soum governors and head of administration of soum are in bagh meetings and communities will be able to speak directly and say their wishes. CRK of soum and bagh discusses the current year's work performance and next year's plan. At the CRK, issues are discussed and joint decisions are made around the law. In Soums, the Governor's Offices, Soum Citizens' Representatives' Khurals and Bagh Citizens' Khurals are the key decision-makers."

KII Shinejinst, August 2019

"… The main issues discussed at the Citizens' Meeting are the allocation of budgets, land allocation, government offices reports, soum development funds, SME loan disbursements and loan repayments. Implementation is regularly reported."

KII Bayan-Undur, August 2019

People's evaluation of central government institutions: In the household survey, only 6% described the present national political situation in Mongolia as good, while 36% described it as bad and 53% reported it as 'average'. At the *aimag* level, only 15% report it as good, 55% as average, and 26% as bad. At the *soum* level, 18% of households say the political situation is good, 55% describe it as average, and 23% as bad. The reason for the low level of satisfaction was linked to local perceptions that government institutions were unresponsive in relation to the current parliament and government activities, arguing that nothing has changed for the better since the 2016 elections (FGD, Shinejinst).

With 27% describing the president's activities from 2016-2017 as good, 44% describe his activities as average, and 18% describe them as bad. In terms of the Parliament/Great State Khural, only 9% report its activities as good. Nearly half (47%) say its activities are bad, and 35% say they are average. When describing the Government's actions, again only 9% say they are good, 38% and 39% describe them as average and bad, respectively (Figure 3). Generally, these findings indicate that people have a poor perception of the effectiveness of national government.

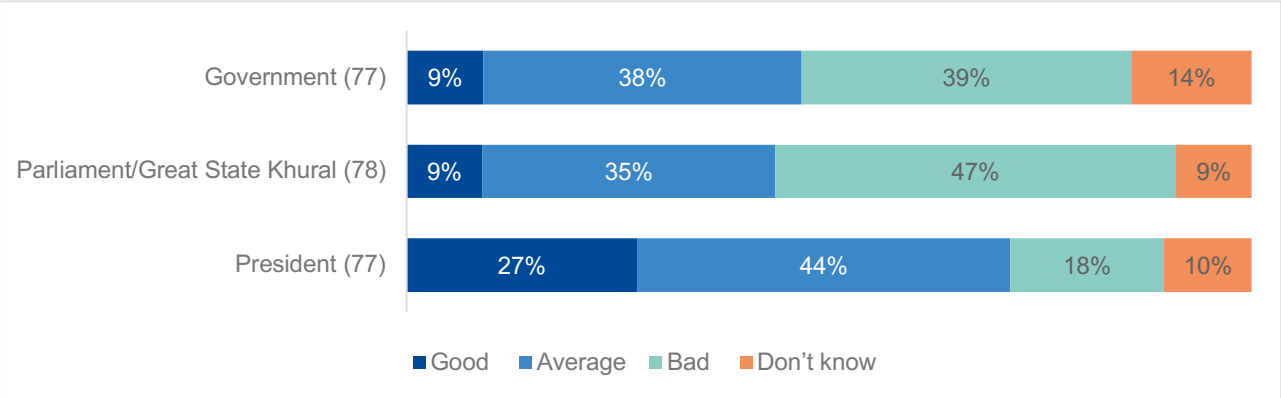

Figure 3 Assessment of the Activities of Political Institutions from 2016/2017

As shown in Figure 4 below, in terms of citizens' trust in government institutions, the least trusted organisations are at the *aimag* level (64% indicating 'not very much trust' and 'none at all') and *soum* level Citizen's Representative Khural (59% consisting of 'not very much trust' and 'none at all'). People also expressed that the autonomy of *soum* government is limited, that *soum* administrations do not have enough power, and that *soum* administration are only able to operate as directed by *aimag* authorities.

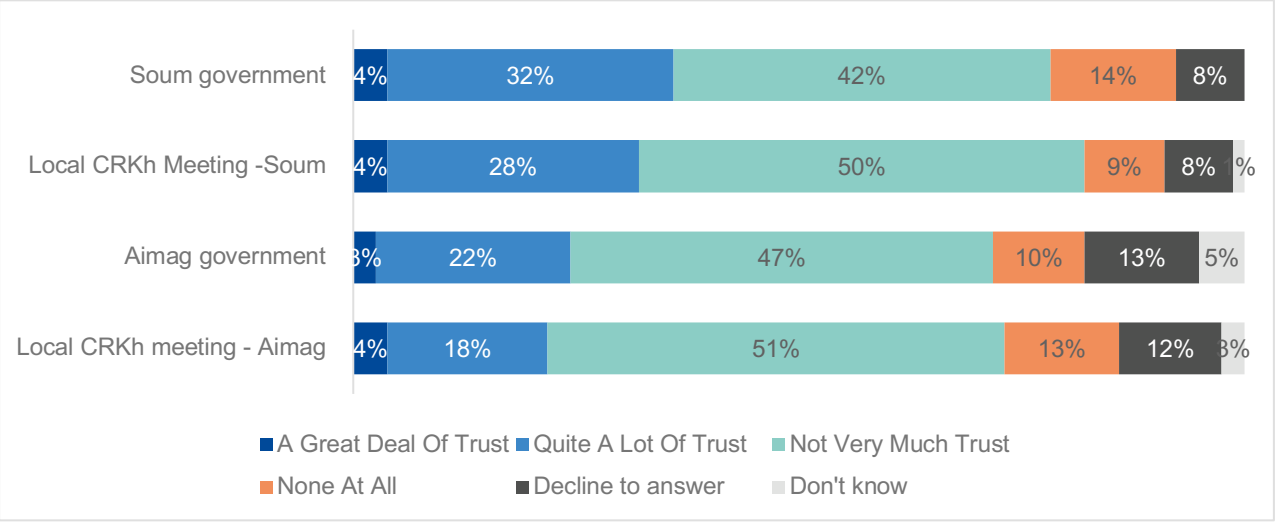

Figure 4 Level of Trust in Government Institutions (n=78)

During the herder FGDs it was mentioned that herders have little to no trust in their local authority and staff regarding serious matters, such as socio-economic issues. Instead they tend to place their trust in family members or close relatives who have higher educational levels and reside in the *soum* centre (and are viewed as highly informed on socio-economic issues and politics).

1.5 Social, Political, Cultural and Economic Organisations

According to the Business Register of Statistics, there were 1,094 registered and active legal entities in Bayankhongor *aimag* as of 2017. Half of the registered entities are private companies, while the other entities include public organisations, cooperatives, NGOs, partnerships and religious organisations (Table 6).

Table 6 Number of Registered Operating Entities, at 2017

	Stock Company	Private companies (LLCs)	Cooperatives	Partnerships	State or Public Owned Enterprises	Public Organisation	NGOs	Religious Organisations	Total
Bayankhongor *aimag*	1	530	181	25	6	182	158	11	1,094

Source: NSO 2018

In the *soum*s in the Project area of influence, most registered entities are public organisations (*soum* administration, schools and hospitals), followed by a small number of small shops, guest houses, and petrol stations (Table 7), (see also Chapter B10 Economy). As reported in the FGDs in Shinejinst *soum*, there are very few NGOs and civil society organisations (CSO), and those that exist are very limited in their activities and capacity in the *soum*. There is a Women's Association, Elder's Associations and Trade Union that are considered relatively active CSOs in Shinejinst *soum*. In Bayan-Undur *soum*, there is an Elder's Association, Women's Association, Youth Association and Horse-trainer's Association. Both *soums* also host a Camel Breeder's Association, which organizes at least one annual competition amongst camel breeders. In general, regular activities of these organisations depend on financial sources and willingness of volunteers (KII, Bayan-Undur). These organisations mainly organise social events, such as

celebrations (Children's day, Women's day etc), sports, and art events every year. Youth are reportedly absent in civic engagement activities (FGDs and KIIs). In Bayan-Undur *soum*, there is a well-known religious temple Amarbuyant Monastery and it serves an important role as a social institution within the local communities in Bayan-Undur and Shinejinst (FGDs, Bayan-Undur *soum*). There is also low private sector representative participation in public activities, and the local community perceives that this is due to the private sector focusing and caring more about their business than civic engagement.

Table 7 Number of Legal Entities, by Main Activity, 2019

Main Activities	Shinejinst	Bayan-Undur
Agriculture, hunting, forestry	3	0
Processing factory	2	0
Construction	1	0
Bulk and small shops, petrol stations and maintenance service	7	4
Hotel and restaurants	1	0
Transport, communication	1	2
Property rent	1	1
Public administration, defense	2	2
Education services	2	2
Health service	3	3
Service for society and individuals	4	4

Source: MSIS 2019

The general enabling environment for the involvement of CSOs and citizens in the accountability of public service and local government activities legally exists in Mongolia. However, in practice, at the *aimag* and *soum* levels, participation of CSOs and the private sector remains limited in local development. There are limited funding mechanisms for collaboration, and this limits opportunities to create sustainable partnerships (IRIM & World Bank 2016). Furthermore, collaboration with CSOs depends on the willingness and interests of the civil servants, which is reportedly low in the Project area of influence. Local political division is perceived to be a key limitation to effective collaboration (FGDs, Shinejinst).

The Household Survey revealed a high level of distrust towards many institutions. Perceived as similar to political parties, politcal movements are the least trusted institution, with 50% of households reporting they do not trust them at all (Figure 5). The police have the highest level of trust (although still very low at 22%), and most people indicated they do not trust the police. NGOs are also subject to high levels of distrust in the local community, with 29% indicating no trust at all, and 32% indicating not very much trust.

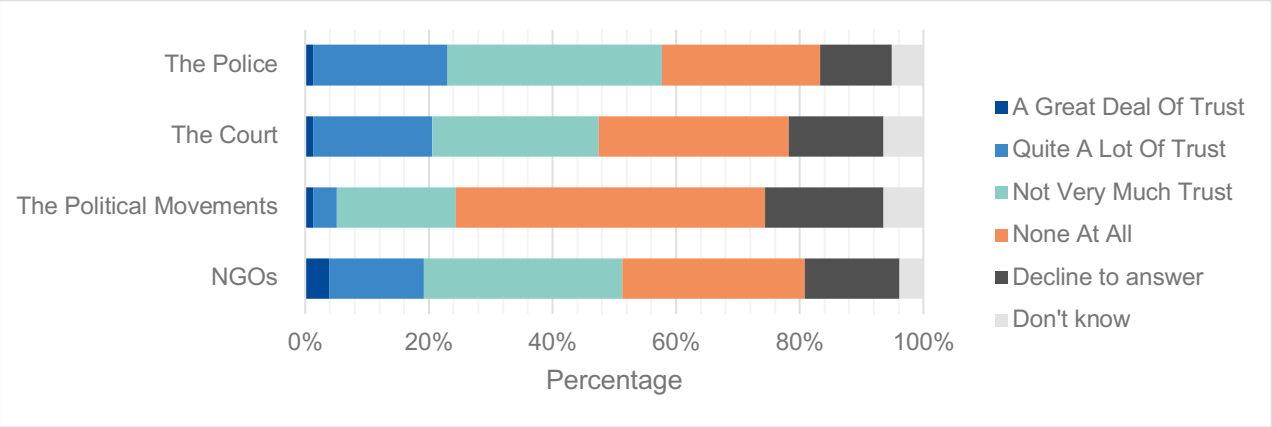

Figure 5 Citizens' Trust Towards the Government, Political and Civil Society Organisations

Generally, among Mongolians, it is common that membership in any type of organization is low and people are mostly inactive in social activities (IRIM 2018:8). This pattern is more prevalent in rural areas due to their often remote nature and the traditional nomadic independent lifestyle. In order to mobilise communities and increase active participation, FGD participants from Shinejinst *soum* suggested enhancing social networks in the *soum* through using the *soum* Facebook Group. Creating a consistent and efficient operation of this forum would be a key way to achieve increased civic participation and invovlement. This strategy was noted as being potentially effective in reaching and activating youth and attracting young talent and professionals to the *soum* (for e.g. in job advertising for the KGP), (FGD, Shinejinst soum).

1.5.1.1 Erdene Contribution to and Involvement in Local Development

Mining companies operating in Mongolia have a statutory obligation under the 2006 Minerals Law (Article 42.1)[3] to establish local-level agreements with local governors. In March 2016, the national government issued a standardised Local Cooperation Agreement (LCA) template called the "Model Agreement on Protecting the Environment, Developing Infrastructure Related to Mine Operations and Plant Construction, and Creating Jobs" (Government of Mongolia, 2016). This model LCA aims to resolve the procedural ambiguity arising from the general requirement within the Minerals Law (Bakeyi, 2017). Since 2017, an initiative to disclose contracts in Mongolia's extractive sector, including LCAs, is progressing through the establishment of a resource contract database by the Open Society Forum in cooperation with the Extractive Industries Transaparency Initiative (EITI). As of 2019, there are ten local level agreements disclosed and shared in the database with the aim of enhancing transparency of contracts (Resource Contracts Mongolia 2019). While many license holders enter into LCAs, both the license holder and the government must agree to its public posting on EITI. The EITI Secretariat is responsible for this function.

Several critiques and challenges have been raised regarding the implementation of LCAs, based on monitoring projects conducted by local NGOs, the Open Society Forum, and the MERIT Project (Dalaibuyan, et al., 2016). The MERIT Project – a Canadian bilateral project that aims to strengthen local governance in active mining provinces – notes that that LCAs mix in elements of existing laws and production sharing agreements; that there is limited practical guidance for their development and implementation; that they potentially exclude critical issues of worker health and

[3] Article 42 of the Mineral Law states that "A license holder shall work in cooperation with the local administrative bodies and conclude agreements on issues of environmental protection, mine exploitation, and infrastructure development in relation to the mine-site development and job creation".

safety, cultural heritage protection and resettlement; and that their implementation is not linked to licence approvals and thus there is no effective compliance mechanism associated with LCAs (MERIT 2019). Other critiques include limited capactiy of local government to implement LCAs, poor community involvement, contents of LCAs tend to be rudimentary, and issues around accountability of both companies and local govnerments in the implementation of LCAs, among others. These are provided in further detail in Appendix A.

Erdene has entered into formal cooperation agreements with Bayankhongor, Shinejinst, and Bayan-Undur governments since 2014 (6 calendar years cumulatively). However, the company's community development support and relations date back earlier to at least 2006, when the company first began exploring in Shinejinst *soum*. Before 2014, no standard cooperation agreement template existed in Mongolia, so the company supported various community development initiatives and governance structures through Memorandum of Understanding (MoU) arrangements and a "local cooperation committee". These local cooperation agreements aim to enable Erdene's operations to contribute to the development of the local area and the livelihoods of citizens, consistent with local development priorities, and to provide ways for local communities to gain information about and opportunities to participate in the company's operations.

Table 8 below shows Erdene's contribution to the local development of Shinejinst and Bayan-Undur *soum*s according to the company's LCAs. The key activities and programs aimed to improve the education and health facilities, provide support to students to pursue higher education, and improve livelihood strategies for herder households (Erdene Mongol LLC 2019). Since 2007, Erdene – a company focused to date on exploration, with no sustainable revenues – has voluntarily contributed an average of MNT 73 million per year in community investments.

Table 8 Erdene Mongol's Contribution to *Soum*s Under Local Cooperation Agreement (2007 – 2018)

Year	Key Activities
2007	Education, health, livelihood and cultural programs and tangible support
2008	Education, health, livelihood and cultural programs and tangible support
2009	Education, health and livelihood programs and tangible support
2010	Education, health and livelihood programs and tangible support
2011	Education, health and livelihood programs and tangible support
2012	Education, health and livelihood programs and tangible support
2013	Education and health programs and tangible support
2014	Infrastructure – health and livelihoods.
2015	Scholarship program, emergency fund, sport event and *bagh* opening event, education support
2016	Scholarship program, education support, security camera and sport, hospital and road fixing
2017	Scholarship program, education support, health support programs, water/smart well, Amarbuyant Monastery.
2018	Scholarship program, education support, health support programs, Amarbuyant Monastery

Source: Erdene Mongol LLC 2019

Erdene has actively used its resources to benefit the communities' social structures. For example, it is praised for its scholarship program it put in place for recent *soum* graduates. Many respondents commented that Erdene is aware and responsive to community concerns and communicates effectively. The *soum* government also indicated that it finds it easy to work with Erdene. People in both Shinejinst and Bayan-Undur *soums* reported understanding how to communicate problems to Erdene. This finding was corroborated in Fraser et al.'s recent study (2019) in which they found that Erdene personnel have earned trust with key stakeholders through

proactive early engagement, focus on ensuring community development decisions and discussion are made in group settings involving affected communities (rather than one-one-one talks), among others. This trust brokered among local communities and with local government institutions can be used to build upon early engagement efforts and support the company's social license to operate as the KGP develops.

Note that perceptions of mining and the impacts thereof, including Erdene, are discussed in Chapter B10 Economy. Chapter B10 also includes discussion of the key areas identified for potential collaborative partnerships between Erdene and communities, based on community feedback and perceptions of mining impacts, among others.

1.6 Formal and Informal Decision-Making Processes

Citizens' participation is important in formal and informal decision-making processes in Mongolia. The formal decision-making process is represented by the *soum* and *bagh* CRKs, meetings of which are required to be held a minimum of twice a year at the *soum* level and 3 times a year at the *bagh* level. The main duties and responsibilities of CRK members are to monitor the government activities; to engage and consult with citizens, to receive citizens' feedback; and to increase citizen participation in decision-making.

There are also mechanisms for citizen's participation directly in the legislative processes. Within the *soum* CRK, there is the Citizens' Hall established in each *soum*, where citizens can provide feedback on Government services and current draft legislation. A key focus of Government is decentralisation. This is to be achieved through the Integrated Budget Law (2012), which has been adopted and includes the mechanisms for implementation of decentralisation. This Law introduced the Local Development Fund (as discussed above), which is a useful avenue for local Governments to exercise more control over local development. The funds allow local people to participate in defining community development priorities and provide their comments/feedback on these community development projects through the *bagh* meetings. However, final decisions on Local Development Fund projects are made by the *soum* CRK. According to the Law, elected *soum* citizens' representatives have additional duties to engage with citizens through discussions and meetings of the Citizens' Hall, conduct further studies based on the proposals and feedback received from citizens, and collaborate with the *soum*/*bagh* Government to solve local issues.

Members of the *bagh* CRKs represent *bagh* citizens at the decision-making level, introduce proposals, provide feedback and requests from citizens, and protect the interests and rights of their constituents. The *bagh* CRK members also have a mandate to conduct advocacy on behalf of their citizens. Generally, citizens' direct participation in decision-making at *bagh* meetings is low.

Citizen's participation at *soum*, *bagh* levels in local decision-making processes: 18% of surveyed households say that *bagh* meetings discuss issues relevant to their lives all the time, and 21% report they never do (Figure 6). Of the households interviewed, 36% indicated that they never manage to make their opinions heard at *bagh* meetings or in decision-making, while 17% say they manage to do so all the time (Figure 7). In contrast, *soum* respondents expressed that the community and households participate in decision-making relatively well. Households' opinions and comments are collected via surveys for decisions regarding the projects / programs to be implemented with investment from the *soum* development fund as it is also a requirement under the law. So, while local authorities consider that citizens' access to services and information is good, this is not reciprocated by citizens in the Project area of influence (KII, Shinejinst).

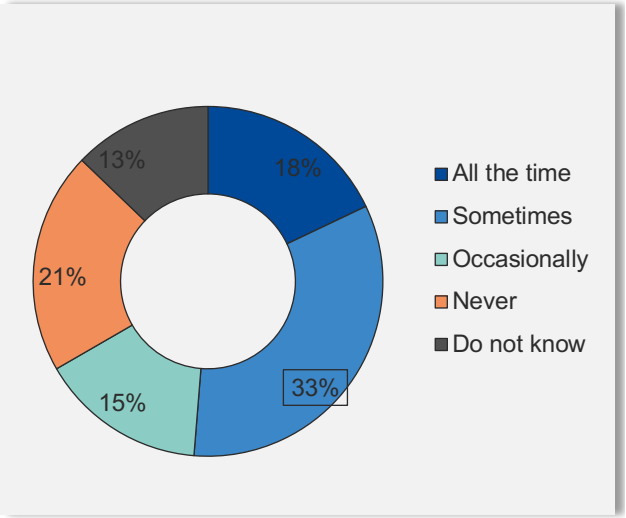

Figure 6 Views on Whether *Bagh* Meetings Discuss Issues Relevant to Respondent's Life

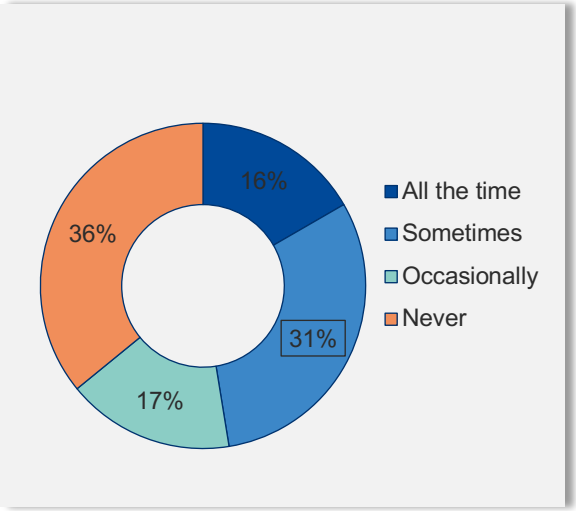

Figure 7 Views on Whether Respondent's Opinions are Heard at *Bagh* Meetings / Decision-Making

The Household Survey indicated that although 68% of respondents have never made a complaint to *soum* officials, 17% report such officials quickly respond and make prompt decisions while 10% say the officials are slow in responding and delay decision-making, and 5% report the officials never take any action.

The Household Survey found that respondents perceive the main advantages of the *soum* administration include that it conducts regular activities (47%), it reaches every citizen (21%), and has capable staff (10%). Although 47% did not know of any, surveyed households reported three main disadvantages of the *soum* administration functions: poor awareness of local life and failure to cooperate with communities (16%); lack of knowledge and morals in civil servants (14%), high bureaucracy and corruption (21%).

Community Leadership: When asked if well-respected people in the *soum* are employed in managerial positions, 21% of surveyed households responded yes and 27% reported sometimes. Highlighting the perceptions of corruption in the community, 35% reported that people only received such managerial positions if their political party matches the current political administration.

Surveyed households report that the people who are nominated for high positions in the *bagh* and *soum* tend to have many friends and relatives in the *soum* (18%), have a good reputation in the community (18%), know the *soum* well (17%), and are skilled and experienced (13%), among other qualities.

> *" …. Change of soum-level officials based on political affiliation is common and mirrors the election cycle. Continual change of officials is a barrier to the development of the soum because work opportunities are not given to experienced and capable people, rather opportunities are based on political affiliation."*
>
> KII Shinejinst, August 2019

Although 25% of households were unsure, 21% believe that those highly knowledgeable in business are the people who are employed in high-ranking positions of local cooperatives,

partnerships, and NGOs. Other common responses include those who are skilled and experienced (13%) as well as those with good reputations in the community (13%).

> *"… At the soum level, people with a reputation for being more knowledgeable about the area and people's lives are employed in cooperatives and partnerships… These people are serious about any issues in the community. They help to make the right decisions for all citizens. They correctly state their position, and local authorities consult on these issues with these people."*
>
> KII, August 2019

1.7 Access to Welfare / Income Support

In times of hardship, such as those caused by sickness or natural disaster, half of surveyed households seek out help from relatives. Meanwhile, 13% receive help from friends, and 20% receive help from either the administration or bank (Figure 8). This is a similar result to the Social Wellbeing Study, which interviewed 2,318 respondents in 11 aimags (including Bayankhongor) and Ulaanbaatar, where social trust was identified as being relatively low, and the average point for perceptions about helping and receiving help from others was also below average (4.7 out of 10 scale-point) (IRIM 2018). The IRIM study also found that people were most willing to help family members, friends and relatives and least willing to help Lesbian, Gay, Bisexual, Trans-sexual, and Inter-sex (LGBTI) people, strangers, people with different religious belief and those of different nationalities (IRIM 2018:2).

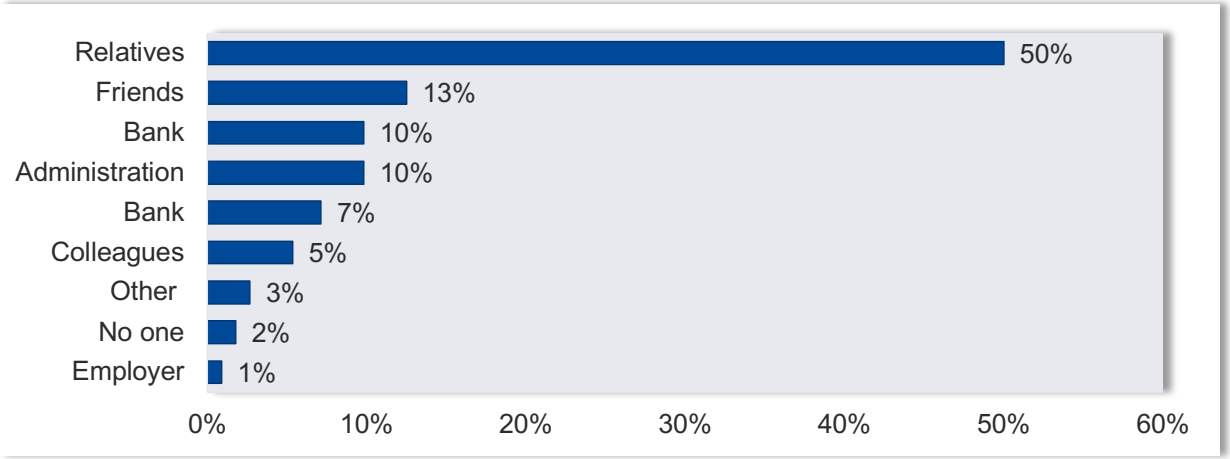

Figure 8 What / Who Households Approach for Help When They Face Shocks and Hardship

The Household Survey found that in the past year, most (54%) households did not receive assistance, 36% received assistance once, while the remaining households received help 2 to 3 times (see further analysis of household living standards in Chapter 10 Economy). While this points to vulnerability in the Project area of influence, it also highlights community resilience and community-led coping mechanisms in place to assist others when in need.

Table 9 Number of Households Who Received Assistance in the Last 12 Months, by *Bagh*

Soum	*Bagh*	Number of households that Received Assistance	Average Amount Received
Shinejinst	Urtiin Gol	13	3,905,000
	Ekhen Khavtsgai	6	1,100,000
Bayan-Undur	Idren	5	1,903,000
	Elgen	7	2,800,000
	Bulgan	4	400,000

Nearly half (49%) received monetary assistance, 34% received material help, and 10% sought out emotional assistance. For those that received monetary assistance, the average amount received was 2.5 million MNT. The maximum reported amount was 9 million MNT, and the minimum was 14,000 MNT (Table 10). In terms of material assistance, 3 households received foraging items, one received charity, and one petrol.

Table 10 Household That Received Assistance from Others

Assistance Amount	No. of Households	
Less than MNT 500,000	8	26%
MNT 500,001-1,000,000	7	23%
MNT 1,000,001-2,000,000	5	16%
MNT 2,000,001-3,000,000	2	6%
More than 3,000,001	9	29%
Total	31	100%

While most (72%) did not have to pay anyone back for the help, those who did have to pay it back did so through actions such as assisting in herding and watering livestock, building shelters for animals, paying monetary interest, and others. There is no counselling centre or meditation centre for people who are in need. Awareness about the community support projects and programmes for improving living conditions of the population was low, and most households indicated that they do not benefit from such projects. For example, very few people knew about the restocking livestock program (37%), the *Soum* Development Fund (19%) and SME Development Fund (13%), (Figure 9).

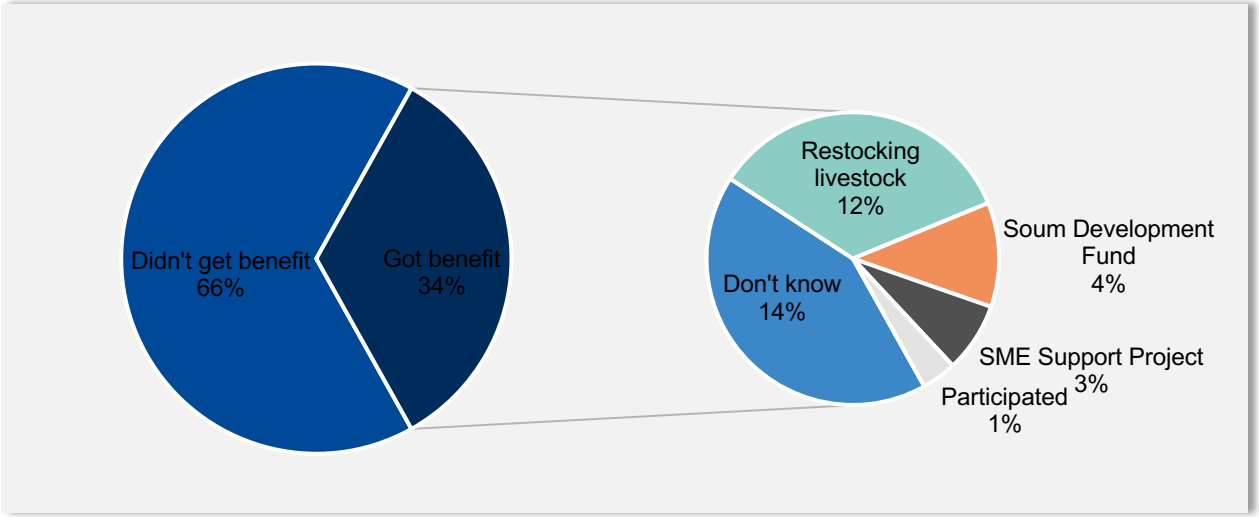

Figure 9 Do Households Receive Any Benefit from Livelihood Support Projects and / or Programmes

It was evident during the Household Survey interviews that people do not see that these programs are available and inclusive for those in need. Also, it is noted that these programs are not adequate to cover to the scope of needs in the ground. Therefore, in addition to these programs,

households that have a higher number of livestock (Myangat herders[4]) generally support the young families in the *soum* by providing them with livestock (KII, Shinejinst *soum*).

> *"… There are around 80 disabled people registered in the soum. Job opportunities for the disabled are important. Although there are projects implemented at aimag level, not much comes down to the soum. In short, support in creating job and income opportunities for not only disabled, but also the poor households in the soum is essential."*
> *"… There are around 30 households, receiving food stamps, and most of them are in the soum centre. The soum authorities try to support and provide temporary jobs for them, like assisting in construction and gardening etc., but they need consistent and sustainable jobs."*
> KII, Shinejinst soum, August 2019

1.8 Women and Youth in Society

Mongolia is known for its strides in the regulatory framework for gender equality. Its situation of "endowment for women" is relatively higher than other Asian countries in terms of education and health. The UN Gender Development Index increased from 0.677 in 2005 to 1.026 in 2015. In terms of the Global Gender Gap Index (see Figure 10), Mongolia ranked 58th out of 144 countries in 2018 (WEF 2018). However, while the country has signed all major international treaties or agreements pledging gender equality, there are still areas for improvement in regards to gender equality, specifically in the economic, education, political, and safety sectors (Aldar and Begzsuren 2014).



Source: WEF 2018
Figure 10 Gender Gap Score in Mongolia

There is a noticeable, and in many occupations increasing, wage gap, with women receiving 22% less wages than men in the same occupation in 2012 (JICA 2013). This wage gap cannot be attributed to a disparity in education, as women are statistically significantly more educated than men in Mongolia. In 2013, nearly 65% of those enrolled in post-secondary school were women. Meanwhile, boys drop out of school at significantly higher rates than women (Aldar and Begzsuren 2014). At the *aimag* and *soum* level in Bayankhongor, these trends were confirmed by KIIs, who expressed that in most cases, women are more educated than men.

In terms of political representation, in Mongolia, women are severely underrepresented in the decision-making and political spheres and mostly work at the executive level. In 2019, women comprised only 17% (13 women) of parliamentary members and there were only 2 female ministers out of the 15 ministerial posts. No *aimag* has a female *aimag* governor.

[4] A herder with more than 1,000 head livestock and considered as affluent.

Most households (60%) say that their female household members make equal contributions to the family economically compared to men, while 26% say women make more contributions, and 13% say they make no significant contribution. During the FGDs completed during the social baseline fieldwork, it was mentioned that there is increased involvement of men in household duties as well as social life (where these duties and roles were traditionally completed mostly by women). Respondents also pointed out that the men in herder households are less educated than women, and that this means that women are more responsible for communicating household concerns and needs at the *soum* centre. So, household level everyday decisions are mainly made by women, and men are generally inactive in this sphere. With respect to financial decision-making, in more than half of households (55%), both the men and women make the primary financial decisions in the household, while 24% of households report the women make the decisions, and the remaining 21% report that the men make the decisions.

There are gendered differences in how time is spent as well. In the household, women spend twice as much time than men on domestic tasks and duties, even if women are employed in the labour force (JICA 2103). This places a greater physical burden on working women to provide economically as well as in the household. The results from the Household Survey suggest that this is the case in the Project area of influence. A majority (77%) of surveyed households believe that both the man and woman should be the major breadwinner in the family. Most (64%) report that women spend more time on housework, but 32% report that men and women share equal amounts of time on housework. Approximately 35% of surveyed households think that women's participation in the formal labour market is low due to them spending more time on housework, while 41% disagreed with this statement. The remaining 24% were unsure. It was mentioned by 40% of surveyed households that production of animal products is the most commonly reported contribution to the household and family economy by female household members (Figure 11). Other frequent contributions include selling and trading animal products (15%) and doing paid, fulltime work (17%). Only 9% reported no contribution at all by women.

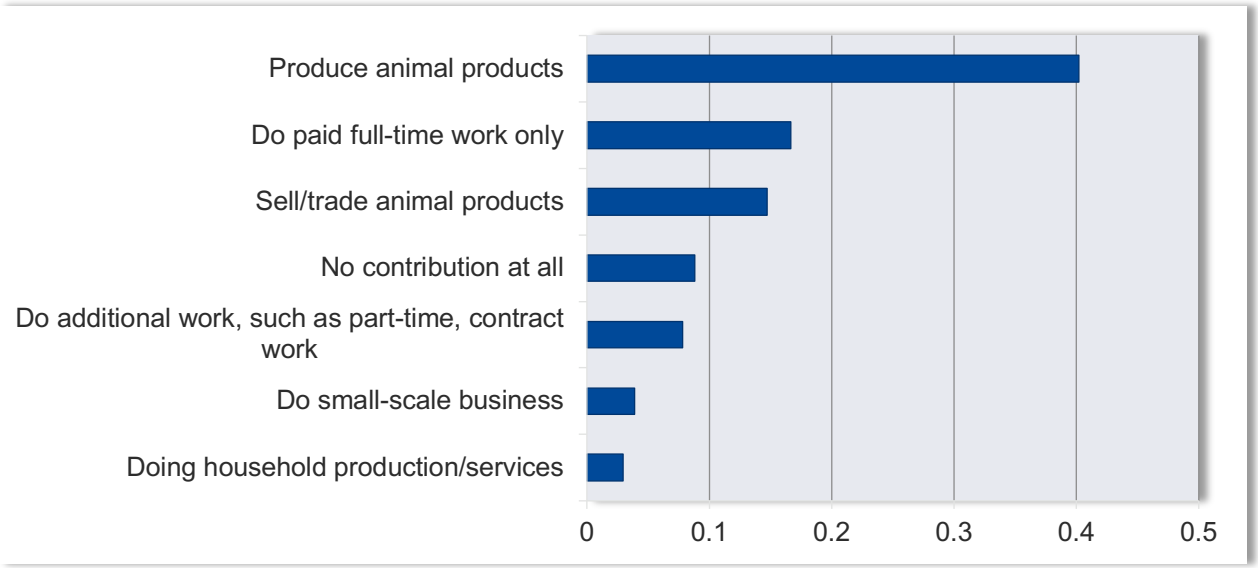

Figure 11 Female Member / Wife's Contributions to Household Economy

Domestic violence: Domestic and gender-based violence is one of the most important gender issues in Mongolia. Nearly 58% of married women have experienced physical, sexual, emotional, and/or economic violence. Domestic violence is exacerbated in impoverished communities, with

an estimated 80% of such survivors living below the poverty line. These inequalities are often intensified in the countryside. The Mongolian government has passed legislation to try to address gender-based violence as well as gender inequalities as a whole, including the 2004 Law to Combat Domestic Violence (LCDV) and the 2011 Law on Promotion of Gender Equality (Begzsuren & Joffre 2018). However, there are still many factors that must be addressed in relation to gender equality.

In the Project area of influence, when a family member encounters domestic violence or is attacked by someone, 26% report approaching the police for assistance. Forty-two (42) households report that they did not encounter any domestic violence, while 1 reported never approaching anyone for help. Around 64.1% of respondents said they had general awareness of the Law to Combat Domestic Violence, whereas nearly 36% of households did not know of or were unsure of any laws against domestic violence in Mongolia. See Chapter B15 Community Health, Safety and Security for further discussion.

Youth issues: Most of the Household Survey respondents are concerned about youth issues, such as young adolescent unemployment and the lack of opportunities for professional and personal development at the *aimag* and *soum* level. The most commonly reported concerns for local youth that households believed need to be addressed are unemployment (35%), followed by high alcohol consumption (19%), and lack of services and facilities for socialising (14%), shown in Figure 12 below.

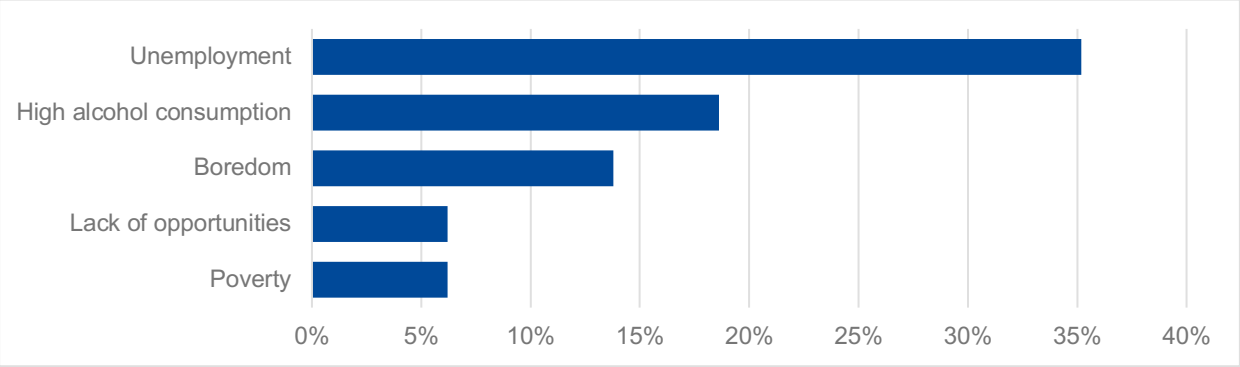

Figure 12 Major Concerns for Local Youth

Households report several major advantages / opportunities for local youth, including opportunities to start businesses (25%), a healthy living environment (21%), and living close to their parents (14%). About a third of households believe that youth spend their leisure time playing sports, while 16% say they spend their time with friends. More than half of households (53%) report that alcohol consumption is high amongst youth, while 31% describe it as normal. Most (69%) youth in the region do not speak any foreign languages, while 19% speak 2-3 foreign languages. The most common foreign languages spoken among the family members (not confined to youth) of the surveyed respondents are English (21 cases reported), followed by Russian (16 cases), then Chinese (7 cases).

1.9 Attitudes to Migrant Workers / Outsiders

From 2000-2010, Mongolia saw historical internal and external migration. Internally, the population locality has changed rapidly since the 1990s due to a steady migration flow from rural to urban areas. As mentioned in Chapter B8 Demography, of the total population in Mongolia, around two-thirds of households are concentrated in cities, with the rest located in rural areas. Across Mongolia, migration to Ulaanbaatar and the central regions has also increased, due to

economic displacement, drought, *dzud* or other natural disasters experienced by herders and rural communities (IOM 2018).

As of 2016, approximately 130,000 Mongolians reside abroad. The main destinations are the Republic of Korea, the Russian Federation, the Czech Republic, and China (Ratha et al. 2016). These 130,000 Mongolians equate to as much as 15% of total active working age Mongolians. There continues to be migration into Mongolia as well. In 2013, the most common countries of origin for people migrating to Mongolia, beginning with the largest foreign population, were: China, Russia, South Korea, USA, and North Korea (UNICEF 2019). Due to these growing migration patterns, people have become more aware about foreign cultures and have had more contact with foreigners compared to the 1990s, and before.

According to the 2018 Social Well Being Survey of Mongolia (conducted by the Independent Research Institute of Mongolia), about half of the surveyed population felt some sense of distrust towards people of different nationalities. While more than half of the surveyed population said they are willing to take time and help people from different nationalities, only 37.4% believed that people from different nationalities would help them. This, further highlights a national distrust towards foreigners (IRIM 2018).

In the household survey, most (85%) households have positive attitudes towards outsiders from other cities, *aimag*s, and *soum*s within their own *soum* (as noted in Chapter B8 Demography). About 41% of such households attribute their positive attitude to the fact that the *soum* population will increase. 27% say that the outsiders contribute a lot to the *soum*, and 23% mention that they look forward to meeting new people (Figure 13). Only 6% of households report negative feelings towards outsiders (See Figure 14 for reasons of negative feelings). The above sentiments highlight some of the challenges associated with the remote nature of the Project area of influence, including social and economic isolation which contribute to residents viewing outsider positively compared to the Mongolia-wide statistics.

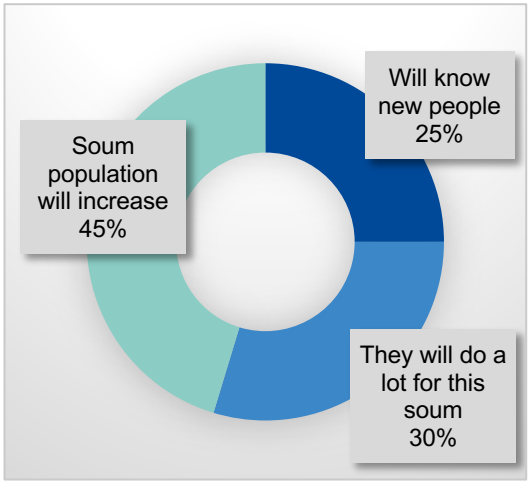

Figure 13 Reason of Positive Attitude to Immigration and Settling of "Outsiders"

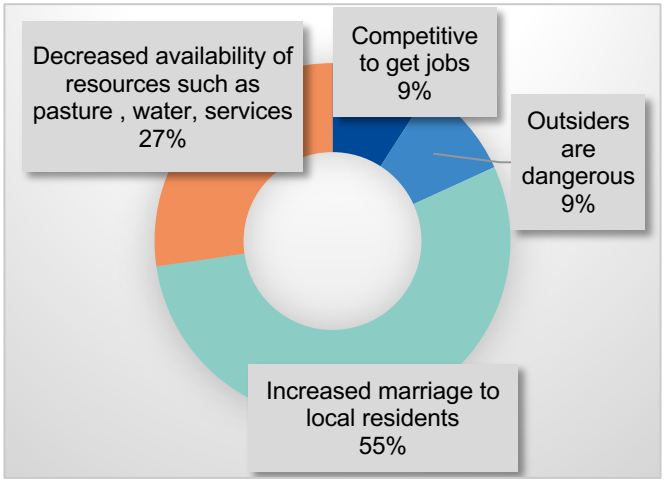

Figure 14 Reason of Negative Attitude to Immigration and Settling of "Outsiders" (n=11)

1.10 Project Affected People

Project Affected People (PAP) are defined as the social groups and/or communities whose characteristics, including vulnerability and means of sustaining livelihoods, may be affected directly or indirectly by actions associated with the construction, operation and/or closure and

decommissioning of a Project. People and communities that may be affected by population changes caused by the KGP development are:

- Residents of all Shinejinst and Bayan-Undur *soum*s, but predominantly, those living in the *soum* centres; and
- Residents of Urtiin gol *bagh* and Idren *bagh* in Shinejinst and Bayan-Undur *soum*s, respectively.

1.11 Conclusion

Understanding social structures is an important step in understanding a region. The key social structure aspects and issues include:

- In Bayankhongor *aimag*, the Household Survey revealed that a large majority of households do not support any political party.
- There is a generally negative view of the current political situation in Mongolia. More than half of respondents have "very little" or "no" trust in government organisations such as the *soum* and *aimag* government. There is also little trust towards institutions, such as the police, courts, political movements, and NGOs.
- While some households report that they are able to make their voices heard at community meetings, most express dissatisfaction towards these meetings. During times of need, half of surveyed households reach out to relatives.
- Nearly half of households surveyed indicated that they received assistance (monetary and / or non-monetary) once or more during the year. Of these, nearly half (49%) received monetary assistance, 34% receive material help, and 10% sought emotional assistance. For those that received monetary assistance, the average amount received was 2.5 million MNT. While this points to vulnerability in the Project area of influence, it also highlights community resilience and community-led coping mechanisms in place to assist others when in need.
- Erdene has built a generally positive relationship with the local communities through the ongoing contribution to local development needs through LCAs.

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Appendix A: Additional Data

Additional Critique on Local Cooperation Agreements:

- *Motivation and sanctions:* LCAs are not integrated into the policies and practices of the majority of mining companies in Mongolia. There are different practice between foreign mining companies and domestic companies. International mining companies tend to be more interested in having, or under more pressure to have an LLA. Conversely, major "national" state-owned mining companies have been reluctant to comply with the requirement to have an LCA. No statutory penalties exist for non-compliance with the model agreement. There are also no incentive instruments in place.
- *Local government capacity*: Local governments lack the capacity to develop a comprehensive understanding of the impacts and benefits of mining projects due to inadequate in-house expertise and resources. This has led to the lower bargaining power of local governments and communities, and minimises the benefits they gain from negotiation.
- *Community involvement:* A downside of most LCAs is that a relatively small number of local government decision-makers play a dominant role in agreement-making, often with little accountability to their citizens, especially project-affected communities. Agreement-making involves little or no community participation / consultation and local governments face practical challenges in facilitating consultation.
- *Content of agreement.* Most LCAs are rudimentary documents. An average LCA does not exceed five pages in length. The content of most LCAs does not vary considerably. In general, they provide local government support for proposed or existing mining projects, in return for some company commitments and obligations to contribute to local development and mitigate socio-environmental impacts. The company's obligations often include preferential access for local community members to employment opportunities, the participation of local businesses in contracting opportunities and social investment in different forms.
- *Financial contributions:* Provisions for financial contributions by companies to local governments have been included in some previous and existing LCAs, and are seen by local governments as one of the main objectives of negotiation. Indeed, LCAs can be seen as a response by local governments to the historical lack of subnational and local revenue sharing. Some local governments view the main value of LCAs as gaining a direct revenue stream from mining companies.
- *Guidance for agreement implementation:* The model agreement does not include any further guidance on ensuring the effective functioning of the LCA committee and its transparency and accountability. There can be serious practical difficulties in establishing and maintaining the effective and consistent functioning of the committee stated in the model agreement.
- *Accountability:* In some instances, companies accept local government demands in order to facilitate project-related approvals. Moreover, some aimag governors are not assured about the legality of agreements they sign with mining companies.



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

Erdene Mongol LLC

B10 – Economy

December 2019

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
ASM	Artisanal and small-scale mining
ERD	Erdene Mongol LLC
ESIA	Environmental and Social Impact Assessment
FDI	Foreign Direct Investment
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GGSPA	Great Gobi Strictly Protected Area
ICMM	Internal Council on Mining & Metals
IFC	International Finance Corporation
IMF	International Monetary Fund
IRIM	Independent Research Institute of Mongolia
KGP	Khundii Gold Project
KII	Key Informant Interview
LLC	Limited Liability Company
MLA	Mineral Licenced Area
MNS	Mongolian National Standard
MNT	Mongolian National Tugrik (currency)
MRPAM	Mineral Resources and Petroleum Authority of Mongolia
MSE	Mongolian Stock Exchange
MSIS	Mongolian Statistical Information Service
NGO	Non-Governmental Organisation
NSO	National Statistics Office
PAP	Project Affected People
SCC	Savings and Credit Cooperative
SDC	Swiss Development Agency
WHO	World Health Organization
XAMODX	Artisanal mining NGO, based in Bayan-Ovoo *soum*, Bayankhongor *aimag*

Glossary

aimag	The Provincial unit of administration in the territory of Mongolia
soum	Sub-province area; The second level of administration in the territory of Mongolia
bagh	Sub-division of soum; The third level of administration in the territory of Mongolia

1. ECONOMY

1.1 Introduction

The baseline conditions described in this section relate to the Project area of influence setting with reference to the local economy in Bayankhongor *aimag*, Shinejinst and Bayan-Undur *soum*s, and specifically Idren and Urtiin gol *bagh*s. It includes the subjects of the local economy and budgets; pricing; development of economic sectors such as agriculture, industry, mining, and livestock; emerging markets; living standards; and, household consumption. Note that the Labour and Employment Baseline is provided in *Chapter B11*, and includes discussion on salaries and earnings, among others.

1.2 Baseline Characterisation Methodology

1.2.1 Sources of Information

Primary Data Collection

Several sources were used to develop the economy baseline Chapter. Erdene commissioned Sustainability to conduct primary data collection in support of this baseline study. Data collection included the completion of Key Informant Interviews (KIIs) and Focus Group Discussion (FGDs) with local community members, and a Household Survey conducted in the Project area in August 2019. See *Chapter B1 Introduction* for further information on primary data collection.

In addition, as part of the environmental and social baseline study conducted to meet Mongolian national requirements, in 2016, a team of researchers from Eco Trade LLC conducted a survey in the Project area, including interviews with herder households. This Chapter also draws upon the findings of this survey.

Secondary Data Collection

Secondary data sources include national statistics, population and housing censuses, official statistics from *aimag* and *soum* governors' offices, annual *aimag*, *soum* and *bagh* level reports, and available reports on projects and programs in the Project area.

A full list of references used to develop this Chapter is included in Section 1.11.

1.2.2 Methodological Approach

See *Chapter B1* for a detailed description on the social baseline methodology employed.

1.2.3 Project Area of Influence

This Chapter provides a description of the economy baseline within the KGP Project area of influence. The area of influence has been defined as Bayankhongor *aimag* as the macro-level social and economic impact of construction and operation of the KGP may affect receptors at the *aimag* level. Sub-areas within Bayankhongor *aimag* include Shinejinst and Bayan-Undur *soum*s, and specifically their *soum* centres, and Urtiin gol and Idren *bagh* (the *bagh*s within which the KGP is located). The KGP will intersect with these *soum*s and particularly at the *bagh* level, which will experience both direct and indirect environmental and social impacts from construction and operation of the KGP.

1.2.4 Applicable Standards

There are no directly applicable national standards in relation to economy. Economy sub-topics are referenced throughout the EBRD's Performance Requirements on Environmental and Social Sustainability (PRs).

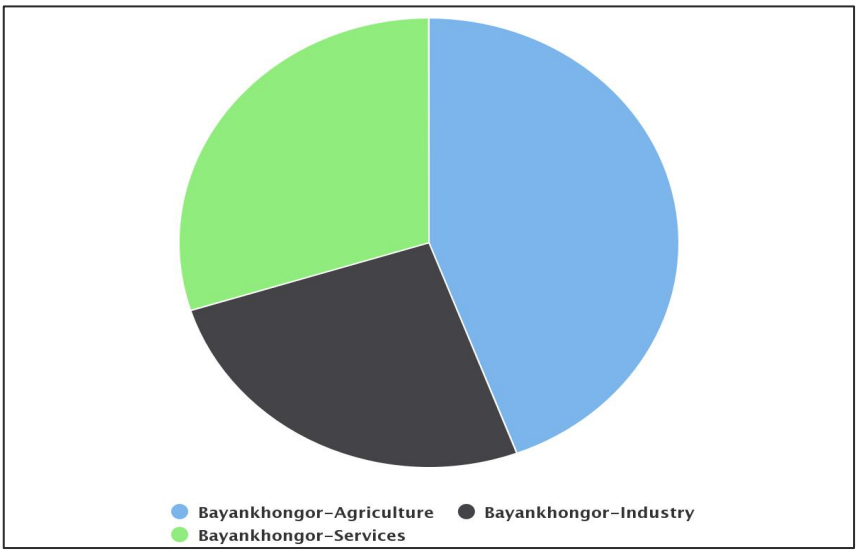
1.3 Local Economy and Budgets

Following recession in 2012–2014, Gross Domestic Product (GDP) in Mongolia increased annually between 2015 and 2018, reaching in 2018 its highest level in Mongolia's history. The Mongolian economy is heavily dependent on the Services and Mining sectors, with other important economic sectors including Agriculture, Transport, Manufacturing, Construction and Utilities.

Economic growth was 6.2% in 2018, and this is mainly attributed to stable exports of commodities (coal and copper), a recovery in foreign direct investment (FDI), an improved business climate and effective implementation of the IMF-backed economic adjustment program by the government[1] (Nordea Trade 2019). In 2019 and 2020, growth is forecast to be 6.3% and 4.9%, supported mainly by private consumption and private investment in the mining and manufacturing sectors. The Mongolian economy picked up in the first quarter of 2019 as a result of increasing investments mostly related to the Oyu Tolgoi (OT) Mine Project, along with increases in exports and imports (Focus Economics 2019).

The economic risks in the short and medium term include political uncertainty (parliamentary election scheduled for 2020), commodities price volatility, and mismanagement of banking compliance. Further, Mongolia's dependence on the mining sector (over 20% of GDP) is a major structural challenge and increases the vulnerability of the economy to commodity prices or other shocks.

In 2018, Bayankhongor *aimag* contributed 1.2% of the national GDP growth and over 13% of the share from the Khangai region[2]. The main economic sectors are agriculture (livestock) which accounts for 44%, industry (mining and manufacturing) which accounts for 25.9%, and services which account for 29.9%, as illustrated in Figure 1. The GDP of Bayankhongor *aimag* has grown steadily since 2013, albeit with a dip in 2016, which coincides with the general economic slowdown in Mongolia at the time. Since 2016, it has steadily increased (MSIS 2019).



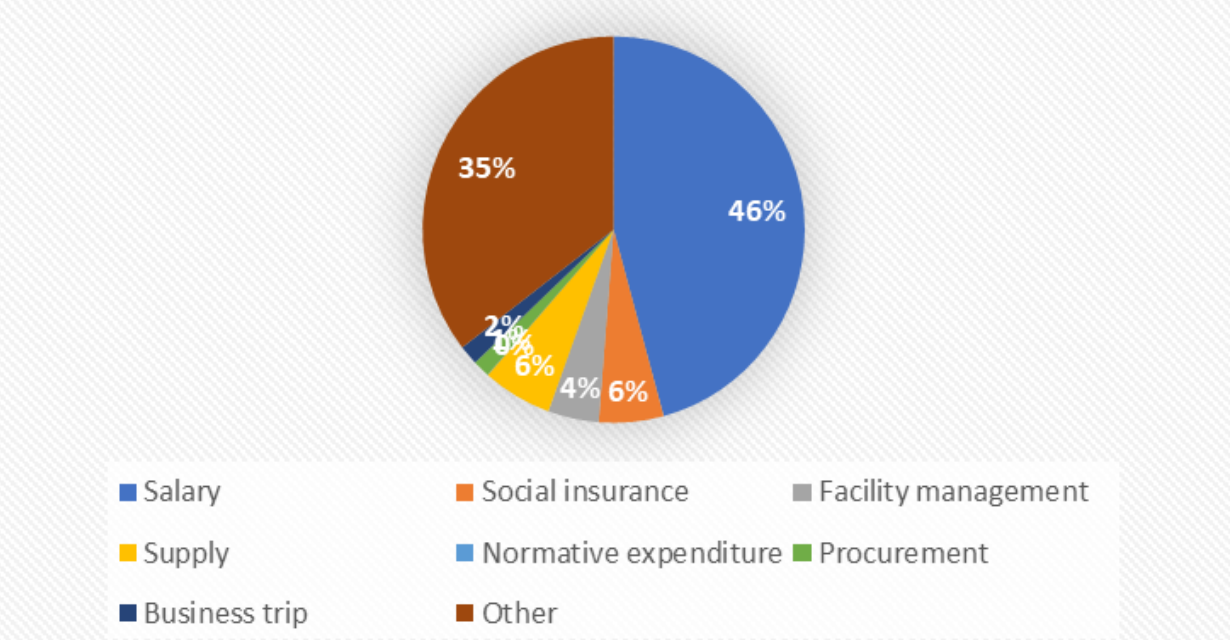
Source: MSIS 2019

Figure 1 Bayankhongor GDP Division by Sector, 2018

[1] Which includes the International Monetary Fund's Extended Fund Facility, and a financing package support by Japan, Korea, China, the World Bank and the Asian Development Bank.
[2] The National Statistics Office (NSO) classifies Mongolia's 21 *aimag*s into four regions - Western, Khangai, Central and Eastern regions. Bayankhongor *aimag* is included in the Khangai region.

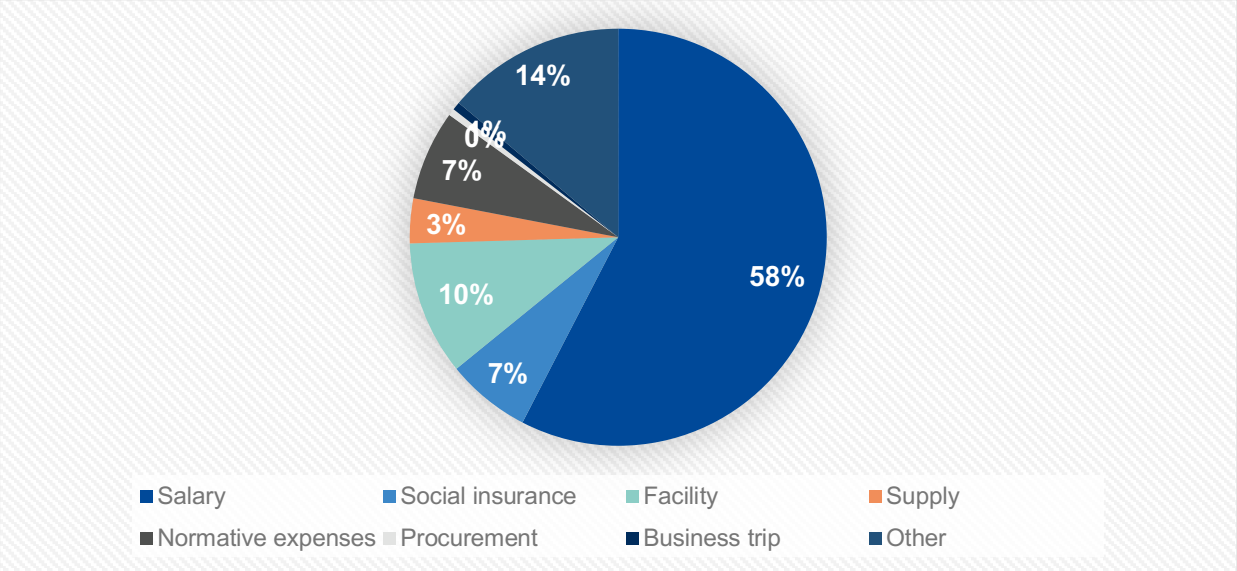
Analysis of the *aimag* budget revenue and expenditure for 1990-2017 reveals that *aimag* expenditure has exceeded the available budget consistently each year. However, the situation improved in 2018, with budget revenues exceeding expenditure. Total budget revenue increased 4.5% in 2018.

At the *soum* level, the Bayan-Undur *soum* budget breakdown for 2018 shows that salaries and "other" expenditure are the biggest component by far (46% and 35% respectively), and all other items significantly smaller. The 2018 Shinejinst *soum* budget is similar to the Bayan-Undur budget, with salaries the main component (58%) and "other" spending (14%) and facilities (10%) making up most of the remainder. Budget breakdowns are shown in Figure 2 and Figure 3 below.



Source: Bayan-Undur soum 2019

Figure 2 Bayan-Undur *Soum* Budget Breakdown, 2018



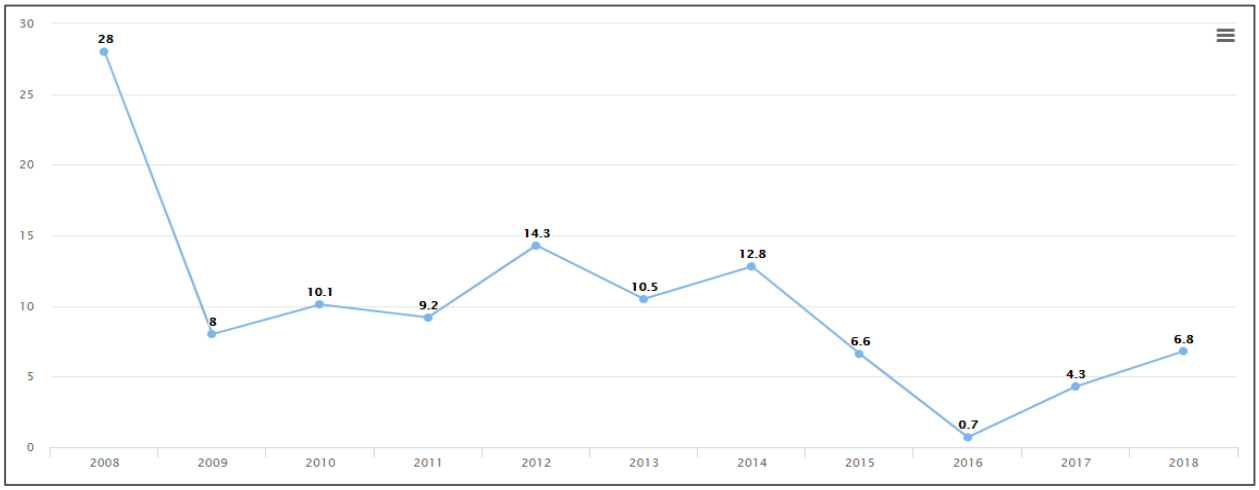
Source: Shinejinst soum 2019

Figure 3 Shinejinst *Soum* Budget Breakdown, 2018

1.4 Pricing and Inflation

In recent history, like many other former socialist countries, Mongolia experienced a surge in inflation in the first few years of transition from 1990-1995. Inflation peaked at more than 250% as an all-time high in 1993, and then fell rapidly, reaching the single-digit range by 2000 through, among other factors, tightening of monetary conditions and the effects of trade liberalisation on domestic prices, and open exchange (IMF, 2003).

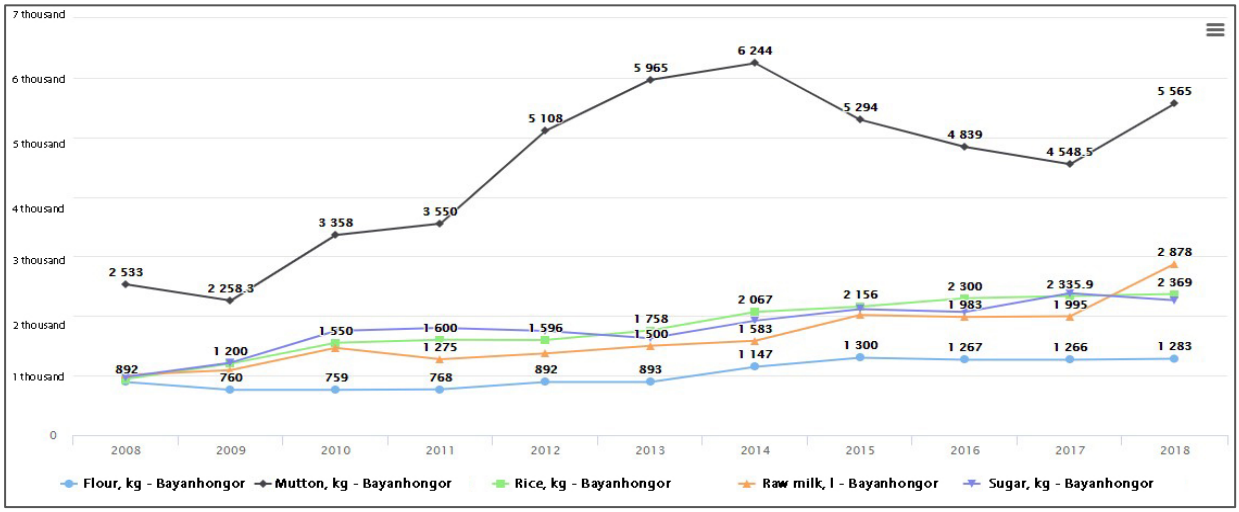
The inflation rate in Mongolia averaged 9.84% from 2007 until 2019, recording a high of 34.2% in August of 2008 and a record low of -0.2% in October of 2016 (Trading Economics 2019). Figure 4 shows inflation in Bayankhongor *aimag*, which mirrors inflation data at the national level.



Source: MSIS 2019

Figure 4 Inflation in Bayankhongor *Aimag*, 2004 - 2018

Food products have experienced the highest price growth, specifically meat. At the national level, meat products alone make up approximately 12% of households' total expenditure and are the major primary food group for most Mongolian households. Bayankhongor *aimag* has seen a constant increase in the consumer price index each year between 2015 and 2018. The biggest price increases have also been for food products (especially meat); alcohol; tobacco; clothing; fabric goods; housing; water; electricity; fuel; and educational services (MSIS 2019). Figure 5 illustrates Bayankhongor *aimag*'s particular food product prices between 2008 and 2018. Comparing 2009 to 2018, mutton increased by 44%, flour by -0.1%, white rice by 29%, and sugar by 34%.



Source: MSIS 2019

Figure 5 Bayankhongor *Aimag* – Consumer Goods Prices for Selected Goods, 2008 - 2018

As part of the Household Survey, households were asked about their experience of price increases in relation to items they purchased in the last two years. The majority of households indicated that they experienced a price increase on most consumer goods, with particularly large increases occurring on food (68%), petrol (63%), clothing (60%), non-food consumables (59%) and medicines (47%). Only 4% of households reported there was no price increase on student tuition fees or stationery and dormitory expenses.

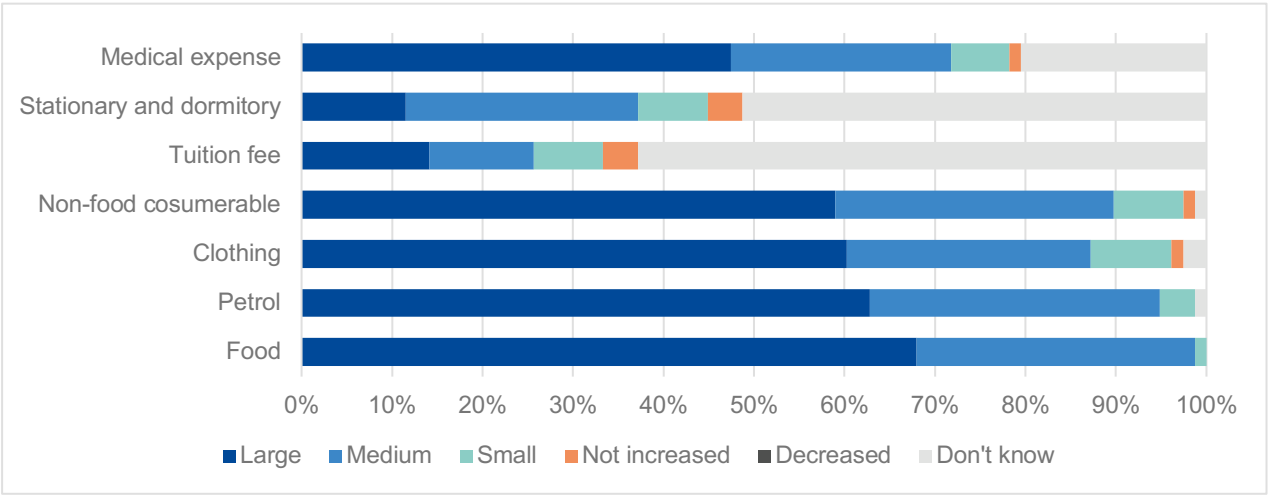


Figure 6 Perceptions of Price Increases of Household Items in the Project Area of Influence in the Past Two Years

High prices were also the key difficulty encountered by households in buying consumer goods, with 46% of households choosing this answer, and thereafter respondents listing unsatisfactory quality (19%), and the remoteness of markets (18%). These findings are not surprising when considering that the provision of goods and services in the *soum* centre is generally limited to basic foodstuffs and consumables that are predominantly brought in the *aimag* centre and Ulaanbaatar, with mark-ups due to transportation costs and the risk premium applied when serving a small market. Most households indicate that they purchase food and non-food consumer goods at *soum* markets (59%) and the *aimag* centre (25%), with a very small percentage thereafter indicating that their main purchasing channel is from Ulaanbaatar (8%), passing

travellers (5%), and border trading points (3%). This is consistent with the largely rural, and land-based livelihoods in the Project area of influence, whereby the population is not highly mobile.

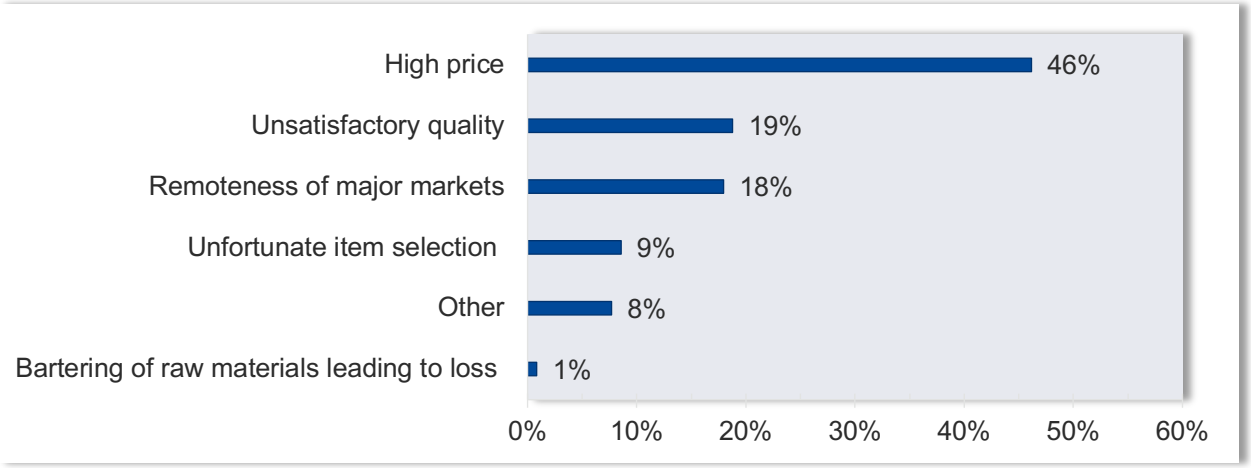


Figure 7 Difficulties Encountered in Buying Consumer Goods (Multiple Choice), 2019

1.5 Economic Sectors

This section describes some of the key economic sectors. In order to avoid repetition, agriculture and livestock herding are discussed here in brief, focusing on market channels, as they are covered in depth in Chapter B13 Land Use.

1.5.1 Livestock Production

In 2018, there were a total of 14,765 herder households in Bayankhongor *aimag*. This included herding families that practice variants of the transhumant lifestyle (see *Chapter B11: Land Use*), as well as those families who keep livestock while residing part of the year or all year round in the *aimag* and *soum* centres.

In Bayankhongor *aimag*, livestock numbers approximately 3,465,864 to 4,249,473 animals (MSIS 2019) (refer to *Chapter B13: Land Use*). Goats are preferentially reared in all *soum*s due to the high return achieved for raw cashmere and production of cashmere products. Most wool, milk and meat produced are used for subsistence purposes, with these and others having increased steadily between 2014 and 2018 (with a slight decrease between 2017 and 2018), from products also sold in local markets.

Goats, sheep, and camels are also the main animals raised in Shinejinst and Bayan-Undur *soum*s, and the two *bagh*s within which the Project is located – Idren and Urtiin gol. The number of livestock in Shinejinst and Bayan-Undur *soum* tripled between 2010 and 2017. On average, households that responded to the Household Survey had 292 animals, which is slightly lower than the *soum* and *aimag* averages.

All products (dairy, hides and skins, cashmere, and wool), excluding meat and live animals, were noted to be sold at *soum* markets by Household Survey participants. The majority of households (67%) indicated they sell their meat at *soum* markets too, although 33% indicate they go to the *aimag* markets to sell meat. A very small percentage of live animals (6%) are indicated to be sold at the *aimag* markets. The low prices, small size of the markets available, and remoteness of the area are the main limiting factors constraining agricultural (including livestock) production in the area of influence *soum*s.

1.5.2 Agriculture

Crop production contributes an insignificant portion to the livelihoods of people in both area of influence *soum*s compared to livestock production, as arable land is very limited. Moreover, there is not a strong tradition of non-livestock agriculture amongst the local population. In 2018, the total cultivated land (vegetables and potatoes[3]) was around 19 ha in the two *soum*s, with Shinejinst *soum* having the most cultivated land. Agricultural production in Shinejinst *soum* is concentrated in a small remote settlement called Ekhiin gol, just inside the Great Gobi Strictly Protected Area (GGSPA) Part A, approximately 220 km south of the *soum* centre and 80 km from the Project site. This area supports seasonal vegetable and fodder cultivation, with tomatoes and cucumbers as primary crops. Ekhiin gol is further discussed in *Chapter B13: Land Use*.

Table 1 Agricultural production in the Project Area of Influence *Soums* in 2018, by ton

Agricultural Harvest	**Bayan-Undur *soum***	**Shinejinst *soum***
Total Vegetables	0.5	27.
Potatoes	0.5	-
Hay harvest	222.3	75.
Handmade fodder	12.8	12.7
Animal feed mineral fodder	135.5	30.
Green fodder	-	0.4
Fodder crops	-	0.4
Total	**371.6**	**145.5**

Source: MSIS 2019

1.5.3 Industry

As of December 2018, industrial product sales (including coal) reached MNT 13.6 million, up by MNT 6.7 million, or 68.8% higher than the same period in the previous year (mining and manufacturing). As shown in Table 2, manufacturing increases occurred across all listed products.

Table 2 Manufacture of Major Industrial Products / Outputs in Bayankhongor *Aimag*

Name of Product	**Unit**	**December 2017**	**December 2018**
Coal	**Tonne**	41.9	58.3
Bakery	**Tonne**	129.3	155.4
Bread	**Ton ne**	155.0	181.1
Sausage	**Tonne**	8.2	8.8
Heat	**Gk**	269.0	462.7
Pure water	**M3**	400.0	695.6

Source: MSIS 2019

The *aimag* centre hosts small-scale industrial activity, such as concrete mixing, trade, municipal water and power systems management, construction, basic services, and construction. The majority of building materials and other necessary materials for the built environment and urban services are brought from Ulaanbaatar. Some are reportedly sourced from overseas as Mongolia produces about 60% of its construction materials domestically and imports the remaining 40%, particularly from Asia (China, South Korea, Japan) and Russia (Export.gov 2017).

[3] Potatoes reported separately to other vegetables.

The number of active legal entities[4] registered across the *aimag* in 2019 is recorded at 1,313, with 28 of these located in Shinejinst and 18 in Bayan-Undur. There has been a steady increase at the *aimag* level of the number of active legal entities, with 925 in 2016 and 1,313 for 2019 (measured in the second quarter). There has been a similar, though small, increase in the two *soum*s as well: from 13 to 18 in Bayan-Undur, and 25 to 29 in Shinejinst.

Table 3 shows the active legal entities in Bayankhongor *aimag* city centre and the two *soum*s in the Project area of influence. In terms of the types of businesses, in Bayankhongor city centre, these include, in order of magnitude - wholesale and retail (146), other community, social and personal service activities (141), construction (72), processing industries (70), health and social work (45), and education (44) (MSIS 2019).

There is limited material industrial activity occurring in the *soum*s. As is illustrated, industrial activity and enterprises in the two *soum*s are mainly limited to small and medium-sized enterprises, such as wholesale and retail trade; other community, social and personal services; agricultural (livestock); and seasonal, on-demand services that operate intermittently (e.g. karaoke, catering). Specifically, some of these business at a *soum* level include the likes of bread and pastry shops, construction block shop, noodle shops, cafes, a household wooden furniture and sewing shop, and there is also a producer of dairy products - camel milk, drinks, yogurt, "Jinchin", and "Ayanchin" food seasoning to the *soum* market (Eco Trade 2017b).

Table 3 Registered Active Legal Entities – Shinejinst *Soum*, Bayan-Undur *Soum*, and Bayankhongor City Centre, 2019

Type of Entity	Number of Active Legal Entities		
	Bayan-Undur	Shinejinst	Bayankhongor City Centre
Agriculture, hunting and forestry	0	3	30
Mining and quarrying	0	0	20
Processing industries	0	2	70
Electricity, gas and water supply	0	0	11
Construction	0	1	72
Wholesale and retail trade; Repair of motor vehicles, motorcycles and personal and household goods	4	8	146
Hotels and restaurants	0	1	20
Transport, storage and communications	2	1	35
Financial intermediation	0	0	13
Real estate renting and other business activities	1	1	35
Public administration and defence; compulsory social insurance	2	2	27
Education services	2	2	44
Health and social work	3	3	45
Other community, social and personal service activities	4	4	141
Extra-territorial organization and bodies	0	0	0
Total	**18**	**28**	**709**

Source: MSIS 2019

[4] This includes the categories of: agriculture, hunting and forestry; mining and quarrying; processing industries; electricity, gas and water supply; construction; wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods; hotels and restaurants; transport, storage and communications; financial intermediation; real estate, renting and other business activities; public administration and defence; compulsory social insurance; education services; health and social work; other community, social and personal service activities; extra-territorial organisations and bodies.

Industry in the two *soum*s is constrained mainly by the small size of the market (lack of demand), and remoteness of the area. Limited business experience in the *soum*s is also a limiting factor to the successful operation of small and medium enterprises (as reported in KIIs and FGDs). The Household survey asked about the main difficulties encountered in selling home-produced products, with the key constraints confirmed to be the remoteness of the area and inability to access markets where higher prices are offered (24%), and weak local prices (19%), with a small percentage indicating that seasonality (7%) and lack of saleable products (6%) are issues.



Figure 8 Difficulties Encountered in Selling Home-Produced Products

1.5.4 Mining

Nationwide, there are 1,636 mining licenses and 1,181 exploration licenses in 7,593 ha of licensed areas, as of October 2019. This figure represents 4.8% of Mongolian territory. In Bayankhongor *aimag*, 3.2% of land is used for mining and exploration as shown in Table 4. There were a total of 129 companies that held 92 mining and 66 exploration licenses across the *aimag* (MRPAM 2019).

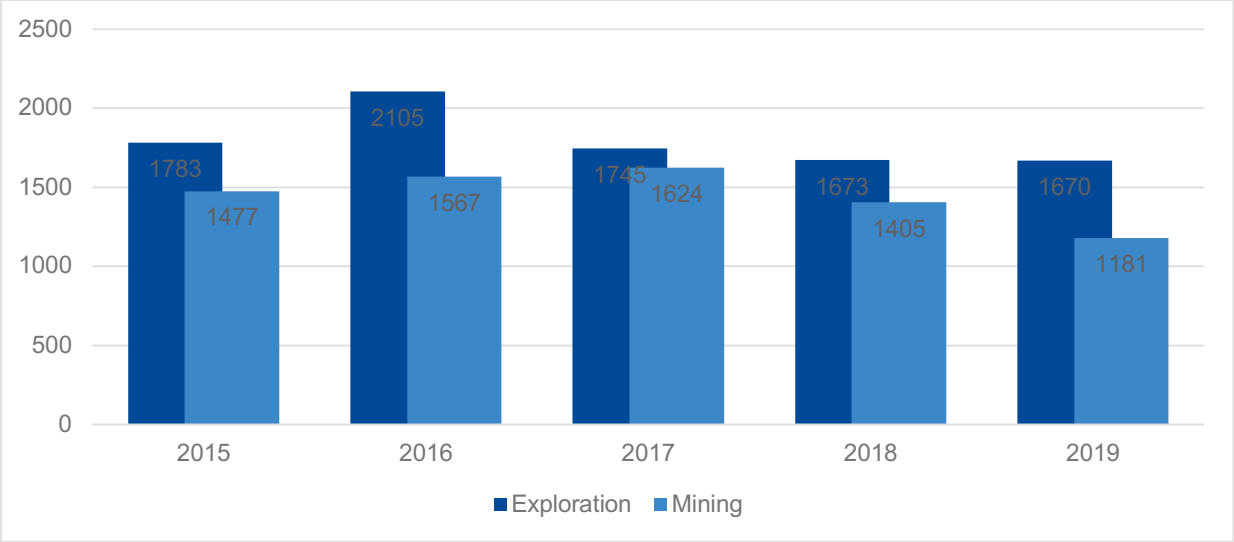
Table 4 Number of Valid Licenses and Allocated Area, October 2019

Item		Mongolia	Bayankhongor
Total	# of licences	2,851	158
	Area (ha)	7,593	371.3
	% of total territory	4.8%	3.2%
Mining	# of licences	1,670	92
	Area (ha)	1,636	124.2
	% of total territory	1%	1.1%
Exploration	# of licences	1,181	66
	Area (ha)	5,958	247
	% of total territory	3.8%	2.1%

Source: MRPAM 2019

At the national level, the issuing of exploration licences has gradually decreased in the last three years (Figure 9). This is mainly due to a decrease in the allocation of land area for exploration and the changing legal environment for exploration licences. The number of mining licenses has

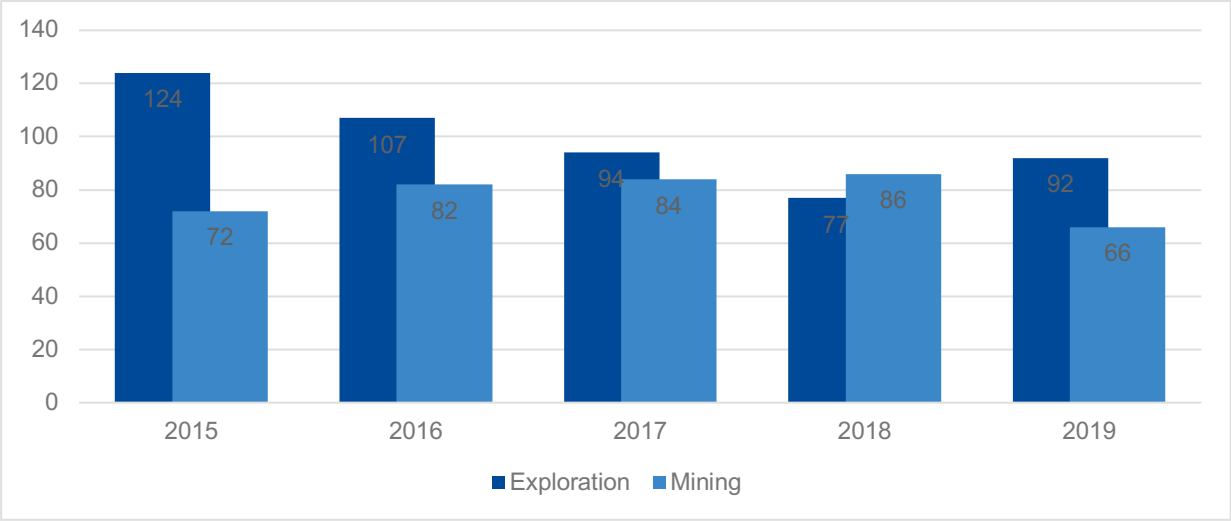
sharply decreased, reflective of greater political risk (cancellation of mining licences and political uncertainty) and shrinking FDI in the country.



Source: MRPAM, Mining and Geology Stats 2015-2019

Figure 9 Trend in Exploration and Mining Licences at the National Level, 2015-2019

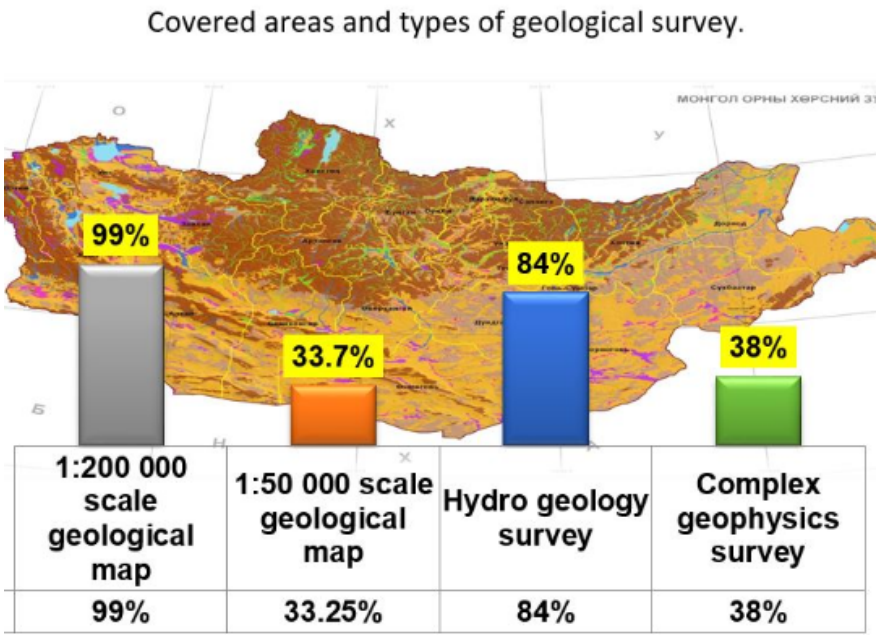
In Bayankhongor *aimag*, the issuance of exploration licences decreased between 2015 and 2018, though there was a small increase in 2019 (Figure 10). The national level decrease in issuance of mining licences was mirrored in Bayankhongor *aimag*.



Source: MRPAM, Mining and Geology Stats 2015-2019

Figure 10 Trend in Exploration and Mining Licences in Bayankhongor *Aimag*, 2015-2019

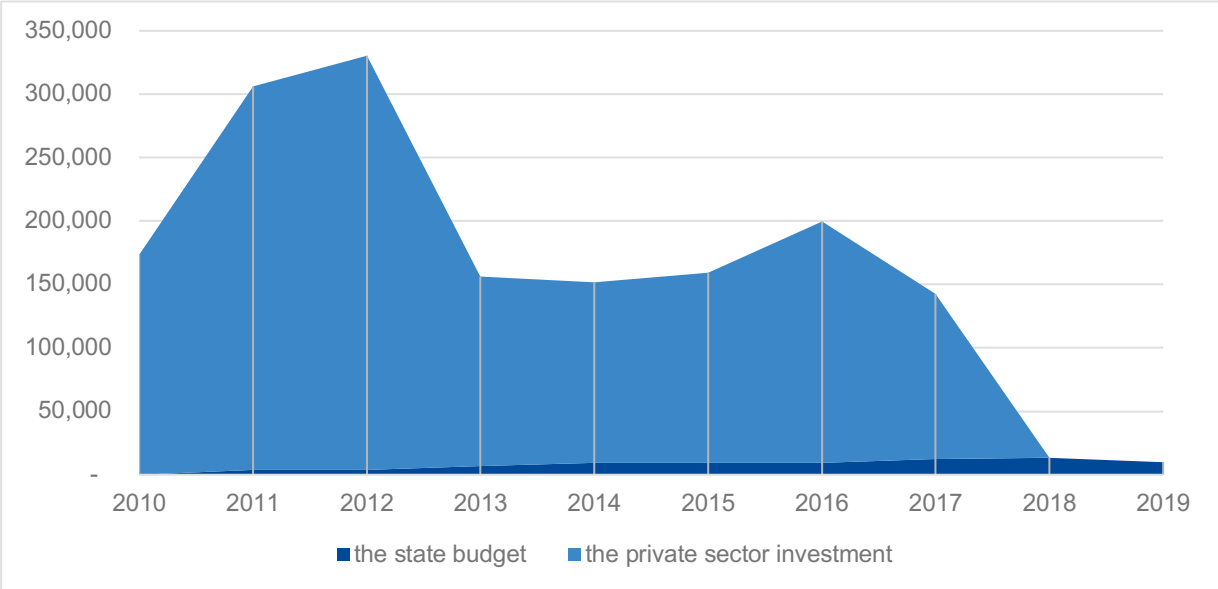
As of 2016, four geological surveys had been conducted to assist in the development of regional minerals and raw materials (shown in Figure 11); and to support government decision-making processes in relation to resources use (MRPAM 2016).



Source: MRPAM 2016

Figure 11 Mongolian Geological Survey Levels, 2016

Geological exploration in Mongolia has been supported, both through the State budget and private investment. Private sector investment has played a significant role in comparison to State budget spent on geological exploration. However, as illustrated in Figure 12, private sector investment in exploration has sharply decreased since around 2013.



Source: MRPAM 2019

Figure 12 Spending on Geological Survey Work (Prospecting, Exploration), 2012-2019, by Million MNT

The orogenic belt, known as the Kazakh-Mongol Arc Terrane, transects the territories of Bayan-Undur and Shinejinst *soum*s. Mineral exploration has occurred at varying levels across both *soum*s for precious and base metals, as well as coal. Modern, methodical, large-scale mineral exploration has been limited. Small-scale gold and limited near surface coal mining have taken place in the *soum*s (see discussion on artisanal mining below). No major, multi-year mining has taken place in either *soum*. Gobi Coal & Energy Ltd was developing the Company's Shinejinst

and Zeegt projects (in Shinejinst *soum*), however both are currently in care and maintenance. Table 5 provides the current list of exploration licences in Bayan-Undur and Shinejinst *soum*s.

Table 5 Exploration Licences in Bayan-Undur and Shinejinst *Soums*

№	Name of the Area	Size (ha)	Company Name	Issued	Expires
Bayan-Undur Soum					
1	Bor Tsahir	1841.2998	Gerel Arvijkh	2006-02-16	2019-03-17
2	Khukh Tolgoi	1735.5537	Bayan Khukh Tolgoi	2004-11-03	2019-01-03
3	Khongor	1789.6213	Topaz Stone Mining	2008-09-09	2020-09-09
4	Khuurai Tal	14835.418	Altargana Khairkhan	2009-09-03	2021-09-03
5	Ulaan	1780.2014	Leader Exploration	2015-02-16	2021-02-16
6	Tsenkher Nomin	4668.643	Erdene Mongol	2009-12-11	2021-12-11
7	Undur	14397.2838	Corundum geo	2017-07-27	2020-07-27
Shinejinst soum					
1	Khalzan Tsakhir	24372.4733	Energy Western Diamonds	2002-07-04	2018-04-24
2	Khukh Tolgoi	1735.5537	Bayan Khukh Tolgoi	2004-11-03	2019-01-03
3	Khongor - 1	35275.8093	Topaz Stone Mining	2008-09-04	2020-09-04
4	Khongot	1789.6213	Topaz Stone Mining	2008-09-09	2020-09-09
5	Bayanbulag	2411.7159	Kingstone	2008-12-08	2020-12-08
6	Ongon Ulaan-Uul	3954.2323	British Mining	2008-12-08	2020-12-08
7	Khuurai Tal	14835.418	Altargana Khairkhan	2009-09-03	2021-09-03
8	Khundii	4514.3297	Erdene Mongol	2010-04-14	2019-04-14
9	Ulaan	1780.2014	Leader Exploration	2015-02-16	2021-02-16
10	Baits	89.5765	Gobi Coal and Energy	2008-06-03	2020-06-03
11	Tsenkher Nomin	4668.643	Erdene Mongol	2009-12-11	2021-12-11
12	Khonkhor ders	102.0187	Gobi Coal and Energy	2014-10-29	2020-10-29
13	Bayankhongor-2	1906.4727	Mondulaan Trade	2015-04-28	2021-04-28
14	Undur	14397.2838	Corundum geo	2017-07-27	2020-07-27

Source: EITIM E-Reporting System 2019

There are over 650 people working for 22 mining companies in permanent positions in Bayankhongor *aimag*. In 2018, MNT 3 billion was spent on employee salaries, MNT 1.2 billion in leasing machines, and MNT 4 billion on food, beverages, and clothing in the *aimag*. Table 6 provides the current list of mining licences in Bayan-Undur and Shinejinst *soum*s.

Table 6 Mining Licences in Bayan-Undur and Shinejinst *Soum*s

№	Name of the Area	Size (ha)	Mineral Type	Company Name	Issued	Expires
Bayan-Undur *Soum*						
1	Aman gol	6352.7913	Coal	Epidot	2014-10-15	2044-10-15
2	Khul Morit	989.9002	Copper	Bayan-Undur Resource	2016-05-26	2046-05-26
3	Ulaan Tolgoi	979.6771	Copper	Bayan-Undur Resource	2016-05-26	2046-05-26
4	Khul Morit-1	309.3549	Copper	Bayan-Undur Resource	2016-05-26	2046-05-26
5	Khul Morit	494.9292	Copper	Bayan-Undur Resource	2016-05-26	2046-05-26
Shinejinst soum						
1	Ukher Chuluutiin Tolgoi	235.5722	Gold	British Mining	2001-03-08	2031-03-08

2	Ongon Ulaan-Uul	235.568	Gold	British Mining	2002-07-19	2032-07-19
3	Khongor	490.1504	Coal	Gobi Coal and Energy	2007-09-21	2037-09-21
4	Khuviin khar	6041.0266	Molybden, copper	Anian Resources	2011-05-26	2041-05-26
5	Adag	5093.0092	Coal	Gobi Coal and Energy	2012-06-04	2042-06-04
6	Khotgor Zuun	122.5394	Coal	Gobi Coal and Energy	2012-06-04	2042-06-04
7	Khotgor Baruun	394.7874	Coal	Gobi Coal and Energy	2012-06-04	2042-06-04
8	Baits	66.991	Coal	Gobi Coal and Energy	2012-06-04	2042-06-04
9	Khuural Tal	5053.692	Coal	Terra Mining	2012-07-07	2042-07-07
10	Khukh Tolgoi	530.792	Coal	Huabei Kuangye	2014-02-06	2044-02-06
11	Ulaan Chuluunii Nuruu	14744.1851	Construction material	Aurum Metals	2018-08-16	2048-08-16

Source: EITIM E-Reporting System 2019

1.5.4.1 Artisanal and Small-scale Mining

Artisanal and Small-Scale Mining Context

Artisanal and Small-scale Mining (ASM) emerged in Mongolia in the 1990s in response to the nation's economic transition and a series of climatic disasters (*dzud*) that fuelled widespread poverty and unemployment. ASM is often a poverty-driven activity that provides and/or supplements livelihoods for mainly rural communities. The first ASM legal framework was enacted and formalisation of the sector achieved in July 2010. From 2011-2014, thousands of miners worked formally via local ASM. The ASM framework stipulated provisions for frugal environmental rehabilitation practices, occupational health and safety standards, child protection, gender equality, and engagement in social and health insurances. Aimag and soum government offices were also assigned mandates to provide support, outreach and services to ASM to fulfil the requirements (SDC 2018). As of 2018, more than 10% of the ASM sector had been formalised (Singo and Seguin 2018).

The formalisation of the sector has in theory, facilitated artisanal miners' ability to secure mining land and hence viable workplaces and a stable income. In practice, there are challenges for miners in accessing land legally, even though this should now be effectively facilitated through the legalisation of the sector. Further, tripartite agreements between *soum* governments, commercial mining operators and formalised ASM partnerships are theoretically able by law to be established, thereby allowing the ASM partnership access to an agreed area of the commercial licence area for ASM activities. However, this requires a level of trust between all parties and a level of understanding of the liabilities associated with implementing such an agreement, both currently lacking.

In general, ASM, with low levels of capital investment and mechanisation, is very different in nature to large scale mining (LSM), including the types of equipment and technology used, as well as the types of deposits mined. ASM can also pose a security threat and risk to company operations and personnel. This can be caused by the criminal or armed group elements that may sometimes accompany ASM, operating with limited to no health and safety, social and environmental guidelines. This complex relationship and coexistence challenge between licensed LSM companies and the ASM sector is acknowledged by the likes of the Internal Council on Mining & Metals (ICMM), Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development and the World Bank/International Finance Corporation (IFC) and many of the other key multi and bi-lateral donors.

The role of LSM companies will necessarily vary according to the local context. Some of the complex issues that LSM companies are faced with include defining responsibility for

environmental liabilities caused by ASM; and reputational damage arising from an association with unacceptable ASM social practices – such as child labour or environmental degradation. Furthermore, the LSM industry does not support trespass and illegal mining activities. In the case of trespass and illegal mining activities, the LSM sector has a responsibility to ensure that their own activities do not support such criminal activities or conflict. However, it is difficult for LSM companies to engage where the precedent for effectively managing this type of activity within the scope of the legislation has not been tested with respect to Government response (as is the case in Mongolia).

In 2017, the ASM sector contributed more than 50 percent of the total national gold production (19,846.8 kg)[5] in Mongolia (Singo & Seguin 2018). While quantifying the extent of ASM from an economic impact perspective is difficult, IRIM (2015) found that the direct economic contribution of ASM in Bayankhongor could be estimated at 676,233,660 MNT per month in Bayan-Ovoo *soum*, and 1,259,449,330 MNT in Bumbugur *soum.* Economic contribution was measured by employment (number of jobs created by miners and traders and employment-related expenses); taxes and fees paid to local authorities, as well as royalties; procurement related to mining activity (food, equipment and tool etc.); and, expenditure on public investment through tripartite agreements. These two *soum*s are where ASM activities are concentrated in Bayankhongor *aimag, as* opposed to the two soums within which the KGP is located – Shinejinst and Bayan-Undur. It was also from Bayan-Ovoo *soum* that Mongolia exported its first fair-mined[6] certified gold by "XAMODX" ASM NGO.

ASM in the Project Area of Influence

In Shinejinst and Bayan-Undur *soum*s, ASM activities have occurred historically. There is at least one small scale mining cooperative operating in Shinejinst under a "reclamation" agreement at two areas, the one approximately 40 km, and the other approximately 20 km from the Bayan Khundii Mineral Licence Area. Orphaned unreclaimed diggings can be found in both *soum*s. Generally, the purpose of ASM is to utilise "ore" that would be otherwise uneconomic to process using modern, industrial scale methods. Neither *soum* has hosted an industrial (or commercial) scale mine operated according to Mongolian (or international) standards. Consequently, practical knowledge of the potential benefits and risks of mining is limited amongst the population (KII 2019).

Many households have at some point had at least one member involved in small scale gold mining seasonally. ASM was discussed during the FGDs in August 2019, with participants generally indicating that very few households are conducting ASM, and that ASM is confined to individuals who mine to sustain or supplement their livelihoods, and not as a permanent occupation in these *soum*s. Households are noted to be ambivalent about small scale mining – recognising that benefits can accrue, but that these flow to relatively few. It was further noted in Shinejinst *soum* that artisanal mining is not widespread in the *soum*, barring a few people or cooperatives (unregistered / unapproved) that mine gold illegally and that these cases are considered a breach of law. Practices whereby ASM companies or cooperatives try to illegally access ground for small-scale mining and employ local households to collect the gold were also noted during FGDs.

Many of the KII respondents mentioned the challenges associated with ASM, as follows:

[5] MRPAM, Mining and Geology Statistics, by end of 2017
[6] Fairmined is an assurance label that certifies gold from empowered responsible artisanal and small-scale mining organisations who meet world leading standards for responsible practices.

- "When artisanal mining activates, internal migration rises and brings problems to the local environment (KII Shinejinst)."
- "Problems with Artisanal miners are heavy….there is no land rehabilitation and no accountability (KII Shinejinst)"

In relation to the KGP and ASM, in 2015, shortly after the public announcement of the results of Erdene's first drilling campaign, small-scale miners visited the property and illegally excavated a small area in open ground directly west of the Company's license tenement. In cooperation with local Government authorities, police shut down the activities within a few months. Removal of the miners was achieved non-violently and since then, there have been no meaningful attempts at illegal small-scale mining near the KGP. Erdene have employed (unarmed) security on site, and it is noted that there have been no violent confrontations with potential artisanal and small-scale miners, and that there has been very little activity or interest in the KGP site in recent years (as confirmed through the KGP visitor log). ERD periodically invites interested local people to visit the site, and this has provided an opportunity for awareness creation within local communities that the gold at the KGP is not amenable to traditional ASM methods of mining, nor is the size of the KGP ore bodies small enough to qualify for ASM. Furthermore, the KGP is very far from the *aimag* alluvial ore processing centre, which makes it hard to use as an economic option.

1.5.4.2 Perceptions of Mining in the Project Area of Influence

Mining is relatively new in Mongolia. This limited experience of mining, related activities, and mining entities has contributed to some misunderstanding and a distrust of the industry within the country. A lack of trust manifests in the negative reputation mineral exploration and mining encounters in Mongolia, with public perception of the benefits of mining remaining low despite the economic value that society can receive from the metals and materials that mining produces (IRIM 2015).

Mining was listed second when respondents were asked about what they think the dominant industries in the *aimag* and *soum* will be in the coming 15 years (with livestock industry listed first, and tourism third), illustrating a general awareness of the growing importance of the sector to the local and regional economy.

When asked which mining projects or companies they know about, most Household Survey respondents listed Erdene Mongol (44%), Oyu Tolgoi (19%), Erdenet (10%), and Tavan Tolgoi (10%). This response is consistent with Erdene's ongoing presence and engagement activities in the area, which have contributed to general awareness of the Company and its personnel in the Project area of influence, with much of the awareness of the Company linked to its contributions to local development and community collaboration activities (see box below for quotes from KIIs and FGDs).

"…[Erdene] has always maintained a positive relationship with the soum authority and delivered on its promises. The soum governor sees Erdene as a responsible mining that the company makes an effort to comply with Mongolia's laws and regulations. When the soum has any requests from Erdene, the company always puts common principles in place first, then responds. Local people are satisfied with the attitude and approach of Erdene's foreign directors."

"I started to learn about Erdene in 2008. They are considered as the most sustainable working mining project in the soum…they have implemented good practice to build a Local Development Committee that consists of representatives of local authority, local community and company to contribute to community development. This is a considerably good case and needs to be expanded in the coming project."

KII, FGDs, Shinejinst *soum*

"We know Erdene Mongol has the right people and its people have the right attitude towards social responsibility and responsible mining."

KII, Bayankhongor

"Erdene Mongol's engagement with local government and community is a good example in the region. Erdene Mongol is always positive about our proposals to cooperate on soum development initiatives. Other companies don't cooperate like their company. Since the start of its operation in Bayan-Undur soum, Erdene Mongol has donated about 20 million tugrik each year for investment in health, education and other necessary sectors. That investment helps a lot to resolve urgent issues at the soum level. Erdene Mongol has also initiated a student scholarship program and 10-20 students receive scholarships each year, if they meet certain criteria. Before the development and operation of the project, Erdene Mongol should organise vocational training and involve local people, especially young adults."

KII, Bayan-Undur *soum*

Household Survey respondents were also asked about how they think companies can best engage with local communities. Table 7 shows that local communities tend to conflate engagement with community development and procurement (many of the responses to this open question were linked to community development rather than engagement practices), and many (16%) couldn't name any methods, pointing to low knowledge of what constitutes good engagement practices by a company. The key relevant responses to this question were that the company should be transparent, fair and accountable, and provide accurate and accessible information to communities.

Table 7 What are the Best Methods for Companies to Engage with Local Communities (Top 5)

Best Methods for Engagement with Local Communities	**%**
Co-working with local communities and buying their products	12
Don't know	16
Provide accurate and accessible information	11
Provide jobs	7
To be transparent, fair, and accountable	20

The majority of Household Survey respondents agreed that companies that engage with local communities and stakeholders in all stages of their activities are good operators (Figure 13). So, while there is low awareness in general about methods of engagement, there is a high level of recognition that engagement by companies at all stages of mining is indicative of a good mining operator.

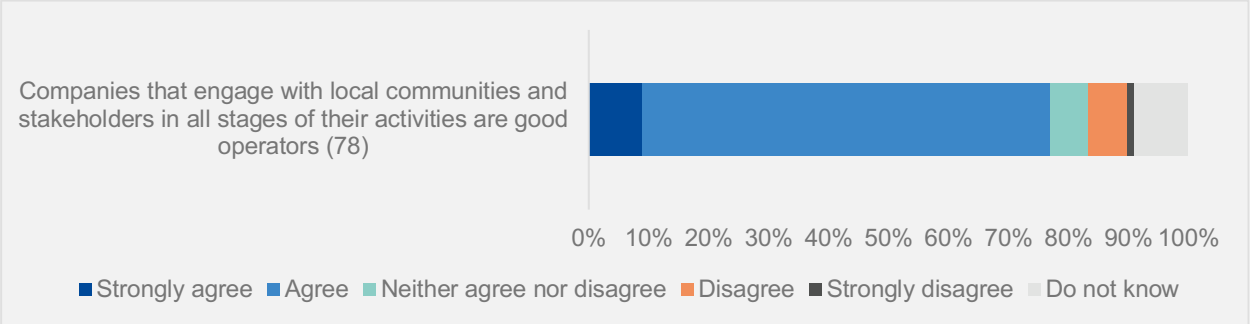


Figure 13 Perception of Households on Mining Companies and Stakeholder Engagement

As noted in the above KII excerpts, awareness of Erdene is linked to its community development programmes and activities, completed primarily through Erdene's Local Cooperation Agreements with the *soum* and *aimag* authorities and linked to *soum* and *aimag* community development priorities. Community development initiatives mentioned include the scholarship programme, and health and water-related support to the *soum*s. Fraser et al (2019) found similar perceptions in their interviews in relation to Erdene's contributions to community development. There is high awareness of the scholarship programme, which from 2012-2018 provided 43 scholarships for high school graduates to pursue a post-secondary education. Recent graduates include at least three full-time employed professionals in the *soum* centre. Fraser et al (2019) found that the Company's support for education was raised by 30% of interviewees as an unprompted example of a positive initiative that supports community development.

Another area where Erdene's community development activities were noted, was around water stewardship. Erdene has worked with local herders, elected officials, and other stakeholders in an effort to reduce competition for water. This includes assisting the Shinejinst *soum* centre to access a reliable source of potable water close to the *soum* centre, and restoring and returning six water wells to service for use by herders in the area.

The third example of local cooperation identified by interviewees related to a new initiative undertaken by Erdene, which was the first foreign-listed company to cross list its shares on the Mongolia Stock Exchange (MSE). Erdene worked with local government officials to provide Shinejinst and Bayan-Undur *soum* residents with the opportunity to subscribe to the offering. Over 5,000 residents of the *soum*s purchased shares. Fraser et al (2019) note that local interviewees indicated that, despite the vagaries of the stock market, the initiative was perceived as a way to create and share value from mining.

Erdene have linked their community development activities closely to the potential impacts of mining construction and development, and perceptions thereof, including (as illustrated above) water-related activities and skills development, among others. With respect to impacts, Household Survey respondents were asked to answer open-ended questions about what they perceived to be negative and positive impacts associated with mining activities. Respondents were also asked to share if they were most concerned about negative impacts they identified in the past, at present, or for the future. The three most commonly shared negative impacts by respondents were land use conversions and reduced land productivity (65 respondents), followed by water resources use (49 respondents), and air quality deterioration and dust pollution (32 respondents), as shown in Figure 14. Most negative impacts from open pit mining were related to concerns about the future, which in addition to the three previously mentioned impacts includes habitat disturbance, disturbance and safety, and a small proportion worried about community problems.

Respondents related negative impacts from open pit mining activities in the past to community problems, disturbance and safety, and habitat disturbance. During the FGDs and KIIs conducted, negative impacts associated with mining were often linked by respondents to the Khotgor coal mine project (Gobi Coal and Energy Limited LLC) and interactions between that project in 2014 and local communities relating to herder concerns around coal mining and construction of a haul road for transport thereof (the coal mine is located 100 km away from the KGP licence area). Herder concerns included dust associated with coal haulage along roads and potential impacts on pasture. The coal project is not currently operational. This case highlights some of the community perceptions or fears around mining, based on the specific herder experience with Gobi

Coal and Energy and media coverage of Oyu Tolgoi and Tavan Tolgoi coal transportation road degradation, and which influence current perceptions of mining projects in general.

Concerns at present were mostly related to water resources use and air quality deterioration, followed by habitat disturbance and safety. It should be noted there were a small number of respondents who had no answer for negative impacts.

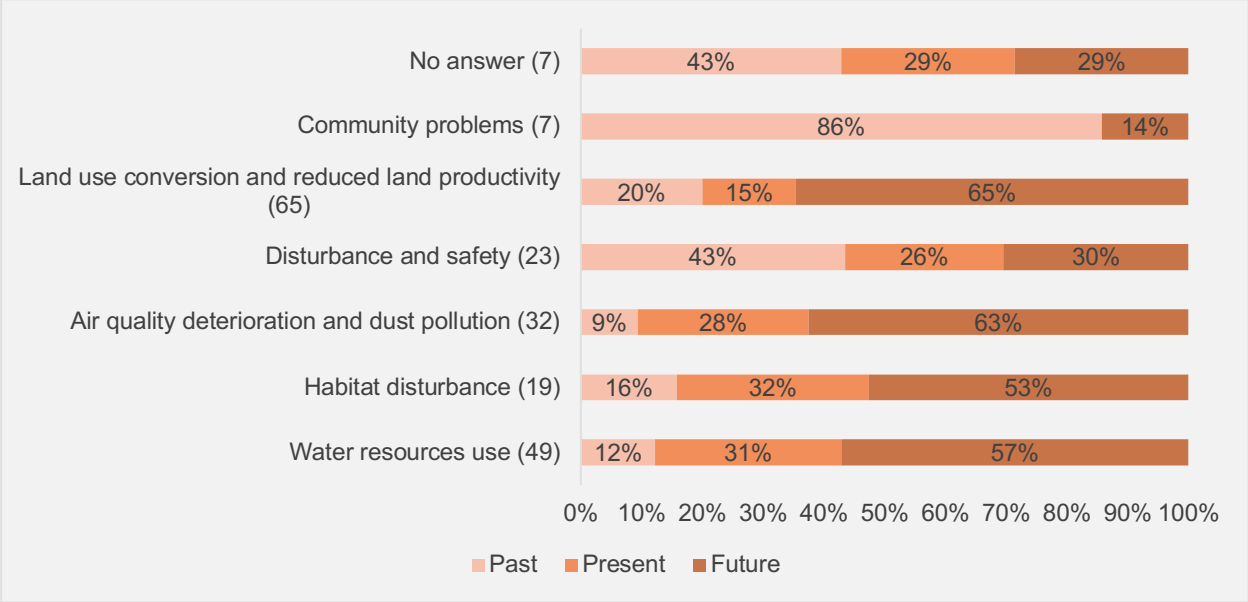


Figure 14 Negative Impacts Associated with Open Pit Mining Activities (Open Question)

To balance this question about negative impacts, respondents were also asked to share what they think are the positive impacts associated with mining and exploration activities. This was again open-ended, and respondents could provide more than one answer. As shown in Figure 15 below, the majority of responses related positive impacts to improving the local economy (30%) and increasing the number of new jobs for the local job market (26%). Other answers included improving local communities' well-being or livelihoods, increasing investment in local development, and the development of SMEs and diversifying job opportunities. In general, the local community has some understanding of the potential positive impacts related to mining and exploration. Most understand these impacts to be a chance to improve job opportunities and the local economy. A small proportion did not know what positive impacts could be.

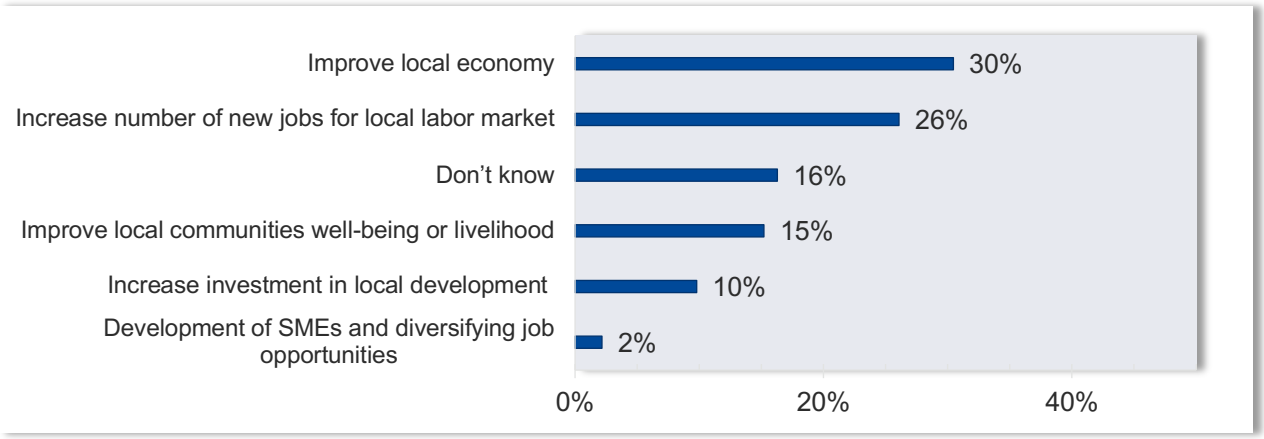


Figure 15 What Do You Think are the Positive Impacts Associated with Mining / Exploration Activities (Open Question)

Table 8 shows the findings noted in the Fraser et al (2019) study related to Erdene's activities in Mongolia and areas proposed by interview respondents for potential collaborative partnerships to advance sustainable development goals set by local, regional, and national governments. The consultation (FGDs, and KIIs) conducted in August 2019 in support of this Social Baseline Study identified many of the same ideas in relation to Erdene's community development activity focus areas.

Table 8 Areas Proposed for Potential Community-Erdene Collaboration

Topic	Specific Ideas Offered
Employment	Local hiring and training
	Opportunities for local people with education but without jobs
Education	Scholarships
	Training
	Partnership programs
Water	Water quantity
	Water quality / testing
	Impact of water withdrawals on aquifers
	Access to drinking water
	Drilling / maintenance of water wells
Economic Development	Local procurement, including opportunities for local SMEs to supply mining sites
	Development of a value added cashmere industry
	Economic prosperity for local *soum*s
	Herd health
Infrastructure	Shared Infrastructure
	Renewable energy
Environment	Mitigating soil erosion / desertification
	Reclamation of exploration / mining activities
	Addressing the impacts of climate change
	Pastureland: availability / quality
	Closure planning

Source: Fraser et al 2019

Specific feedback on community development, included the view that mining is not sustainable, so other initiatives will be critical to the *aimag* economy, such as helping *soum*s to develop businesses based on local products and competitive advantage over time. For example, the potential to build a camel milk product processing plant in Shinejinst *soum*, and developing programs to assist herders to produce better quality wool and cashmere (KII, Bayankhongor *aimag*). Many respondents noted there are some expectations that when mining starts there will be new jobs, increase in *soum* trade and improvements to the road. There is also a desire to improve school education, improve the quality of healthcare, support SMEs, and establish an employment support centre to prepare a work force for mining. FGDs in both *soum*s shared similar ideas, with the need to enhance or support SMEs in supplying products to mining projects, support to develop other industry such as factories in the area, and the hiring of local people by the KGP.

Both Fraser et al's (2019) research, and that conducted as part of this Social Baseline Study indicates that "there has been a positive return to date on the strategy to build relationships, to understand local issues, and to work collaboratively with stakeholders to address issues of mutual interest and deliver tangible benefits".

1.6 New Economic Opportunities

Since the advent of the market economy in early 1992, business opportunities have increased in the rural areas of Mongolia. However, as noted elsewhere in this Chapter, new economic opportunities are effectively constrained in the focus *soum*s – Shinejinst and Bayan-Undur. The

key constraints noted include the remoteness of the *soum*s and the corresponding lack of a market for goods and services and poor infrastructure available (roads, power, water, among others) to support the development of new economic opportunities and business. The small number of SME's noted in the two *soum*s is indicative of the dearth of new economic opportunities.

The KIIs and FGDs conducted in support of the Social Baseline Study found that most respondents had many ideas for businesses and opportunities for development in the *soum*s. These include developing processing factories for vegetables produced at Ekhiin gol, cashmere processing plants, yak and other dairy products factories, among others. However, many of the ideas are neither founded in a strong understanding of business development and economics, nor backed by experience within the local community in the development of such enterprises on a commercial scale.

It was noted in the KII in Shinejinst *soum* that locals are able to obtain subsidised loans at a 3% interest rate from the *Soum* Development Fund should they be interested in opening a business. The purpose of these loans is to support local enterprises, such as baking, sewing, dining, or others.

As noted in Section 1.5.4 in the discussion on Erdene and community development, there are expectations among the local community that when mining commences there will be new jobs created and an increase in *soum* trade and SME opportunities, among others.

1.7 Finance

Banking services in Bayankhongor *aimag* centre include a branch of the Central Bank (mongolbank) as well as five commercial bank branches the Trade and Development Bank, State Bank, Xac Bank, Golomt Bank, and Khan Bank.

According to the Financial Regulatory Commission, there were 4 Non-Banking Financial Institutions (NBFI) and 4 Savings and Credit Cooperatives (SCC) in operation between 2007 and 2018 in Bayankhongor *aimag* (shown in Table 9). As of 2019, there is only one SCC that has a legal license to operate, "Durvun Bogdiin Buyan" SCC in Bogd soum, Bayankhongor *aimag* (Financial Regulatory Commission 2019).

Table 9 Financial Institutions in Bayankhongor Aimag, 2007-2019

Name of the Entity	Licence Issued	Location
Solongo Capital NBFI	6/24/2015	Bayankhongor soum
Evt Zaan Chuluu NBFI	4/1/2015	Bayankhongor soum
Zambal Uguuj NBFI	7/17/2013	Bayankhongor soum
Usukh Capital NBFI	1/9/2013	Bayankhongor soum
Durvun Bogdiin Buyan SCC	1/24/2018	Bogd Soum
Buyant Bogdiin Khishig SCC	6/25/2009	Buutsagaan Soum
Khar At Khugjil SCC	12/26/2007	Bumbugur Soum
Khugjliin Deej SCC	2/16/2007	Galuut Soum

Source: Financial Regulatory Commission 2019

Khan Bank maintains a physical branch office in Shinejinst and Bayan-Undur *soum* centres. Xac Bank provides services remotely to these *soum*s from its *aimag* centre branch. Household borrowing amongst herders appears relatively high, due to the seasonality of cashmere cashflows. Conversely, business lending is reportedly limited in the *soum*s. Consumption loans are relatively common amongst the salaried workforce, including civil servants, medical staff, school personnel, and others. Most adults have brokerage accounts, as a result of the

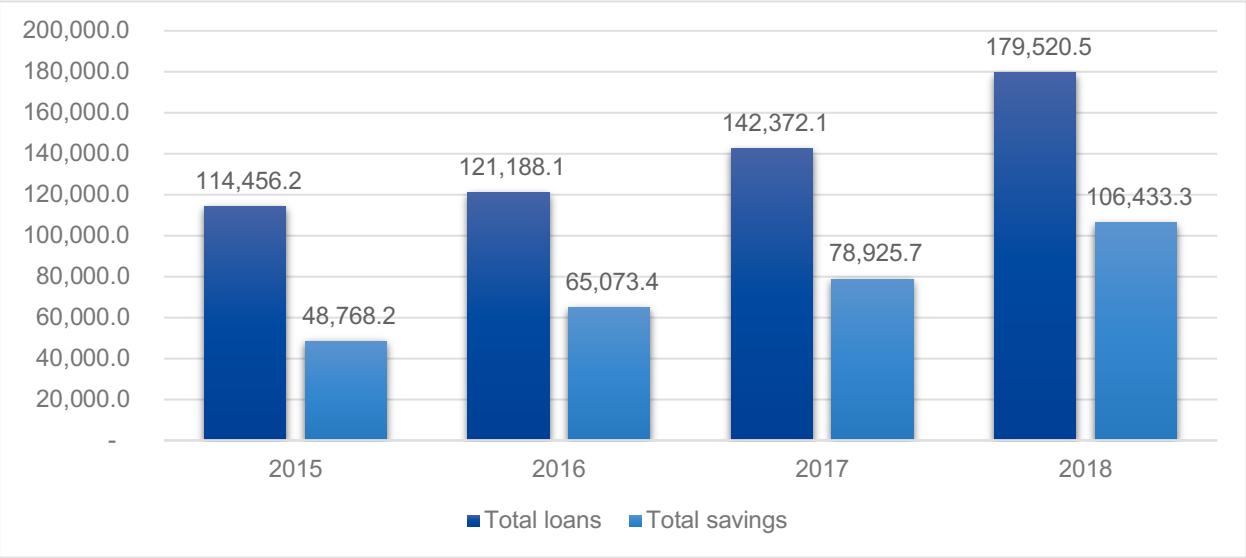
government's drive to distribute Tavan Tolgoi shares. Knowledge of capital markets is very low (KII, 2019).

According to the Central Bank of Mongolia, bank loans have increased steadily in Bayankhongor since 2015, while there has been a gradual increase in savings. Illustrated in As of 31 December 2018, Bayankhongor aimag had MNT 179,520,500,000 in commercial bank loans. Of which MNT 175,952,100,000 were normal loans, MNT 1,358,600,000 were overdue loans, and 2,209,800,000 were non-performing loans (Figure 16) (Central Bank of Mongolia 2018). At the end of 2018, citizens' savings reached MNT 106,443,300,000, of which MNT 29,240,500,000 were demand deposits, and 77,192,800,000 MNT were term deposits (Table 10). These figures indicate the high levels of debt compared to savings in the aimag, however the levels of overdue (0.75%) and non-performing loans (1.2%) were much lower compared to the national average of overdue (4.9%) and non-performing loans (10.4%).

Table 10 Savings and Loans in Bayankhongor Aimag and the Study Soums in 2018

Area	Total Loans	Of which			Total savings	Of which	
		Normal Loans	Overdue Loans	Non-Performing loans		Term Deposits	Demand Deposits
Bayankhongor	179,520.5	175,952.1	1,358.6	2,209.8	106,433.3	77,192.8	29,240.5
Bayan-Undur	2,872.4	2,845.3	27.1	-	5,140.9	3,501.2	1,639.7
Shinejinst	2,852.4	2,847.1	3.8	1.4	3,182.5	2,398.6	783.9

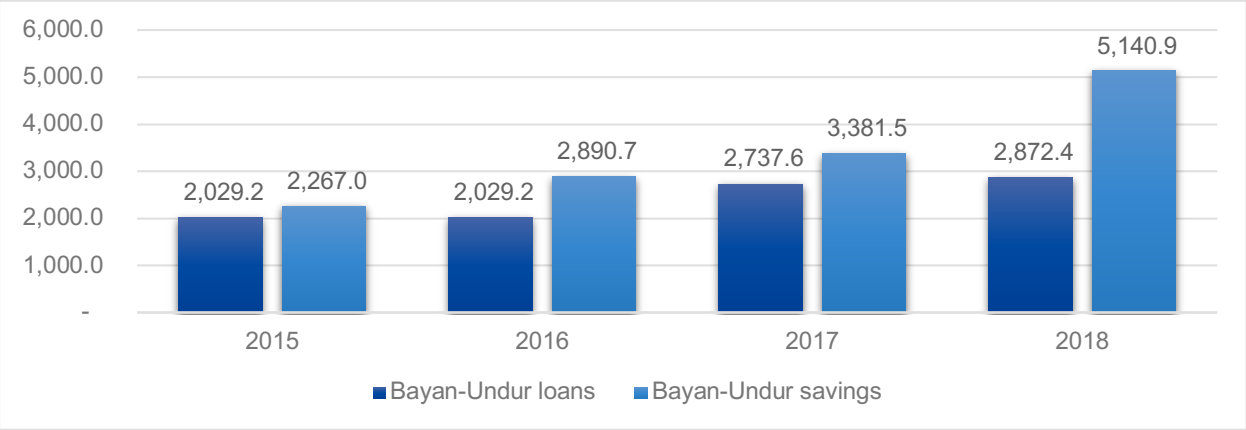
Source: Central Bank of Mongolia



Source: Central Bank of Mongolia 2018

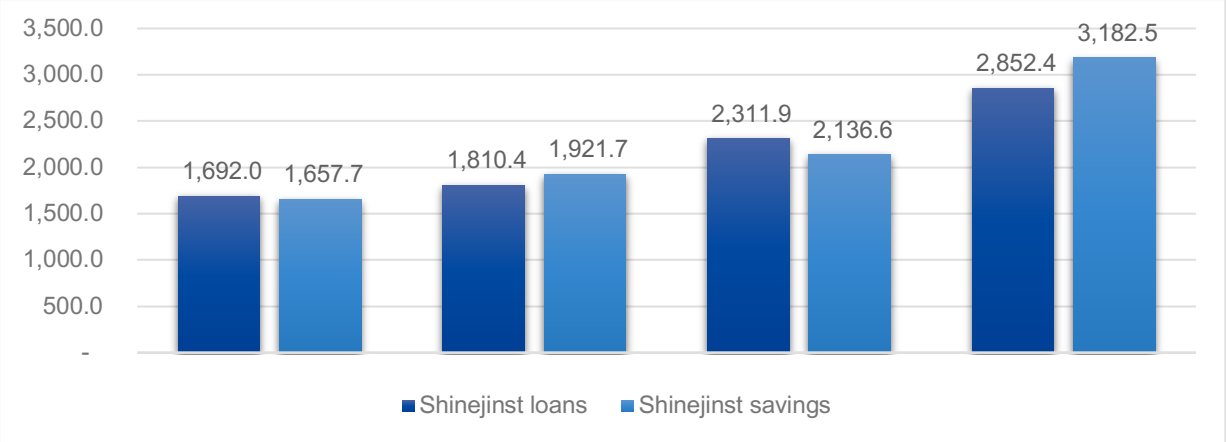
Figure 16 Total Savings and Loans in Bayankhongor Aimag, 2015 - 2018 (by million)

Figure 17 and Figure 18 provide the ratio between savings and loans at the soum level, showing that they have been generally consistent with each other since 2015, with savings outstripping loans in 2018 in both soums.



Source: Central Bank of Mongolia 2018

Figure 17 Savings and Loans in Bayan-Undur Soum, 2015 - 2018, by Million



Source: Central Bank of Mongolia 2018

Figure 18 Savings and Loans in Shinejinst Soum, 2015 - 2018, by Million

Consistent with the above, the Household Survey confirmed that households generally feel that they have good access to banking and financial services in the Project area of influence (albeit limited diversity thereof). As illustrated in Figure 19, most households (58%) tend to approach the bank when in need of a loan, and thereafter non-banking financial institutions (12%). It is also common to borrow money from relatives (10%). Households are also able to obtain loans whenever they need them (86%), although fewer households (63%) indicated that they can get the amount they want. Livestock is the most common collateral provided (43%), which is consistent with the primary livelihood (herding) in the area, with wages and pensions (26%) thereafter.

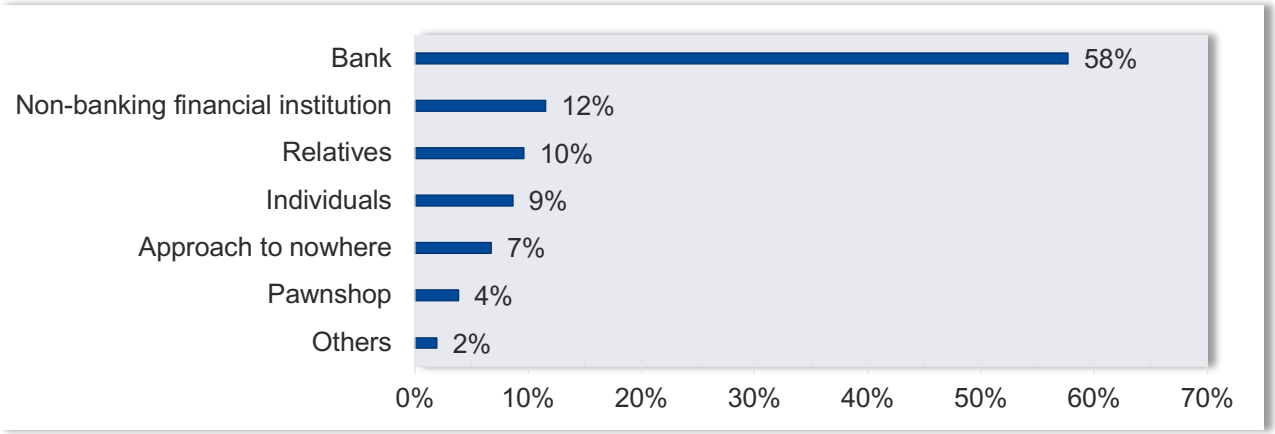


Figure 19 Who / What Institution Do You Usually Approach When You Need to Borrow Money?

Of those households that indicated they face difficulties in obtaining loans (32%), the key difficulties listed were that it takes too much time and effort to obtain a loan, high interest rates offered, collateral not meeting the requirements, and only short loans term being offered, among others (see Figure 20).

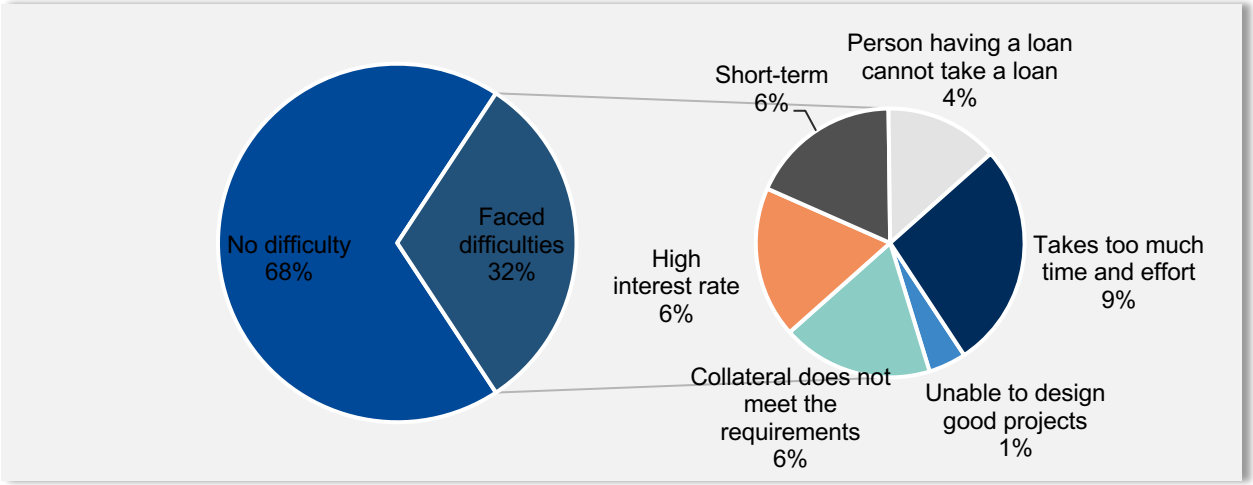


Figure 20 Difficulties Encountered in Obtaining Loans

Most households (73%) noted that they have savings deposits, and that these are mainly located with commercial banks, shown in Figure 21. It was found that households did not generally lend money directly to individuals (86%). However, 56% (or 44 households) of households indicated that they borrowed money from a financial institution, business enterprise and / or individual with the purpose of improving their household living conditions in the past 12 months. Of the households that borrowed money in the past 12 months, most (47%) borrowed MNT 2-5 million and the average loan amount was MNT 4,816,300. The lowest loan amount was MNT 100,000, whereas the highest loan amount was MNT 13 million (2 households) (see Table 11). Most households that took out a loan noted that the main purpose of the loan was to cover household expenses (67%). Timing of cashflows is a major consideration for herders, who tend to borrow to smoothen cashflow. It may also indicate that some households are not able to cover everyday living costs on their current incomes. Some 29% noted that loans were obtained to assist in raising livestock.

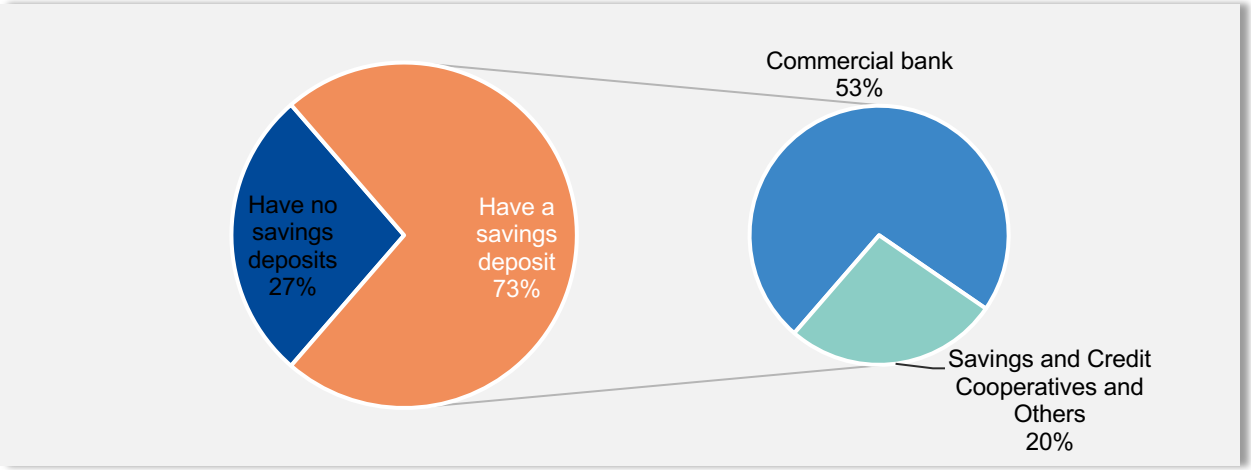


Figure 21 Household's Saving Status

Table 11 Household Loan Amounts

Loan Amount	No. of Households	
Less than MNT 2 million	9	21%
MNT 2-5 million	20	47%
MNT 5-7 million	8	19%
More than 7 million	6	14%
Total	43	100%

1.8 Living Standards

To understand poverty in Mongolia, household surveys conducted by the National Statistics Office (NSO) include data related to household income, expenditure and consumption. To measure living standards, it is useful to look at income and consumption as a welfare indicator. Consumption is the measure preferred by NSO as it is a more accurate and useful measure of living standards than income. In addition, households are generally less reluctant to share consumption data than income data. Therefore, the consumption component has been used to measure living standards. People who have a consumption level lower than the minimum living standard are considered poor (NSO 2019).

The poverty headcount percentage is the share of the population whose consumption level is below the poverty line. In Bayankhongor *aimag* it was recorded as 29.6% in 2018, which is marginally lower than the Khangai region (30.8% average) and slightly higher than the national average (28.4%). The national poverty headcount percentage decreased by approximately 1% from 2016 (29.6%). The poverty headcount recorded in *soum* centres was 28.9% and 32.9% in rural areas indicating that rural areas have higher poverty headcounts (NSO 2019). In terms of poverty headcount, the data was recorded in 2011 for *soum*s in Mongolia and indicated that in terms of the *soum*s of the KGP area of influence, the poverty headcount was recorded at 36.5% Bayan-Undur and Shinejinst *soum*s which was higher (approximately 3.5%) than the poverty headcount of the Bayankhongor *aimag* (32.9%).

Nationally, the incidence of poverty increased in urban areas between 2014 and 2018. During the period between 2017 and 2018, the poverty rate declined by 4% in rural areas and increased by 0.1% in urban areas. This decrease in poverty in rural areas may be attributed to the increase of economic growth that Mongolia has experienced over the past decade, as well as increasing herd sizes and large transfers of public revenue from mining and Ulaanbaatar to rural areas. Although

the poverty rate remains high in rural areas, with two-thirds of the total population of Mongolia living in urban areas, poverty has become concentrated in urban areas. The share of the poor population in urban areas has increased from 62% in 2016 to 64% in 2018, and more than 40% of the poor lived in Ulaanbaatar in 2018 (World Bank 2019).

1.8.1 Household Consumption and Income

Income:

At the *national* level, monthly average income per household was MNT 1,201,900 in 2018, increasing by MNT 160,800 (15.4%) from the previous year. The monthly average income of households residing in rural areas was MNT 1,041,900, which is lower by MNT 247,900 (23.8%) than the urban average. In the Khangai region, monthly average income of the households was MNT 1,038,347. In terms of household income composition at the national level, monetary income accounts for 92.4%; goods received from the others at free of charge is 4.1%; and food products used from own farming is 3.5%. In rural areas, households' monetary income consists of salary (35.2%), sales of agricultural products (31.4%), social welfare (20.7%), earnings from business and services (5.1%) and other type of income (7.6%) (NSO 2019). As shown in Table 12, in the Project area of influence, household incomes consist of three main sources, including salary income, social welfare payments and sales of agricultural products.

Table 12 Household Median Income and Income Sources, Monthly and Annual

Income Sources	Study Area (n=78)	*Soum* Centre Households (n=20)	Rural Households (n=58)
Monthly salary income	700,012 (n=33)	900,024 (n=15)	700,007 (n=18)
Monthly sales of agricultural products*	883,333 (n=59)	366,667 (n=7)	962,083 (n=52)
Monthly social welfare payment	165,000 (n=40)	400,000 (n=10)	111,000 (n=30)
Households' monthly median income	1,132,500	1,095,016	1,356,845
Households' annual median[7] income	13,590,000	12,460,000	15,440,000

n=number of responses

** It should be noted that households sell their agricultural products once a year (mostly in April), therefore, their annual sales income was divided by 12 so as to estimate monthly sales income.*

Salary income: The Household Survey asked about monthly salary incomes of households. Thirty-three (33) households provided a response to this question, out of a possible 78. The median was MNT 700,012 (or MNT 8.4 million per annum), which is found to be slightly higher than the national average (MNT 599,100). This can be explained due to a number of households that have more than three working adult members. Another difference noted is that *soum* centre households earned higher salary incomes than herder households (higher by MNT 200,000) (see Table 12 above).

[7]This Chapter mainly uses median values rather than averages. Median household income is a more robust and accurate measure for summarising income at the geographic level as compared to average household income since it is not affected by a small number of extremely high or low income outlier households. In a geographic area, for example, where there happen to be a small number of high income households and a large number of lower income households, the average income can become inflated and give the false impression that all households on average have more money than they actually have. The median income on the other hand is unaffected by high-income outliers and therefore better reflects the income status of the majority of households.

Social welfare payments: There were 10 households in the *soum* centres and 30 households in rural areas that reported they have a family member who receive social welfare payments. The median income from social welfare payments in the study area was MNT 165,000 (*soum* centre, MNT 400,000 and rural, MNT 111,000 respectively). *Soum* centre households tend to receive higher social welfare payments as the most common type of welfare was pension, whereas rural households generally receive child support money.

Sales income of agricultural products: There were 59 households that have a sales income from agricultural products. Of these, herder households' monthly income from sales of agricultural products (MNT 962,083) is much higher than those from the *soum* centres (MNT 366,667). The greatest income is received from annual earnings from cashmere and live animal sales (mostly goats and camel). Households sold 80 kg cashmere and 40 animals on average annually. One kg cashmere was priced at MNT 115,000; 1 goat was priced at MNT 65,000-100,000 (depending on the season) and 1 camel was priced at MNT 1,000,000 in the market as of April 2019. The main market was the *soum* centre and sometimes the Shivee Khuren border point.

As illustrated in Figure 22, the median annual income was found to be MNT 13,590,000, while the average (mean) income was found to be MNT 16,775,115. Of the surveyed households, 44% (32 households) earned less than MNT 13,590,000 a year and the rest, 56% (44 households), earned well above that. It was evident that households in rural areas (herders) had higher incomes than *soum* centre households.

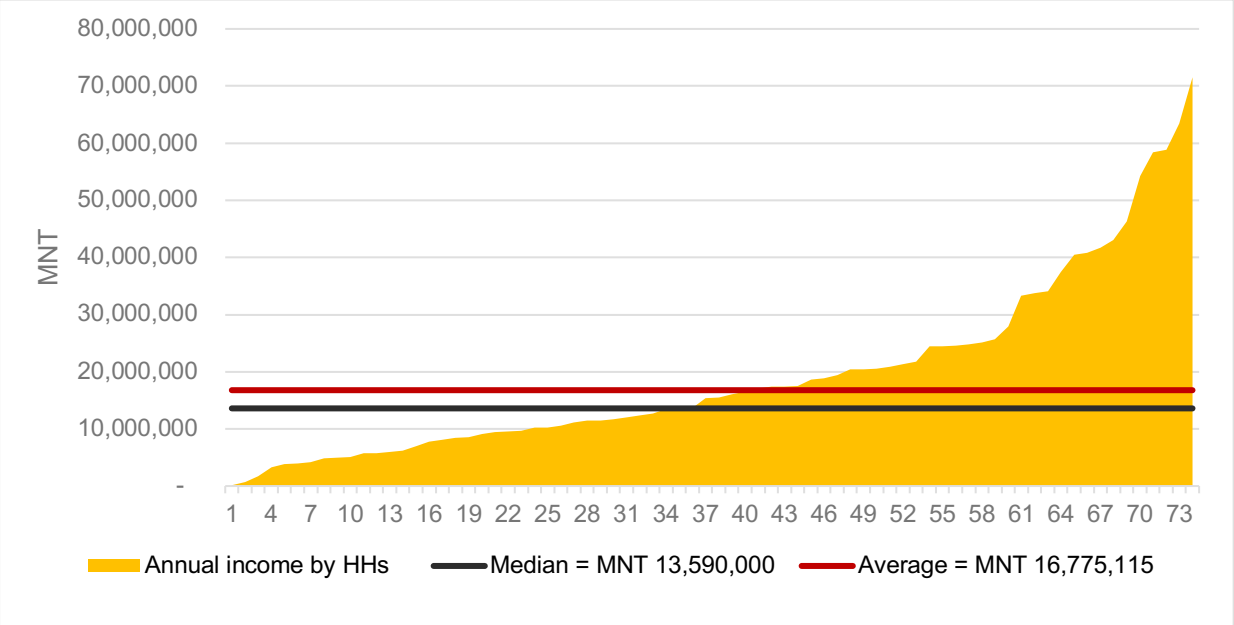


Figure 22 Average and Median Annual Income (73 HHs) Among Surveyed Households

Other earnings: Of the 78 households in the Household Survey, 74 provided a response to the question as to whether their household receives income in the form of goods (for example groceries, clothing, etc.). While 4 declined to provide an answer, 26 (35%) households noted that they receive income in the form of goods, while 48 (65%) did not. This type of income is not regarded as an indicator of poverty in this case, but rather is a common method of trade given the remote location of many of the households from formal markets.

Consumption Expenditure:

At the national level, the average monthly household consumption expenditure in 2018 was MNT 1,237,400, which increased by MNT 117,500 (10.5%) compared to the previous year. In the

Khangai region, the average monthly household expenditure in 2018 was MNT 1,130,671, which is slightly higher than the national average. These expenditure items included food 66.8%, non-food items and services 16.6%, other expenses 13.2% and support/ donation to others 3.4% (NSO 2019).

The consumption expenditure figures obtained in the Household Survey were highly variable in terms of the number of responses obtained for the different items (as can be seen in the Table 13) and it is therefore not possible to state with accuracy the average household consumption expenditure. However, those items with the highest number of responses include food – with the average annual expenditure MNT 2.7 million; followed by expenditure on social events and celebrations (including Lunar New year and Naadam) of MNT 2.0 million, and education costs MNT 1.8 million; and thereafter petrol and car services at just over MNT 1.5 million.

Table 13 Median Annual Household Consumption Expenditure (n=75)

Expenditure	No. of Households[8]	Average Expenditure Per Year (MNT)
Cost for livestock feeding, veterinary and tax	51	800,000
Cost for plantation and harvesting	6	500,000
Petrol and car service	67	1,500,000
Electricity and heating	28	240,000
Rent /pasture, winter and spring quarters/	1	300,000
Food*	70	2,750,000
Education (tuition fee, uniform etc.)	29	1,800,000
Medical expenses	54	475,000
Purchases (car, house items, furniture)	26	650,000
Clothes	70	1,000,000
Mobile, internet	66	300,000
Social activity, events, celebrations	68	2,000,000
Other expenses	9	1,000,000
Average monthly expenditure	**-**	**976,609**
Median monthly expenditure	**-**	**804,167**
Average annual expenditure	**-**	**11,719,307**
Median annual expenditure	**-**	**9,650,000**

The above noted level of consumption expenditure (monthly average MNT 976,609, and median MNT 804,167) is below the Khangai region (which includes Bayankhongor *aimag*) monthly average consumption recorded in 2018 at MNT 1,130,670. Figure 23 illustrates the median and average annual consumption expenditure among surveyed households.

[8] Number of households that provided a response in this category.

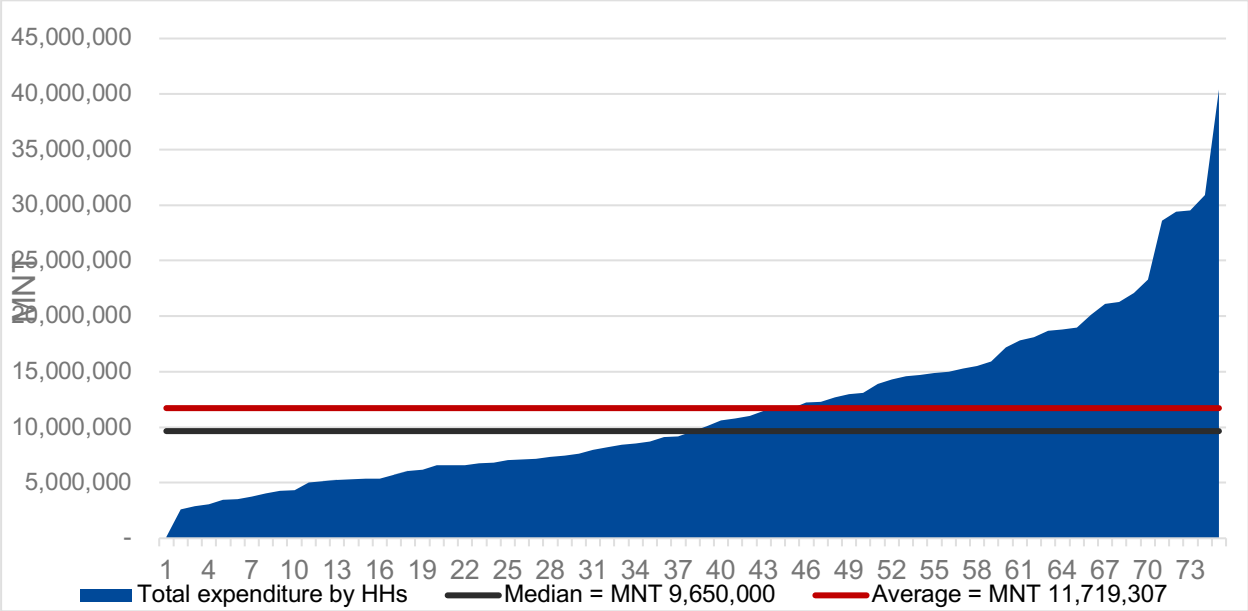


Figure 23 Median and Average Annual Consumption Expenditure Among Surveyed Households (75 Households)

Household consumption in the Project area of influence appears lower than stated incomes. This suggests that households in the Project area of influence are able to cover average, expected household expenses. Another key reason for the lower consumption expenditure observed can be explained by the fact that households did not include meat costs in their food expenditure as they consume their animals at no purchase cost.

In terms of household perceptions of the adequacy of their incomes, 42.5% indicted that their income is adequate enough to afford basic needs, but not adequate enough to allow for savings. A further 36% indicated that their income is adequate enough to afford basic needs and clothes, while 7% noted that their income is not adequate enough to afford basic needs, indicating that these households may be vulnerable to potential negative impacts of the project. Only 7% felt their income was adequate enough to allow them to buy luxury goods, and 8% noted that their income was sufficient to allow them to make savings.

1.9 Project Affected People

Project Affected People (PAP) are defined as the social groups and/or communities whose characteristics, including vulnerability and means of sustaining livelihoods, may be affected directly or indirectly by actions associated with the construction, operation and/or closure and decommissioning of a Project. The following PAP are relevant for assessing a range of economic impacts:

- local residents;
- herders; and
- businesses and entrepreneurs.

In an economy experiencing economic growth and associated inflationary effects, the following groups of people are potentially vulnerable to a relative decline in income and wellbeing:

- disabled and chronically sick people;
- families and people dependent on fixed welfare payments;

- low income households; and
- elderly people who are dependent on public pensions.

1.10 Conclusion

The key issue and themes noted in regard to the economy baseline are:

- Households in the Project area of influence have a high sensitivity to price fluctuations, with the majority of households' indicating that prices have increased a large amount in the past two years (particularly food prices).
- The monthly median income was MNT 1,132,500 among surveyed households, which is slightly lower than the per household income at the national level (MNT 1,201,900). Rural households had slightly higher incomes compared to the soum centre households. The main income source for rural household was income from agricultural products, whereas the soum centre household incomes were primarily derived from salaries and social welfare payments.
- The median annual expenditure was MNT 804,167 a month. Households did not include meat costs in their food expenditure as they consume their animals at no direct cash cost.
- The *aimag* centre hosts small-scale industrial activity, such as concrete mixing, trade, municipal water and power systems management, construction, and also a range of basic services. In 2019, Shinejinst had 28 active business establishments, and 18 in Bayan-Undur, including bread and pastry shops, a construction block business, noodle shops, cafes, a household wooden furniture and sewing shop, as well as a producer of dairy products.
- Mineral exploration has occurred at varying levels across both *soum*s. No major mining has taken place in either *soum*, though some small-scale gold and limited near surface coal mining have taken place. Very few households are reportedly conducting ASM, and ASM is confined to individuals who mine to supplement their livelihoods, and not as a permanent occupation in these *soum*s. In relation to the KGP and ASM, aside from some initial interest coinciding with Erdene's resource announcements, there has been little activity or interest in the KGP site by small-scale miners. Erdene periodically invites interested people to visit the site, and this has provided an opportunity for awareness creation within local communities that the gold at the KGP is not amenable to traditional ASM methods of mining, nor is the size of the potential KGP mine consistent with ASM.
- Regarding community perceptions of mining impacts, the top negative impacts mentioned relate to land use conversion and reduced land productivity, followed by water resources use, air quality deterioration and dust pollution. The main positive impacts associated with mining are that it can improve the local economy and increase the number of new jobs for the local job market.
- While there is low awareness among the community in the Project area of influence of methods of stakeholder engagement by mining companies, there is a high level of recognition that engagement by companies at all stages of mining is indicative of a good mining operator.

- As the KGP progresses into construction and operations, there are a multitude of opportunities for further return on investment for the Company and opportunities for advancement of community development priorities that build on the Company's successful approach and activities conducted thus far. Key to the success of future community development activities will be: Further linking community development activities to impacts (positive and negative); building capability within the Company and community to effectively scale up community development projects as the KGP progresses; managing community expectations and perceptions on community development projects, benefits, and entitlements so as to maintain and build trust in the Company and its integrity.

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

Erdene Mongol LLC

B11 - Employment and Labour

March 2019

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

BAG	Bayankhongor Aimag Government
EBRD	The European Bank for Reconstruction and Development
FDI	Foreign Direct Investment
FGD	Focus Group Discussion
GDP	Gross Domestic Product
ILO	International Labour Organisation
KGP	Khundii Gold Project
KII	Key Informant Interview
LLC	Limited liability company
MNT	Mongolian National Tugrik (currency)
NSO	National Statistical Office
PAP	Project Affected People
SPSS	Statistical Package for the Social Sciences

Glossary

aimag	The Provincial unit of administration in the territory of Mongolia
soum	Sub-province area; The second level of administration in the territory of Mongolia
bagh	Sub-division of soum; The third level of administration in the territory of Mongolia

1. EMPLOYMENT AND LABOUR

1.1 Introduction

This Chapter describes the Khundii Gold Project (KGP) context in relation to employment and labour, including the overall workforce, employment, labour and working conditions at the national, *aimag*, and local levels.

1.2 Baseline Characterisation Methodology

1.2.1 Sources of Information

Primary Data Collection

Several sources were used to develop the employment and labour baseline Chapter. Erdene commissioned Sustainability to conduct primary data collection in support of this baseline study. Data collection included the completion of Key Informant Interviews (KIIs) and Focus Group Discussion (FGDs) with local community members, and a Household Survey conducted in the Project area in August 2019. See *Chapter B1 Introduction* for further information on primary data collection.

In addition, as part of the environmental and social baseline study conducted to meet Mongolian national requirements, in 2016, a team of researchers from Eco Trade LLC conducted a survey in the Project area, including interviews with herder households. This Chapter also draws upon the findings of this survey.

Secondary Data Collection

Secondary data sources include national statistics, population and housing censuses, official statistics from *aimag* and *soum* governors' offices, annual *aimag*, *soum* and *bagh* level reports, and available reports on projects and programs in the Project area, among others.

A full reference list of sources of information is provided in Section 1.11.

1.2.2 Methodological Approach

The methodological approach employed to obtain the employment and labour baseline data included the completion of a statistically representative household survey in the Project Area of Influence, the data from which were analysed using the Statistical Package for the Social Sciences (SPSS). Furthermore, Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) were also conducted to explore and identify issues related to employment and labour at the *aimag*, *soum*, and *bagh* levels.

See *Chapter B1 Introduction* for further description of the social baseline methodology employed.

1.2.3 Project Area of Influence

The area of influence has been defined as Bayankhongor *aimag* as the macro-level social and economic impact of construction and operation of the KGP may affect receptors at the *aimag* level. Sub-areas within the Bayankhongor *aimag* include Shinejinst and Bayan-Undur *soums*, and specifically their *soum* centres, and Urtiin gol and Idren *bagh* (the *baghs* within which the KGP is located). The KGP will intersect with these *soums* and particularly at the *bagh* level, which may experience both direct and indirect environmental and social impacts from construction and operation of the KGP.

1.2.4 Applicable Standards

Applicable national laws and standards include the Labour Law of Mongolia which, among others, sets out the rights and duties of employers and employees, including provisions for collective agreement, collective bargaining, collective and individual labour disputes, labour conditions, terms and conditions of work, liabilities for breach of the legislation, and gender equality.

Applicable international standards and conventions include the EBRD Performance Requirement 2, which sets out the recommendations for labour and working conditions. Mongolia has also ratified international conventions on labour and occupational health and safety, including the International Labour Organisation's core conventions.

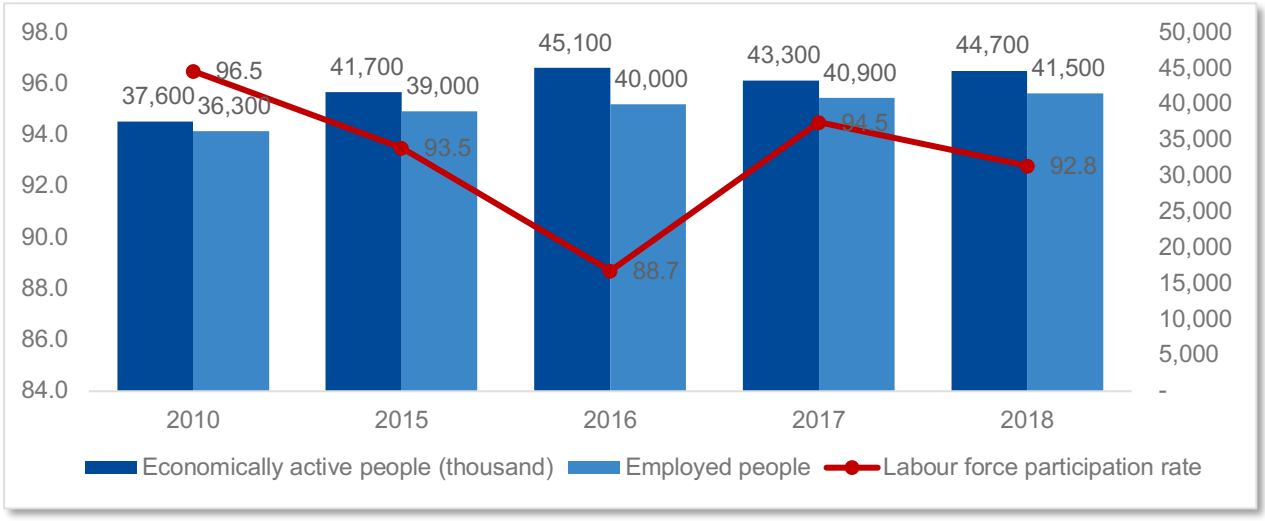
The above applicable standards are discussed in depth in Section A2 Policy and Legal Framework, and not repeated other than in summary here.

1.3 Labour Force and Labour Participation

As of 2018, at the national level, Mongolia had over 1,358,600 economically active[1] people, including 1,253,000 (92.2%) are employed[2], 105,600 (7.8 %) are unemployed[3]. The labour force participation rate in Mongolia is 61%, with urban participation at 55.4%, while rural participation is relatively high at 72.3%. The discrepancy between rural and urban labour force participation is due to most households in rural areas follow traditional nomadic livelihoods based on herding. In terms of the key employment sectors, the service sector accounts for 51.4%, agriculture 27.1% and the industrial sector 21.5%. Of those employed, a total of 294,800 people works as herders, while the remainder (944,100) are employed in salaried jobs, including 219,800 (17.7%) people that work in the informal sector (NSO 2018).

Of the economically active population in Mongolia, 3.7% (44,700) reside in Bayankhongor *aimag*. The economically active population in the *aimag* has increased between 2010 and 2018, consistent with average population growth. As shown in Figure 1, compared with the national average, the *aimag* had a relatively high labour participation rate of 92.8% (41,500) as of 2018. The relatively high labour participation rate can be explained by the *aimag* accommodating a high proportion (45%) of herder households (11,900) in the agricultural sector. Concerning the gender ratio, female participation in the labour force is 46.2%, which is lower than the figure for males at 52.8% (BAG 2018b). The lowest rate in the last decade was 88.7% in 2016. This decline mirrored the national economic decline in Mongolia in 2016 when the GDP grew by just 1.4% (CNN Business, 2019).

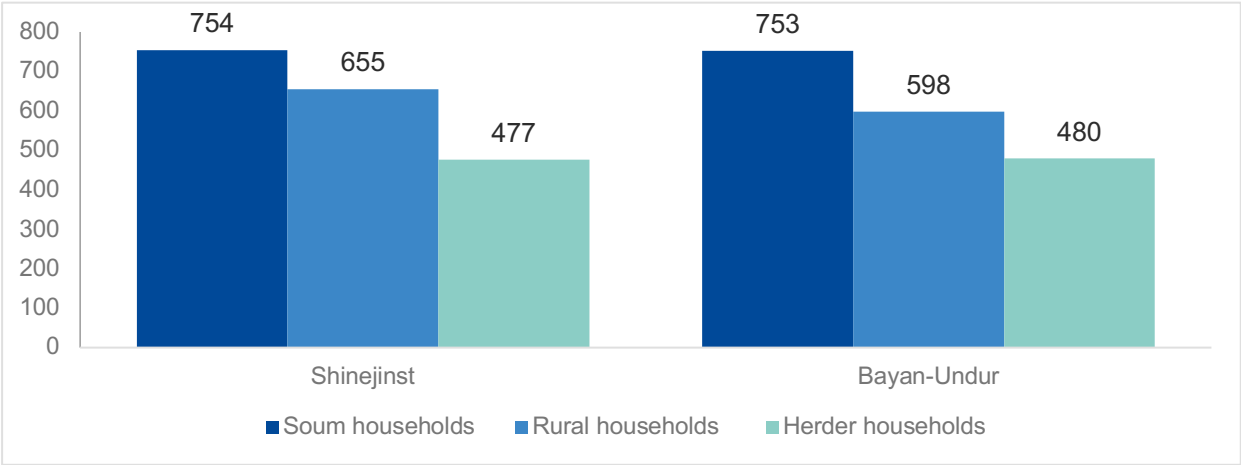
[1] Economically active population refers to the population who are capable of working (age 15 and over in Mongolia).
[2] Employed refers to people engaged in economic activity for wages or salary and have an employment status. According to the NSO methodology, people who worked for 1 hour in the past week are considered 'employed'.
[3] Unemployed refers to people who are capable of working and who have been unemployed during the reference period, and are available for work and actively looking for a job.



Source: BAG 2018b

Figure 1 Labour Force Indicators, Bayankhongor *Aimag*, 2010-2018

At the *soum* level, Shinejinst *soum* has 1,381, and Bayan-Undur *soum* has 1,685 economically active people. In both *soums*, the majority of working-age people work in the agriculture sector, mainly in herding: Shinejinst *soum* has 477 herder households (63.2%) and Bayan-Undur has 480 households (63.7%), which shows a very similar pattern between the two *soums*, as well as the significance of animal husbandry in household incomes as shown in Figure 2 (BAG 2018b).

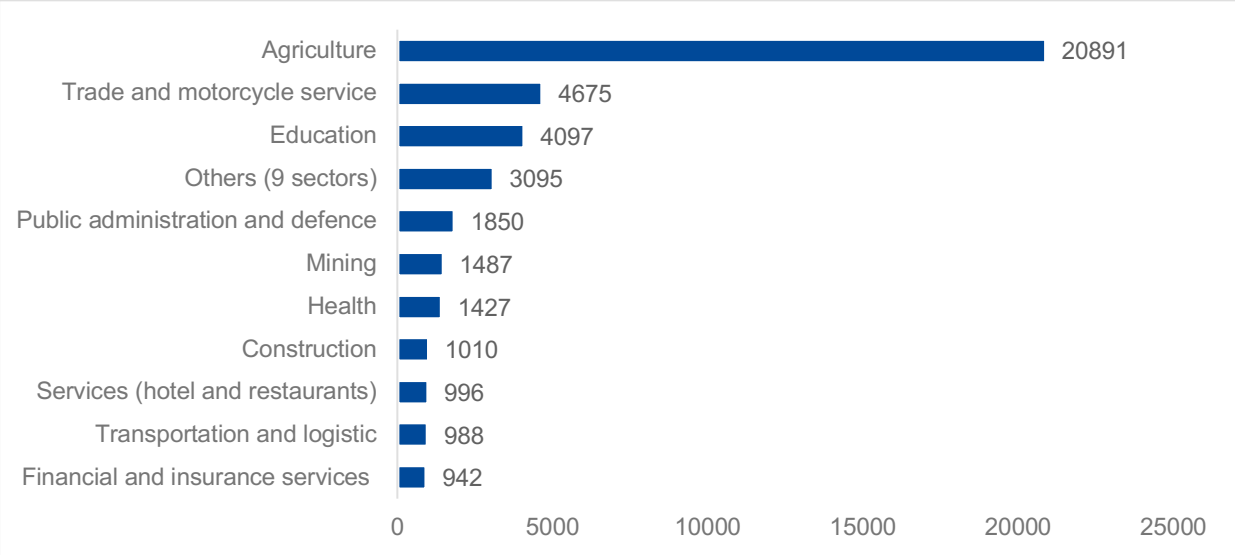


Source: BAG 2018b

Figure 2 Composition of Household Types, by *Soums*, 2018

1.4 Employment

At present, there are over 1.25 million people currently employed in Mongolia; 53.4% male and 46.6% female (NSO 2018). On the national scale, 3.7% of them live in Bayankhongor *aimag*. Since 2010, the employment rate in the *aimag* has gradually increased as follows: 36,300 (2010); 39,000 (2015); 40,000 (2016), 41,000 (2017) and 41,500 (2018). Eleven percent of total employment is in the public sector, whereas the remaining 89% is in the private sector, including agriculture. The ratio of public sector employment has barely changed in the last five years. As shown in Figure 3, agriculture, which includes herding, forestry, fishing and hunting, is the most significant sector (50%) for providing employment opportunities, followed by trade (11%), education (10%), public administration (4%) and mining (3.5%) (BAG 2018b).



Source: BAG 2018b

Figure 3 Employment by Sector, Bayankhongor *Aimag*, 2018

At the *soum* level, the primary employment sector is agriculture – herding and cropping which are mostly not regularly salaried and instead, agricultural products are sold to achieve earnings. Government-funded employment (mostly public servants) is the single largest salaried employment source in the *soums* due to the low level of business entities operating in both *soums*. The main activities for day labourers are cashmere combing, artisanal mining, and construction (KII, 2019). In a KII in Shinejinst, some of the difficulties associated seasonal and temporary employment were noted to include that day labourers and temporary workers often exhibit improper and irresponsible behaviour, leading to a loss of the job. For example, among seasonal workers, alcohol consumption is common, particularly around payday. This is associated with absenteeism in the days following payday.

As illustrated in Figure 4 below, the household survey results showed that 84% (62 persons) of household heads worked to generate income in the last month, and of which, 93% of them worked for more than ten months a year. Of 62 household heads that worked in the last month, 50% worked in herding[4], 18% worked in public sector, 10% worked in private sector and the rest 23% were self-employed. Further, it was found that 33% of other family members of working age (i.e. in addition to the head of the household) worked to generate income in the last month. Of these, the type of employment was indicated as self-employment. Of the self-employed family members, 82% were engaged in herding in the past 12 months.

[4] Note that this does not equate to the number of herder households, it is referring to the household head (who may be from a herder household, but not necessarily engaged in herding themselves).

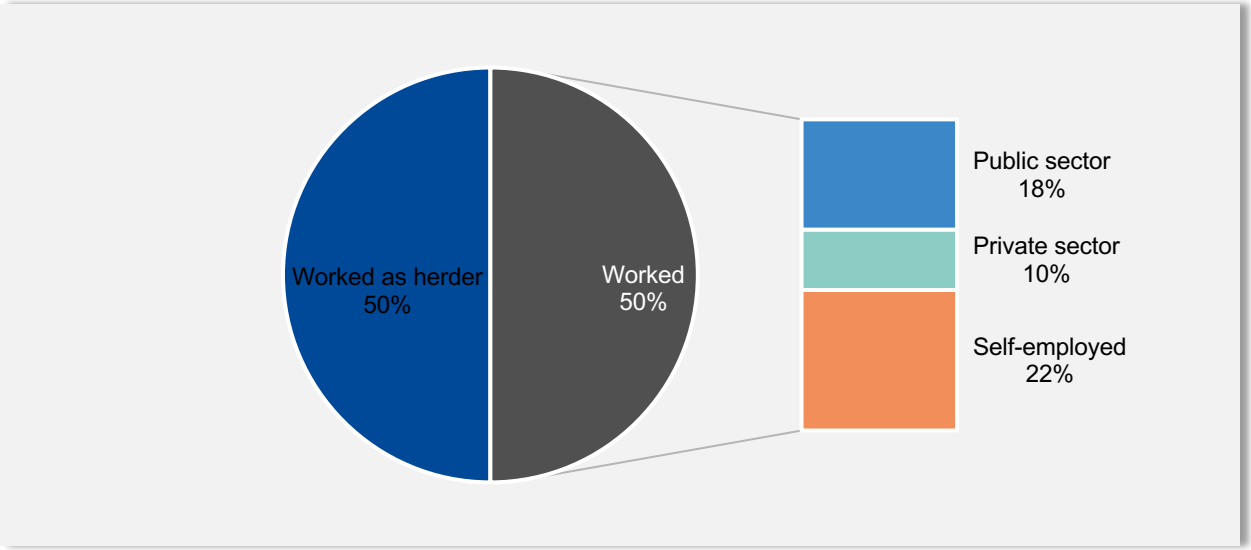
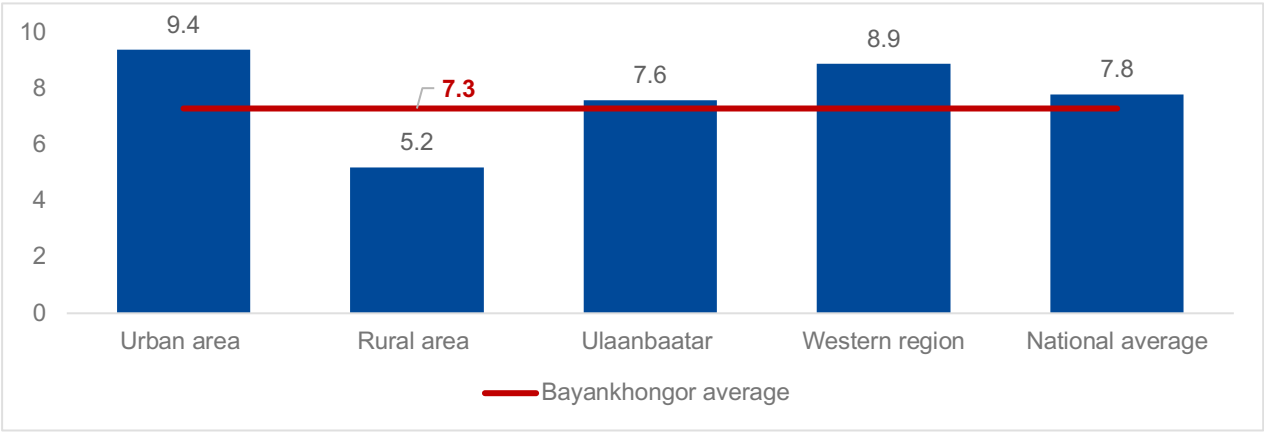


Figure 4 Percentage of Household Heads Who Worked in the Last Month

1.5 Unemployment

The unemployment rate is seen as an indicator of the efficiency and effectiveness of an economy to absorb its labour force and of labour market performance (ILO, 2019). As of 2018, the official national unemployment rate was 7.8%. Urban areas had a 9.4% unemployment rate, while the rate in rural areas was 5.2%. Men experienced a higher rate of joblessness at 8.3% compared to 7.1% for women. Historically, women have had a significantly larger share of non-agricultural wage employment than men in Mongolia (ILO 2019). However, women tend to be under-represented in the highest levels of wage employment (e.g. General Directors of companies).

According to the Labour Force Study (2018), the unemployment rate in Bayankhongor *aimag* is 7.3%, which is 0.5% lower than the national average, and 1.6% lower than the western region average, as shown in Figure 5. At the end of 2018, the number of *aimag* level registered unemployed people was 1,073 which was 0.7% lower than the previous year. Of those unemployed, 58.7% were women, while 41.3% were men. Only in the western region of Mongolia, is the women's rate of unemployment higher than men. In terms of age groups, 77.9% of unemployed people are between the ages of 15 and 44.



Source: Labour Force Study 2018

Figure 5 Unemployment Rate of Bayankhongor *Aimag*, Comparison with Other Locations

At the *soum* level, as of 2019, there were 128 unemployed people (28 people from Urtiin Gol *bagh*) registered in Shinejinst *soum* and 40 in Bayan-Undur *soum*. The *soum* labour market is not diversified, with the key employment sectors being agriculture (herding), the public sector, and services. Furthermore, the *soums* generally lack skilled people (see *Chapter B8 Demography* for further discussion on skill levels).

> *"… The soum promotes individuals if their profession meets soum needs. For example, the soum government provides accommodation free of charge and gives a bonus salary of 2 million MNT each year. But it is hard to attract skilled human resources in a remote soum…There is more competition for job opportunities such as for drivers and service workers etc. However, work positions that require special skills have no competition, and there are no people who can meet the requirements."*
> KII, Bayan-Undur *soum*, August 2019

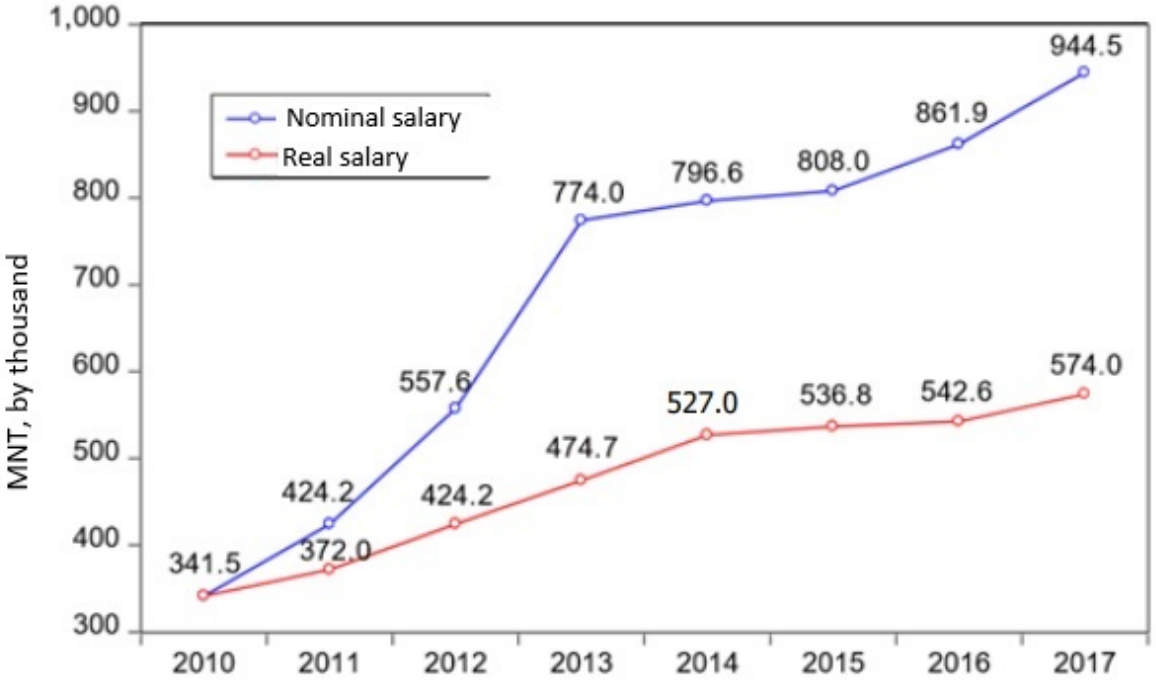
Unemployment among youth is considered as the biggest problem at both the *aimag* and *soum* levels. Young adults, and particularly males, are vulnerable in this respect, due to the relatively lower levels of formal education among males, and lack of soft skills, combined with the very low rate of job creation. According to the KIIs, many new graduates return to their home *soum* after graduation, but there are no available jobs in most cases, except herding, which is often not attractive to youth. The perceived high levels of alcohol consumption among young adults in the *soum* is attributed to underemployment and lack of opportunities.

> *"… The number of people who work in governmental organisations is limited. If a man is hired, he will work until retirement. The new graduates have no jobs. Low market and low profitability."*
> KII, Bayan-Undur *soum*, August 2019

The Household Survey indicated that 16% of household heads and 18% of other family members over the age of 15 had not worked formally to generate any income in the last month and in most cases, all of the past year (i.e. in occupations other than herding). The reasons provided for being unemployed included, retired, no jobs available, sick, and studying. It should be noted that in rural areas, being a herder is regarded as the equivalent to "official" employment. It was observed that there are almost no job opportunities for those who reside in the *soum* centre.

1.6 Salaries and Income

At the national level, out of total workers, 39.3% are contracted employees, 35% are self-employed, and 24.8% are unpaid workers who assist in a family business. Most of the unpaid workers who help households (61.3%) are women (NSO 2018). Mongolia has experienced a notable increase in salaries since 2012, due to high economic growth driven to a large extent by the resources sector and foreign direct investment (FDI) (World Bank, 2012). The inflation rate has also played a critical role in the salary increases experienced, in addition to the afore-mentioned drivers. The average nominal salary experienced a sharp increase between 2010 and 2013, with the 2013 nominal salary (MNT 774,000) 2.3 times higher than the amount in 2010 (Figure 6). Since 2013, the average nominal salary gradually increased, and reached MNT 944,500 in 2017, which was 1.2 times higher than in 2013. However, when adjusting for inflation during this period, real salaries were much lower (by almost half) than nominal salaries and there was little changes to people's purchasing power (NSO, 2018).



Source: NSO. 2018

Figure 6 Annual Average Nominal and Real Salaries, 2010-2017, by Thousand

The government has periodically issued decisions to increase the minimum wage since 1995 (16 times) and the last five decisions are noted as follows:

- MNT 140,400 in 2011 – 2013;
- MNT 192,000 in 2013 (Sep) – 2016;
- MNT 240,000 in 2017 – 2018;
- MNT 320,000 in 2019; and
- MNT 420,000 in 2020 (to be enacted).

As of 2018, at the national level, the gross average monthly salary was MNT 1,002,900. Looking at the average salary by economic sectors, the highest wages are in the mining and extractive sector (MNT 2.3 million per month), whereas the lowest wages are in the services sector, such as housekeeping jobs at hotels and cafés (MNT 0.6 million per month). Out of the total percentage of employed people, 8% (or 58,000 people) are paid the minimum wage rate, as defined by the government (MNT 240,000 per month).

As required by the Mongolian Labour Law, employers are obliged to pay the same salary to female and male employees performing the same work, as well as determine and eliminate breaches of these legal provisions. There has been a prominent narrowing of the gender wage gap in Mongolia since 2006-2007. In 2006 – 2007 it was 11.4% (% of male hourly earnings), narrowing to 8.8% in 2016. In 2019, there is now only a marginal relative difference between the average hourly earnings of men and women, at 1.1 per cent as shown in Table 1 below (ILO 2019:26). During the KII with Bayankhongor *aimag* officials, there was no mention about gender wage gap.

Table 1 Gender Wage Gap, 2006-07 and 2016 (%)

Employees	Average Hourly Earnings (MNT Thousand)		Gender Wage Gap (% of Male Hourly Earnings)
	Male	Female	
2006-2007	0.6	0.5	11.4
2016	3.3	3.0	8.8

Source: NSO 2018

The 'average salary' at the *aimag* level is MNT 656,500 which is 11% higher than in 2017 (the *aimag* has experienced a gradual increase in average salaries since 2014) but it is still lower by MNT 346,400 when compared with the national average of MNT 1,002,900 (BAG 2018b).

With regard to income sources within the Project Area of Influence, the Household Survey found these consistent with the key employment sectors – namely agriculture (herding), public service, and services sector. There were 33 respondents (40%) who have formal employment and obtain more regular earnings. The other households mostly relied on earnings from agricultural products, which vary each year. Out of these 33 who have a monthly income:

- 19% earn less than MNT 300,000;
- 28% earn between MNT 300,001-500,000;
- 28% earn between MNT 500,001-700,000;
- 19% earn MNT 700,001-900,000; and
- Only 6% earn more than MNT 900,001.

At the same time, if the monthly income of all household's subject to the Household Survey is assessed, incomes are consistent with these same brackets (Shown in Figure 7 below). The average 'household income' per month was MNT 1,132,500 (*aimag* average is MNT 990,800), including the highest income of MNT 4,200,000 and lowest income of MNT 200,000.

The Household Survey asked about monthly salary incomes of households. Only 33 households of the total 78 households surveyed reported that they had a salary income in the last 12 months.. The median (average) was MNT 700,012 (or MNT 8.4 million per annum), which is slightly higher than the national average (MNT 599,100), partially explained by those households (42% of total surveyed households) who have more than three adult members that work in the household. It is noted that *soum* centre households earn higher salary incomes than herder households (higher by MNT 200,000).

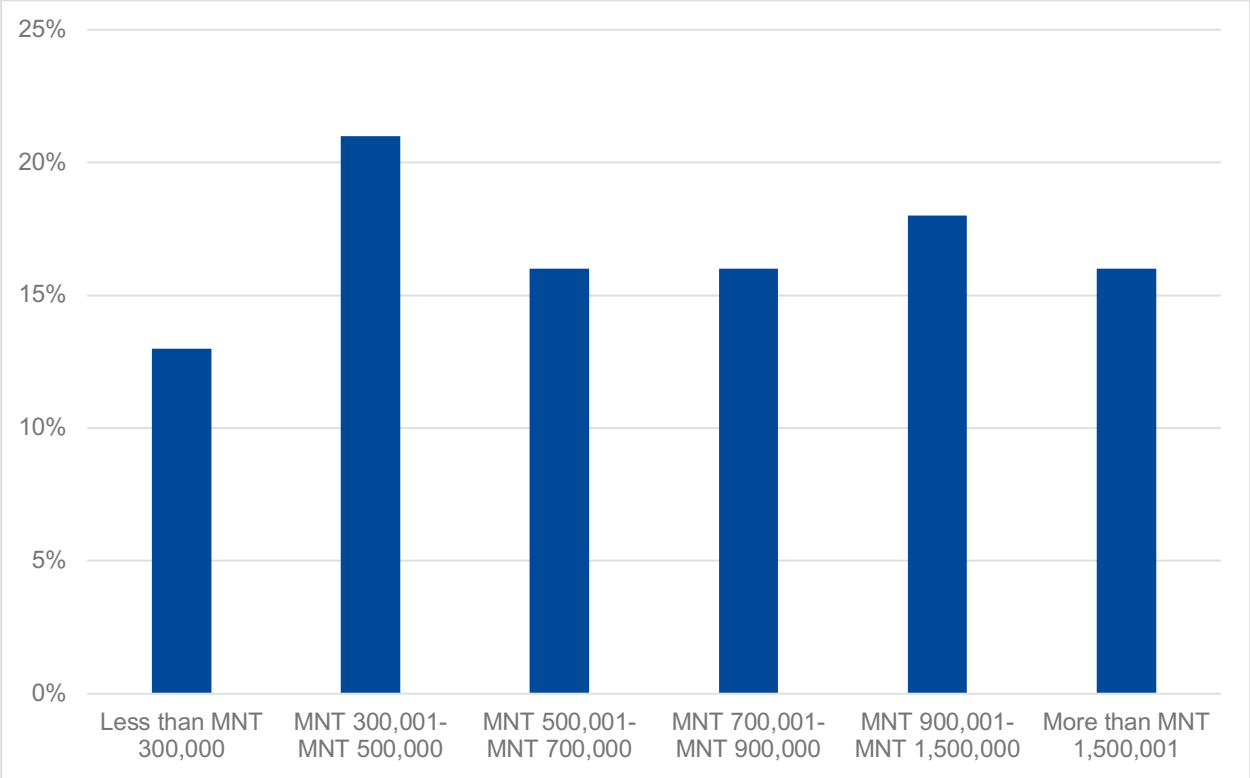


Figure 7 Monthly Income of Surveyed Households

Full-time salaried workers have public medical and social insurance, with public pension options at retirement age. Temporary seasonal jobs tend to be unpredictable and do not provide social protection (KII, 2019).

Among all surveyed households, the highest annual earnings from herding were reported at MNT 57.5 million whereas the lowest one was MNT 70,000. In both *soums*, herding is the primary economic activity and income from agricultural products is significant. For *soum* centre households, the main source of income is salaried employment, supplemented with sales of agricultural products. Whereas for herder households, the key sources are mainly sales of agricultural products (see further detail in *Chapter B10 Economy*). For the surveyed households, the average annual earnings per household were 11.3 million MNT. Among the surveyed households, annual incomes from livestock ranges as follows (see Figure 8):

- 12% earn up to MNT 5 million;
- 19% earn MNT 5-10 million;
- 32% earn MNT 10-20 million;
- 23% earn MNT 20-40 million;, and
- The rest 14% earn higher than MNT 40 million MNT.

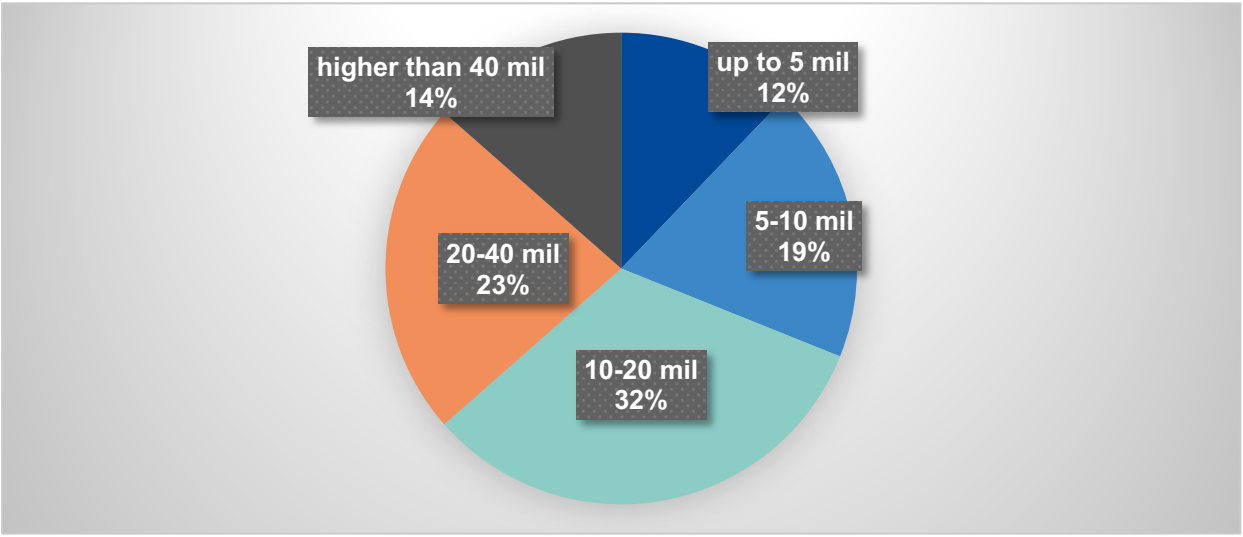


Figure 8 Households' Annual Income from Livestock (MNT)

Note that discussion on living standards and poverty, with reference to consumption and income indicators, is included in *Chapter B10 Economy*.

1.1 Working Conditions

As stated by the ILO (2019), the proper application of labour legislation depends on an effective labour inspectorate. In 2017, the labour inspection rate in Mongolia was 0.8 (eight labour inspectors per 100,000 employed persons), which indicates considerable staff deficiency. Working conditions in Mongolia are therefore rarely inspected, and worker complaints tend to remain unattended by the public administration generally.

The common issues associated with working conditions and rights in Mongolia are working time (excessive, atypical and short hours), poor adherence to annual leave entitlements, health and social insurance coverage, as well as poor job security and vulnerability. This is particularly the case for those employed in the animal husbandry sector, with often unfavourable working conditions, such as lack of job security and social protection. In the Household Survey, respondents were asked about cases related to violations of employee rights and labour relationships, only two respondents mentioned that they had heard about "forced child work" and "assistant herders not receiving their wage due to lack of a written agreement" in their area. When the researcher probed further to clarify responses, additional detail was not forthcoming. Additionally, during the FGDs and KIIs, no issues were raised in relation to working conditions and labour relations in the soum. People generally perceive that family assistance in activities such as livestock breeding (including children's support) is both a normal and traditional activity.

There were three respondents in the Household Survey that indicated there are cases of employers requiring employees to work overtime in private entities in the *soum* (consistent with the key issues noted at the national level). However, when the researchers probed further about particular cases, respondents did not provide any further specification or information. Further investigation did not reveal any evidence that Labour Law and legislation violations had occurred in either *soums*.

In general, data on occupational injuries are not readily available in Mongolia, and there was no information to this end at the *aimag* and *soum* level.

1.7 Job Creation

In 2018, the Employment and Labour department of Bayankhongor *aimag* received 1,688 open job orders from the employer organisations *aimag*-wide. The sectors that made the highest number of requests were agriculture (451), service sector (276), construction (205), processing industry (178), education (177), mining (116), administration and public service (51) and social welfare (34) (BAG 2018b).

In Shinejinst *soum* centre, very few new, regular or temporary vacancies are announced. Furthermore, private business opportunities are constrained due to weak infrastructure development, lack of market for goods and services, among others, which hinder job creation. Significant barriers to improvement are evident, including at the *soum* government level. For example, in Shinejinst *soum*, one public servant is responsible for both employment and social welfare issues. Due to the high workload relating to social welfare requests, the staff has limited time to focus on employment-related duties (KII, Shinejinst *soum*). It was suggested that the *soum* needs to establish an employment support centre that could provide practical assistance, information, and advice in order to prepare potential workers for the available sectors (potentially for mining).

As noted by the Bayankhongor *aimag* Industry and Agriculture Department, regarding their livelihood support program for target social groups, the *aimag* implements a program called "Ilgeeltiin Ezen" which provides 100 animals to 10 households respectively each year. This program helps unemployed household members become herders and improve their livelihood. In terms of effectiveness, generally the program helps households cope with hardship. However, the success of these programs mostly depends on individual's attitudes, hard work and commitments. Therefore, behavioural-based training and practical capacity-building are noted to be indispensable to these (and other) livelihood and job creation support programs in the *aimag*.

It was observed that the *soum* authority and families with active working-age members have high expectations of Erdene and the KGP to create more job opportunities for *soum* residents. They hoped that mining activities would create workplaces and increase salaries. However, at the same time, they assessed that the current work force at the *soum* level is not ready to engage with the mining industry in terms of having the required skills and work ethic.

> *"… When aimag and soum have mining operations, there are certainly employment opportunities for the local people. However, we, the local authority and local people, generally could not meet the workplace requirements. For example, a few years ago, [a company] hired locals from the community when they were active. Yet, there were problems from the workers, like people were not skilled enough, being irresponsible and having a very poor work ethic. This made it hard for mining companies to further consider local people as a potential human resource for their project. Therefore, job preparation programs and training are essential at the soum level."*
>
> (KII, August 2019, Bayankhongor)

1.8 Project Affected People

Project Affected People (PAP) are defined as the social groups and/or communities whose characteristics, including vulnerability and means of sustaining livelihoods, may be affected directly or indirectly by actions associated with the construction, operation and/or closure and decommissioning of a Project. The following PAP groups are relevant for assessing a range of employment and labour impacts:

- Mongolian and foreign workers;
- local residents;

- herders; and
- businesses and entrepreneurs.

In the context of employment and livelihoods, the following types of people are considered as being potentially vulnerable to impacts when attempting to gain employment in a developing economy such as that of Bayankhongor *aimag*, and specifically Shinejinst and Bayan-Undur *soums* (in which there is little experience of mining):

- people with low levels of education;
- women;
- people with a limited non-agricultural skills base; and
- people without easy access to information on job opportunities.

1.9 Conclusion

The Social Baseline study has drawn several key patterns regarding employment and labour.

- At the *soum* level, Shinejinst *soum* has 1,381, and Bayan-Undur *soum* has 1,685 economically active people. In both *soums*, the majority of working-age people work in the agriculture sector, mainly in herding. Herding is also the primary source of household incomes in the Project Area of Influence.
- Unemployment and under-employment among the youth are considered as the biggest problem at both the *aimag* and *soum* levels.
- With a general reliance on herding as the primary source of income and lack of income diversification at the *soum* level, there is high potential vulnerability to shocks (economic, social, environmental) among households in the event that the primary source of income is impacted.
- The average 'household income' per month was MNT 1,132,500 (*aimag* average is 990,800 MNT), including the highest income of MNT 4,200,000 and lowest income of MNT 200,000.
- *Soum* authority and families with active working-age members were observed to have high expectations of Erdene and the KGP to create job opportunities for *soum* residents. However, at the same time, there is an awareness by communities that the current workforce at the *soum* level does not generally have the required skills and work ethic to take advantage of these potential opportunities without additional skills / capacity development and / or job readiness training.

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

Erdene Mongol LLC

B12 - Social Infrastructure

March 2019

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

ADB	Asian Development Bank
BVN/ZMBH	The Bayankhongor Airport
CO_2	Carbon Dioxide
EBRD	The European Bank for Reconstruction and Development
ESIA	Environmental Social Impact Assessment
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GIZ	The Deutsche Gesellschaft für Internationale Zusammenarbeit or German Development Agency
GPS	Global Positioning System
IT	Information Technology
KGP	Khundii Gold Project
KII	Key Informant Interview
LLC	Limited Liability Company
MNT	Mongolian National Tugrik (currency)
MSIS	Mongolian Statistical Information Service
PAP	Project Affected People
PR	Performance Requirement
SPSS	Statistical Package for the Social Sciences
TV	Television
TVET	Technical and Vocational Education and Training
UN	United Nations
UNICEF	United Nations Children's Fund

Glossary

aimag	The Provincial unit of administration in the territory of Mongolia
soum	Sub-province area; The second level of administration in the territory of Mongolia
bagh	Sub-division of soum; The third level of administration in the territory of Mongolia

1. SOCIAL INFRASTRUCTURE

1.1 Introduction

This Chapter of the KGP ESIA describes the social infrastructure in the Project area, including the development thereof, the current condition and adequacy of existing infrastructure, and the supply and consumption of social services. The content focuses on education, energy, water supply and wastewater management, sanitation and solid waste management, transport infrastructure, and communications and postal services in Bayan-Undur and Shinejinst *soums* and *baghs* in Bayankhongor *aimag*.

1.2 Baseline Characterisation Methodology

1.2.1 Sources of Information

Primary Data Collection

Several sources were used to develop the social infrastructure baseline Chapter. Erdene commissioned Sustainability to conduct primary data collection in support of this baseline study. Data collection included the completion of Key Informant Interviews (KIIs) and Focus Group Discussion (FGDs) with local community members, and a Household Survey conducted in the Project area in August 2019. See *Chapter B1 Introduction* for further information on primary data collection.

In addition, as part of the environmental and social baseline study conducted to meet Mongolian national requirements, in 2016, a team of researchers from Eco Trade LLC conducted a survey in the Project area, including interviews with herder households. This Chapter also draws upon the findings of this survey.

Secondary Data Collection

Secondary data sources include national statistics, population and housing censuses, official statistics from *aimag* and *soum* governors' offices, annual *aimag*, *soum* and *bagh* level reports, and available reports on projects and programs in the Project area. These sources are referenced as applicable throughout the Chapter. A full reference list of sources of information is provided in Section 1.11.

1.2.2 Methodological Approach

The methodological approach employed to obtain the social infrastructure baseline included the completion of a statistically representative household survey in the Project Area of Influence, the data from which was analysed using the Statistical Package for the Social Sciences (SPSS). Furthermore, KIIs and FGDs were also conducted to explore and identify issues related to social infrastructure at the *aimag*, *soum*, and *bagh* levels.

See Chapter B1 for further description on the social baseline methodology employed.

1.2.3 Project Area of Influence

The area of influence has been defined as Bayankhongor *aimag* as the macro-level social and economic impact of construction and operation of the KGP may affect receptors at the *aimag* level. Sub-areas within the Bayankhongor *aimag* include Shinejinst and Bayan-Undur *soums*, and specifically their *soum* centres, and Urtiin gol and Idren *bagh* (the *baghs* within which the KGP is located). The KGP will intersect with these *soums* and particularly at the *bagh* level, which may

experience both direct and indirect environmental and social impacts from construction and operation of the KGP.

1.2.4 Applicable Standards

Applicable national laws and standards include the Minerals Law which regulates the exploration and mining of minerals and the protection of mining areas and their surroundings. The Mongolian Water Law is also relevant in that it makes provision to regulate issues arising from the protection, use and recovery of water, and responsibilities thereof. Similarly, the Energy Law is also relevant in that it regulates matters of energy generation, transmission, distribution, dispatching and supply activities. The Law on Waste and Hazardous Substances is applicable to social infrastructure, setting out provisions for the classification, collection, transportation, storage, reuse and disposal of waste. *Chapter A2 Policy and Legal Framework*, provides a detailed description of national requirements. The key international standards, specifically the European Bank for Reconstruction and Development's (EBRD) Performance Requirements (PRs), applicable to the Project are also detailed in Chapter A2.

1.3 Education

While education levels in Mongolia are generally high (see *Chapter B9 Demography*), a key issue currently confronting the country is the maintenance and modernisation of aging educational facilities and the building of new facilities to meet the requirements of the future.

Education facilities and resources are provided in *aimag*s, *soums* and *baghs* based on population, funded by the state budget, and administered by the Ministry for Education. In order to provide education services for rural households, including nomadic herder households, Mongolia has historically provided dormitory facilities in most *soum* centres for children during the academic year.

In total, Bayankhongor *aimag* currently has 42 kindergartens and 30 schools available. Bayan-Undur *soum* has one kindergarten, and one school, and there is also one kindergarten and a school in Shinejinst *soum*. Both of the schools in Bayan-Undur and Shinejinst *soum* only provide educational services up to Grade 9, whereupon students who progress their education further must do so at facilities based in other *soums* or in the *aimag* centre. Despite a slowly increasing population and a large portion of young children within the population, the number of institutions providing education at all levels is tending to remain static, leading to overcrowding of the existing facilities. There is a TVET program in the *aimag*, in addition to a branch of the national university. Further discussion of specific educational infrastructure and services is provided below.

1.3.1 Kindergarten Services

Nationally, with respect to kindergarten facilities, UNICEF notes that access to kindergarten still remains a challenge in Mongolia, despite creative practices, such as the mobile ger kindergarten, which aims to cater for the children of nomadic herders. Kindergartens include state-owned and private kindergartens as well as alternative educational programs that are coordinated in parallel with the kindergarten educational syllabus (UNICEF 2019). At the *aimag* level in 2018 there were 42 kindergartens available, staffed by 474 teachers (including full-time, part-time and assistants) who catered for 7,836 children. The majority (90%) of children attended kindergarten at the *aimag* level.

Both Shinejinst and Bayan-Undur *soums* have one kindergarten. A new kindergarten was built in Shinejinst in 2017. In FGD discussions in Shinejinst *soum*, it was noted that improvement of the skills and qualifications of the kindergarten teachers is an issue. In Bayan-Undur the capacity of

the kindergarten is insufficient to meet current needs and the facility is thus in need of expansion. Kindergarten coverage is good in both *soums*, with over 90% of children under 6 provided with services.

1.3.2 Primary and Secondary Education Services

The majority of primary and secondary schools in the *aimag* are public facilities. As of 2018, there were a total of 31 primary and secondary schools with 16,794 children and 886 full-time teachers operating at the *aimag* level. Of the schools in Bayankhongor *aimag*, 29 are state-owned, while two are privately owned. In total, there are 14 secondary schools (Grades 1-12), 11 elementary schools (Grades 1 – 9), and 5 primary schools (Grades 1-5) in the *aimag*. Bayankhongor city centre has a total of 9 schools, including 5 primary, 1 elementary and 5 secondary schools.

Education service coverage is good in Bayankhongor, with 99% of children between 6 and 18 provided with education services. As noted in Chapter B9, the school dropout rate in Mongolia is low, including in Bayankhongor *aimag* where it is around 0.01%. In the 2017-2018 school year, 153 children with moderate/mild disabilities attended formal education services. Moreover, six children with severe disabilities received informal, home-based education services through teacher visits from the *aimag* Education Agency's Lifelong Education Unit (The Lifelong Education National Centre 2018).

Teachers receive incentives based on their quarterly performance review. At the *aimag* level, teachers take specific exams to determine their level of qualification and based on the result, teachers receive incentives. Teachers are remunerated (by the *aimag* fund) in association with the success of students during the general admission examination. School teachers are reported to attend specialisation training on a regular basis (KII, Bayankhongor *aimag* centre).

Shinejinst *soum*:

In Shinejinst *soum*, there is one public school that provides for Grades 1 to 9. There are 15 classes and the capacity of the school is for 320 students. In 2012, the school building was extended, and the capacity of the school increased by 90 students. However, there is still a lack of classrooms especially for the primary grades as the number of children attending 1-5th grade is increasing. A key issue with the educational facilities is the limitation of only providing services up to Grade 9, which prohibits many children from progressing with their education at home. This issue was noted in the Herder FGD, with participants indicating the lack of a high school in the *soum* prohibits their children from high school attendance due to the extra costs of sending them elsewhere and the difficulties of separation.

In order to attend school, herders' children stay in the dormitory in the *soum* centre. Therefore, the maximum distance travelled by children to school is around 700-800m, as reported in the Household Survey. The school facilities include a main building, a sports hall, and two dormitories. The main school building was renovated in 2018 with investment from the State. Electricity and plumbing in dormitory #1 were renovated with investment by the *Soum* Development Fund. There is no central water supply network in the *soum*. However, the *soum* school has both in-house and outdoor toilets. Water drawn from an engineered well is used in the in-house toilet and taps. Shinejinst school facilities are therefore better equipped than the majority of schools in the *aimag* which generally lack plumbing, heating and permanent power supply (KII, Bayankhongor *aimag*).

Some of the upgrades to the Shinejinst education facilities have been financed through mining company support, and previous support and collaboration with Erdene was noted as particularly beneficial. This support includes the provision of equipment for the school dormitory, among others. Also providing a major source of support in maintaining school infrastructure is parent

involvement and contribution, particularly in the maintenance of the dormitories. A high level of parental involvement in maintenance of school facilities is reportedly required, in the absence of these services being provided by the State. Parents are also reported to be paying more attention recently to the quality of the education that their children are receiving, and the value ascribed to educational quality is increasing in the *soum*.

Reportedly, there are around 20 students including children and adults receiving informal educational services, such as literacy programmes, in Shinejinst. There is no difference between different groups/people in the community in terms of access to facilities and education service. Children from vulnerable households (e.g. single-headed households, migrant families) are recorded by the respective class teachers and special measures are taken to support these students, for example, providing textbooks from the school library, and giving New Year's presents, among others. In the *soum*, there is also a Joint Team (comprised of different specialists including teachers and social workers) and these team members take actions in their respective sectors to ensure facilities and services are adequately provided to these individuals.

The *soum* school has 22 full-time teachers including 9 for primary grades and 13 for secondary grades. The majority of schoolteachers (19 of 22) are female. In addition, 4 teachers have a master's degree, while the others have bachelor level educations. Teachers are predominantly young and have been teaching for less than 10 years. As noted in the quotes below, a program has been prepared to support teacher retention based on a similar experience in another *soum* which involved support from a mining company.

> *"Motivation of teachers is not good and not much has been done to retain good teachers. It is essential for the soum to retain good teachers. So, the Teachers' Development Program has been prepared and will be reviewed by the soum Citizens' Representatives Khural. Soums, such as Bayan-Ovoo, where mining is well developed, are taking measures to motivate and retain teachers. For instance, an incentive of (3 or 10 million MNT) is given to teachers every year who have remained in the soum for 5 years and performed well. The same approach is included in our proposed program."*
>
> KII, Shinejinst *soum*

The main challenges reported in education infrastructure and services in Shinejinst include:

- High turnover (instability) of teachers, and lack of specific teachers (i.e.: chemistry). Developing or improving knowledge and skills of the teachers and retaining highly qualified teachers in the *soum* school.
- Improving school facilities as a complex is important, instead of the current piecemeal approach.
- The *soum* has Wi-Fi, however, additional tools and technology for teaching such as projectors are required to utilise the benefits of IT and advanced technologies.

Bayan-Undur *soum*:

Educational services in the *soum* are limited to primary school (1st to 9th grade). There is no secondary school in the *soum*. One KII respondent eluded to the difficulties currently experienced with over-crowding in the local school, highlighting that "the primary school accommodates only 87%-88% of school age children in the *soum*, and the remaining children have to enroll in other schools in different areas including the *aimag* centre and the capital. The school has a capacity of 320 and currently has 420 pupils." Community feedback from FGDs and KIIs was mixed on the capacity of the school, with some noting it insufficient, and others perceiving that the school is able to provide adequate services. Like in Shinejinst, the limitation of only offering education up to Grade 9 was also noted.

A number of the challenges currently experienced are noted in the quotes below. Of particular reference to potential mining impacts such as potential population influx and exposure of local communities to the mine workforce, is the comment that health education is poor in the *soum*. This points to vulnerability among youth to potential health impacts of mining development (for example, increased exposure to communicable diseases such as STIs through interactions with Project workforce).

> *"Health education is very poor among the soum people, such as general hygiene and sexually transmitted diseases. "*
>
> KII, Bayan-Undur *soum*
>
> *"Education is poor. New teachers come every year and there is no stability."*
>
> KII, Bayan-Undur *soum*

In 2016, a sports hall was constructed with a cost of 470 million MNT under the Local Development Fund budget. In addition, school restoration was conducted. KIIs reported that the supply of devices such as laptops and printers are sufficient for teachers, but the supply of laptops and other training utilities and materials are insufficient for students, limited to only 15 laptops (with the appropriate number being 30). In order to accommodate all students, the lower grades study in two shifts and middle grades study in one shift. The school building has a usable area of 2,600 m^2, and dormitory that has the capacity to accommodate 80 pupils. The school building is directly connected to a well by a pipeline, though there is no sewage system. Currently, the dormitory is being expanded and will be operational in 2019.

One KII respondent highlighted that the political situation greatly influences the quality of educational services in the *soum*. Namely, in the last 2 years, parents' satisfaction has dropped rapidly since the principal was reportedly replaced for political reasons. As noted in Figure 1, the level of satisfaction with educational services is predominantly "good" and "average", with only just over 9% indicating "bad".

The school has 25 teachers. Of which, 2 are male and 23 are female. All of them possess bachelor's degrees. According to the Institute of Teacher's Professional Development in Mongolia, there are three professional levels for teachers – 1. Leading, 2. Advising, and 3. Methodologist. Thirteen of the teachers have attained the 'leading' professional level and the remaining 12 have not attained a professional level. Like in Shinejinst, teacher attraction and retention are key issues in Bayan-Undur. Reportedly, experienced and highly skilled teachers seldom come to the *soum*, and this has a great impact on the quality of teaching and the developmental outcomes of children. An example of an effective short-term secondment was provided to illustrate the types of initiatives that have worked well in the *soum*: "An English teacher working at Oyu Tolgoi, who is native to this *soum*, came for one month and taught English. The training was very effective." Further, it was noted that as part of a community development initiative, Erdene engaged an English teacher for a month, as well as a dance teacher for a week, as part of a capacity building, community development initiative for the *soum* school, which was well received by the local community.

The Household Survey asked respondents about their level of satisfaction with the quality of school / education services in their living area, with the majority indicating "good" (over 40%), closely followed by "average" (just over 36%). It can be concluded that while there are many challenges facing the provision of quality educational services and infrastructure, and opportunities for improvement, residents in the Project area are generally satisfied. A KII respondent corroborated this, noting that, generally, the level of satisfaction is around 80%, based on the satisfaction survey completed bi-annually.

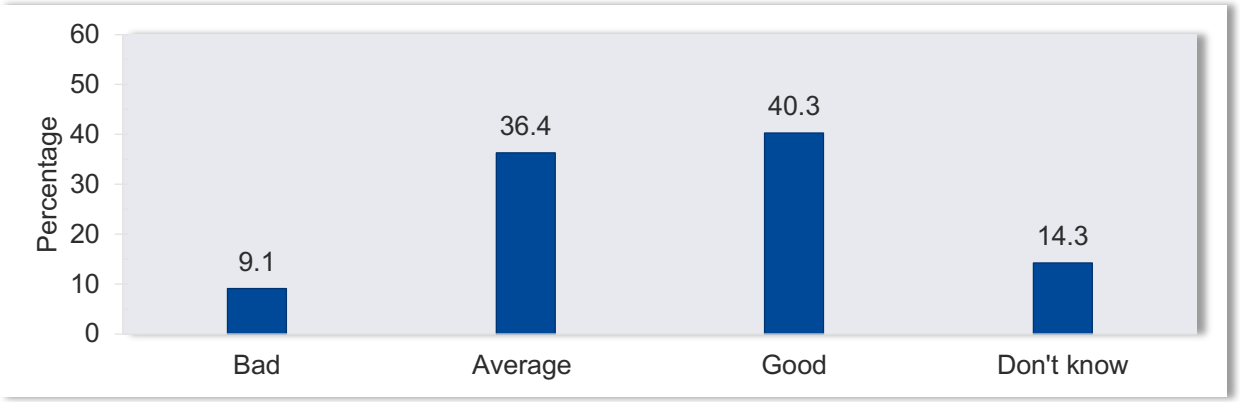


Figure 1 Satisfaction with Quality of School / Education Services

1.3.3 Tertiary and Further Education and Training

In the *aimag* center, there is a vocational training center (college) and branch of the University of Trade and Industry. There are no *soum* level tertiary and further education and training centres. Programs provided by the Vocational Training College in Bayankhongor *aimag* include 1.5 to 3 year technical courses in specialities such as construction, and electrician. In addition, 2.5 or 1 year professional training is provided in areas such as plumbing, carpentry, cooking, tailoring, hairdressing, and electrical device repairs. The Vocational College also offers professional orientation programs and modules to provide life skills to a variety of residents in the *aimag*.

The National University branch includes bachelors and master's degrees in accounting and management, in addition to vocational training courses in accounting, sales, bookkeeping and administration. Below, Table 1 shows enrolment in tertiary institutions within the *aimag* over the last five years. Attendance at institutes or colleges has remained steady, but it appears attendance at vocational and technical institutions is declining, although it is not clear why. Many of the courses on offer may have some relevance to the mining sector. However, there has historically been a mismatch between supply of graduates and demand in the marketplace, as well as quality concerns with the vocational programs themselves. Table 1 shows student attendance in tertiary institutions in Bayankhongor *aimag*. The high level of female students at these facilities is highlighted for reference with respect to Erdene's future workforce and the possibilities this raises for a high level of female participation. Gender disaggregation by course was not available. Furthermore, Table 1 shows the number of students that attended religious schools and colleges in Bayankhongor *aimag*. The number was not significant between 2015 and 2017, although it notably increased to 81 students in 2018. All of these students attend Buddhist schools.

Table 1 Students Attending Tertiary Institutions in Bayankhongor *Aimag*

Location	Sex	2014	2015	2016	2017	2018
Vocational & Technical Institutions	Male	762	695	578	525	519
	Female	721	734	723	543	532
Universities, Institutes & Colleges	Male	69	69	69	55	69
	Female	136	156	156	108	139
Religious schools & colleges	No sex-disaggregated data	26	18	0	4	81

Source: MSIS 2019

Programs offered by the Bayankhongor Polytechnic College are provided below.

Table 2 Programmes Offered by the Vocational Training College in Bayankhongor *Aimag*

Technical Education (1.5 - 3 years)	Professional Training (2.5 years)	Professional Training (1 year)
• Industry technician • Construction technician • Electrical technician • Safety technician • Tailor technician • Food and service industry technician • Plumber, heating and aeration technician	• Brick layer • Plasterer • Plumber • Carpenter • Electrical worker • Mechanist • Operator • Cook, pastry chef • Tailor • Hairdresser • Beauty specialist • Shoemaker • Electrical device repairer • Musician (traditional)	• Meat processing specialist • Designer- leather • Hand craft • Building foundation specialist • Plumber • Carpenter • Mechanist • Operator • Cook, pastry chef • Tailor • Hairdresser • Beauty specialist • Shoemaker • Electrical device repairer • Construction carpenter • Farmer • Felt production specialist • Technician in initial processing of wool and cashmere • Secretary • Gardener

Source: Vocational Training College, 2019

Additional programs and events organised by the vocational training centre are listed below.

- Profession orientation programs offered by the Bayankhongor Polytechnic College for high school and college graduates, high school teachers, unemployed people, parents, social workers, ex-convicts, and people returned from army service. A total of 15,000 people have completed training at the College since 2014. The programs provide local labor market updates, open vacancies, and professional and career guidance counselling. In 2018, 2,606 (700 from the soums) people participated in programs, of which, 85% were high school students and graduates (Bayankhongor Polytechnic College 2019).
- Bayankhongor Polytechnic College has started to build the “Training and Workshop Centre with Industry Cooperation”, partnering with the “Vocational Training Based on Partnership with the Mineral Resources Sector Project” implemented by the GIZ and “Navtgar Khairkhan” LLC from Bayankhongor *aimag*. “Training and Workshop Centre with Industry Cooperation” aims to become a host centre that prepares construction professionals and workforce for the aimag labor market (Bayankhongor Polytechnic College 2019).

- Life skills training is organized by the Ulziit TVET for high school and college graduates, high school teachers, unemployed people, parents, people released from prison, and people returned from army service. For example, there are 12 modules designed to provide and enhance personal skills in communication, confidence, decision-making, stress and emotion management, gender and violence awareness, and planning.
- A Business Incubator Centre was established next to Bayankhongor Polytechnic College in 2007. The centre aims to strengthen the capacity of active citizens who are interested in running a business through providing various types of training and advisory services. The centre has organised business information sessions for approximately 200 people; provided information about machinery and equipment for micro and small business; and conducted business training for 800 people (Bayankhongor Polytechnic College 2019).

1.3.3.1 Non-Formal Education

A national program to develop non-formal education was instigated in the Mongolian Government Resolution No. 116 (1997) in accordance with the provisions of Article 17.2 of the Law on Education. The non-formal educational system facilitates both informal educational programs that support formal education and livelihood educational programs, including:

- Literacy training at beginner, intermediate and advanced levels;
- Alternative education (includes primary, secondary and high school education) for schools drop-outs, comprising after-hours / night classes and short training classes to assist students obtain school certifications; and
- Life skills training (includes life skills, health, and others).

In Bayan-Undur and Shinejinst *soums*, there is a Lifelong Educational Centre that works with school drop-outs and those wanting to achieve formal school certifications between the ages of 25 and 30. It was indicated in a KII in Shinejinst *soum* that young people from the *soum* are very reluctant to participate in the programmes offered at the centre, perhaps due to the fear that they will be perceived as uneducated. Soum officials mentioned that they actively encourage parents to send their children to school and also work to prevent school dropout[1] and promote the attainment of higher grades.

1.4 Energy and Heating Infrastructure

1.4.1 Energy Infrastructure

Energy directly affects the national economy, sustainable development of the country and the quality of life of the general public. Up to the present in Mongolia, the State has managed almost all energy production, its transfer and distribution.

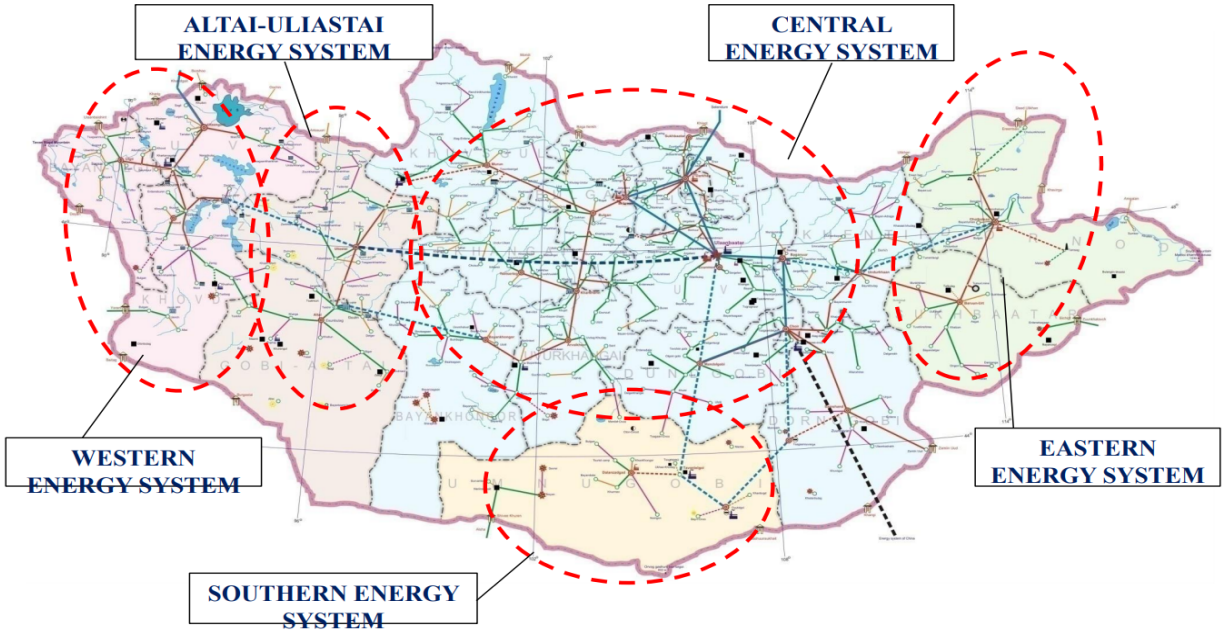
Mongolia has a total of 1,158 MW of installed capacity, but because of aging power facilities that are well past their economic life, only 969 MW is available. Electricity imports met about 20% of power demand in 2017. The country's energy sector relies heavily on coal-fired power generation,

[1] In Shinejinst soum, there were 2 dropouts in 2018, although 1 of them took the necessary exams. The other dropout from the 9th grade will receive informal education. The main reason for dropping out of school is to help family members with herding livestock (the child didn't want to continue studying) (KII Shinejinst 2019).

which accounts for 91% of total installed capacity and contributes over 63% of CO_2 emissions. Mongolia is the world's fifth most carbon-intensive economy (ADB 2018).

The country's power system consists of four grid systems, which have successfully expanded electricity access to 97% of the population. The central energy system, covering around 90% of power demand, has attracted private sector-led renewable energy projects totalling around 400 MW, of which 120 MW have been commissioned. At the same time, other grid systems in western Mongolia, which supply power to 25% of the population in the country and have exhibited annual demand growth of more than 10% between 2010 and 2015, have not attracted any private investment in utility-scale grid-connected renewable energy development, mainly because of the relatively small size of power demand in geographically scattered load demand centres (ADB 2018:2).

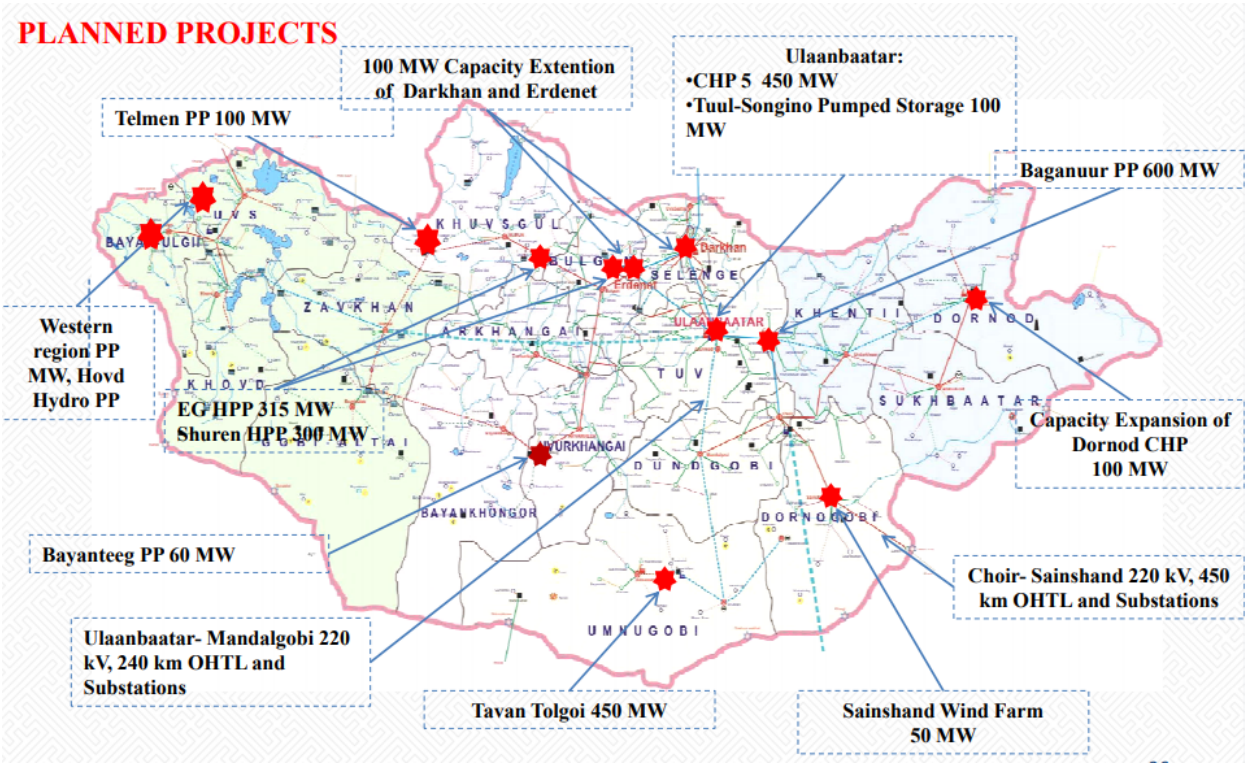
Figure 2 shows the main five energy systems in the country, with Bayankhongor covered by the central energy system.



Source: Enebish, N.

Figure 2 Map of Mongolia's Integrated Power System

High fuel costs and the low financial ability of consumers hamper the generation and consumption of electricity. The Government of Mongolia intends to extend the national grid (220 kV and 110 kV transmission lines as well as 35 kV distribution lines) in order to connect off-grid *soums*. The grid extension will be financed by the state budget and the development fund of Mongolia. As of 2017, out of 331 *soums,* 304 were connected to the domestic electricity system, 12 soums out of the remaining 27 were provided with renewable energy resources, and 13 border soums of 7 aimags were connected to the electricity systems of neighbouring countries - Russia and China (Ministry of Energy 2017). The original grid extension programme includes the construction of 7,000 km of power lines; to date 2,300 km have been realised. In some areas, transmission lines are already constructed but are not operational because no power is feeding in. **Error! Reference source not found.** shows the planned energy developments in the country by the Ministry of Energy, with the Bayanteeg power plant sited for development in Nariinteel *soum* of Uvurkhangai *aimag* which is the closest site to Bayankhongor *aimag* (Ministry of Energy 2017:36).



Source: Enebish, N.
Figure 3 Proposed Projects Under Pipeline

On 20th October 2014, both Shinejinst and Bayan-Undur *soums* were connected to the Central Energy System through Bayanteeg Substation (IKON.mn 2014). While the *soums* are connected to the central energy grid, the maximum electrical potential is 35 kV in Shinejinst and 15 kV in Bayan-Undur *soum*. Moreover, the power quality is poor, with planned and unplanned outages regularly affecting reliability.

The Household survey found that only 31% of respondents acquired their electricity from the central system, whilst the majority (64%) relied on solar systems. This is consistent with the sample population in the Household Survey, which interviewed a higher proportion of rural households in the Project area of influence. Herder households tend to rely heavily on small, decentralised power supply, particularly solar-battery systems, which are portable and generally provide a reliable source of power in remote areas.

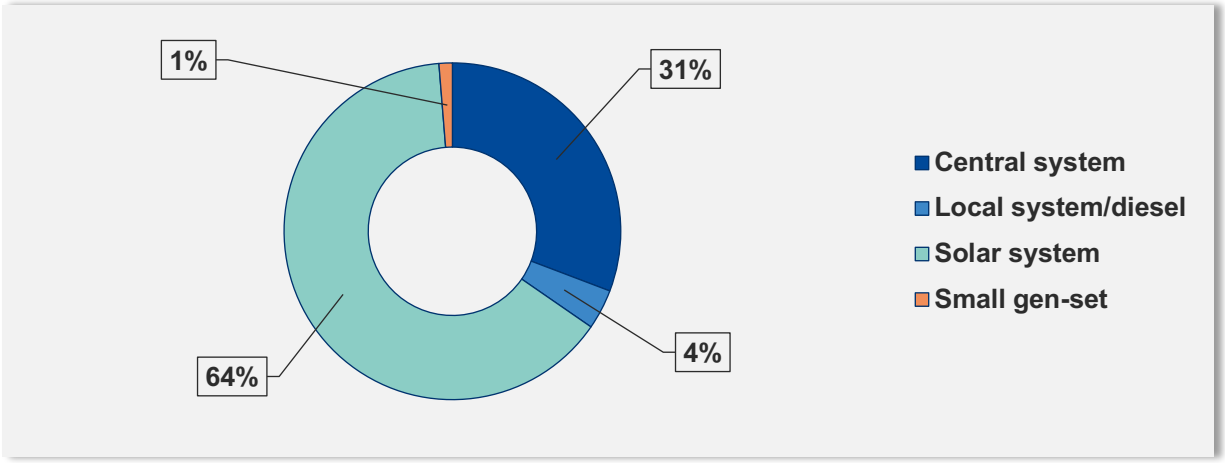


Figure 4 Type of Electricity Source Used in the Project Area of Influence

In addition to the general power sources described above at the *aimag* level, the Gobi region has natural conditions potentially supportive of solar and wind generated power. With co-funding from the International Finance Corporation, a preliminary feasibility study of renewable energy supply options at the Project was completed. The renewable energy study provided a site-specific business case for renewable energy as well as the potential co-benefits of integrating renewables into a future mine in terms of supporting Mongolia's pledges towards the Sustainable Development Goals. As a base case, the Project expects to utilize an off-grid, hybrid power stations consisting of diesel gensets, solar array, and batteries.

1.4.2 Heating Infrastructure

In Mongolia, heat is generated primarily through combustion of coal. Centralised heat supply is an essential basic service in Mongolia, but it is not accessible to everyone, especially people in rural areas in both Shinejinst and Bayan-Undur *soums*. The current heating system in *soums* mainly consists of (i) small stoves; and (ii) decentralised coal fired boilers used for heating in schools, dormitories, hospitals, local government office buildings and some apartments.

Bayankhongor *aimag* has no centralised heating system. Several heat-only boilers operate during the cold season, although it is primarily government organisations' buildings that are connected to this heating system. In a KII in the *aimag*, it was noted that "the Government of Mongolia is planning to implement a heating plant and pipeline project and the decision is already made and relevant studies already done." No further detail or timeframes for completion of this infrastructure could be confirmed.

There is also no heating system at the *soum* level, although some organisations, as noted above, have low-pressure steam boilers. (Eco Trade LLC 2018a). The coal fuel supply for heating consumption for boilers is normally sourced from Ongon coal mine operated by Gobi Coal and Energy LLC in Shinejinst.

Heating in households and small businesses is independent of any centralised system. Most households residing in Bayan-Undur and Shinejinst *soums* use traditional firewood, coal, or dung stoves for heating. Households in the *soum* also buy coal for household heating purposes locally and also sometimes burn Saxual trees . As highlighted in the responses gathered in the Household Survey, 90% of respondents used traditional firewood, coal and /or dung to heat their homes.

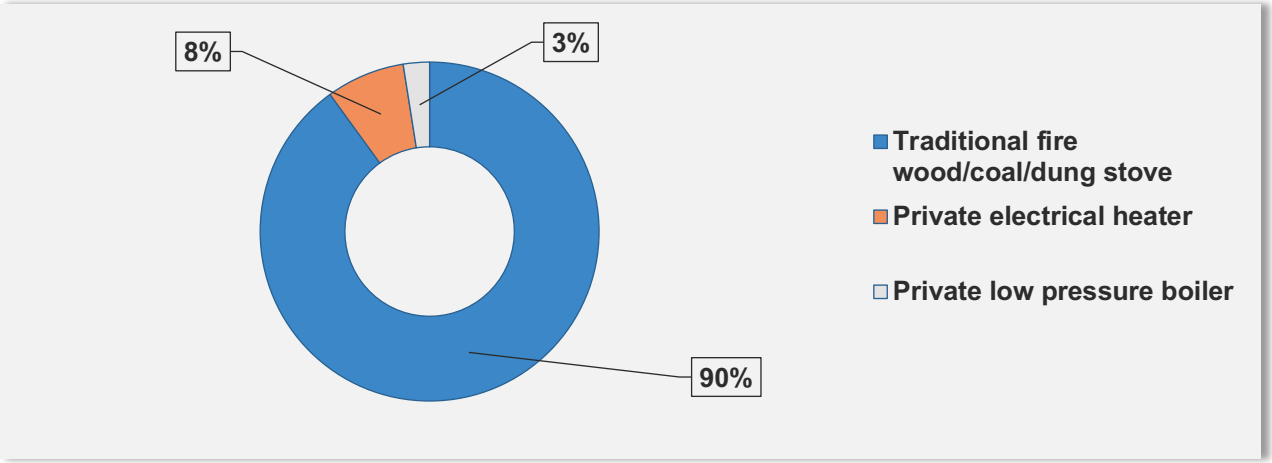


Figure 5 Type of Heating Used by Households in the Project Area of Influence

Further investigation into the type of fuel used by households in the Project area of influence revealed that dung was the predominant fuel source (47%), with use of charcoal and wood nearly equal at approximately 26%. Higher use of dung is likely due to charcoal being a more expensive option, and wood being less accessible given its scarcity in the area.

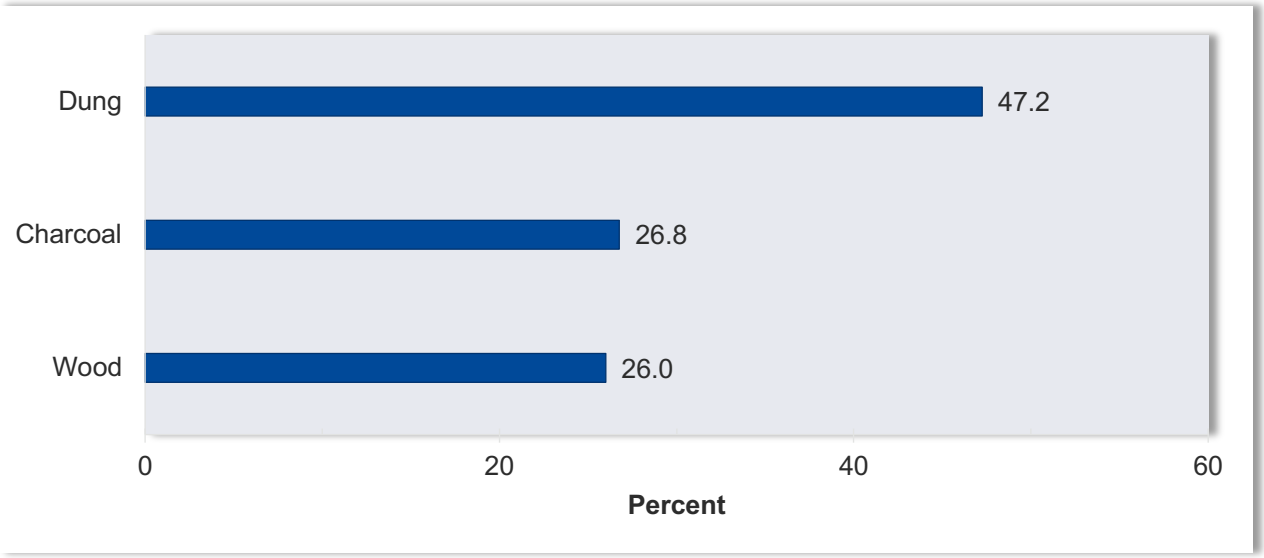


Figure 6 Type of Fuel Used in the Project Area of Influence

1.5 Water Infrastructure

This section provides an overview of water infrastructure. It should be read in conjunction with the detailed water resources baseline contained in *Chapter B5 Water Resources*, which includes detailed mapping of water resources in the Project area of influence among others.

At a national level the percentage of freshwater resources withdrawn is very low (approximately 1.5%). In several regions, potential over-exploitation of water resources, both groundwater and surface water, and inadequate water supply services are major issues faced by Mongolia. The main causes for these are rapid urbanisation, climate change and increased mining activity, along with immature policy and water resource management systems. A key challenge confronting Mongolia is that of the effective provision of water and sanitation services, especially in rural areas. This is compounded by Mongolia's harsh climate, including freezing temperatures which

complicate the extension of water networks, as water pipes need to be laid making special provision for depth, and insulation in order to work effectively in the cold.

While there is nearly universal access to basic water services, only around a quarter of the population receive water on premises. When looking at the differences between rural and urban access to basic water services, the disparities in access are even greater, with only half the rural population reporting access to basic water services. Mongolia's nomadic population is also further challenged, as much of their access to drinking water is via shallow wells, of which the quality is often very poor. Reliable and safe access to drinking water is an issue at a country level, and it is also a human rights issue. The right to water and sanitation are widely recognised as human rights globally, however there is a lack of clear understanding of these rights in Mongolia at all levels including Government and legislative, civil society and the general population.

Bayankhongor *aimag* centre had very poor access to water infrastructure until 2012. In that time, more than 26,000 of Bayankhongor city's 29,000 residents lived in ger areas. Their water needs were meet by trucks that delivered water to 11 kiosks daily. The supply was limited, and water was not considered safe to drink without boiling, and even after boiling still may not have been safe due to excess minerals and heavy metals. The ADB implemented a project to upgrade Bayankhongor aimag's water infrastructure, including rehabilitating two source wells, building one new well and a new chlorination facility. As a result, in 2015, the average distance from all ger plots in Bayankhongor city centre to an uninterrupted and clean water supply to households was less than 250 meters (ADB 2015).

Both Bayan-Undur and Shinejinst *soums* have access to potable water, but no municipal water distribution or wastewater treatment infrastructure. In addition, both *soums* lack surface water, outside of ephemeral streams and drainages. They are also not connected to a central water supply system, which further compounds water access and quality issues. Shinejinst *soum* centre has historically had heavy, poor quality water. Shinejinst first secured a source of fresh, potable water in 2018, with the assistance of Erdene – which the government trucks to households in the *soum* centre twice daily on average. Shinejinst has recently implemented a "smart well" system with the support of Erdene, which supplies drinking water, and uses cards and an automatic meter to distribute. Bayan-Undur *soum* centre has 2 wells that supply clean water resources, and 2 water reservoirs with a capacity of 600 litres, in addition to softening and purifying equipment with an operating capacity of 3 ton/day (Eco Trade LLC 2018a).

Water infrastructure issues, as noted in the KIIs and FGDs, included.

"A water pipeline system is needed to enable transfer of water to the soum centre households."
FGD Shinejinst *soum*

"*Water supply is not sufficient*."
KII Bayan-Undur *soum*

"*Water quality is poor due to geographical location and water bearing sediment. There is no tap water. Water is not transmitted through pipeline and only transported by vehicles and push carts*."
KII

The main sources of drinking water in the Project area of influence, as reported in the Household Survey, are unprotected wells (33%), springs / rivers (29%), protected wells (22%), and transport distribution (12%). It is noted that some respondents indicated "centralised" supply, however in this instance they were referring to the newly established smart wells. As can be seen from the responses, communities in the Project area of influence predominantly access drinking water from

sources that are vulnerable to contamination. It also highlights the inequalities in rural water access in Mongolia, as noted by United Nations Human Rights Special Rapporteur on the conclusion of his visit to Mongolia to assess the human rights to safe drinking water and sanitation (UN 2018).

> *… I was able to witness this clear distinction during my stay in Ulaanbaatar City and when I travelled to Dundgovi aimag and the Umnugovi aimag (provinces). According to the Government, out of 334 soums (sub-provinces), only 20 have centralised systems of water supply for its central areas. The rest of the soums rely on collective or individual wells built by the Government, private entities or individuals. It is concerning that 34 soums still do not have a drinking water source that meets the drinking water standard of Mongolia.*
>
> UN Special Rapporteur on the Human Rights to Safe Drinking Water and Sanitation, Ulaanbaatar, 20 April 2018

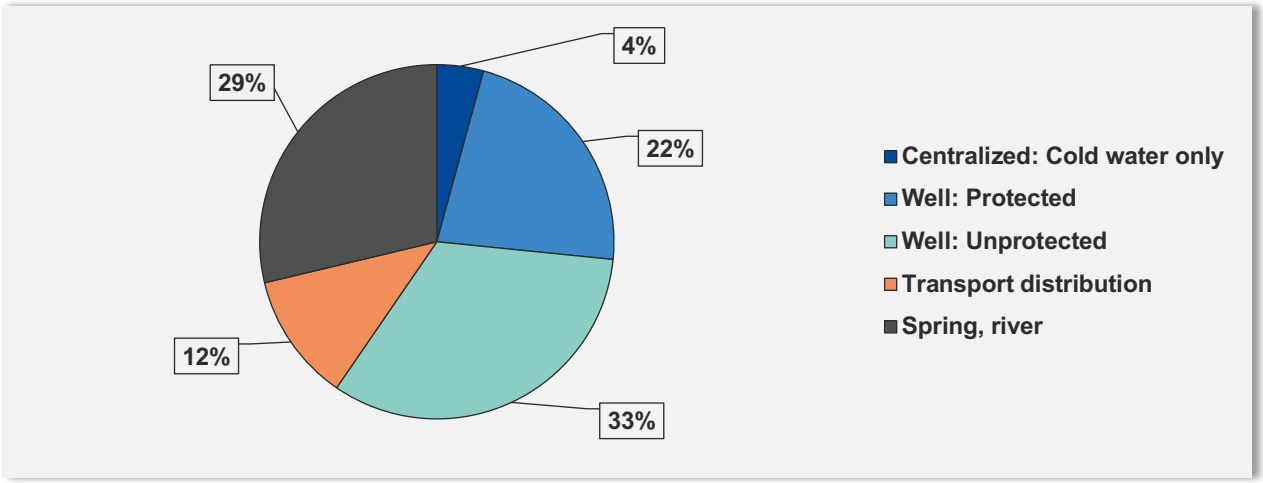


Figure 7 Sources of Drinking Water in the Project Area of Influence

While approximately half of the households surveyed find drinking water quality to be good throughout all seasons, water quality of wells in the Project area of influence does not generally meet national drinking water standard requirements. Water is required to be treated before drinking, and long-term use of water from these wells is reported to cause digestive tract diseases that are common among local community, as reported by community members in the KIIs and FGDs. One respondent in the Shinejinst general community FGD highlighted that "because of the hardness of the drinking water, the internal organs…of the body are adversely affected." Perceptions of poor water quality were corroborated by the water quality indications from 2017 well testing by Erdene which revealed levels of various naturally occurring elements whereby the water does not comply with the national standard on drinking water (Eco Trade 2018a & b).

Further discussion on herder water use and resources is provided in *Chapter B13 Land Use*.

1.6 Sewerage, Sanitation and Solid Waste Management

As noted by the United Nations Human Rights Special Rapporteur on the conclusion of his visit to Mongolia to assess the human rights to safe drinking water and sanitation (UN 2018), only 13% of Mongolians have sewerage connections (plumbed sewerage). Furthermore, the majority of wastewater treatment plants in *aimag* centres do not treat their throughput. At the same time, the high technical standards required by equipment that can operate in Mongolia's environmental extremes, the short construction season, and distance from international markets all make the construction and maintenance of sewerage, sanitation and solid waste management infrastructure expensive by global standards.

In general, sanitation facilities are overstretched in Mongolia's urban areas, where only apartment dwellers tend to have access to plumbed sewerage. Ger residents in rural and urban areas use pit latrines and soak pits for their sanitation. Simple pit latrines are often not adequately maintained, and ger residents simply construct a new latrine once the first one fills up. In some of the older ger areas, households have run out of space to dig a new latrine although this problem is mainly a concern in urban areas and aimag centres. Many ger residents use soak pits to discard graywater. More often, however, water is discarded anywhere in the ger area. Because ger areas are usually very dry, standing water is not a problem except during the occasional heavy rain showers that occur in the summer.

Solid waste collection and disposal facilities are overwhelmed in Mongolia's urban areas. Solid waste is not separated at collection points and disposal is haphazard, with many dump sites filled to capacity. Solid waste collection is also sporadic, and small informal dumping areas arise throughout settlements. Animal waste and dry ash are large components of solid waste. In small towns, collection trucks have mostly not been upgraded since the Soviet era, and budgets for solid waste collection have also remained constant, even though populations have become more permanent. As inorganic waste is not yet a huge problem in many communities and populations are not that dense, many small towns are able to ignore solid waste collection altogether (UN 2018).

Bayankhongor *aimag* centre's main wastewater treatment plant had ceased to function, leaving sewage to flow directly into a nearby river until 2012. As part of the afore-mentioned ADB project, comprehensive improvements to sanitation systems in Bayankhongor were made in 2015, including 4.2 km of new sewer pipelines in the aimag centre; as well as processes of wastewater to international standards at the rehabilitated wastewater treatment facility before release to the environment (ADB 2015). At the *soum* level, the sewerage and sanitation services in the Project area of influence primarily consists of pit toilets. A key challenge in Shinejinst and Bayan-Undur is the lack of sewerage infrastructure. This issue was noted on a number of occasions in KIIs and FGDs, as noted in the below quotes. Households residing in gers only have access to outdoor pit latrines. According to the Household Survey, approximately 80% of households have a toilet outside the main dwelling, and 20% do not have a toilet at all.

"Introduction of an affordable household sewerage system is needed."

KII Bayan-Undur soum

"There is lack of a sewage and sanitation system in the soum. Even the hospital has no such system itself and that is such a shame. Household and soum organisations use outside dug hole toilet facility and don't sanitise monthly or quarterly."

KII Bayan-Undur

"There is no bathhouse/public shower in the soum. No networks or systems relating to toilet facilities, pure water and sewage. So, households have their own toilets and sewage pits (some)."

KII Shinejinst *soum*

With regard to waste disposal, this mainly consists of minimally developed, unlined landfilling near the *soum* centres. At the *soum* level, there is a garbage truck that provides services to *soum* centre residents. However, it was noted in a number of different forums, particularly in Shinejinst *soum*, that there are opportunities for recycling and improvements in waste segregation practices (see quotes below). Further FGDs indicated that there are perceived opportunities in relation to the creation of waste recycling businesses and jobs.

There is a waste truck and routine, so waste collection is an established practice in the soum centre compared to a few years ago. In today' practice, the soum waste truck just collects the rubbish and dump waste directly on the landfill site out of the soum centre. We need to improve waste segregation practices and there is the potential to establish a waste recycling factory/plant, if possible. This may also create a few jobs for the soum's unemployed residents and improve the soum's environment and surroundings.

FGD Shinejinst soum

According to the Household Survey, just over half of households (53%) utilise their own private rubbish dump / place, whereby the rubbish is burned. Another 32% utilise a specified collection point, 12% use other methods of disposal, and 4% dig a hole and bury their rubbish. This is indicative of the generally rural composition of the population surveyed in the Household Survey, most of whom have little to no access to specified collection points for rubbish.

1.7 Technology, Communications and Postal Services

Over the last five years Mongolian demand for information technology (IT) goods and services has boomed as Mongolia's population has embraced IT products for personal and professional uses. Internet service users rose from 30,103 subscribers in 2010 to 1.06 million by July 2016, increasing internet penetration to 35.6% (Internet Live Stats 2019). By end of 2018, both internet users and active social media users reached 2 million with penetration rate at 65%. The share of web traffic by devices are mainly laptop and desktop computers (73%), mobile phones (25%) and tablet devices (1%).. As of 2018, the highest ranked websites considering a combination of average daily visitors and page views are google.mn, yuotube.com, facebook.com, google.com and gogo.mn (Data RePortal 2018). Mongolians' use of mobile and smart phones has also skyrocketed, growing from 60% of the population in 2009 to 102% of the population in 2015. Demand for both communications and internet technologies has evolved rapidly. In the telecommunications sector, the use of fixed lines is minimal and declining, as Mongolia has largely bypassed this stage, proceeding directly to the use of mobile and wireless technologies. There are four major providers — Mobicom, Skytel, Unitel, and G-mobile — all offering pre-paid and subscription plans for communication and computer services (Export.gov 2017).

All four Mongolian mobile phone service providers are available at the *aimag* and *soum* centre level (Mobicom, Unitel, Skytel, G-Mobile). Internet service via the respective carriers is provided. As noted above, internet access in the *aimag* is increasingly via mobile device (especially mobile phone). The key barriers to access are cost of services. However, prepaid services are common and relatively affordable, and the cost of devices has dropped dramatically in the past ten years.

Bayan-Undur internet access is reported to be good, with all individuals having access to data, and improved access to phones and internet networks. The same was found in Shinejinst *soum*, where a KII highlighted that "G-Mobile service including mobile phone and internet is available in the *soum,* and the level of access and use of technology is good compared to the neighbouring *soums*." Further, Shinejinst *soum* reports that 100% of herders in the *soum* are connected to the mobile and internet network. Landlines are not common in the two *soums*, with one KII participant in Bayan-Undur noting that landline telephones are not available in offices, with people tending to use their personal mobile phone and internet. The above feedback from KIIs and FGDs was corroborated by the Household Survey, with nearly 99% of respondents indicating that they access communications services using their own mobile phone, highlighting good access to mobile phone communications in the Project area of influence. However, as illustrated in Figure 8, use of the internet is not as common, with slightly more respondents indicating that they use the internet (just over 52%) compared to those that do not use the internet (just over 47%). Most (73%) of Household Survey respondents could access the internet in their own homes, while

those that couldn't (nearly 27%) reported a mean distance of 17 km to access the internet. The furthest distance reported was 50 km, and the shortest 1 km.

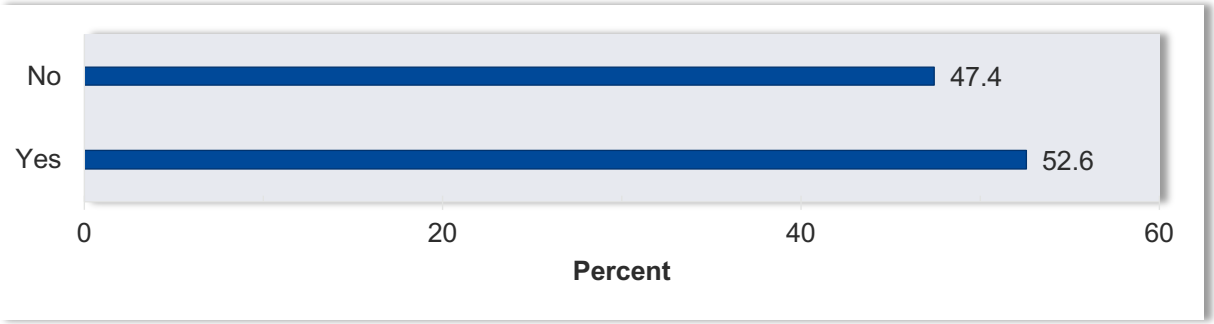


Figure 8 Household Survey Participants That Use Internet

Household Survey participants were also asked about the frequency of their internet use, with most (39%) reporting regular (weekly) use, and daily (29%) use, and thereafter occasional (24%) use, and rarely / none (7%). There was at least one semi-public *soum*-focused Facebook group per *soum*. Facebook groups, video, livestream, and photo content are potential communications strategies accessible to stakeholders.

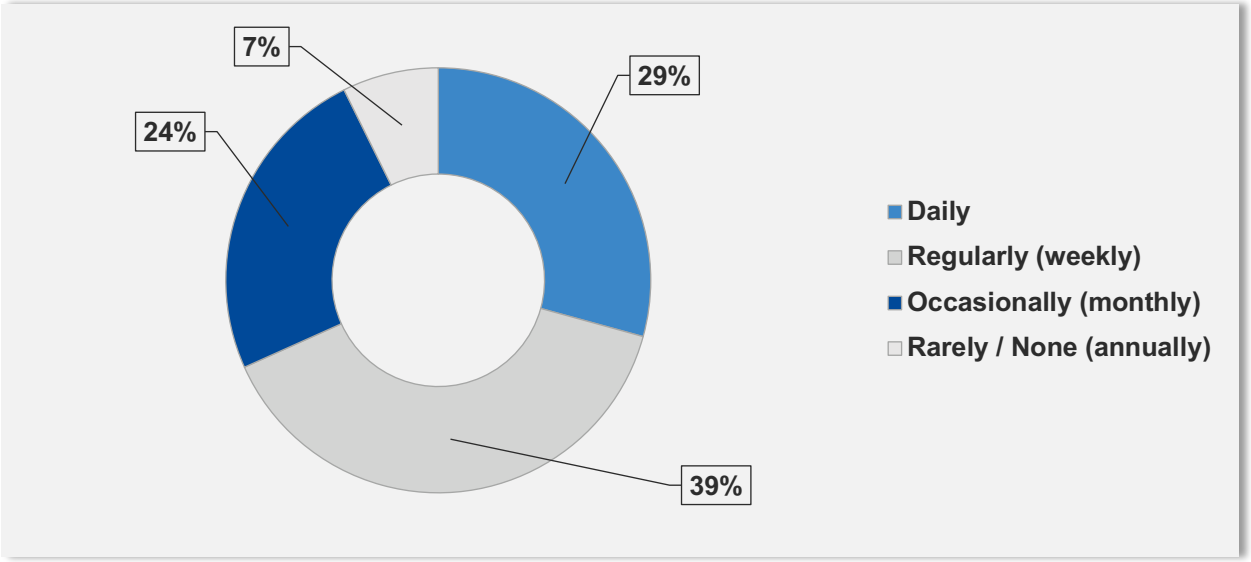


Figure 9 Household Internet Use Per Year

The local media output in Bayankhongor includes at least 4 local newspapers, of which one is a children's newspaper and one other a classified advertisement newspaper. There are also two FM radio stations and two television stations. Despite the comprehensive output of local media in Bayankhongor the variety is limited. Furthermore, the media do not generally provide independent and critical news. The only local media that to some extent reach the *soums* and the herders are the local newspapers. On this point, the Household Survey found that around 70% of respondents do not read the local newspaper, which indicates that newspapers are also likely to be only a partially effective form of communications at the *soum* level. The same was found for *soum* radio, with over 80% of respondents noting that they do not listen to it. Most herders and *soum* centre households have satellite television with the full suite of mainstream Mongolian channels. TV is a key source of information, and this is particularly noted for youth in the Project area of influence who are reported to obtain 45% of their news and information from the TV. In order for effective

communication and engagement with local communities to take place, multiple methods will need to be employed.

The National Program "Postal services to every household" was approved by the Government of Mongolia in 2011 and is planned to be completed by 2020. Its purpose is to make Mongolia's postal sector competitive with those in foreign countries, introducing new services, better meeting the requirements of users, and effectively introducing information and technology developments in the postal sector (The Government of Mongolia 2011). As part of this Program, the logistics services of the main network have been equipped with new equipment, and 66 postal transportation vehicles were connected to GPS monitoring network. In 2015, mobile postal services were introduced within the Program. Current works also include updates to the basic network, technical equipment and vehicle renovation. Ways to ensure better delivery of postal services to remote areas, regional organisation of intercity and rural postal delivery, and setting up regional centres for postal exchange are being researched. There is a weekly scheduled postal delivery from the *soum* government buildings in Shinejinst and Bayan-Undur to the Bayankhongor *aimag* centre.

1.8 Transport Infrastructure

Note that road transport and traffic are discussed in *Chapter B16 Traffic and Transport*.

1.8.1 Aviation Infrastructure

The Bayankhongor Airport (BVN/ZMBH) has two runways, and is served by one weekly return flight from Ulaanbaatar, varying from season to season.

In 2012-18, a temporary landing strip located on a dry lake bed in the Tsenkher Nomin exploration license, was approved by the Mongolian Aviation Authority for light aircraft. Annual approval is required to use the temporary landing strip. At least two private charter flight services are available from Ulaanbaatar, and a one-way trip to Tsenkher Nomin takes approximately 3 hours by plane or 5 hours by helicopter.

1.8.2 Railway Infrastructure

The region hosting the KGP is one of the least densely populated areas in Mongolia, however, infrastructure to access south-western Mongolia's natural resources from China is developing rapidly. While there is no railway infrastructure in Bayankhongor *aimag*, the border crossing into China includes a major automated railcar coal loading facility with three railway terminals where goods can be loaded on train and shipped out over the Jiayuguan–Ceke Railway, Ejin–Hami Railway or Linhe–Ceke Railway. Planning is underway to extend railway infrastructure in Mongolia, including through Bayankhongor *aimag* (Gansukh et al. 2018).

1.9 Project Affected People

Project Affected People (PAP) are defined as the social groups and/or communities whose characteristics, including vulnerability and means of sustaining livelihoods, may be affected directly or indirectly by actions associated with the construction, operation and/or closure and decommissioning of a Project. People and communities that are most likely to experience impacts from the KGP within the Project area of influence are:

- Residents of Shinejinst and Bayan-Undur *soums*, but predominantly, those living in the *soum* centres; and
- Residents of Urtiin gol *bagh* and Idren *bagh* in Shinejinst and Bayan-Undur *soums*, respectively.

1.10 Conclusion

Several key themes are noted in relation to social infrastructure in the Project area of influence.

- Educational services in both *soums* are limited to primary school (1st to 9th grade). In Bayan-Undur current challenges include over-crowding and lack of technology and educational tools. Health education is also reportedly poor, pointing to vulnerability to potential impacts of mining development. The main challenges in Shinejinst include high turnover of teachers, lack of discipline-specific teachers, and retaining highly qualified teachers.
- Bayankhongor *aimag* center has a vocational training center and branch of the University of Trade and Industry. There are no *soum*-level tertiary and further education and training centres. Of note is the college's previous experience, working with the GIZ on vocational training for the mineral resources sector, as well as the Business Incubator Centre, which assists entrepreneurs in building their small businesses. Some courses on offer by both institutions are relevant to the mining sector. There is a higher female than male attendance at the college and university, which raises the probability of female participation in the workforce.
- Bayankhongor *aimag* centre has very poor access to water infrastructure, which is mirrored at the *soum* level. Both Bayan-Undur and Shinejinst *soums* have access to potable water, but no municipal water distribution system or wastewater treatment infrastructure. In addition, both *soums* lack surface water, outside of ephemeral streams and drainages. The main sources of drinking water as reported in the Household Survey, are unprotected wells (33%), springs / rivers (29%), protected wells (22%), and transport distribution (12%). Communities predominantly access drinking water from sources that are vulnerable to contamination.
- All four Mongolian mobile phone service providers are available at the *aimag* and *soum* centre levels. Bayan-Undur and Shinejinst *soum* internet access is good. The Household Survey found nearly all respondents access communications services using their own mobile phone. However, use of the internet is not as common, with slightly more respondents that use the internet (52%) compared to those that do not (47%). Around 70% of respondents do not read the local newspaper. The same was found for *soum* radio. Most herders and *soum* centre households have satellite television with the full suite of mainstream Mongolian channels. TV is a key source of information, and this is particularly noted for youth in the Project area of influence.

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

Erdene Mongol LLC

B13 - Land Use

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Glossary

ALAMGC	Agency of Land Affairs, Geodesy and Cartography
AoI	Area of Influence
CRK	Citizens Representative Khural
EBRD	European Bank for Reconstruction and Development
FGD	Focus Group Discussion
HH	Household
KGP	Khundii Gold Project
KII	Key Informant Interview
LLC	Limited liability company
LPA	Local Protected Areas
NSO	National Statistical Office
PR	Performance Standard
SPA	Special Protected Area
SPSS	Statistical Package for the Social Sciences
UN	United Nations

aimag	The Provincial unit of administration in the territory of Mongolia
soum	Sub-province area; The second level of administration in the territory of Mongolia
bagh	Sub-division of *soum*; The third level of administration in the territory of Mongolia
dzud	Mongolian term for summer drought followed by a severe winter, generally causing serious loss of livestock
negdel	A local agricultural collective organisation between 1960 and 1990 in Mongolia had members of herding households that manage livestock production jointly in line with socialist state planning.
khashaa	plot of land
khot ail	Traditional rural socio-economic unit for grouping of livestock keeping and herder households
ger	Mongolian traditional round-shaped dwelling that is portable, easily assembled and disassembled which makes suitable for a nomadic lifestyle

1. LAND USE

1.1 Introduction

This Chapter of the Social Baseline Report describes the context of the Project in relation to land use, land ownership and possession, and the use of natural resources in the Project area. The Project is located in Shinejinst and Bayan-Undur *soums* in a sparsely populated area of southwestern Mongolia. The *soums* comprise mostly pastureland (rangeland) with desert and desert steppe ecosystems.

1.2 Baseline Characterisation Methodology

1.2.1 Sources of Information

Primary Data Collection

Several sources were used to develop the land use baseline Chapter. Erdene commissioned Sustainability to conduct primary data collection in support of this baseline study. Data collection included the completion of Key Informant Interviews (KIIs) and Focus Group Discussion (FGDs) with local community members, and a Household Survey conducted in the Project area in August 2019. See Chapter B1 Introduction for further information on primary data collection.

In addition, as part of the environmental and social baseline study conducted to meet Mongolian national requirements, in 2016, a team of researchers from Eco Trade LLC conducted a survey in the Project area, including interviews with herder households. This Chapter also draws upon the findings of this survey.

Secondary Data Collection

Secondary data sources include national statistics, population and housing censuses, the pasture monitoring reports of academic and research organisations, official statistics from *aimag* and *soum* governors' offices, annual *aimag*, *soum* and *bagh* level reports, and available reports on projects and programs in the Project area. A full list of references is provided in Section 1.8.

1.2.2 Methodological Approach

The methodological approach employed to obtain the land use baseline included the conduct of a statistically representative Household Survey in the Project Area of Influence, the data from which was analysed using the Statistical Package for the Social Sciences (SPSS) and subsequent information presentation. Furthermore, KIIs and FGDs were also conducted to explore and identify issues related to land use at the *aimag*, *soum*, and *bagh* levels. See Chapter B1 for further description of the social baseline methodology employed.

1.2.3 Project Area of Influence

The area of influence has been defined as Bayankhongor *aimag* as the macro-level social and economic impact of construction and operation of the KGP may affect receptors at the *aimag* level. Sub-areas within Bayankhongor *aimag* include Shinejinst and Bayan-Undur *soums*, and specifically their *soum* centres, and Urtiin gol and Idren *bagh* (the *baghs* within which the KGP is located). The KGP will intersect with these *soums* and particularly at the *bagh* level, which may experience both direct and indirect environmental and social impacts from construction and operation of the KGP. Project elements contained within the two *soums*, and their respective two *baghs* are described below:

- Shinejinst *soum* (Urtiin gol *bagh*) – contains the Khundii licence areas, process plant and non-process infrastructure, and the Site Access Road from Shinejinst *soum* centre to the KGP;
- Bayan-Undur *soum* (Idren *bagh*) – contains the Tsenkher Nomin licence area.

The baseline information presented in this chapter provides macro-level and local-level data related to land use.

1.2.4 Applicable Standards

1.2.4.1 National

The Constitution

Under the Mongolian Constitution, 1992 all land, except that given to the citizens of Mongolia for private ownership, subsoil, natural resources and water are the property of the State. The Constitution allows the State to grant ownership of land to Mongolian citizens, but they shall not transfer such land to foreign entities. Land may be leased to foreign entities.

Law on Land of Mongolia (In force on 1st January 2003; last amended 2nd May 2019)

This law regulates 'possession' and 'use' of 'land'. The following definitions are important in the context of the law:

- Land includes the surface of land and airspace above;
- To 'own' land means to have control over land and a right to dispose of it;
- To 'possess' land means to have control over land in accordance with a contract that sets out the permitted use and other terms of possession;
- To 'use land' means the right to use land in accordance with a contract granted by those who 'own' or 'possess' the land; and
- A 'certificate of land use' means a certificate granting the right to use land to foreign legal entities.

Land must be monitored, protected, restored and used efficiently for its permitted use. Any activities that may cause damage to human health, nature and ecological balance, or national security are prohibited. Foreign countries, international organisations, legal entities and citizens may become users of land for a specific purpose and a specific time period subject to contract conditions and in compliance with the law.

Land Use Planning and Compulsory Purchase (Expropriation)

The Law on Land of Mongolia also addresses land use planning and expropriation.

The State Central Administrative Organization has the power to implement legislation and policy on land use and to determine land use classifications subject to government approval.

Citizens' Representatives Khurals and Governors of *aimag*s, the Capital City, *soums* and districts have powers to:

- enforce land legislation and ratify general land management plans;
- take land from citizens for the special needs of *aimag*s, the capital city and *soums* on submission of such proposals by corresponding level governors;

- determine the size and boundaries of land to be taken from Citizens and approve the use of such land; and
- make decisions on granting compensation in respect of land taken.

Governors of *aimag*s, the capital city, *soums* and districts have the following powers with respect to land issues:

- to enforce land use laws;
- to prepare land use management plans;
- to submit to Citizens' Representatives Khurals proposals regarding taking land for special needs, upon prior agreement with the possessor of the land and the governor of the corresponding level;
- to evict people from land if they cause significant land degradation; and
- to override land use decisions made by lower level governors if there is a legal ground.

Soum and District governors have the power to grant rights to citizens to use and possess land in accordance with annual land management plans approved by Citizens' Representatives Khural. Citizens' Representative Khurals and governors of *baghs* and khoroos have powers to regulate and protect common tenure land. Governors of *baghs* and khoroos have the powers to enforce land use and land protection legislation including the implementation of decisions of higher level authorities. A separate Law on Land Fees imposes fees on the possession and use of land (1st July, 1997).

Law on Land Use Fees (In force on 01st July 1997 and last amended on 2nd May 2019)

This law regulates the relations concerning the imposition of fees for the possession and use of state-owned land for citizens, business entities and organizations as well as the payment of such fees to budget.

Customary Land Use Law

Customary Law develops over time through accepted patterns of behaviour within societies that become accepted as law within such communities. Customary law is still used in Mongolia for the allocation of grazing rights between herder families and communities. Grazing rights may be acquired under customary law through the:

- use of land for generations;
- construction of animal shelters;
- possession of a water well close to grazing land; and
- possession of croplands close to grazing land.

Pasture use issues among communities are settled via consultation with neighbours.

Customary land use rights will also need to be considered due to the requirements of International financial institutions (IFIs) (“Lenders”) in the event of impacts on herder water supplies or resettlement of herders.

2019 Law on Pastureland Management and Conservation

The Law on Pastureland Management and Conservation is currently subject to final approvals. The law is expected to regulate the relationship that protects pastureland soil and the user rights thereof. The draft law specifies pastureland classification (common pasture area, reserved pasture area, shared pasture area and contracted pasture area) criteria on pasture usage, agreement conditions, rights and duties, information rights of herders, government organisations' mandates, and conflict resolution, among others. There are expected changes on current pasture management in the law that ensure livestock numbers are balanced with pastureland capacity, and that there is clear classification of pasture areas (State Great Khural 2019).

1.2.4.2 International

The EBRD's Performance Standard 5 on Land Acquisition, Involuntary Resettlement and Economic Displacement is the key applicable international standard in regards to this Project. PR 5 underscores that unless properly managed, involuntary resettlement may result in long-term hardship and impoverishment for affected persons and communities, as well as environmental damage, and adverse socio-economic impacts in areas to which they have been displaced. Under some circumstances, poorly executed involuntary resettlement may leave the client exposed to legal action in other jurisdictions. Objectives for this PR are to:

- avoid, or when unavoidable, minimise, involuntary resettlement by exploring alternative project designs;
- mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of and access to land by: (i) providing compensation for loss of assets at replacement cost, and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected;
- restore, or where possible, improve the livelihoods and standards of living of displaced persons; and
- improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.

1.3 Land Use Overview

Land in Mongolia has been used collectively by herders under traditional, socialist and market economies, and Mongolian culture is heavily influenced by a "nomadic way of life". Land use is therefore important from both economic and socio-cultural and environmental perspectives. Herding and Mongolians' use of land has undergone several changes in recent history, summarised below (Upton, Moore, Nyamsuren, & Batjargal, 2013)

> Mongolia is a country with a unique trajectory and scale of rural livelihood transformations over the last 80 years. Until the late 1950s and into the subsequent *negdel* era (era of collectivised agriculture), rural people relied primarily upon extensive herding for their livelihoods. The collectivisation movement, which achieved full dominance by the late 1950s to early 1960s, survived over 30 years with a full dismantling of *negdel* in the 1990s under a nationwide shift to market-driven economic relations. Under this transformation, the cooperative/collectivisation movement, or socialist command economy, gave up its existence to private ownership based, market-oriented economic development."

Key to the shift from a collective to a market-driven system was the implementation of laws that regulated tenure, allocation, expropriation and transactions associated with land and other immoveable assets. Since the transition to democracy in the early 1990s, herders have experienced major changes in economic and socio-political systems that have influenced their rangeland and livestock management practices and knowledge. Specifically, growing numbers of livestock and decreased herd movements around seasonal pastures have created more pressure on the pastureland affecting its productivity and sustainability (Swiss Agency for Development and Cooperation 2019).

1.3.1 Protected Areas

Mongolia has significantly expanded its protected area over the last two decades, reaching 16.1% of the country's surface (Ministry of Environment and Tourism 2019). There are a number of protected area designations, including internationally sanctioned protected areas, state protected areas, local protected areas (see box below), important bird areas, and proposed protected areas. However, the increase in protected areas has not been matched by a growth in capacity and resources to manage the conservation of species and habitats in these areas.

State Special Needs Land - Definition

The State land for special needs was legalised by the Mongolian Law on Land (2002) and includes:

- Special Protected Areas; Border areas; Land allocated for national defence and security; Land for foreign diplomatic missions and consulates, as well as the representative offices of international organisations; scientific and technological experiment, environmental and climatic observation areas; Inter-class grazing pastures; Pastureland reserved for emergency use (in case of natural disasters, e.g. *dzud*); Land for oil exploration; Free Zones; and Land for construction of nuclear facilities.

According to the Law on Special Protected Areas, the Article #3 Special Protected Areas shall be classified as:

1) Strictly protected areas;
2) National conservation parks;
3) Nature reserves; and
4) Monuments.

*Aimag*s, the capital city, *soums* and districts may take certain areas within their territorial jurisdictions under special protection as "local protected areas".

1.3.2 Land Rights in Mongolia

The use of pastureland for the grazing of livestock varies across Mongolia from nomadic herding in the desert to transhumance[1] systems in the more fertile forest-steppe. The Mongolian legal system allows for various types of land rights depending on the purpose for which the land will be used, i.e. herding, crop farming, forestry. Private ownership of land is restricted to residential land. In urban areas this is 0.07 ha, and in rural areas residential land of 0.5 ha is allocated.

Under the Mongolian Constitution and Law on Land, pastureland is classified as common use land and cannot be privately owned. However, the law provides for the protection of winter pastureland (and associated winter camps) to ensure that it is not grazed out of season. *Soum* Governors have the power to grant land use possession certificates to herders for winter / spring camps, not for the associated pasture areas. Summer and autumn pastures are not afforded the

[1] Transhumance is the seasonal movement of people with their livestock between fixed summer and winter pastures.

same protection and so are considered available for open access. Mechanisms through which pastureland use rights are obtained are:

- Use of the land by previous generations;
- Access / proximity to a well;
- Proximity to crop lands;
- Ownership of a dwelling (e.g. winter shelter); and
- Inherited through formal arrangements.

Customary rights to pasture land use are based on peer pressure to behave respectfully and reciprocally. Historically, custodial practices worked reasonably successfully, and the socialist system maintained this. Since the collapse of this system in the early 1990s, there has been a dramatic increase in pressure on limited pasture, due to increases in livestock numbers. Over-grazing and desertification, symptomatic of the tragedy of the commons, has occurred as a result of slowly developing government policy in this area.

1.4 Land Use in Bayankhongor *Aimag*

As estimated by the Agency of Land Affairs, Geodesy and Cartography (herein after ALAMGC), the total land size of Bayankhongor *aimag* is 11,597,779.69 ha, which makes it the fourth largest *aimag* at the national level. In 2018, the highest percentage of Bayankhongor land (76.6%) was allocated to agriculture[2], followed by special needs areas (19.8%). In Bayankhongor *aimag*, of the land allocated for agriculture, almost all of it is for pasture, which is indicative of the lack of intensive agricultural activities in the *aimag*.

Crop production is constrained by the prevailing weather conditions, poor water supply and soil productivity in the *aimag*. In terms of vegetable cultivation, around 1,000 households and 20 organisations in the Bayankhongor *soums* cultivate over 135 ha of land. The main crop fields are located in Bor balgas, Bumbat, Khoolt and Shargaljuut, which are cultivated by 142 families and entities. Households also grow vegetables in their khashaas[3]. The total harvest was 98.8 tons of potatoes and 43.7 tons of vegetables in 2018 (Statistics Office of Bayankhongor *aimag* 2018).

The state land for special needs is estimated at 2,298,819 ha, of which 94.5% is regarded as Special Protected Area (SPA). There are two SPAs, including the “A” part of the Great Gobi Strictly Protected Area and Gobi Gurvansaikhan National Park in the *aimag* (ALAMGC, 2018). There is not much-forested area (2.9%) compared with the national average (9.2%), and the rest of the categories (urban, land for roads and communications, and water reservoirs) share a similar pattern with the national land allocation trends (ALAMGC 2018).

1.4.1 Livestock Resources

The total number of livestock in Bayankhongor *aimag* was 1,962,970 in 2010, and it reached over 4,249,473 in 2018 – highlighting the steep increase in livestock numbers. Goats accounted for the highest share at 52.3% of total livestock in 2018. Since the main source of income for rural households in the *aimag* is animal husbandry, in order to increase their income, households have focused on breeding livestock that produce the most financially lucrative raw materials. This has

[2] According to the Law on Land, agricultural land shall include pastureland, hayfields, crop lands, lands for cultivation of fruits and berries, fallow lands, lands under agricultural construction and other land for agricultural production.
[3] Khashaa refers to within the fence-line or property.

led to an increase in the number of goats (out of all livestock product prices, the price of cashmere has increased the most in the past few years) (Statistics Office of Bayankhongor *aimag* 2018).

Table 1 Livestock Composition Dynamics, 2010, 2015 and 2018

	2010	2015	2018
Total livestock	1,963,100	3,771,800	4,249,473
Camel	30,100	44,500	57,388
Horse	74,400	141,300	175,944
Cow	101,500	189,000	239,777
Sheep	543,800	1,082,600	1,297,467
Goat	1,213,300	2,314,400	2,478,897

Source: Statistical Yearbook of Bayankhongor, 2018

1.4.2 Land Degradation

There is consensus among herders, government officials, non-government organisations (NGOs), among others, that Mongolian rangeland has, and is, degrading due to overgrazing and climate change trends. Indeed, nearly 60% of rangeland is degraded, and of this, 13% is considered to have passed the threshold of recovery (UN Environment 2019). The primary reason for overgrazing is the continuous increase in livestock numbers. As shown in Table 1, the total number of livestock in the *aimag* was 1,962,970 in 2010, and it reached over 4,249,473 in 2018 (equivalent to a 216% increase).

The number of livestock expressed in heads of sheep[4] per 100 ha of pastureland area was 99 sheep units as national average in 2017, compared to 66 in 2013. This indicates the increased pressure on rangelands in a short period of time. According to the Agriculture Sector Report (NSO 2019), the number of livestock expressed in heads of sheep per 100ha of pastureland area was 77 sheep units in Bayankhongor *aimag* in 2017. While this is 22 sheep units lower than the national average (99), it has increased steeply in the past decade (as noted above), indicating high stocking rates in the *aimag*, and increased pressure on available pastureland.

1.5 Land Use in Shinejinst and Bayan-Undur *Soums*

1.5.1 Overview

Shinejinst and Bayan-Undur *soums* are similar in that they are both characterised by a sparse and widely spread population. As of 2019 in Shinejinst *soum* there were a total of 2,449 registered residents, while the population of Bayan-Undur *soum* in 2018[5] was 2,668. Both *soums* are characterised by a desert steppe, with sparse and low-lying vegetation, with slightly more vegetation cover and trees around ephemeral and permanent spring areas. Within the desert steppe ecosystem, plant growth varies according to rainfall, hence the pattern of pastureland use is annually and seasonally variable. Rainfall levels are extremely low and unpredictable (~105mm per annum). These conditions result in herders having to move their herds longer distances in some years to find suitable pasture.

Table 2 shows that at the *soum* level, in Shinejinst, 60.1% and 35.7% of land is allocated for agriculture (largely pasture) and special needs places respectively. In contrast, Bayan-Undur

[4] Heads of sheep equivalent factors, or sheep units, are used to indicate grazing land livestock carrying capacity. Heads of sheep conversion factors are: 1 camel to 5 sheep units; 1 horse to 7 sheep units; 1 cow to 6 sheep units; 1 sheep to 1 sheep unit; and 1 goat to 0.9 sheep units (e.g. 1 camel + 10 goats + 1 cow = 5 + 9 + 6 = 20 sheep units).

[5] Data not available for 2019 at the time of this Study.

soum allocated 36.2% and 51.1% of the land for agriculture and special needs, respectively). This highlights the importance of agriculture in both *soums* as the most significant land use; and that a large proportion of land is reserved by the state for special needs. Only a very small area of both *soums* is urban land – 0.1% for Shinejinst and even less for Bayan-Undur. The two *soum* centres are the only built-up areas, and contain public infrastructure, services, and small businesses. In addition, the *bagh* centres in the two *soums* comprise a basic community building used mainly by herders occasionally for public meetings.

Table 2 Land Allocation by Usage Purpose, 2018

Purpose	*Aimag*		Shinejinst		Bayan-Undur	
	ha	%	ha	%	ha	%
Total land	11,597,779	100.0	1,650,123	100.0	1,689,135	100.0
1. Agriculture	8,884,264	76.6	990,955	60.1	610,959	36.2
2. Urban areas	24,808	0.2	1,956	0.1	245	0.0
3. Land for roads, communications and other infrastructure	8,067	0.1	177	0.0	203	0.0
4. Forested areas	330,703	2.9	66,770	4.0	213,701	12.7
5. Land for water reservoir	51,118	0.4	892	0.1	410	0.0
6. Special needs place	2,298,819	19.8	589,371	35.7	863,500	51.1

Source: Integrated Land Database Report 2018

Of the land designated for agriculture, as shown in Table 3, the vast majority is for pasture at the *aimag*, and *soum* levels.

Table 3 Land Allocation for Agricultural Purposes, Bayankhongor, 2018

Purpose	*Aimag*		Shinejinst		Bayan-Undur	
	ha	%	ha	%	ha	%
Agriculture (total)	8,884,264	100.0	990,956	100.0	610,959	100.0
Pasture	8,859,008	99.7	990,489	99.95	610,775	99.9
Hayfield	10,662	0.12	210	0.02	-	-
Cropping	2,196	0.02	13	0.00	6	0
Fallow land	10,137	0.11	15	0.00	-	-
Agricultural building	2,068	0.02	229	0.02	178	0.03
Land not suitable for agriculture	190	0.00	-	-	-	-

Source: Integrated Land Database Report 2018

Shinejinst *soum* has 589,371 ha of land for special needs, of which 92.7% is designated as SPA, while Bayan-Undur *soum* has 863,617 ha of land for special needs, of which 96.2% is designated as SPA. The limited zones of the Great Gobi SPA part A and the Gobi Gurvan Saikhan national park are located approximately 27 km and 48 km from the KGP, respectively (Eco Trade LLC, 2018b). There are three Local Protected Areas[6] (LPA) proximal to the exploration area, namely Bor Khairkhan Mountain, Nogoon Tsav and Idren Nuruu (see Figure 1).

[6] "Locally Protected Area is an area protected by administrational units such as *aimag*, capital, *soum* and districts, to conserve areas of natural indigenous landscape, unique formation, and of high significance in terms of history, culture, and tourism, and to ensure proper use of natural resources.

Figure 1 provides an overview of land use within the two *soums*. As illustrated, the KGP is located in Shinejinst and Bayan-Undur *soums*. There are 4 *baghs* in Shinejinst *soum*, namely Zaraa (I), Urtiin Gol (II), Erdeneshand (III) and Ekhen Khavtsgai (IV). There are 4 *baghs* in Bayan-Undur *soum*, namely Ulaan uzuur (I), Elgen (II), Bulgan (III) and Idren (IV). At the *bagh* level, the KGP is located in Urtiin Gol *bagh* (Shinejinst *soum*) and Idren *bagh* (Bayan-Undur *soum*). The Project Site Access Road is located in Urtiin gol *bagh*, from Shinejinst *soum* centre to the site.

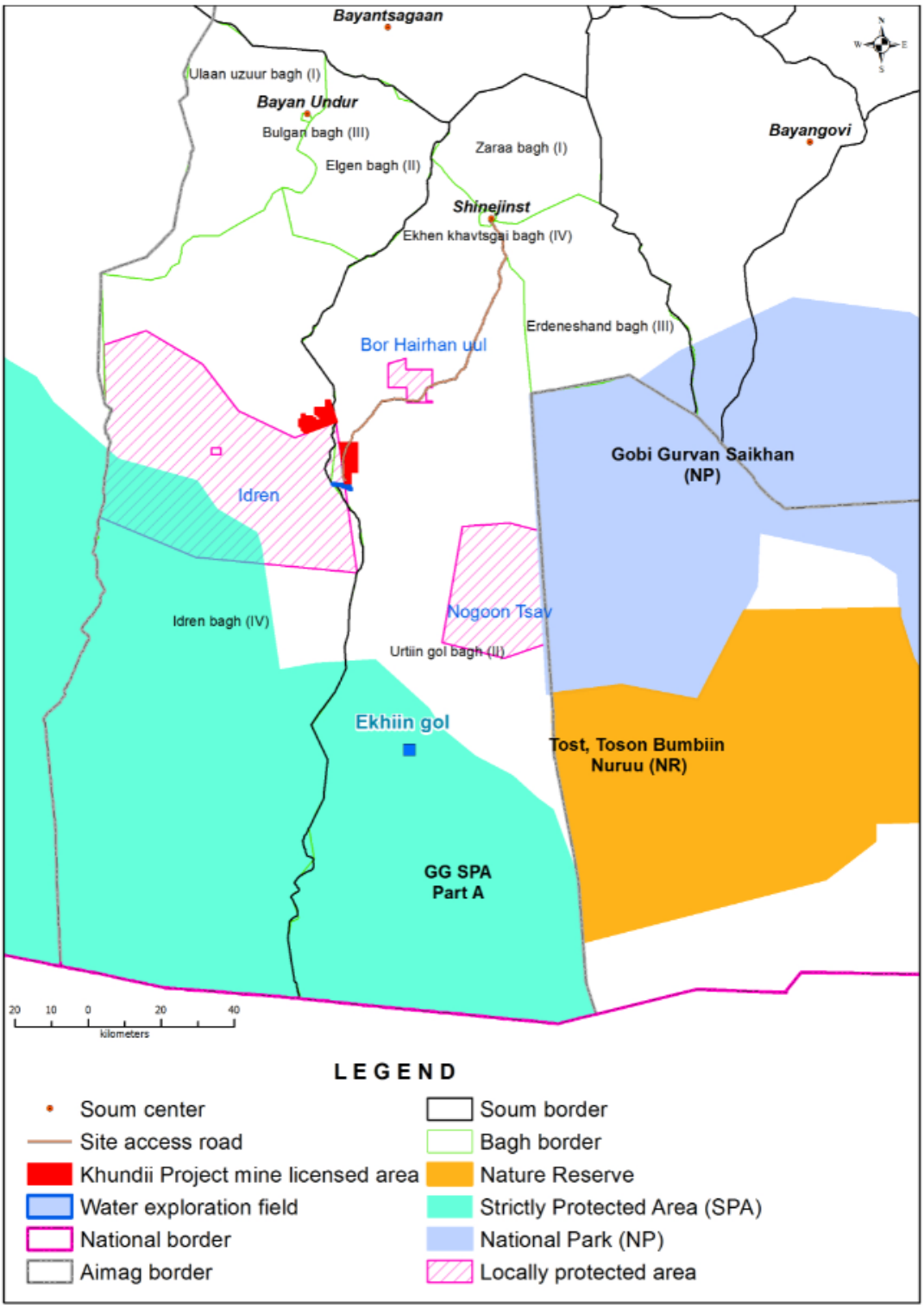


Figure 1 Features of the KGP Licence Area

1.5.2 Herding and Livelihoods

The majority of residents of Shinejinst and Bayan-Undur *soum* are rural and/or seasonal herder households totalling 477 (62.8%) herder households in Shinejinst *soum* (out of a total of 759 households); and 480 (63.7%) herder households in Bayan-Undur *soum* (out of a total 753 households). An additional 162 (21% of total HHs) households in Shinejinst *soum* and 118 (15.6% of total HHs) households in Bayan-Undur *soum* have livestock, but do not permanently herd their livestock and live either part or full-time in the *soum* centres. In sum, 83.8% of total households in Shinejinst and 79.3% of total households in Bayan-Undur *soum* possess livestock.

The number of herder households and total number of herders increased slightly between 2010 and 2018 (Table 4), with this being a consistent trend at the *aimag*, *soum* and *bagh* level. The reason for the increase is mainly due to general population growth. For example, when herder households' children get married, they are registered as a separate herder household. Otherwise, there was no reported increase in the number of herder households due to internal migration.

Table 4 Number of Herder Households, by *Aimag*, *Soum* and *Bagh*, 2010-2018

	2010	2015	2018	Comment
Bayankhongor *aimag*	11,055	11,171	11,920	Increased
Shinejinst *soum*	402	411	477	Increased
Bayan-Undur *soum*	428	439	480	Increased
Urtiin gol *bagh*	-	-	192	-
Idren *bagh*	-	-	97	-

Summer grazing is conducted informally, and there are no designated summer pasture areas, as these change from year to year depending on forage conditions, livestock numbers, weather and the individual requirements of herder families. According to the Law on Land, summer and autumn settlements and rangelands shall be allocated to *baghs* and *khot ail*[7] and shall be used collectively. However, herders may individually use the winter / spring camps (0.07ha area) via possession certificates.

As was noted by the agriculture specialist of Bayankhongor *aimag*, herders are increasingly choosing to obtain possession certificates for land in recent years. However, it was further noted that there is still confusion over pasture possession and common (open) pasture areas, and the widespread belief that among herders that possession (0.07ha area) contracts also apply to nearby pasture and water resources.

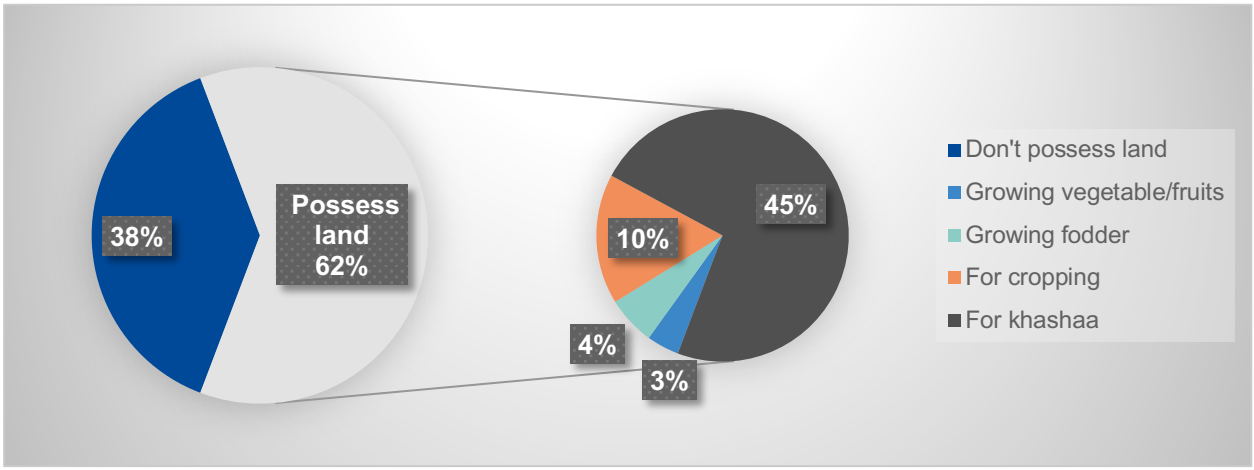
With reference to the national review of key land use laws currently underway, at of the time of this study (August 2019), the *soum* level Citizens Representatives' Khural (CRK) was in the process of discussing the annual situation of pastureland management and the rules around land use and payment issues. Historically, winter / spring camp land (i.e. land possession certificates) was given to herders for between 40-60 years from 2000 to 2010, and more recently, only for 15 years between 2010-2019 (KII with CRK, Shinejinst *soum*).

[7] It is customary for households to camp together in small groups called *khot ail*. The households in *khot ail* are often, but not always, related through kinship. Within a *khot ail* households pool their livestock into herds of the same species (sheep and goats, cattle, horses, and camels) achieving economies of scale in herding labour. Households within a *khot ail* also usually share tasks such as hay-cutting and seasonal nomadic movements. However, the composition of *khot ail* is seldom stable and often shifts from season to season and year to year. *Khot ail* tend to be larger in the more productive, mountain-steppe zones and smaller in the more arid desert steppe regions (Fernandez-Gimenez 2002).

Ownership: As identified in the Household Survey, 50 households (64%) own land and 28 households (36%) do not own land. Of the households that own land (64%), the *soum* centre is the most common location to own land (53%), while 5% of respondents indicated that they own land in the Bayankhongor *aimag* centre and 6% of them own land in other *soum*s and *aimag*s. Since the *soum* centre is surrounded by mountains where there is limited open or flat area, *soum* citizens are generally granted ownership of 0.07 ha of land despite 0.5 ha of land being permitted for ownership in the *soum* centre by the Law on Allocation of Land to Mongolian Citizens for Ownership (KII Shinejinst *soum*).

Possession: Of the surveyed households in the Project area of influence, 48 households (62%) possess land. As reported by 35 households (45%) of surveyed households, the most common use for land that is possessed is *khashaa* (plot of land) associated with a spring / winter camp (Figure 2).

Figure 2 Household Land Possession, by Purpose



Herders reported that when a new family joins the *khot ail*, 41% of surveyed households consult with neighbouring herders, while 19% do not believe any actions need to be taken. Only 6% inform the *bagh* and *soum* to obtain formal recognition. When formal tenure holders of pastureland have permanently migrated to different places, a quarter of households reported that the community decides how the vacated pastureland will be used. In some cases, either the *bagh* or the *soum* administration makes the decision to transfer user rights to others.

Summer Camps and Seasonal Migration

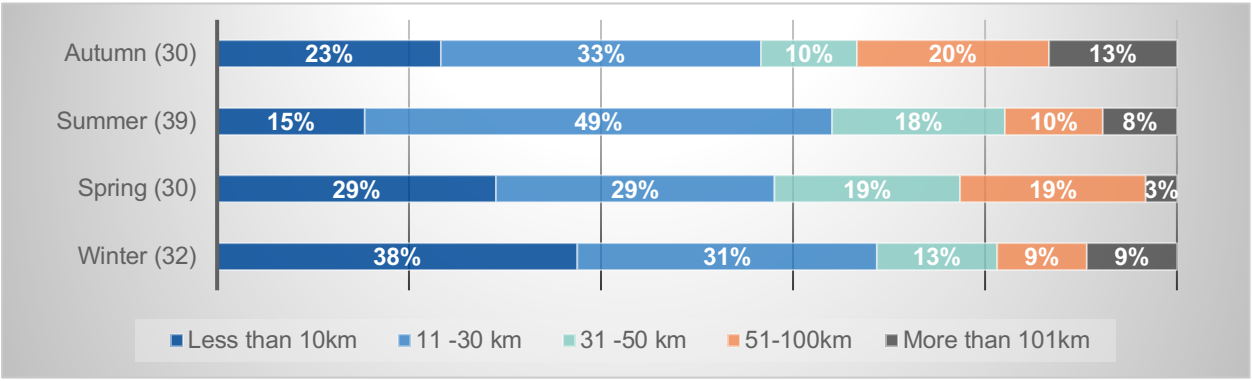
During spring, summer, and autumn when pastures grow, seasonal herders move their gers to a location they consider to have good pasture access. Summer camps are normally located in the vicinity of a water source, usually a hand dug shallow well that provides water for animals and families. Summer / autumn grazing allows winter grazing areas time to recover and to let livestock gain strength and fatten ahead of winter.

The locations of these camps are directly dependent on the pasture conditions and high seasonal variation thereof in this area. The Household Survey results showed that 48 herder households (out of 64 households who have livestock) said that they need to frequently migrate across the land season by season following the yield of pasture. Herders, who do not need to move, mainly reside in the *bagh* centre (Urtiin gol and Zuun mod area) and *soum* centre. Households indicated they usually move around five times a year, with the following approximate frequency of seasonal movement in search of pasture:

- Spring movement – once.
- Summer movement – twice;
- Autumn movement – once; and
- Winter movement – once.

The Household Survey found the average household moving distance is between 10 and 40 km. Based on herder household's estimations, seasonal herding areas were reported to range within 5-10 km. If weather conditions are poor, or deteriorate in summertime due to droughts, herders reported that they will, by necessity, move to neighbouring *aimag*s, such as Uvurkhangai, Arkhangai, Zavkhan, Gobi-Altai or Omnogovi. However, moving to the other *aimag*s was noted to be very rare as herders prefer not to leave their *bagh* (KII, Bayankhongor *aimag*). During the Household Survey, herders expressed that households with good manpower and finances have a higher frequency of movement, whereas those with few family members or acquaintances nearby tend to move less.

Figure 3 Seasonal Movement of Herder Households in Project Area of Influence



FGDs, KIIs, and the Household Survey conducted established that there are no clear boundaries for the use of summer and autumn grazing areas, and that grazing areas are highly variable both within and between seasons. Most herders in Urtiin gol and Idren *baghs* tend to move / migrate in customary areas, and mainly within their respective *baghs* (KII, Shinejinst). To illustrate the highly variable nature of predominantly spring, summer, and autumn pasture use, a comparison can be drawn to the locations of herder households in the baseline studies conducted in 2016 and 2019 respectively. Figure 4 shows that there were five spring camps within a 20km radius of the Bayan Khundii licence area during the baseline study[8] in May 2016. However, during the August 2019 social baseline study, there were no households with camps within 20 km of the Mineral License Areas. Most households of Urtiin gol *bagh* were found within 20km of the site access road from the Shinejinst *soum* to the Khundii Gold Mineral Licence Area (MLA). The recorded locations of herder camps given in Figure 4 are based on those found at the time of the Household Survey, and are not exhaustive or necessarily representative of all camp areas used over time. As such, the locations are a limited snapshot in time of herder locations.

[8] Environmental and Social Baseline Study in Bayan Khundii and Tsenkher Nomin license area in 2016 and 2017 conducted by Eco Trade LLC

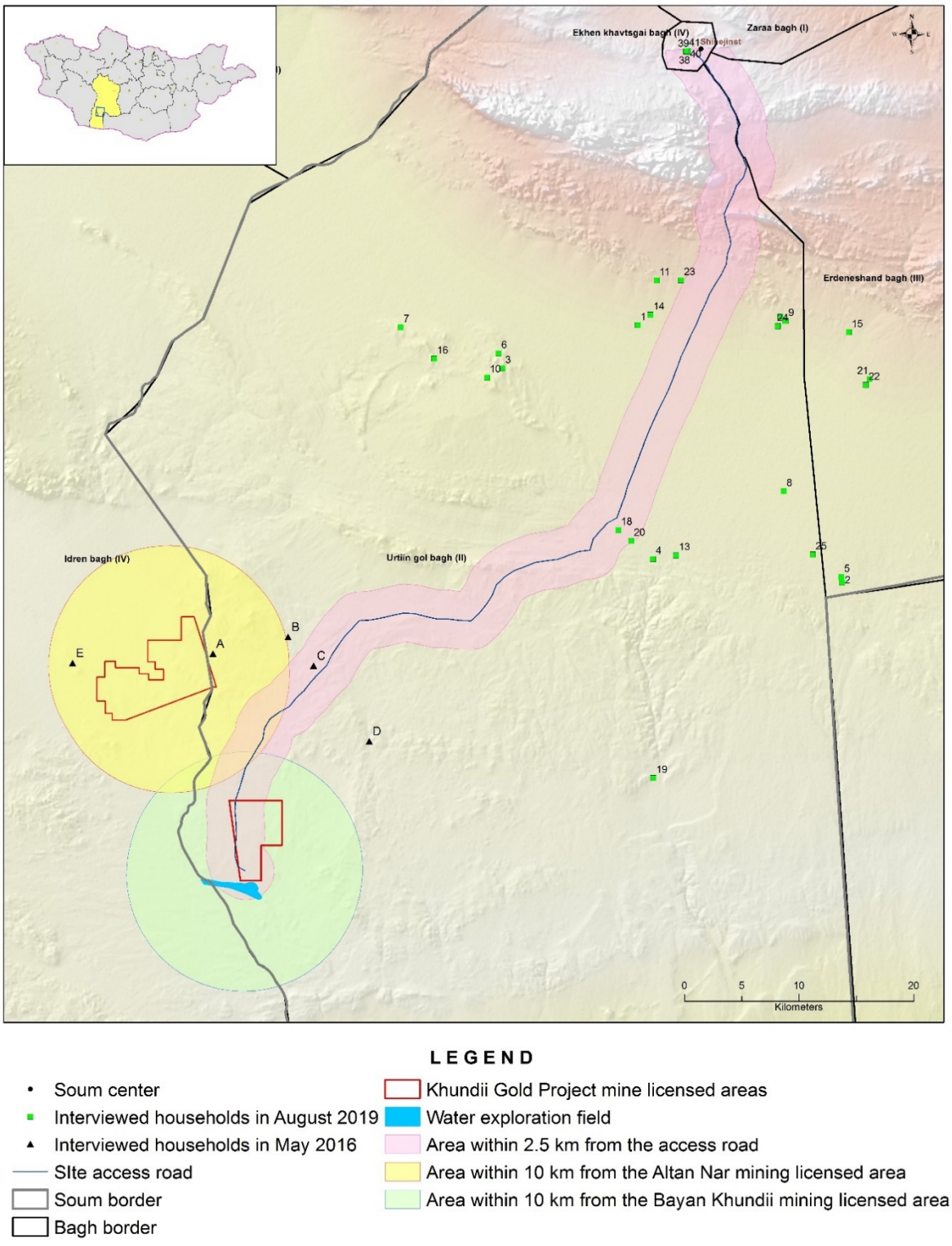


Figure 4 Recorded Herder Spring and Summer Camps

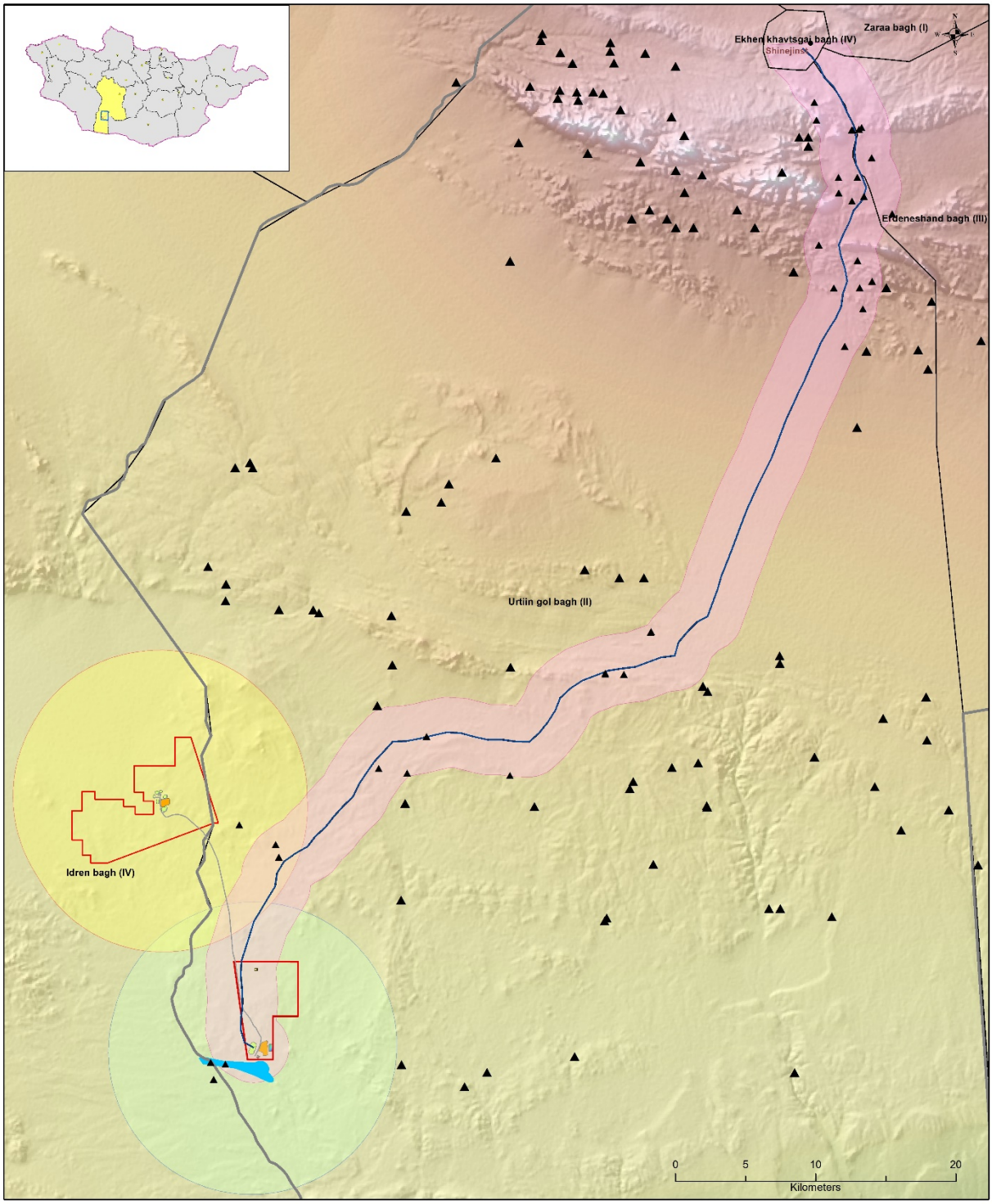
Winter Camps

Herder households frequently move in other seasons depending on pasture conditions; however they tend to return to a given winter camp site (depending on pasture availability). At most, herders stay in their winter camp for 4 months from around November to February. Winter is generally a sedentary season with few herder families moving during this time. If the quality of pasture near their winter camp is good, households indicated that they may move earlier, around mid-October. Winter camps are usually located near wells, and a sheltered location is favoured - often a protected nook on a mountainside, in a canyon, or on the lee side of a hill. Camps are key for survival – with winter temperatures averaging minus 30-40°C. A good campsite is developed over time and typically has many winters accumulation of dung, which insulates animals and people against the cold, and may be used by herders as fuel. Livestock are kept close by, and families use fodder, hay, and wheat as a supplement feed for their animals during this time (Fernandez-Gimenez 2002:69). In Mongolia generally, a winter shelter has a fence, large *(ikh ger)* and small *(baga ger/banag) gers*, a well, and pit latrines (less frequently).

As noted above, and in accordance with the Law on Land, herder households may acquire possession rights to a given winter camp. Figure 5 below shows recorded winter camps (138 of them) in Urtiin Gol *bagh* territory to give an overall snapshot of herders' winter camp locations[9]. Most of the winter camps are found south of Shinejinst *soum*, particularly around the Tsagaan Khaalga area in the nearby hills. The temporary camp areas observed in the southern part of the *bagh* generally lacked any improved buildings or facilities and were historically used sporadically for short periods in the spring or autumn when pasture conditions permitted.

Figure 6 shows recorded winter camps at a higher level, in relation to other key land uses, including showing protected areas, and key settlement such as Ekhiin gol oasis, among others. The Great Gobi SPA part A (see Figure 6) has a 994,413.36 ha buffer zones in the territory of Bayan-Undur and Shinejinst *soum*s of Bayankhongor *aimag*. According to KIIs in Bayan-Undur *soum*, the southern part of Idren *bagh* belonged to this buffer zone until 2018 and therefore, herder winter camps in the southern area of Idren *bagh* (where the KGP is located) were not formally able to obtain possession certificates by herders. As of 2018, this provision was relaxed, and herder households have been able to request possession certificates for their winter camps. Requests for certification are noted to be currently under review by relevant authorities.

[9] The locations of the winter camps were provided by Urtiin gol *bagh*, Shinejinst *soum* (as of 18 September 2019).



LEGEND

- Soum Center
- Winter Camps
- SIte Access Road
- Proposed Link Road
- Soum Border
- Bagh Border
- Khundii Project Mineral Licensed Area
- Open Pit
- Process Plant
- Integrated Waste Facility
- Fenced Landfill
- Camp
- Water Borefield Area
- Area Within 2.5 km from the Access Road
- Area Within 10 km from the Altan Nar Mineral Licensed Area
- Area within 10 km from the Bayan Khundii Mineral Licensed Area

Figure 5 Recorded Herder Winter Camps

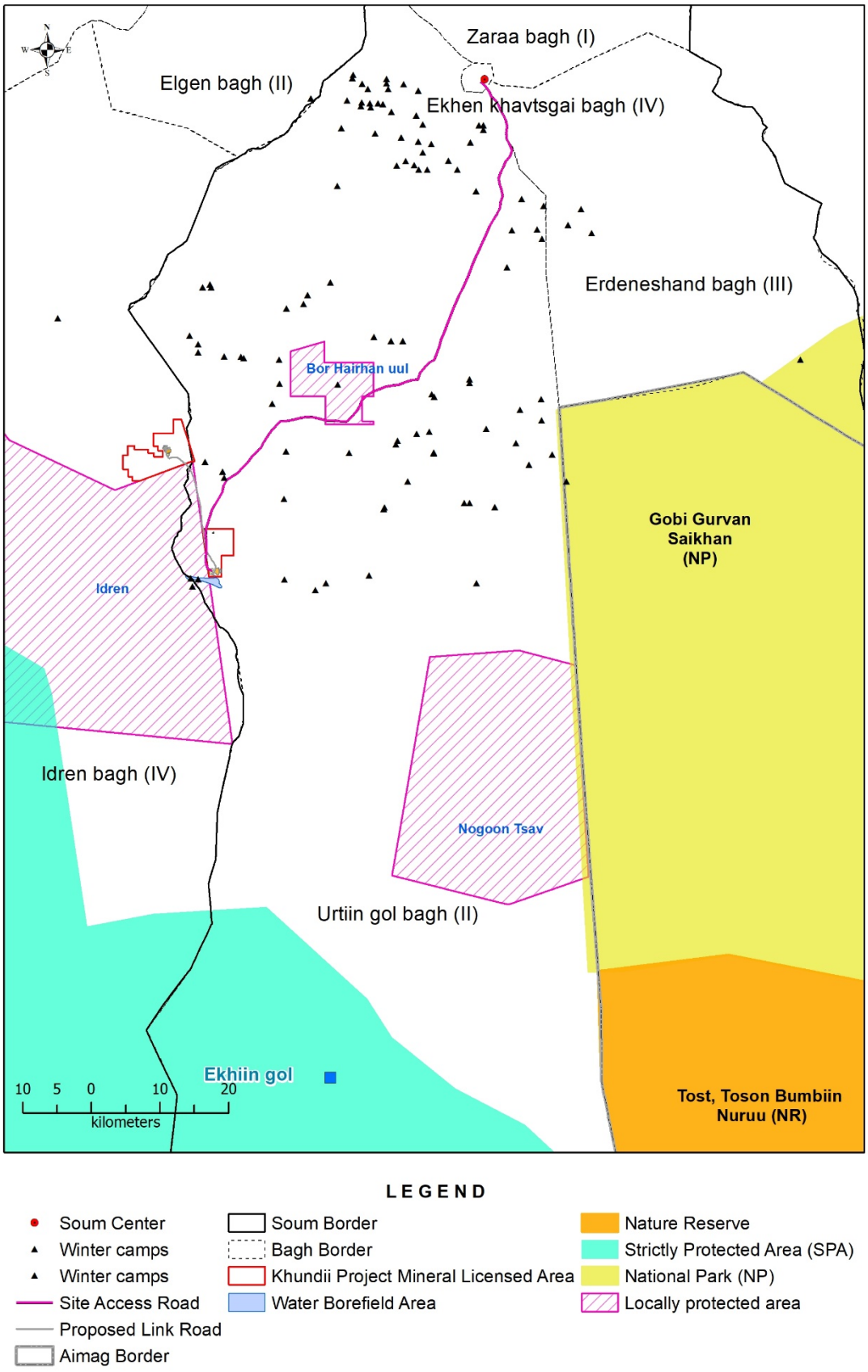


Figure 6 Recorded Herder Winter Camps in Relation to Other Land Use Features

Winter Camps Near the Project

According to KIIs, in wintertime, Urtiin gol *bagh* herders tend to move to the southwestern part of the Shinejinst *soum* area; and Idren *bagh* herders tend to move to the Idren Mountain, which is located in the southwestern part of Idren *bagh*, depending on the pasture availability.

There are a total of seven recorded winter camps within 10 km of both MLAs (Bayan Khundii and Tsenkher Nomin).[10] Specifically, there are three winter camps within 10 km of the Bayan Khundii MLA (all in Urtiin gol *bagh*[11], Shinejinst *soum*), with the closest being approximately 1.6 km away from the boundary of the Bayan Khundii MLA. There are 4 winter camps within 10 km of the Tsenkher Nomin (Altan Nar) MLA. Three of these are in Urtiin gol *bagh*, Shinejinst *soum*. The fourth is located in Idren *bagh*. As noted above, the winter camp in Idren *bagh* is reportedly currently undergoing registration, consistent with the ability of herders to lodge applications for land use possession certificates for their winter camps in this area from 2018. Coordinates for the camp are yet to be ascertained at the time of writing (it is therefore not illustrated in Figure 5) (KIIs, 2019). There are 29 winter camps recorded in the area within 2.5 km of either side of the Site Access Road (as shown in Figure 5), (KII, Shinejinst).

There are no permanent structures associated with the afore-mentioned winter camps. Use of registered winter camps is dependent on the seasonal conditions, and possession of a winter camp is not indicative of use of that camp area every winter season.

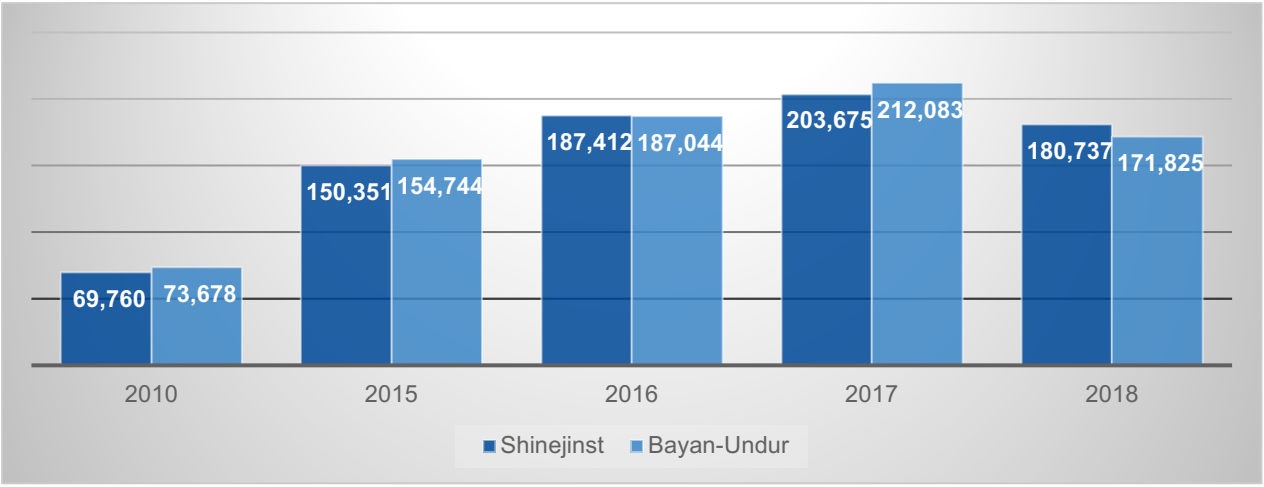
It should be noted that there are no winter camps within the KGP Mine Licence Areas or within the site access road footprint (i.e. there will be no physical displacement as a result of KGP).

1.5.3 Livestock Resources

Goats, sheep, and camels are the main animals raised in Shinejinst and Bayan-Undur *soums*, and the two *baghs* within which the Project is located – Idren and Urtiin gol. Figure 7 shows the number of livestock in Shinejinst and Bayan-Undur *soum*, like at the *aimag* level, tripled between 2010 and 2017 (Statistics Office of Bayankhongor *aimag* 2018:39). At the same time, there has neither been an increase in the size of land allocated for pasture nor a decrease due to allocation of land for other purposes in recent years (KII Shinejinst). However, a slight decrease in livestock numbers occurred over the 2017-2018 season, and it was explained that herders tended to sell their livestock in 2018 due to a harsh winter which was caused by the shortage of precipitation across three consecutive summers.

[10] To date, the status of four winter camps have been clarified with Shinejinst *soum* authorities.
[11] One of the camps is physically located in Idren *bagh*, but is considered part of Urtiin gol *bagh*. Clarification with local authorities advised that the household's winter shelter is formally registered as part of Urtiin gol *bagh*, Shinejinst *soum* and that this discrepancy reflects an anomaly from the past.

Figure 7 Livestock Numbers by *Soum*, 2010-2018



One of the indicators to define the pasture stress is herd size. According to the *aimag* statistics, on average, each herder household has an average of 379 and 358 animals in Shinejinst and Bayan-Undur *soum*, respectively. This matches with the *aimag* averages (Statistics Office of Bayankhongor *aimag* 2018). Among the households surveyed as part of the Social Baseline in August 2019, the highest number of livestock a household possessed was 1,090 whereas the lowest was 17. On average, households had 292 animals, which is slightly lower than the *soum* and *aimag* average. The Household Survey highlighted that there is a wide range of herd sizes, and this variation can be attributed to a number of reasons. For example, some herder households have fewer animals as they have alternative income sources, such as vegetable farming, while others may be unable to support a larger herd due to lack of income and limited manpower, especially for households with an older head.

Table 5 Herd Sizes and Sheep Units Per 100 ha, by *Aimag*, *Soum* and *Bagh* (2019)

	Bayankhongor *aimag*	**Shinejinst *soum***	**Bayan-Undur *soum***	**Urtiin gol *bagh****	**Idren *bagh****
Herder household	11,920	477	480	192	97
Herd size	4,249,473	180,737	171,825	66,132	42,798
Camel	57,388	6,133	4,973	3,343	3,462
Horse	175,944	2,238	2,273	659	311
Cow	239,777	326	561	120	111
Sheep	1,297,467	22,016	27,252	8,284	7,619
Goat	2,478,897	150,024	136,766	53,636	31,295
Average herd size per household	356	379	358	344	441

**Source: Official data provided during KII interview*

To express livestock numbers in sheep units, the average household in the study area has 400-430 sheep units which is 100-140 sheep units lower than the *aimag* level household average. In terms of sheep units per 100 ha, Shinejinst has 21 sheep units, and Bayan-Undur has 32 sheep units, both are lower than the *aimag* and national level (Table 6).

In the Household Survey, when asked to describe a viable herd size to support a herding household of 4 to 5 members to meet their basic needs, the mean size was 493 animals. Compared with the current average herd size of 292 at the *bagh* level, this indicates that herder

households may not perceive their current herd size as adequate to support their household. It also underscores the tendency for households to increase their livestock numbers if there is available pastureland and enabling weather conditions.

Table 6 Sheep Units Per 100 ha, by *Aimag*, *Soum* and *Bagh*, 2019 (research team calculation)

	Bayankhongor *aimag*	**Shinejinst *soum***	**Bayan-Undur *soum***	**Urtiin gol *bagh***	**Idren *bagh***
Sheep units (total)	6,485,684	205,325	194,483	78,604	55,938
Sheep units per herder household	544	430	405	409	577
Pastureland (ha)	8,859,008	990,956	610,775	-	-
Sheep units per 100ha	73	21	32	-	-

During the FGD and KIIs, people were critical of the trend of continually increasing the number of livestock, especially regarding the awards called "*Myangat malchin*" (herders who have 1,000 animals, or more), "The best herder of the country" and "The best herder of the province" awards that go to the herders with the most livestock. This reward practice encourages herders to focus on the quantity of animals, not the quality. This is a sign that herders' perceptions are changing, towards a preference for herd quality over quantity. In the Household Survey, all surveyed herder households thought that the quality of livestock is more important than the quantity of livestock.

Shinejinst and Bayan-Undur *soums* are nationally renowned for white cashmere from the Zalaajinst-Idren goat breed. At the *soum* level, 70 to 80 tons of fine micron goat cashmere are produced from Zalaajinst-Idren breed goats annually and sold to the market. Studies carried out in Shinejinst and Bayan-Undur *soums* of Bayankhongor *aimag* between 2011 and 2016 reviewed the results of work undertaken in crossing native goats with the Gobi Gurvan Saikhan breed, and the Zalaajinst white strain. The size of the Zalaajinst-Idren breed herds raised in Shinejinst and Bayan-Undur *soums* (home to the nucleus herds) has now reached 217,500, including 47,800 of the desirable type, representative of the breed.



Figure 8 Goat of Zalaajinst-Idren Breed in Urtiin Gol *Bagh* (August 2019)

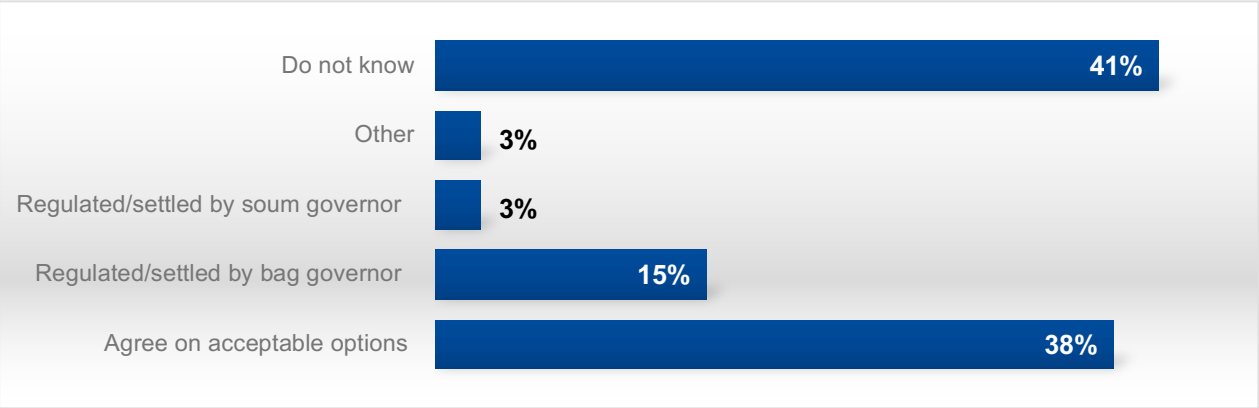
Households indicated that veterinary services for livestock vaccinations are generally perceived to be good, with 80% noting full coverage of their herd, 11% partial coverage, and 9% no coverage. In terms of the accessibility of veterinary services, 59% reported that they are able to obtain veterinary services when needed, with 24% only occasionally able to do so, and a further

17% unable to obtain services. Most households assessed the quality of veterinary care as good (42%) or fair (38%).

1.5.4 Pasture and Livestock Disputes and Resolution

The Household Survey indicated that disputes over pasture and other natural resources are infrequent, with only 9% reporting weekly occurrences and 50% reporting them to occur rarely or never. When such disputes do occur, 35.9% occur between herders camping nearby. Although 41% of surveyed households indicated they did not know how disputes are settled, 38% report that they are settled between parties through mutual agreement on acceptable options. Only 18% reported that the *bagh* or *soum* governor is involved in settling such disputes (Figure 9).

Figure 9 Commonly Used Methods and Measures for Settling Disputes



1.5.5 Agricultural Production

At Ekhiin gol (oasis) in Shinejinst *soum*, there are 12-14 households that run vegetable plantations on a small area of approximately 1-2 ha. Households plant vegetables, including tomatoes, cucumbers, carrots, onions, chilli, potatoes, and melons; and also sell canned vegetables. In socialist times, Ekhiin gol was used to grow and prepare vegetable seedlings for national seed consumption as a seed bank.



Figure 10 Vegetable Field at Ekhiin Gol (August 2019)

1.5.6 Use of Natural Resources

Users of natural resources are required by law to pay a natural resource usage fee, such as for water or land use. Users obliged to pay fees for use include *aimag* citizens, cooperatives and companies. Every month the *soum* authority collects natural resource fees as part of the local development budget, which is required by law to be spent on environmental protection and natural resource restoration measures.

Table 7 Investment of Natural Resource Royalties by *Soum* Governments (all *Soums* in Mongolia)

Natural Resource Use Revenue Type	Percentage of Revenues Required to be Spent on Environmental Protection & Natural Resource Restoration Measures
Income from the use of natural herbs	15%
Water use fees	35%
Income from use of forest (timber, firewood royalty)	85%
Hunting royalty income	50%
Income from land use	15%

Source: Law on Natural Resource Use Fees 2012

As defined by the Tax Authority, land users are required to pay land use fees calculated on the following basis:

- A fee of pastureland use, calculated based on heads of sheep is 0.01-0.03%;
- Fee-based on one hectare of possessed, used cropping and hayfields is 0.01-0.03%.

As per the above table, only 15% of fees from land use are reinvested into environmental improvements. However, the herder households are excepted to a certain degree from the payment of 0.07 ha land ownership (90%) and pastureland use (100%) (Mongolia Tax Authority 2019).

The Household Survey showed that 22% of households surveyed often utilise natural resources for household consumption, while more than half (53%) reported doing so “sometimes” and the remaining 26% never used natural resources (Figure 11). Of the households that reported using natural resources, 69% utilise the natural plants in the region, and 30% utilise wood. Anecdotally (see box below), it was reported that saxaul wood[12] is only used when households are desperate, due to very cold winter or poor quality of available coal. A vast majority (93%) of surveyed households do not generally sell the goods they gathered or hunted.

[12] The Mongolian Law on Forests divides forests into three categories: strict, protected, and utilisation zones. The protected forest zone category includes saxaul forests. The main functions of forests and protection regimes are to preserve the original natural condition and features in certain areas; and to conduct observation and investigation for the special purpose of long-term conservation (Tsogtbaatar, 2004).

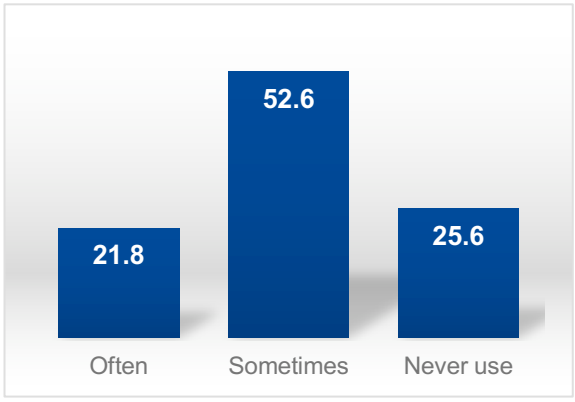


Figure 11 Use of Natural Resources

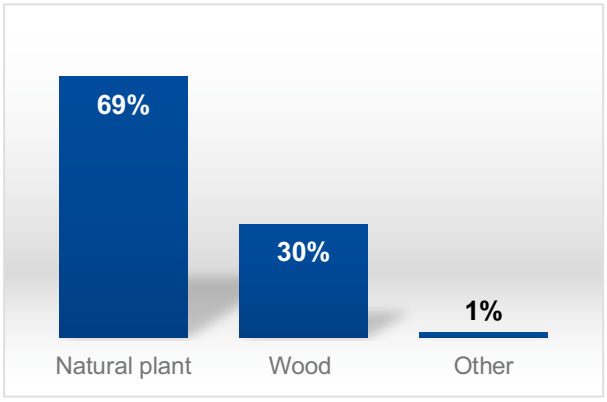


Figure 12 Kinds of Natural Resources Used

During the Household Survey, people were also asked what strategy their household uses to cope with shocks. Results showed that only 4% would collect and sell natural resources to cope. Nearly half (49%) reported that they would sell their livestock to cope with unexpected shocks, such as sickness or natural disasters.

> *… Illegal hunting and/or harvest of both rare as well as common plants and animal species are rare (almost none) because in one hand there are no animal and plant species that are of economic value; on the other hand local people are well aware that rare animals and plants should be valued and protected. … There were cases of using zag (Saxaul) (dead branches and trunks) for livelihood (heating and cooking) purposes due to extremely cold winter and quality of the local coal. However, when coal quality is good, zag consumption is almost zero.*
>
> *(KII Shinejinst)*

1.5.7 Herder Water Resources

Chapter B5 Water Resources, provides the detailed water resources baseline. Water resources are discussed in brief in this Chapter, with reference to herder water use.

Water is the key pastureland resource and plays a major role in the location of the seasonal camps of herders within the two *soums* and *baghs*. Due to the lack of permanent sources of open water, herders traditionally and primarily extract water from wooden-lined hand-dug wells. Herders also use temporary accumulations of rainwater from flooding and runoff in the spring, as well as springs that are recharged from periodic rainfall events.

Figure 13 shows the water points near the KGP Mine Licence Area. Wells that have been identified as being used periodically by herder families within the region are Khooloi, Khuren tsav, Maihan, Gun zag, and Suul tolgoi wells.

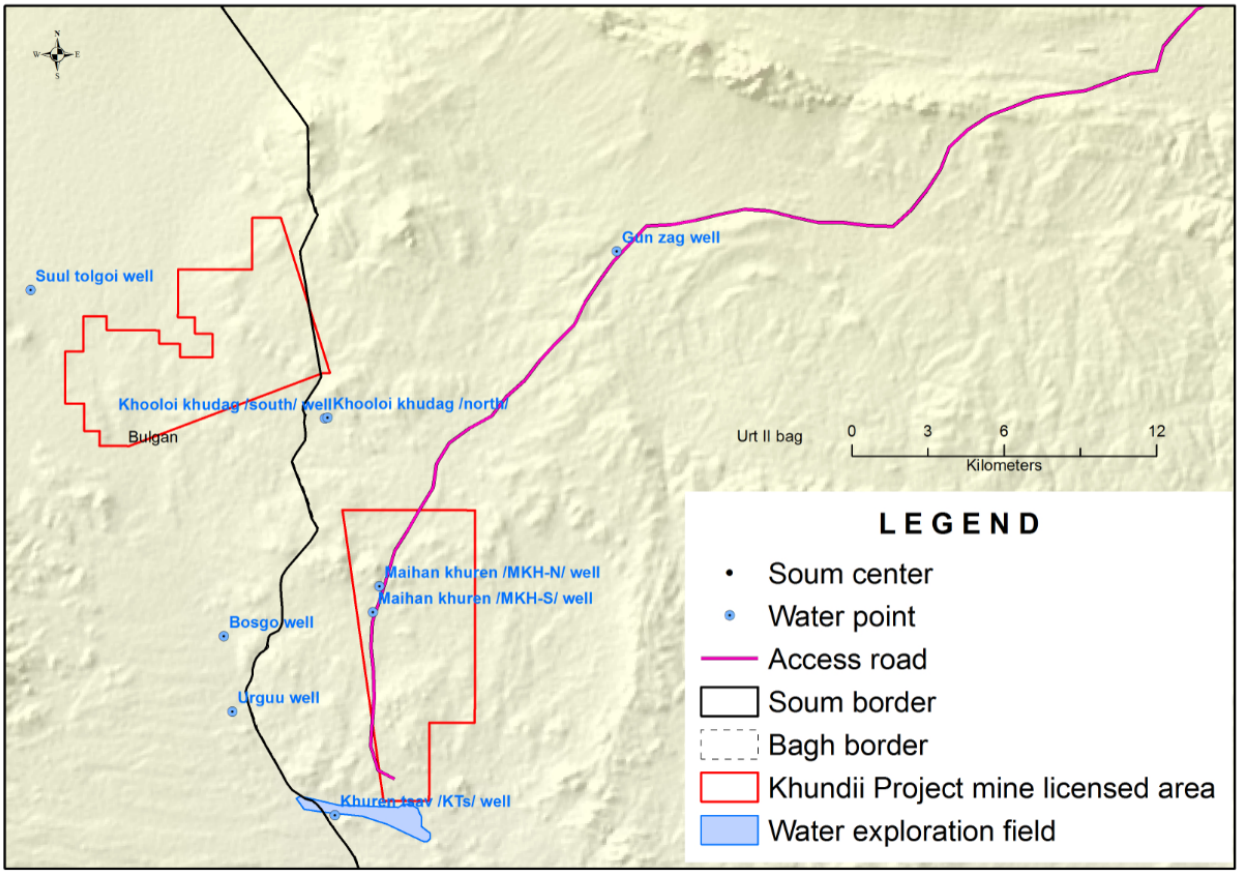


Figure 13 Water Points Near the Mine Licence Areas

Historically, Erdene has engaged with herders and local government officials about water quantity and quality. The Company has restored and returned to service six remote water wells built during the Socialist era. These wells had fallen into disrepair and were no longer available for herds. These water initiatives are viewed as important by local stakeholders, and are noted to have generated recognition from local government officials and non-governmental organisations, and are viewed as having economic value (Fraser et al 2019). The Household Survey results confirmed that the most common major water source for animals in the region is shallow / hand dug wells. These wells are used by 70% of households in the winter and 45% in the summer (Figure 14).

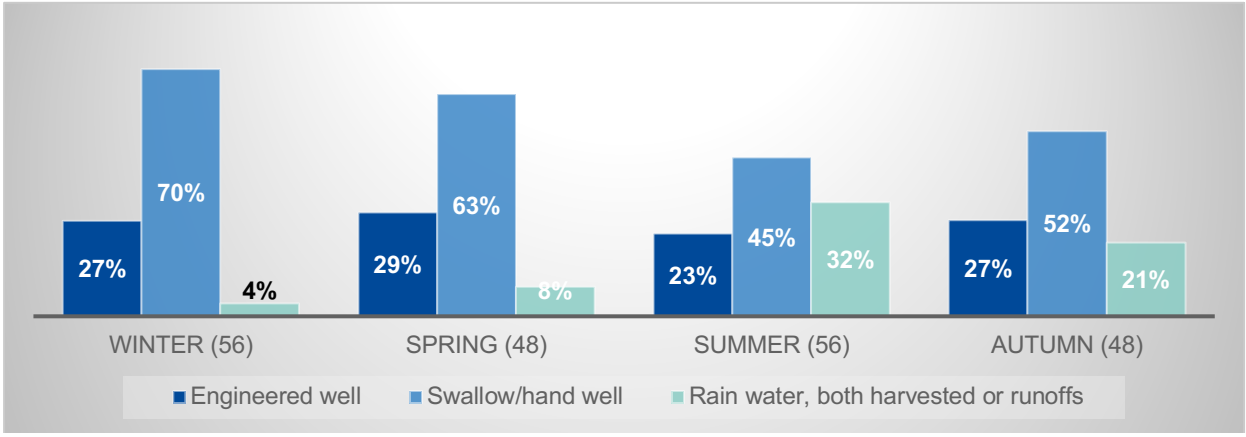


Figure 14 Major Water Source Used for Livestock

The distance to major water sources varies between households, but the average distance throughout all seasons was reported by Household Survey respondents to be 2.3 km. This distance falls within the range of daily grazing of small stock. In all four seasons, a majority of households find that there is good availability of water for animals and good availability of drinking water for households. Approximately half of the households find drinking water quality to be good throughout all seasons, with 56% reporting good quality in summer and 46% reporting good quality in spring. Sixteen households reported poor drinking water quality, attributing poor quality due to high solidity. Only a quarter of surveyed households regularly test their water quality. Out of 59 herder households surveyed in the summer, (68%) of families have separate water sources for drinking and livestock. In other words, they have separate water wells for household consumption. Of the households surveyed, 33% indicated they have access to a drinking water well at their winter camp.

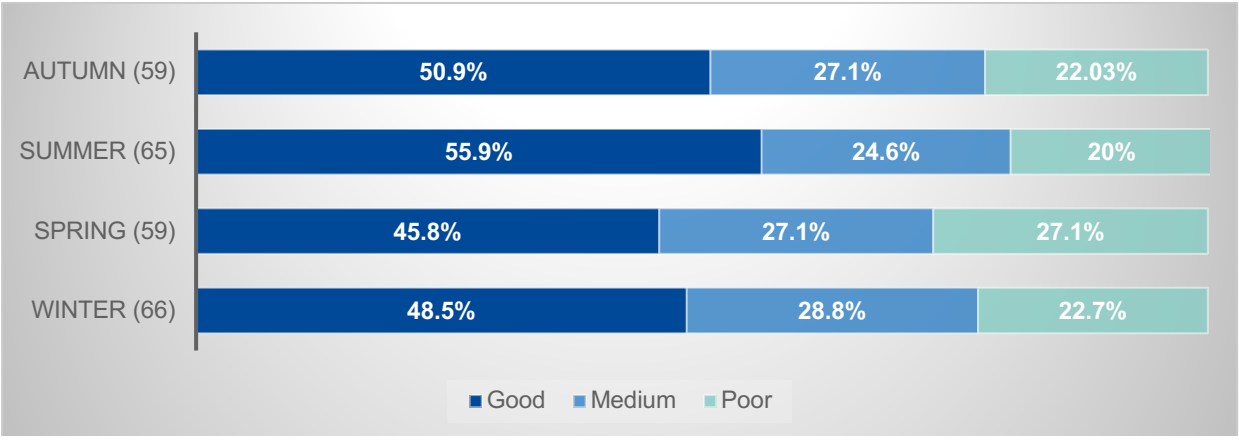


Figure 15 Assessment of quality of drinking water households use, by seasons

Most (70%) of households do not think that access to water is equal for everyone. Most households use their own vehicles to obtain drinking and household water (62%), while 20% obtain it by hand, and 12% using a pack animal. A further 6% indicated that they have to hitchhike to access water. Most households also indicated that they need to obtain water on a daily basis (just over 43%) or every two days (just over 33%), which poses significant time obligations on households who need to travel further to obtain their water or do not have reliable transport. The time spent collecting water is time that could otherwise be productively spent on income generation or family and household duties.

Disputes over wells and water access are reported to occur regularly for 29% of respondents, while 63% report only occasional disputes. Nearly half of such disputes occur between herders using the same water source for their animals, while a quarter occur between local herders and herders from other *soums*. In order to settle disputes, 69% of households agree on mutually acceptable options. Only 19% of households reported that either the *soum* (13%) or the bag (6%) governor settles disputes. The remaining 13% of households indicated that no measures are taken.

1.6 Project Affected People

All herder households, with winter or summer camps, pasture and wells close to the Project, may be exposed to potential direct impacts from the Project. Vulnerable herder households and people are those with reduced resilience to change and include:

- woman-headed herder households;

- herder households headed by the elderly with no family members to support them;
- herder households regarded as very poor; and
- People with disabilities and chronically sick.

1.7 Conclusion

The majority of residents of Shinejinst and Bayan-Undur *soum* are rural and/or seasonal herder households totalling 477 (62.8%) herder households in Shinejinst *soum* (out of a total of 759 households); and 480 (63.7%) herder households in Bayan-Undur *soum* (out of a total 753 households). An additional 162 (21% of total HHs) households in Shinejinst *soum* and 118 (15.6% of total HHs) households in Bayan-Undur *soum* have livestock, but do not permanently herd their livestock and live either part or full-time in the *soum* centres. In sum, 83.8% of total households in Shinejinst and 79.3% of total households in Bayan-Undur *soum* possess livestock.

Land use in the KGP area of influence *soums* is predominantly rangeland-based transhumant animal husbandry, with goats, sheep and camels being the most typical types of livestock raised. Seasonal migration of livestock, at times over considerable distances (average of between 10 – 40 km in summer) is necessary for livestock survival and is, also, a traditional method of pastureland management. This is aimed at the alleviation of grazing pressure on pastures that naturally have low productivity. Households indicated they move around five times a year.

Cultivation of crops in the two *soums* is on a very limited scale and is mainly intended for household subsistence purposes. It is only at Ekhiin gol (oasis) in Shinejinst *soum*, that a small number of households run vegetable plantations on a small area of approximately 1-2 ha.

Pastureland is not owned privately and, often customary land use management allows for common access, particularly in summer and autumn pasture areas. Land allocation for herder winter camps is regulated by the *soum* governments. During the fieldwork conducted in August 2019, studies were undertaken to identify the locations of the herder camps near the KGP MLAs and along the Site Access Road. The MLAs are located within the territories of Urtiin gol *bagh* (Shinejinst *soum*) and Idren *bagh* (Bayan-Undur *soum*). The recorded locations are a limited snapshot of herder locations as observed at the time of the Survey, and are not exhaustive or necessarily representative of areas used over time. Herders operate across broader areas within the Project area of influence and it can be expected that herders could use pasture land seasonally and sporadically in the Project area of influence.

There were no herders found to be within 20 km of the KGP MLAs during the Social Baseline fieldwork. Seven winter camps are noted to be officially recorded within 10 km of the two Mine Licence Areas (3 near Bayan Khundii and 4 near Altan Nar). Six out of the seven winter camps are in Urtiin gol *bagh*, and one is in Idren *bagh*. Four of the camps in Urtiin gol have been verified as officially registered (with possession certificates), and the winter camp in Idren *bagh* is currently in the process of being certified.

The site access road from Shinejinst *soum* centre to the KGP is located in Urtiin gol *bagh* (Shinejinst *soum*). The nearest herder was found to be located approximately 2 km from the road during the fieldwork. Twenty-nine winter camps are recorded within 2.5km of the Site Access Road (with the closest winter camp located 0.01 km away). Verification of the status of these winter camps remains ongoing.

Ten herder wells are being monitored currently by Erdene. These are located approximately 2-12 km in the south-western and south-northern direction of the KGP. Herders may use land near these wells periodically for grazing, particularly in spring or autumn when conditions permit.

Due to the lack of permanent sources of open water, herders traditionally and primarily extract water from hand-dug wells. The average distance to water sources for animals is about 2.3 km and this distance falls within the range of daily grazing of small stock.

The average herd size is 379 and 358 animals in Shinejinst and Bayan-Undur *soum*, respectively. Among the households surveyed in August 2019, the highest number of livestock possessed was 1,090 and the lowest was 17. On average, households had 292 animals, which is slightly lower than the *soum* average.

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

Erdene Mongol LLC

B14 – Cultural Heritage

March 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Appendices

Appendix A: Additional Data, Tables, and Figures

Acronyms and Abbreviations

BCE	Before the Common Era
CE	Common Era
EBRD	The European Bank for Reconstruction and Development
FGD	Focus Group Discussion
KGP	Khundii Gold Project
KII	Key Informant Interview
LLC	Limited liability company
LPA	Local Protected Area
MASIHA	Mongolian Academy of Sciences – Institute of History and Archaeology
PAP	Project Affected People
PR	Performance Requirement
SPA	Special Protected Area
SPSS	Statistical Package for the Social Sciences
UNESCO	United Nations Children's Fund

Glossary

aimag	The Provincial unit of administration in the territory of Mongolia
soum	Sub-province area; The second level of administration in the territory of Mongolia
bagh	Sub-division of soum; The third level of administration in the territory of Mongolia
dzud	Mongolian term for summer drought followed by a severe winter, generally causing serious loss of livestock

1. CULTURAL HERITAGE

1.1 Introduction

This Chapter describes the tangible and intangible cultural heritage context at the national and regional levels, and within the Project Area of Influence. This includes palaeontological and archaeological heritage – physical artefacts, ritual sites, places of cultural or historical interest and protected landscapes ("tangible" heritage) as well as rituals, ceremonies, folklore, music, handicrafts, and traditional knowledge (known as "intangible" heritage).

1.2 Baseline Characterisation Methodology

1.2.1 Sources of Information

Primary Data Collection

Several sources were used to develop the cultural heritage baseline Chapter. Erdene commissioned Sustainability to conduct primary data collection in support of this baseline study. Data collection included the completion of Key Informant Interviews (KIIs) and Focus Group Discussion (FGDs) with local community members, and a Household Survey conducted in the Project area in August 2019. See *Chapter B1 Introduction* for further information on primary data collection.

In addition as part of the environmental and social baseline study conducted to meet Mongolian national requirements, in 2016, a team of researchers from the Department of Anthropology and Archaeology, School of Sciences of the National University of Mongolia and the Institute of Palaeontology and Geology at the Mongolian Academy of Sciences conducted a survey in the Project exploration licence area. This Chapter also draws upon the findings of this survey (Eco Trade 2017a & b).

Secondary Data Collection

Secondary data sources include international and national statistics, official statistics from *aimag* and *soum* governors' offices, and available reports on projects and programs in the Project area. A full reference list is provided in Section 1.9.

1.2.2 Methodological Approach

The methodological approach employed to obtain the cultural heritage baseline included the completion of a statistically representative household survey in the Project area of influence, the data from which were analysed using the Statistical Package for the Social Sciences (SPSS). Furthermore, Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) were also conducted to explore and identify issues related to demography and population at the *aimag*, *soum*, and *bagh* levels. See *Chapter B1 Introduction* for further description on the social baseline methodology employed.

1.2.3 Project Area of Influence

This Chapter provides a description of both tangible and intangible cultural heritage assets and features that have been identified within the KGP Project area of influence. The area of influence has been defined as Bayankhongor *aimag* as the macro-level social and economic impact of construction and operation of the KGP may affect receptors at the *aimag* level. Sub-areas within Bayankhongor *aimag* include Shinejinst and Bayan-Undur *soums*, and specifically their *soum* centres, and Urtiin gol and Idren *bagh* (the *bagh*s within which the KGP is located). The KGP will

intersect with these *soums* and particularly at the *bagh* level, which may experience both direct and indirect environmental and social impacts from construction and operation of the KGP.

1.2.4 Applicable Standards

The Mongolian Law on the Protection of Cultural Heritage (2014; last amended 21st July 2016) regulates the collection, registration, research, classification, evaluation, preservation, protection, promotion, restoration, possession and usage of cultural heritage including tangible and intangible heritage. The items of cultural significance most commonly considered include archaeological findings, sites, tombs and rock carvings. However, in a broader sense, cultural heritage can include the remnants of mining, processing, or industry, and elements of contemporary living culture such as song, dance and clothing. Heritage is classified as "common", "valuable" or "unique and valuable", and the protection of each of these types is identified at the national, regional (*aimag*) and local (*soum*) level.

The protection of cultural heritage values is determined through an approval process undertaken by the Ministry of Education, Culture and Sciences. The Law establishes the principle that archaeological and cultural heritage items should be preserved within their natural place wherever possible. The law also allows the government to establish protection zones around areas of identified cultural or historical value. Activities that could result in disturbance within a protection zone are prohibited.

The Law requires an authorised organisation to undertake archaeological exploration and survey prior to commencing mineral exploration, mining and associated development. These activities cannot proceed without clearance from the authorised archaeological organisation. In the event items of cultural or heritage value are discovered in the course of development, and may be at risk of disturbance, the law requires immediate notification to the *soum* Governor, local police, and protection of the heritage site and/or items. The *soum* Governor is responsible for decisions about identified heritage sites and items following completion of research. The land and subsoil where items of historical, scientific, and cultural value are located fall within State protection and any findings become State property. At present, Mongolia does not have any specific standard guidelines for evaluating the importance of physical cultural heritage sites.

The 2014 amendments to the Law on the Protection of the Cultural Heritage included safeguards for intangible cultural heritage and the promotion of bearers thereof. In addition, procedures related to the safeguarding of intangible cultural heritage include the "Procedure for the investigation and research of intangible cultural heritage" and the (Ministerial Decree A151, 2015) "Honouring Procedure for the bearers who have contributed to the promotion and dissemination of intangible cultural heritage at the national and worldwide level" (Government Resolution No.145, 2016).

The European Bank for Reconstruction and Development's (EBRD) Performance Requirement 8 (PR8) on Cultural Heritage is the key applicable international standard in regards to this Project. PR8 recognises the importance of cultural heritage for present and future generations. The aim is to protect cultural heritage and to guide clients in avoiding or mitigating adverse impacts on cultural heritage in the course of their business operations. Objectives of this PR are to: support the protection and conservation of cultural heritage; adopt the mitigation hierarchy approach to protecting cultural heritage from adverse impacts arising from the project; promote the equitable sharing of benefits from the use of cultural heritage in business activities; and promote awareness and appreciation of cultural heritage where possible.

Additional international standards and conventions relating to cultural heritage are described in *Chapter A2 Policy and Legal Framework*.

1.2.5 Definitions

"Tangible" heritage comprises physical objects, artefacts and sites with heritage value from the perspective of history, art or science. UNESCO's World Heritage Convention (Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972) includes the following within this definition:

- Monuments – architectural works and structures, works of monumental sculpture and painting, inscriptions, cave dwellings and combinations of these features;
- Buildings – groups of separate or connected buildings; and
- Sites - physical structures and areas including archaeological sites which are of significance from an historical, aesthetic, ethnological or anthropological point of view.

EBRD PR 8 (2014) defines tangible cultural heritage as movable or immovable objects, property, sites, structures or groups of structures that have archaeological (prehistoric), palaeontological, historical, cultural, artistic, aesthetic and/or religious values. Unique features of the natural environment that embody cultural values or are attributed special spiritual significance are also included within this definition. These natural elements and protected landscapes are also known as "living" tangible heritage, together with structures built for spiritual purposes. Typically for Mongolia, living tangible cultural heritage comprises the following types of elements.

- *Ovoo* (also known as *oboo*), which is either:
  - a stone structure erected to mark historically, culturally or religiously significant places. These are also known as worship cairns; or
  - a particular mountain or hill (i.e. a natural feature) that is situated separately from other mountain ranges.[1]
- *Stupa*, which is a religious monument/worship location made of bricks, mud, wood and other materials[2].

The UNESCO Convention for the Safeguarding of Intangible Cultural Heritage defines "Intangible" heritage as practices, knowledge, skills, objects, cultural spaces, etc. that are associated with specific communities, groups and individuals. UNESCO includes, within this definition, ancestral traditions and living expressions such as oral renditions, performing arts, social practices, rituals, festive events, ceremonies, as well as the historically-developed skills required to produce traditional crafts.

EBRD PR8 (2014) also includes the instruments, objects, artefacts and cultural spaces associated therewith that communities, groups and individuals recognise as part of their cultural heritage and which are transferred between generations.

[1] Historically, *ovoos* were also set up to mark boundaries and to define the terrain, and in some cases they continue to be used as such in modern times.
[2] Originally, *stupas* were used as places of worship in the Buddhist tradition.

1.3 Heritage Context

Mongolia is well known for its rich history and culture rooted in nomadic pastoral traditions. Social changes, globalisation and rapid urbanisation are increasingly affecting the cultural traditions of Mongolia. One of the serious challenges facing the country is how to balance rapid growth and the preservation of its cultural heritage.

The Ministry of Education, Culture and Science administers the affiliated Cultural Heritage Centre in providing policy and planning. Implementation of cultural heritage issues is governed by the Culture and Arts Centre, the Government implementing agency; the Cultural Heritage Centre; and museums. The Cultural Heritage Centre is responsible for protecting, documenting, restoring, and disseminating tangible and intangible heritage of Mongolian national culture with the motivation to hand down to future generations the cultural heritage inherited. In turn, the Mongolian Academy of Sciences – Institute of History and Archaeology (MASIHA), and the Ethnography Division within its institute of History and Archaeology are key institutions engaged in the research, documentation and preservation of key items of cultural heritage. The institute of History and Archaeology has its own treasury to preserve findings for the purpose of research. At the completion of research, artefacts are sent to museums.

In addition, the National Museum of Mongolia organises numerous archaeological and cultural field expeditions to study, document, preserve and protect Mongolian heritage. It is also responsible for the provision of guidance and education to local museums.

1.4 Tangible Cultural Heritage

At a national level, Mongolia hosts a number of sites that are listed on the United Nations Education, Scientific and Cultural Organisation's (UNESCO) World Heritage List, including:

- Great Burkhan Khaldun Mountain and its surrounding sacred landscape (2015);
- Orkhon Valley Cultural Landscape (2004);
- Petroglyphic Complexes of the Mongolian Altai (2011).
- Landscapes of Dauria (2017); and
- Uvs Nuur Basin (2002).

Given Mongolia's rich history, it is reasonable to predict that additional, undiscovered archaeological sites exist within the country. However techniques continue to be applied to confirm where these can be reasonably predicted to occur. A summary of the key known archaeological resources at a country level is presented in Table 1, none of which have been identified within the Project area.

Table 1 Chronological Summary of Known Archaeological Resources

Cultural Period	Age	Site Type	Geographic Extent (known sites)
Lower Palaeolithic	ca. 800,000 to 100,000 years ago	Stone tools	Bayankhongor *aimag*, Umnugovi *aimag*, Bayan-Ulgii *aimag*
Middle Palaeolithic	ca. 100,000–40,000 years ago	Several small campsites and settlements	Bayankhongor *aimag* Umnugovi *aimag* Uvur-Khangai *aimag*
Upper Palaeolithic	ca. 40,000–12,000 years ago	Mostly stone tool production sites	Bulgan *aimag* Khentii *aimag* Uvur-Khangai *aimag*

Mesolithic Period	ca. 12,000–8,000 years ago	Various Mesolithic stone tools	Most regions of Mongolia
Neolithic Period	ca. 8,000-3,000 years BCE	Various Neolithic stone tools and pottery	Most regions of Mongolia
Bronze Age	Began ca. 2000 BCE	Remains from bronze smelting activities, slab graves, Khirgisuur tombs, deer stones, rock painting and rock art	Throughout Mongolia
Chandmani Culture	early Iron Age	The special graves indicating a unique tribe	Chandmani Uul near Ulaangom *soum* in Uvs *aimag*
Pazyryk Culture	6th to 2nd century BCE	Graves with highly crafted artefacts	Altai Mountains of Mongolia
Xiongnu Period	3rd century BCE	Graves (elite and common), large urban settlements, and rock art.	Throughout Mongolia
Turkic Period	6th to 10th century CE	Memorial monument complexes that were built for emperors and for commoners, stone stelae covered with runic script, architectural objects, drawings and inscriptions on rocks and other components, as well as burial sites and graves.	Prevalent from the Khentii Mountains to the Altai Range

Note: BCE – Before Common Era, CE – Common Era.

Along with having rich archaeological resources, Mongolia also has many palaeontological sites of worldwide renown. Palaeontological localities like Baishin Tsav, Khuurai Tsav, Amtgai, Urlub Khudag, and Shar Tsav constitute the main evidence of animal (in particular, dinosaurs) and plant evolution dating back to the early Late Cretaceous Period of the Mesozoic Era, nearly 145 million years ago. Dinosaur fossils and other remains found in this region prove that Central Asia was the centre of dispersion of the hadrosaurid super family of “duck-billed” dinosaurs, which lived widely in North America as well. There is also potential for significant fossil remains in later geologic units extant in Mongolia (e.g., Quaternary Period, 2.4 million years ago to present), which could provide insight to evolution and adaptation of species living during this period.

At the *aimag* level there are two State Special Protected Areas (SPAs) in proximity of the Project area. The **Great Gobi SPA part A** is located approximately 32 km from the Project, and extends over the territories of Bayankhongor (Bayan-Undur, Shinejinst *soums*) and Gobi-Altai *aimag*s. The territory includes multiple examples of cultural heritage, such as fossilised plants and animals. **Gobi Gurvan Saikhan National Park** is 54 km from the KGP and includes some territory in Shinejinst *soum*. The park comprises mountains, valleys, dry steppe, semi-desert and desert landscapes. It has diverse vegetation and plant species, including very rare and critically endangered plants and mammals.

There are two locally protected areas near the Project. A “Local Protected Area” (LPA) is an area protected by *aimag*, capital, *soum* or districts, to conserve areas of natural indigenous landscape, unique formations, and areas of high significance in terms of history, culture, and tourism. **Bor Khairkhan mountain** is under local protection for its value as a natural and cultural monument and is located approximately 16 km from the Project area. **Nogoon Tsav** covers an area of 85,713.6 ha, and is located some 45 km from the KGP. It includes the Beds of Nogoon Tsav which are a geological formation dating back to the Late Cretaceous period. Dinosaur remains are among the fossils that have been recovered from the formation.

Shinejinst and Bayan-Undur *soums* are also home to numerous archaeological sites, such as rock paintings and palaeontological sites, among others. A full List of tangible cultural heritage,

as defined by the Cultural Heritage Centre (2019) in Shinejinst and Bayan-Undur *soums* is provided in Appendix A. None of these sites are located within the vicinity of the KGP mine licence area.

A nationally and historically significant discovery of artefacts from the Yuan Dynasty was made in Bayan-Undur in 2012. Among the findings were a mummified woman and child wrapped in sheepskin, as well as various objects including a headdress with copper and mother of pearl ornamentation, copper earrings, a mirror and a comb, possibly indicating a royal burial (Kash-Erdene 2012).

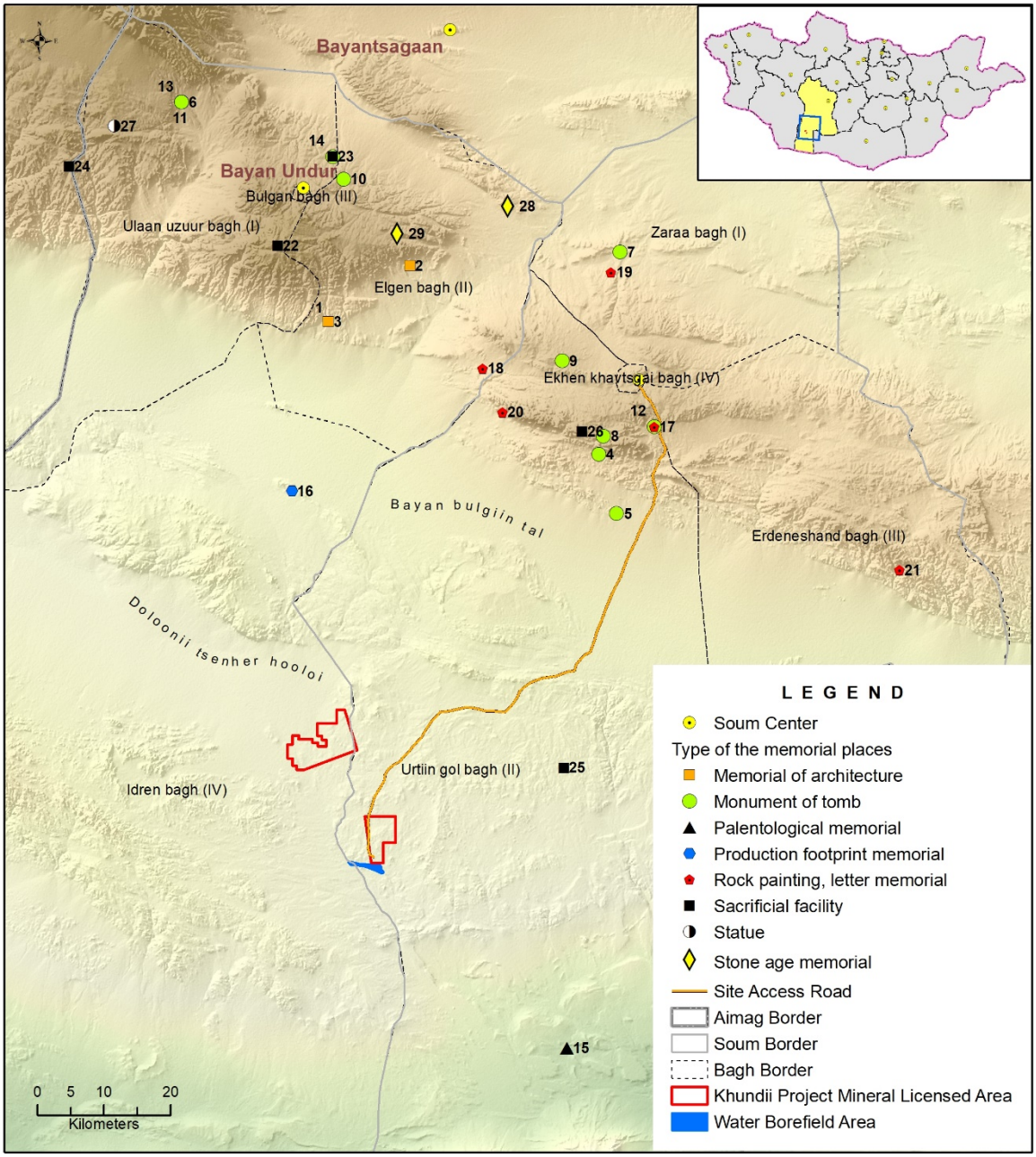
Within the KGP mine licence area and surroundings, the Survey completed by the Department of Anthropology and Archaeology, School of Sciences of the National University of Mongolia in 2016 examined places with potential to host ancient tombs and ritual establishment, including on mountains, in valleys between mountains where saxaul and sagebrush are grown, steppe, and edge of the steppe (Eco Trade 2017a & b). The survey found no artefacts related to ancient tombs and other human activities in the areas assessed - mountain mouth, escarpments, and tops high mountains - where ancient nomadic tombs might exist. In addition, no ancient tombs or other artefacts were found in the exploration work conducted in the ravines, depressions and their boundaries, and dry channels. The explanation for the lack of findings is that the land in this area is unsustainable for the long term inhabitancy of people and livestock, due to its lack of surface water for human and animal consumption.

The research team from the Institute of Palaeontology and Geology at the Mongolian Academy of Sciences in their palaeontological survey in 2016 also did not identify any artefacts in their survey in the mine exploration licence area.

1.4.1 Sacred Landscapes and Living Cultural Heritage

Interviews and FGDs were undertaken as part of the social baseline fieldwork in August 2019 to establish the existence of living tangible cultural heritage – in other words, features of the natural and built environment that are ascribed special spiritual significance and used for spiritual practices and other rituals.

Shinejinst and Bayan-Undur *soums* have numerous traditional and sacred places, including mountains / hills (which represent an important feature in nomadic culture), together with springs / water sources, and *ovoos*, among others. Appendix A provides a list of cultural heritage resources as listed on the Cultural Heritage Centre of Mongolia's database of traditional and sacred memorial sites. None of these sites are located in the KGP mineral licence area, and the Site Access Road also avoids these sites. Figure 1 maps the cultural heritage resources identified in Appendix A (note that locational data was not provided for all resources noted in Appendix A, and hence the map shows only those resources for which this data was available).



Name of the memorial places

#	Name	#	Name	#	Name
1	Amar buyant temple	11	Shar bulag Monument	21	Monument of Indert rock
2	Gyaltganuur Monument	12	Khan Uul Monument	22	Bayan-Ovoo
3	Amar buyant temple	13	Shar bulag Monument	23	Khushuut Monument
4	Urd Jargalant Monument	14	Khushuut Monument	24	Monument of Ulaan chuluut khairkhan
5	Tomb of Khongor taish	15	Palentlogical Monument of Nogoon tsav	25	Monument of Suvragan Suhai
6	Shar bulag Monument	16	Monument of Chandmani mountain	26	Monument of Zalaa jinst mountain
7	Khashaat monument	17	Khan Uul Monument	27	Monument of Erdeniin huren
8	Zulegt monument	18	Bichigt Hanan monument	28	Khuuvur monument
9	Monument of Ikh Samant khairkhan	19	Monument of Tahilgat khairkhan	29	Khavtas valley monument
10	Monument of Delger murun	20	Darkhan bulag Monument		

Figure 1 Traditional and Sacred Mermorial Sites

Amarbuyant Monastery (Khiid) is located some 50 km west of Shinejinst. Established in 1692, it once housed over 1,500 monks. The Monastery was destroyed in 1937 during the purges, though it has been gradually restored since the 1990s. According to local people, the monastery is the most important spiritual, cultural and educational organisation covering three *soum*'s citizens for worship - Bayan-Undur, Shinejinst and Bayantsagaan. Moreover, citizens from Gurvantes, Umnugovi and Govi-Altai are also reported to visit the monastery to pray. Currently there are around 60 monks associated with the monastery, 30 of whom are residential, 12 of whom are trainees, and 15 are conducting training internationally at Buddhist institutes in India (Correspondence with Monastery 2019).



Figure 2 Amarbuyant Monastery

The Household Survey, FGDs, and KIIs conducted sought to explore perceptions and awareness of cultural heritage in general, and specifically at the *soum* and local levels. The Household Survey asked respondents to name what aspects or things they consider as Mongolian cultural heritage, to which a third indicated that they did not know, while 23% specified "wild nature", just over 7% stated "ancient items", and approximately 6% listed Amarbuyant monastery. Respondents had a greater awareness of local level cultural heritage resources. When asked specifically about their knowledge of cultural heritage artefacts and sites at the *soum* level (see Figure 3), the majority (40%) indicated "natural and unique places," and "other worship places" (18 %).

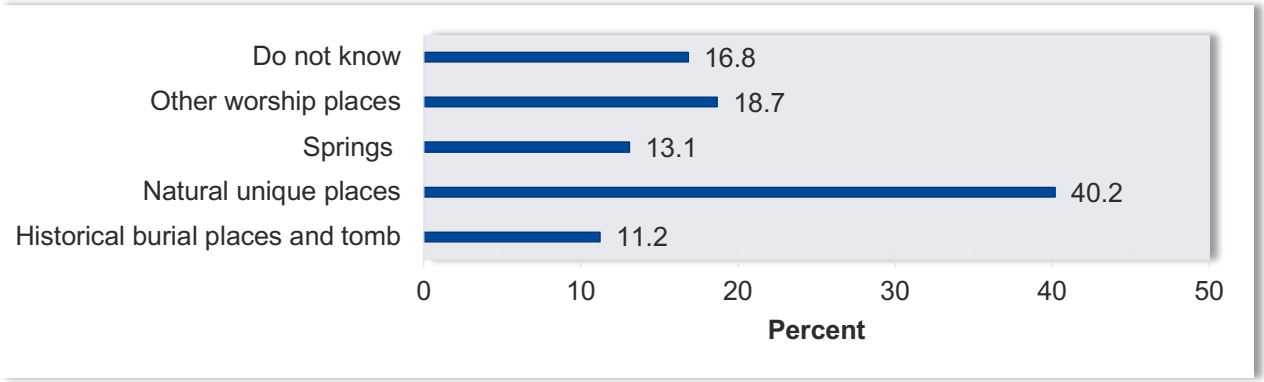


Figure 3 Knowledge of *Soum* Tangible Cultural Heritage

In the FGDs held in Shinejinst and Bayan-Undur *soums*, deeper discussion was held on cultural heritage themes. Participants were asked to list the places and items that are culturally and spiritually meaningful for them. As can be observed in Figure 4, many of the same items are listed consistently between the Shinejinst and Bayan-Undur FGDs and the Household Survey. This includes mainly *ovoos,* various artefacts; as well as sacred places, among which mountains represent a predominant feature.

Shinejinst Soum	Bayan Undur Soum
• Historical and cultural sights nearby Tsagaan Khaalga; • Ancient tombs and mounds; • Rare animals like Mazaalai (Gobi bear); • Stone music instrument "Chuluun Tsargil"; • Natural area of Segs Tsagaan Bogd; • Nogoon Tsav area; • White cashmere goat; • Khuj rock; • Dush Mountain; • Zaan rock; • Khaan Tooroi; • Zalaa Mountain; • Ingen kkhuuvur Tohoi; • Ekhiin Gol; • Suvargiin Sukhai; • Khuren Tsav.	• Stone music instrument "Chuluun Tsargil"; • Wildlife: Gobi bear-Mazaalai, Khulan, wild camel, Khar suult, wolf, wild goat and cougar; • Amarbuyant monastery; • Chihen hoovor place; • Historical burial and tomb; • Bayan-Ovoo worshipping mountain; • Shar us in the Great Gobi; • Yakut's White Cave; • Buural mountain; • Ulaan Chuluun; • Dorvoljin sacred mountain; • Chandmani sacred mountain; • Ancient accessories found in the soum from the Yuan dynasty; • Petroglyphs and rock art.

Figure 4 Cultural Heritage Identified in Focus Group Discussions

1.5 Intangible Cultural Heritage

In addition to tangible heritage, Mongolians also have a rich intangible heritage, comprised of traditional music, songs, craftsmanship, language, religious practices, nomadic herding, horsemanship, and other sports, some of which have been recognised internationally by UNESCO. UNESCO-listed national representative intangible heritage includes (UNESCO 2018):

- **Traditional music of the Morin Khuur (2008):** Traditional Morin Khuur music is an integral part of rituals, ceremonies and everyday activities in the nomadic Mongolian society, and has featured in Mongolian culture for over seven centuries. The Morin Khuur is a two-stringed instrument with an ornamental horse-head on its upper end.

- **Urtiin Duu, traditional folk long song (2008), (multinational nomination submitted together with China):** Urtiin duu is one of the oldest genres of Mongolian musical art, a professional classical art that dates back to the 13th Century. Urtiin duu involves the performance of complicated, drawn-out vocal sounds. It is representative of vast, wide spaces and demands great skill and talent from the singers in their breathing abilities and guttural singing techniques.
- **Naadam, Mongolian traditional festival (2010):** Naadam is a national celebration in July across the country and is focused on three traditional competitive games: horseracing, wrestling and archery. The rituals and customs of Naadam accentuate respect for nature and the environment. Oral forms of expression, performing arts, national cuisine and craftsmanship, Khoomei singing, Bie biyelgee dance and Morin khuur fiddle are the typical highlights of Naadam celebrations. Mongolians follow special rituals and customs during the festival, such as wearing unique costumes and using distinctive gear and sporting items. The main three types of sports are inextricably linked with the ancient lifestyles and living conditions of the Mongols.
- **Mongolian traditional art of Khoomei (2010):** Khoomei is a form of overtone singing that originates in the Altai Mountains of western Mongolia. Khoomei is typically performed by Mongolian nomads at social occasions, ranging from state ceremonies to festive household events.
- **Falconry, a living human heritage (2010), (multinational nomination)**: Following their own set of traditions and ethical principles, falconers train, fly and breed birds of prey developing a bond with them and becoming their main source of protection. The practice, present in many countries around the world, may vary regarding certain aspects, for example the type of equipment used but the methods remain similar. Falconers consider falconry as providing a connection to the past, particularly for communities for which the practice is one of their few remaining links with their natural environment and traditional culture. Knowledge and skills are transmitted in an intergenerational manner within families by formal mentoring, apprenticeship or training in clubs and schools (UNESCO 2018).
- **Traditional craftsmanship of the Mongol Ger and its associated customs (2013):** The Ger is a round structure of walls, poles and a peaked roof covered with canvas and felt, and tightened with ropes. It is light enough for nomads to carry; flexible enough to fold and pack; and sturdy enough to be dismantled and reassembled. The structure is the same across the country: a wooden frame painted and decorated with traditional ornamentation, covers made of white felt and canvas, ropes of animal hair, flooring and carpets of hand-sewn felt, and furniture. As a traditional dwelling, the Mongol Ger plays an important social and cultural role for nomadic families.
- **Mongolian knuckle-bone shooting (2014):** Mongolians revere certain parts of bones of their domestic livestock and use them in religious rites, plays and traditional games. One such popular team-based game is knuckle-bone shooting. Teams of six to eight players flick thirty domino-like marble tablets on a smooth wooden surface towards a target of sheep knuckle-bones, aiming to knock them into a target zone, while shooters sing traditional knuckle-bone shooting melodies and songs. Each shooter possesses individually crafted shooting tools and

instruments, and wears costumes embossed with distinguished characteristics depending on their rank and merits.

Further, the UNESCO list of intangible heritage urgently in need of safeguarding[3] includes:

- Mongol Tuuli, Mongolian epic (2009);
- Mongol Biyelgee, Mongolian traditional folk dance (2009); and
- Traditional music of the Tsuur (2009);
- Folk long song performance technique of Limbe performances - circular breathing (2011);
- Mongolian calligraphy (2013); and
- Coaxing ritual for camels (2015).

The list of UNESCO World Documentary Heritage comprises the following:

- Kanjur written with 9 precious stones (2013);
- Altan Tobchi: Golden History (2011);
- Mongolian Shunkhan Danjuur (2011); and
- Stone Stele Monument for Mongolian Tanjur (2017).

A number of types of intangible resources were identified and discussed during the KIIs, FGDs and Household Surveys that were noted as specific to, and popular in, Shinejinst and Bayan-Undur *soums*. Key among these included:

- **Traditional Long Song:** Shinejinst *soum* noted that there were around 10 long/throat songs specific to the *soum*, but that nowadays only some of the older *soum* residents know and can sing the songs (this was not able to be further verified at the time of the social baseline fieldwork in August 2019.)
- **Religious ceremonies:** Respondents highlighted the recent 380th Anniversary of the Buddhist leader "Lamiin Gegeen Luvsandanzanjantsan".[4]
- **Amarbuyant Buddhist temple worshipping:** Fire worshipping ceremonies are held at the temple. Further, local people are noted to visit the temple for worship and therapy purposes.[5]
- **"Takhil"** (tile-based games) in Shinejinst *soum*: In a KII, it was noted that Shinejinst *soum* is known for its traditional "takhil" game. Purportedly, the old *soum* authority created Takhil in order to eliminate Chinese dominoes from everyday life, although this claim could not be corroborated. Takhil is now considered as a significant traditional game by *soum* officials and is actively

[3] An Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage is established within UNESCO, composed of representatives of 18 states' parties. With a view to taking appropriate safeguarding measures, the Committee establishes, updates and publishes a List of Intangible Cultural Heritage in Need of Urgent Safeguarding, and inscribes such heritage on the List at the request of the State Party concerned. The Committee draws up and submits to the General Assembly for approval, the criteria for the establishment, updating and publication of this List.
[4] This practice has historically received support from Erdene as part of community development activities.
[5] This practice has historically received support from Erdene as part of community development activities.

supported to popularise it among the community in the area. During the fieldwork, *soum* officials showcased the "Takhil" game to the study team (see Figure 5).



Figure 5 "Takhil" Game, Shinejinst Soum, August 2019

- **"Chuluun tsargil"** is a musical instrument consisting of a mountain rock or pieces of rock which are struck to produce musical notes. Musicians are reported to visit Bayan-Undur from Ulaanbaatar to research the instrument.
- Shinejinst *soum* people consider the breed of "Zalaa Jinst cashmere goat" as a symbolic and historical inheritance from their ancestors.
- The traditions unique to **Mongolian herders and their way of life**. Such as ceremonial events and associated rituals of various occasions – making ger (yurt), seasonal movements, bathing newborn, wedding, funeral, stamping animals.

"The nomadic way of life is our traditional heritage, and we need to keep it that way. Our ancestors and previous generations created and inherited the nomadic lifestyle that is highly harmonised with nature, the environment and a focus on hospitality. Generation by generation, people lose the traditional customs and rituals and all these machines and technology developments have replaced and changed the traditional lifestyle. Nowadays, no one herds their animals by riding horses, motorcycles are used everywhere for herding. When Mongolian's live with their nomadic culture in daily life, then it makes Mongolia nomadic. So, we need to keep and preserve our culture and teach our cultural traditions to our children.

KII, Bayan-Undur soum

Consultation with the Cultural Heritage Centre of Mongolia as part of this social baseline study in August 2019 established a number of bearers of intangible cultural heritage in Bayan-Undur and Shinejinst *soum*, in addition to a description of their particular skill, shown in Table 2.

Table 2 Identified Bearers of Intangible Cultural Heritage in Shinejinst and Bayan-Undur *Soums*

Soum	**Description**
Bayan-Undur	Drawling song singer
Bayan-Undur	Drawling song singer
Bayan-Undur	Rhymester of Horse title
Bayan-Undur	Blessing poem
Shinejinst	Short folk song singer
Shinejinst	Carving
Shinejinst	Poet
Shinejinst	Carving
Shinejinst	Collection holder of traditional fiction story

Shinejinst	Drawling song singer
Shinejinst	Horse fiddle musician
Shinejinst	Folk song singer
Shinejinst	Traditional dance /Biyelgee/

Source: Cultural Heritage Centre of Mongolia, 2019

Household Survey respondents revealed a moderate level of engagement with intangible cultural heritage practices, with just over a third of respondents indicating that they do not know what cultural and spiritual heritage their community possesses. However, there was recognition by approximately 22% of respondents that musical instruments are a key intangible cultural heritage, followed by ancient traditions (15%), and songs (13%).

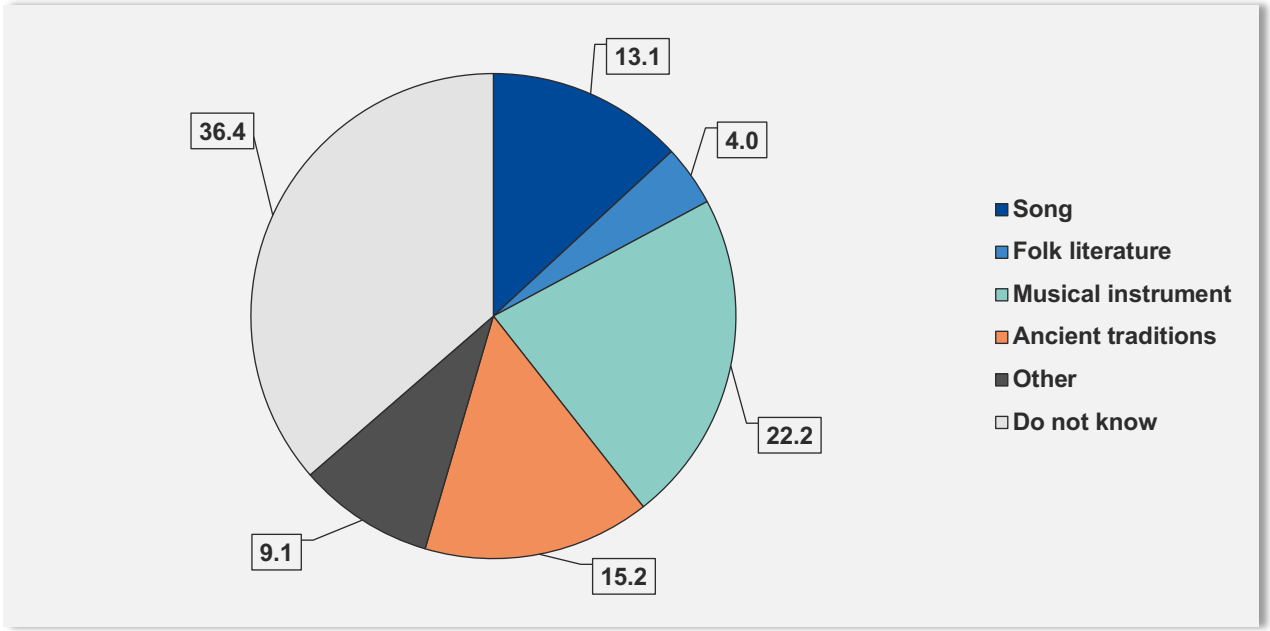


Figure 6 What Cultural and Spiritual Heritage Does Your Community Possess?

As can be noted from the above listed intangible cultural heritage, Mongolia has a strong tradition of oral and written literature. These comprise legends, proverbs, sayings, moral teachings, riddles, verses, poetry, epics and odes and are passed down through the generations. To be kept alive, intangible cultural heritage must be relevant to its community, continuously recreated and transmitted from one generation to the next. The importance of the familial / kinship, and generational mechanisms through which intangible cultural heritage is passed on or transmitted is recognised within the local community. In a number of KIIs and FGDs, it was noted that traditional customs are inherited from the family. The Household Survey also found the key manner in which respondents know or find out about cultural heritage is from kinship relatives (69%), and thereafter from school or informal training (20%), and other sources (7%). Only 2% of respondents in the Household Survey indicated that they obtained knowledge on cultural heritage from local cultural centres, which is consistent with the lack of such institutions in the Project *soums* (see below section for further discussion).

National festivals and ceremonial events are also key occasions that young people learn about culture and traditions from the community's elders. In the study soums, people celebrate national and local festivals, namely the Naadam Festival, Tsagaan Sar (Lunar New Year) and the Camel Festival (celebrates the unique heritage of camel herding culture and tradition during the summer time).

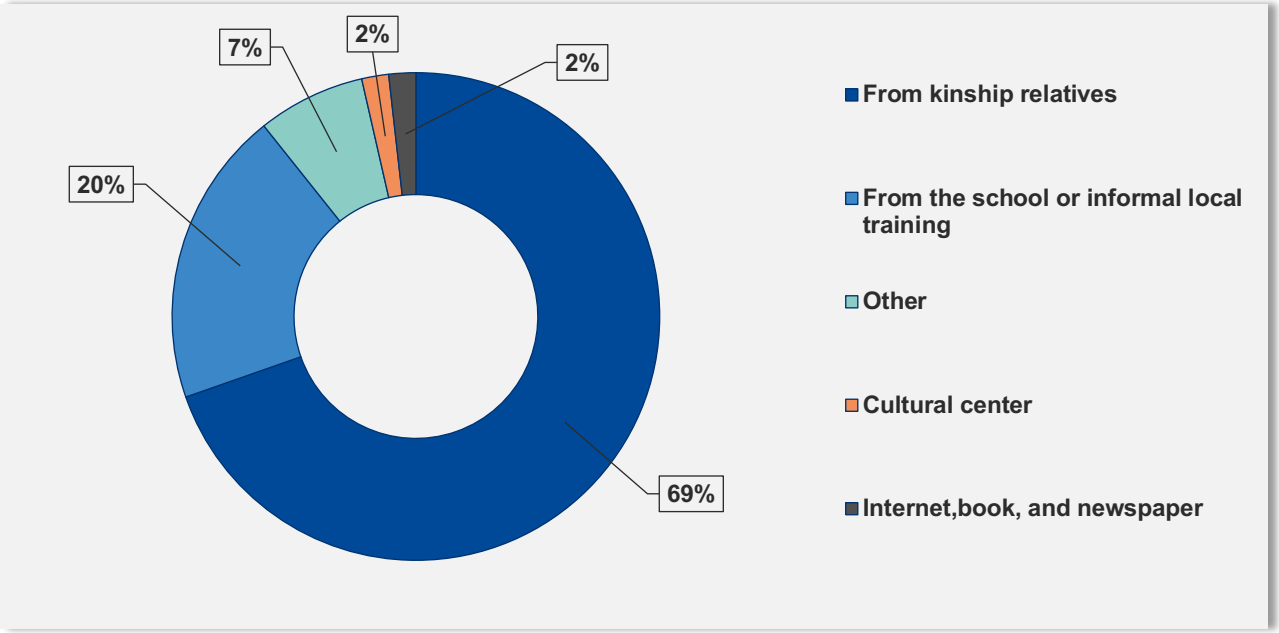


Figure 7 Where / From Whom Do You Find Out About Cultural Heritage

In regards to the perceived benefits of religious ceremonies and rituals, around 26% of Household Survey respondents indicated that these practices contribute to the public good, with 17% noting that benefits are related to preserving a sense of place in society, and 15% indicating that benefits are specific to particular groups of people, allowing them to raise their reputation. Further, nearly two thirds of respondents in the Household Survey have participated in a worship ceremony in the past 12 months.

"Those who learned / inherited intangible cultural heritage traditions and practices have some benefit (i.e. participating talent shows etc), otherwise, there are almost no benefits for the locals from cultural heritage. Not many government / private activities are conducted to promote cultural heritage awareness except for a case where a statue was erected in memory of a wrestler who fought for the locals in earlier days."

KII, Shinejinst soum

1.6 Cultural Heritage Institutions

After the democratic transition in the 1990s state investment in cultural heritage preservation and protection fell sharply. With the decline in funding, cultural institutions and buildings quickly degenerated. This was compounded by the population influx from remote areas to urban areas, leading to the loss of cultural heritage knowledge and institutions, as well as sharp employee turnover and staff shortages in rural areas.

In Bayankhongor *aimag* the main cultural institution that delivers cultural services to the population, is a museum (established in 1940) where *aimag* cultural heritage artefacts are stored and exhibited. It was noted in the KII that the *aimag* is paying increasing attention on restoring old historical temples in the *aimag*. The museum organises an Open Door event and allows people to enter free of charge once a year. The museum is currently exploring the possibility of establishing a "moving" or "travelling" museum to showcase its artefacts. The museum contains more than 14,000 objects and displays, including some that are reportedly valuable.

Most respondents in all FGDs identified that Bayankhongor *aimag* has the potential to develop tourism (and associated benefits to local people). Similar to the FGDs, in response to the questions on whether cultural heritage benefits people, most Household Survey respondents

agreed that it is beneficial (42%) or fairly beneficial (11%), and just over 30% did not ascribe any benefits to cultural heritage.

At the *soum* level, there is a dearth of cultural heritage institutional and professional expertise. In Shinejinst, information on the historical and scenic locations of the *soum* are stored in a private local museum, and the *soum* cultural centre. It was noted that events for school pupils in Shinejinst *soum* are often organised at the museum with the intent of introducing school children to local and *soum* history and places of natural or environmental interest. A local Eco Club for students operates, through which students visit local cultural sites, including with support from Erdene as part of the Company's community development activities. Other than these, formally organised activities and events involving the larger community are not common.

In Bayan-Undur, there are no museums, however cultural artefacts are stored in the small cultural centre in the *soum*. Feedback in the KIIs conducted in Bayan-Undur highlighted the desire for an expanded museum, including facilities and space for exhibiting rare animals and artefacts and facilitating military history and veterans. Previous cooperation between Bayan-Undur *soum* cultural organisations and Erdene were highly regarded, and the possibility for expansion of collaborative cultural activities was noted.

Unique Mongolian natural and cultural heritage sites are key factors for diversified economic growth through development of the tourism industry. However, many of the sites have become the victims of poor management and unregulated exploitation. The *aimag* noted that there are sometimes cases of tombs in the *aimag* being looted. Shinejinst *soum* was also aware of instances of illegal excavations of cultural heritage objects. The management of cultural heritage sites by local Government for the benefit of local communities and visitors is a key challenge nationally.

To protect and promote cultural heritage sites and practices, it was noted in the Shinejinst FGDs that the key measure that can assist in protecting cultural heritage is increasing the young generation's awareness of cultural heritage, and fostering scientific and academic study. It was also reported that local herders are often contracted to assist in protecting cultural heritage sites in *soum* territories (e.g. checking the condition, monitoring for suspicious activities). Involving local communities in such a way is viewed positively in the Project area of influence as it has the dual benefit of assisting in cultural heritage protection and preservation and it fosters community awareness of, and pride in, local cultural heritage.

The top three responses to the question in the Household Survey on how cultural heritage can be preserved are noted in Figure 8. Chief of which is the *soum* government taking action to protect and preserve cultural heritage (36%), and thereafter, state protection (26%), and advocacy by the community (16%). Community participation and advocacy in cultural heritage protection is clearly important to the local community, as evidenced in the KIIs, FGDs and Household Survey responses. Of note, is the importance ascribed by local communities to the *soum* government in protecting cultural heritage.

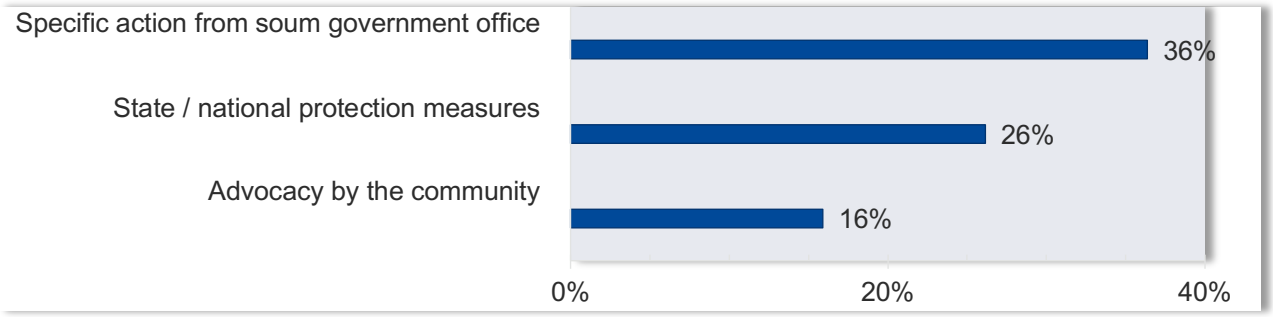


Figure 8 How Can *Soum* Cultural Heritage Be Preserved?

1.7 Project Affected People

Project Affected People (PAP) are defined as the social groups and/or communities whose characteristics, including vulnerability and means of sustaining livelihoods, may be affected directly or indirectly by actions associated with the construction, operation and/or closure and decommissioning of a Project. The following PAP groups are relevant for assessing a range of cultural heritage impacts:

- Local residents of Bayan-Undur and Shinejinst *soum*;
- Herders; and
- Bearers of intangible cultural heritage.

1.8 Conclusion

The key issues and themes that emerged in relation to cultural heritage can be summarised as follows.

- Within the Project area, no tangible cultural heritage resources have been identified. Site surveys noted a low probability of future findings based on the history of the area being unsustainable for long-term inhabitancy of people and livestock historically.
- A number of intangible resources were identified including traditional long songs specific to Shinejinst *soum*; *soum*-specific religious ceremonies, including Amarbuyant Buddhist temple worshipping ceremonies; “Takhil” (tile-based games) in Shinejinst *soum*; “Chuluun tsargil” traditional musical instrument playing; the breed of “Zalaa Jinst cashmere goat” as a symbolic and historical inheritance; and the traditions unique to Mongolian herders and their way of life.
- Increased promotion of cultural heritage, tourism, awareness-raising activities, and cultural events in the *soum* may be strongly valued by the local community, based on the discussion held KIIs and FGDs.
- The key manner in which the local community know or find out about cultural heritage is from kinship relatives, and thereafter from school or informal training.
- There is a lack of cultural heritage institutions and professional expertise at the *aimag* and *soum* levels. Local communities perceive the *soum* government as being the key responsible institution in leading cultural heritage protection and promotion.

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Appendix A: Additional Data, Tables, and Figures

List of Tangible Cultural Heritage sites of memorial value, as defined by the Cultural Heritage Centre (2019).

№	Name of the memorial place	*Soum*	Description
1	Erdene Huren Monument	Bayan-Undur	Statue
2	Bayan-Ovoo	Bayan-Undur	Sacrificial facility
3	Gyaltganuur Monument	Bayan-Undur	Memorial of architecture
4	Khushuut Monument	Bayan-Undur	Sacrificial facility
5	Khuuvur monument	Bayan-Undur	Stone age memorial
6	Monument of Chandmani mountain	Bayan-Undur	Memorial
7	Shar bulag Monument	Bayan-Undur	Monument of tomb
8	Khavtas valley monument	Bayan-Undur	Stone age memorial
9	Amar buyant temple	Bayan-Undur	Memorial of architecture
10	Saalit monument	Bayan-Undur	Stone age memorial
11	Monument of Ulaan chuluut khairkhan	Bayan-Undur	Sacrificial facility
12	Monument of Delger murun	Bayan-Undur	Monument of tomb
13	Monument of Erdeniin huren	Bayan-Undur	Statue
14	Bayan-Ovoo	Bayan-Undur	Sacrificial facility
15	Gyaltganuur Monument	Bayan-Undur	Memorial of architecture
16	Khuuvur monument	Bayan-Undur	Stone age memorial
17	Monument of Chandmani mountain	Bayan-Undur	Production footprint memorial
18	Khavtas valley monument	Bayan-Undur	Stone age memorial
19	Khushuut Monument	Bayan-Undur	Sacrificial facility
20	Shar bulag Monument	Bayan-Undur	Monument of tomb
21	Amar buyant temple	Bayan-Undur	Memorial of architecture
22	Saalit monument	Bayan-Undur	Stone age memorial
23	Monument of Ulaan chuluut khairkhan	Bayan-Undur	Sacrificial facility
24	Urd Jargalant Monument	Shinejinst	Tomb
25	Tomb of Khongor taish	Shinejinst	Tomb
26	Paleontological Monument of Nogoon tsav	Shinejinst	Paleontological memorial (Plants and animals of Mesozoic era)
27	Khan Uul Monument	Shinejinst	Rock painting
28	Bichigt Hanan monument	Shinejinst	Rock painting
29	Khashaat monument	Shinejinst	Monument of tomb
30	Zulegt monument	Shinejinst	Monument of tomb
31	Monument of Tahilgat khairkhan	Shinejinst	Rock painting
32	Darkhan bulag Monument	Shinejinst	Rock painting
33	Monument of Ikh Samant khairkhan	Shinejinst	Monument of tomb
34	Monument of Suvragan Suhai	Shinejinst	Sacrificial facility
35	Monument of Indert rock	Shinejinst	Rock painting
36	Monument of Zalaa jinst mountain	Shinejinst	Sacrificial facility
37	Urd Jargalant Monument	Shinejinst	Monument of tomb
38	Tomb of Khongor taish	Shinejinst	Monument of tomb
39	Paleontological Monument of Nogoon tsav	Shinejinst	Paleontological memorial
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42	Shar bulag Monument	Bayan-Undur	Monument of tomb
43	Khushuut Monument	Bayan-Undur	Statue
44	Khushuut Monument	Bayan-Undur	Rock painting letter memorial
45	Shar bulag Monument	Bayan-Undur	Monument of tomb
46	Monument of Delger murun	Bayan-Undur	Rock painting letter memorial
47	Khushuut Monument	Bayan-Undur	Monument of tomb
48	Khan Uul Monument	Shinejinst	Rock painting, letter memorial

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57	Monument of Zalaa jinst mountain	Shinejinst	Sacrificial facility
58	Khan Uul Monument	Shinejinst	Monument of tomb



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

Erdene Mongol LLC

B15 – Community Health, Safety and Security

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Appendices

Appendix A: Additional Data, Tables, and Figures

Acronyms and Abbreviations

BAG	Bayankhongor Aimag Government
FGD	Focus Group Discussion
HIV	Human Immunodeficiency Virus
IHME	Institute for Health Metrics and Evaluation
KGP	Khundii Gold Project
KII	Key Informant Interview
LGBTI	Lesbian, Gay, Bisexual, Trans-gender, and Intersex
LLC	Limited liability company
MNT	Mongolian National Tugrik (currency)
MSIS	Mongolian Statistical Information Service
NCD	Noncommunicable diseases
NSO	National Statistical Office
OSCE	Organization for Security and Co-operation in Europe
PAP	Project Affected People
SHI	Social Health Insurance
TB	Tuberculosis
UNDP	United Nations Development Program
UNFPA	United Nations
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Glossary

aimag	The Provincial unit of administration in the territory of Mongolia
soum	Sub-province area; The second level of administration in the territory of Mongolia
bagh	Sub-division of soum; The third level of administration in the territory of Mongolia

COMMUNITY HEALTH, SAFETY AND SECURITY

1.1 Introduction

This Chapter describes community health, safety and security information. It provides key health data including patterns of morbidity and mortality, the incidence of communicable and non-communicable diseases, maternal and child health, nutrition and diet, health services provision, health insurance, and community security and safety.

1.2 Baseline Characterisation and Methodology

1.2.1 Sources of Information

Primary Data Collection

Several sources were used to develop the community health, safety and security baseline Chapter. Erdene commissioned Sustainability to conduct primary data collection in support of this baseline study. Data collection included the completion of Key Informant Interviews (KIIs) and Focus Group Discussion (FGDs) with local community members, and a Household Survey conducted in the Project area in August 2019. See *Chapter B1 Introduction* for further information on primary data collection.

In addition, as part of the environmental and social baseline study conducted to meet Mongolian national requirements, in 2016, a team of researchers from Eco Trade LLC conducted a survey in the Project area, including interviews with herder households. This Chapter also draws upon the findings of this survey.

Secondary Data Collection

Secondary data sources include international and national statistics, population and housing censuses, official statistics from *aimag* and *soum* governors' offices, annual *aimag*, *soum* and *bagh* level reports, and available reports on projects and programs in the Project area. Data has also been obtained from the Mongolian Ministry of Health, as well as the *soum* hospitals. A full reference list is provided in Section 1.8.

1.2.2 Methodological Approach

See *Chapter B1 Introduction* for a detailed description on the social baseline methodology employed.

1.2.3 Project Area of Influence

The area of influence has been defined as Bayankhongor *aimag* as the macro-level social and economic impact of construction and operation of the KGP may affect receptors at the *aimag* level. Sub-areas within Bayankhongor *aimag* include Shinejinst and Bayan-Undur *soum*s, and specifically their *soum* centres, and Urtiin gol and Idren *bagh* (the *bagh*s within which the KGP is located). The KGP will intersect with these *soum*s and particularly at the *bagh* level, which may experience both direct and indirect environmental and social impacts from construction and operation of the KGP.

1.2.4 Applicable Standards

The main provisions on land ownership and use are housed in The Constitution (1992); Law of Mongolia on Labour Safety and Hygiene (2008), and the Law of Mongolia on Health (2016). Additional provisions are specified in Mongolian national standards, which are described in *Chapter A2 Policy and Legal Framework*.

The EBRD's Performance Standard 4 on Health and Safety is the key applicable international standard for this Project. Further description of the provisions therein are also provided in Chapter A2.

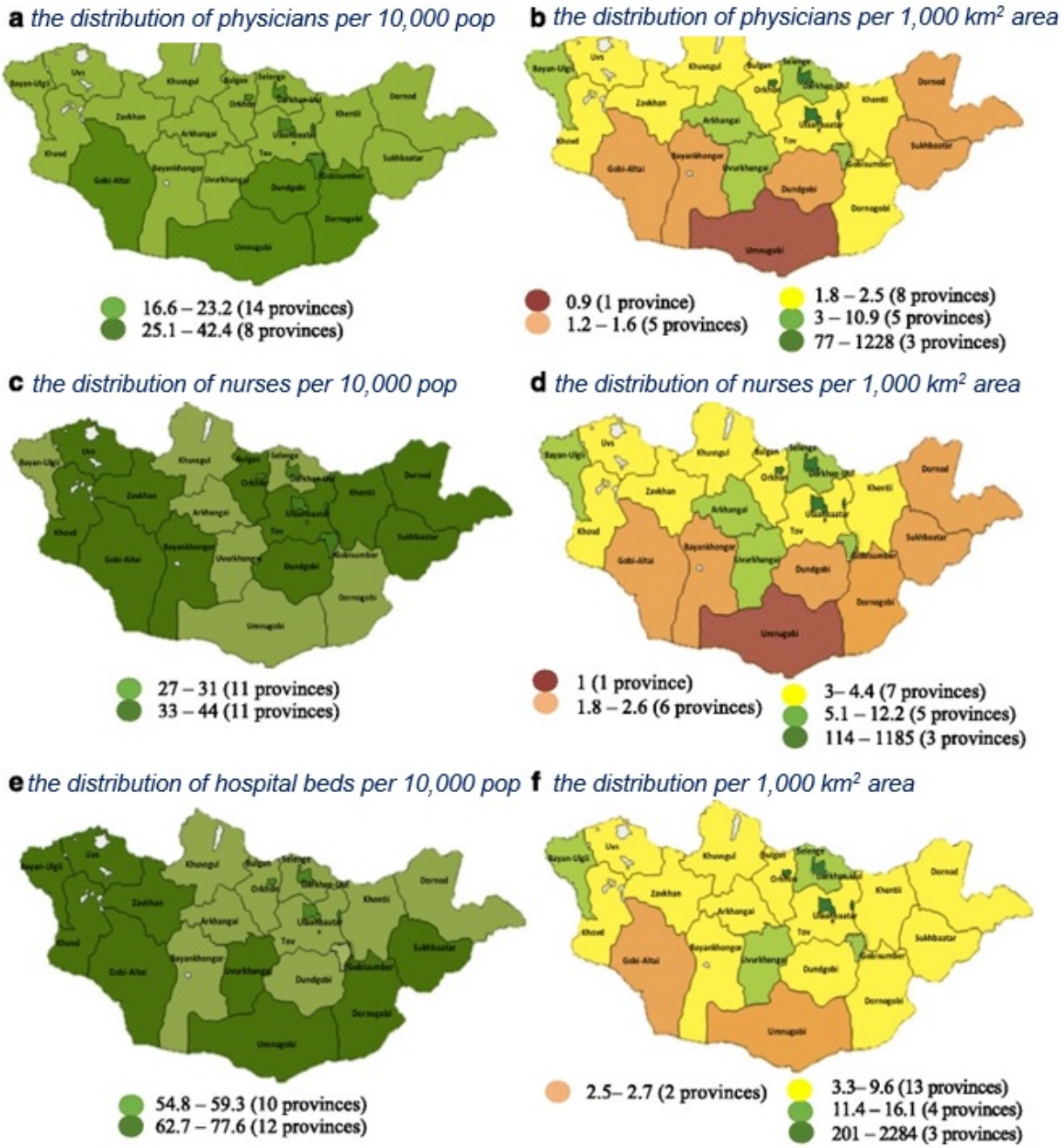
1.3 Healthcare Services and Standards

Mongolian health administration is split into two main divisions: one for the capital city of Ulaanbaatar and one for the 21 *aimag*s. Healthcare is provided at three service levels – primary, secondary, and tertiary.

Health services and facilities available in Mongolia, include family health centres, *soum*s and *bagh* health centres, inter*soum* hospitals, clinics, maternity hospitals, public health centres, general hospitals, sanatoria, and emergency centres (further detail on the types of facilities at each level and their designation are provided in detail in Appendix A: . At the *aimag* level, primary health care is delivered by family group practices, and *soum* hospitals (one per *soum*). In addition, there are also inter*soum* hospitals that serve multiple *soum*s. To reach rural populations, a particular form of delivery is organised through *bagh feldshers*, who undergo a four-year medical training schedule. They report to the *soum* health centre and refer people to the *soum* doctors. Family group practices provide general professional care and focus on health promotion, preventive care, clinical and follow-up care and, if necessary, they refer patients to higher level facilities for specialised care (Tsilaajav et al. 2013).

At a national level, the health sector employs over 52,274 people – with 35.4 physicians, 39.1 nurses, and 24.8 other medical professionals and technical education staff per 10,000 people. The ratio of medical doctors to nurses is 1:1.1 nationally and 1:1.4 in primary health care (CHD 2019). According to the World Health Organization's (WHO) World Health Report (WHO 2016), an estimate of 22.8 physicians, nurses, and midwives per 10,000 people is the minimum standard for achieving essential health interventions in those countries most in need. Whilst the population distribution of health services / providers is generally adequate, it is the geographic distribution

that is the key challenge in Mongolia (see



Source: MOH 2014

Figure 1 Distribution of Health Care Resource Variables Per Share of the Population and Area

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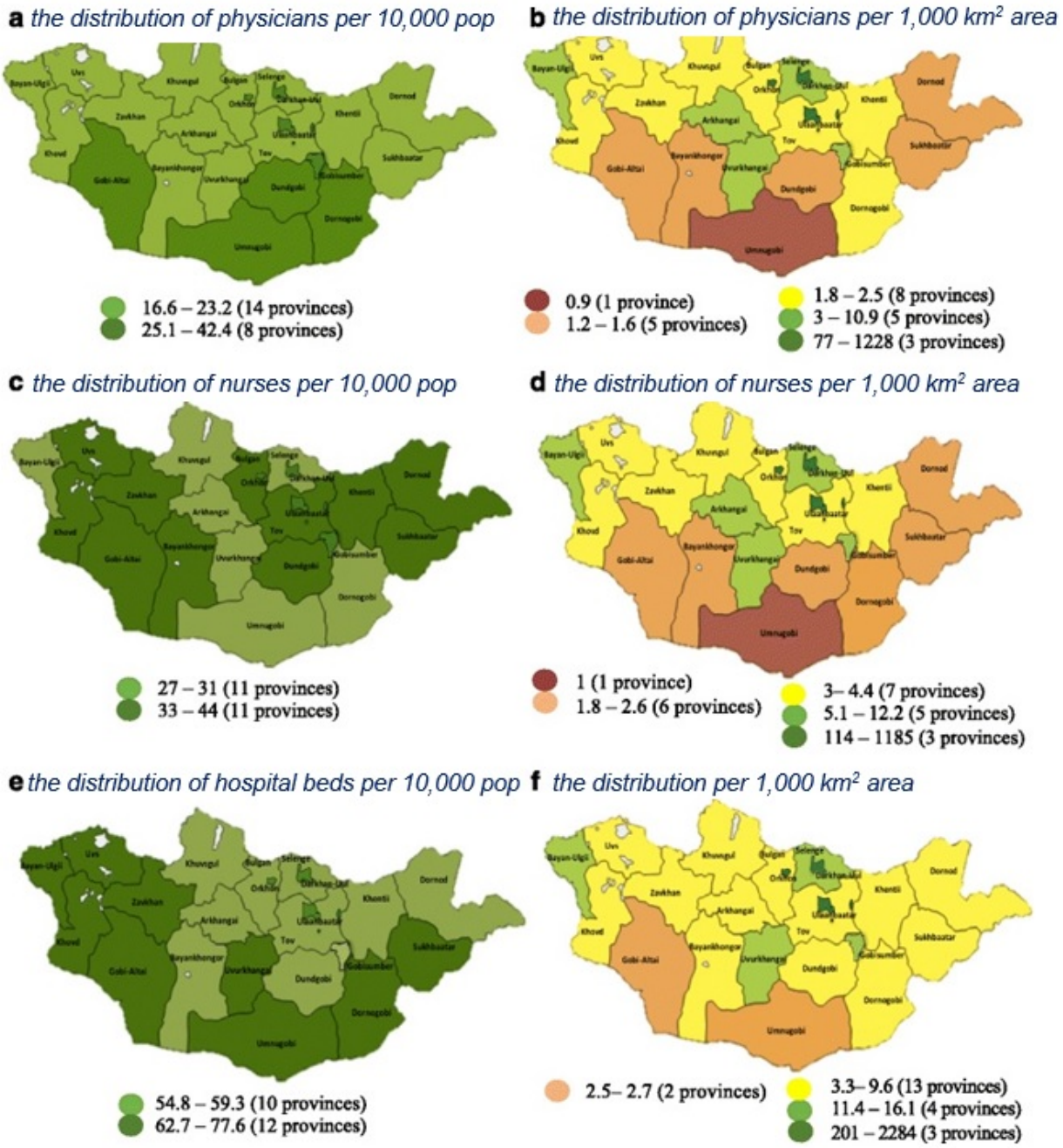
The Government budget accounts for approximately 62% of health sector financing, followed by social health insurance (SHI) (around 25%), user fees (just over 3%) and other sources (nearly 10%). Approximately 60% of the budget is allocated to secondary- and tertiary-level hospitals. Although the Government budgets for health care and over 90% of Mongolians are covered by health insurance, out-of-pocket payments represented around 42% of total health expenditure in 2014. Health insurance reforms, the expansion of the health insurance package to outpatient services, high-cost diagnostics and treatments, and medicine reimbursement have combined to

push down the share of inpatient care covered by health insurance from over 66% in 2011 to just over 47% in 2016 (WHO 2017).

The strengths and achievements of the Mongolian health care system in recent years include the existence of well-trained and retained staff, understanding of the service needs and local conditions, availability of data on health utilisation, decentralised management, and the involvement of clinicians in health service management. Some of the key challenges and gaps include the lack of modern diagnostic equipment and technology, bureaucracy in the health care system, poor distribution of healthcare roles and specialities, inefficiency in allocation of financial resources between curative and preventive services, and major income-related and geographical barriers to quality healthcare access among rural populations (WHO 2017).

In Bayankhongor aimag, there are 96 health institutions with 202 doctors, and 34 pharmacists (see Table 1). The Bayankhongor *aimag* health budget increased by 7.7 billion MNT or 7.3% in 2018 from 2017. Health budgets are allocated from the state budget, the health insurance fund and from paid services. provides a useful illustration for comparison of three health care resource variables in Bayankhongor *aimag* with the rest of the country. Differences among provinces are visualised using red to green colours, with red representing inadequate distribution, and green an adequate distribution. Figure 1.a and b show the distribution of physicians per 10,000 population, and the distribution of physicians per 1,000 km^2 area, respectively. Bayankhongor, consistent with other *aimag*s, fairs better with the population distribution of physicians than geographical distribution, whereby it fairs among the worst in Mongolia. Comparing Figure 1c and 1d, the distribution of nurses per 10,000 population is more balanced than the distribution of nurses per 1,000 km^2 area. Bayankhongor fairs similarly to the previous measure here. Figure 1e illustrates that the distribution of hospital beds per 10,000 population is nearly balanced, with only slight differences across the provinces. In contrast, the distribution per 1,000 km^2 area is highly imbalanced, as can be seen in Figure 1f, with Bayankhongor *aimag* consistent with the majority of *aimag*s with a less than adequate rating.



Source: MOH 2014

Figure 1 Distribution of Health Care Resource Variables Per Share of the Population and Area

Table 1 Number of Health Facilities, Hospital Beds and Physicians at *Aimag* and *Soum* Level, 2018

	National	Bayankhongor *aimag*	Shinejinst *soum*	Bayan-Undur
Number of health institutions	2,706	96	1	1
Doctors	9,300	202	2	1
Pharmacists	1,611	34	1	1
Medical specialists (nurses, obstetricians, *bagh* doctor's assistant and other assistants)	18,317	571	12	12
Other medical workers	-	-	1	-
The number of hospital beds	20,576	591	10	9
Number of people per doctor	310	435	1,000	2,668
Number of people per nurse	263	295	489	445

Source: KIIs, MSIS 2019, and BAG 2019

Mongolian traditional medicine, which is based on medical theories, techniques and medications from Tibetan traditional medicine, was repressed during the mid to 20th century but is now officially recognised. Many public and private hospitals in Mongolia offer traditional medicine treatments, and these treatments are particularly popular in the remote areas where there is often low access to healthcare.

In Shinejinst soum, the health care system consists of one public hospital, which includes a laboratory room, autoclave, and a vehicle. The hospital has 10 beds, but only has the capacity to hospitalise 6 patients at a time. It has two doctors (one for modern medicine, one for traditional medicine), one midwife, four paramedics, one vaccinator, one lab technician, five nurses, one social worker, one accountant, and one driver.

General and initial health services provided at the *soum* level include general blood tests, biochemical tests (e.g. blood sugar), tests (using kits) for Hepatitis B and C, and sexually transmitted diseases including HIV. There is no bathhouse/public shower in the *soum*, including no plumbed sewerage system, and pure water systems at the hospital. This is a health concern for the general population and medical workers in the *soum* as it compromises the ability of the hospital to provide effective care. The *soum* hospital only provides emergency care and maternal care as needed (urgent deliveries) and performs no operations. Most pregnant women are sent to the *aimag* center to give birth. The *soum* shared that in 2018 there were 183 calls for medical help, over 700 cases of people hospitalised, and 3,900 people who were visited or examined at the hospital (includes repeat patient visits).

There is also a regional health care centre located in Bayantsagaan *soum* that serves residents of Bayan-Undur, Shinejinst and Bayantsagaan *soum*s. The regional health care centre is the only hospital in Bayantsagaan *soum*. It has 15 beds available, but only one doctor. During a KII in Shinejinst *soum* it was shared this facility is considered locally to have poor services, and residents of Bayantsagaan prefer to visit the *soum* hospitals in Bayan-Undur or Shinejinst, or travel to the *aimag* centre hospital.

In Bayan-Undur *soum*, the hospital was newly built 4 years ago. Despite having 9 beds, the hospital only has the capacity to receive 5 patients for treatment at once. One bed is for children, 2 are for the care of women, and 2 for therapeutic purposes. The hospital also has a van that travels 200 to 275 km to provide emergency medical services.

During a KII, it was noted that ideally the hospital should have three doctors, three psychiatrists, five nurses, a vaccinator, a social health officer, a specialist in mental and physical heath, and a

driver to serve the population and allow the hospital to utilise its capacity. At present, the hospital only has one doctor to serve all patients (between 25 and 30 people a day). The KII noted that the lack of attractive working conditions is a key factor for doctors, who generally don't want to live and work in the *soum* longer than 1 or 2 years. The official also mentioned that there are very few people who practice traditional medicine in Bayan-Undur *soum*, which is a popular service in the community.

> "*All the soum residents come to the soum hospital seeking health services. Additionally, people also use traditional medicine fairly often as the soum is a neighbour to Inner Mongolia"*
>
> KII Shinejinst *soum*

According to the Household Survey, 93.5% of respondents indicated they have access to health services. The 6.5% percent who do not have access list reasons such as lack of services available, the hospital is too far away, or they have a shortage of money. Respondents were also asked which type of hospital they usually visit if in need, with 79% of respondents indicating they visit the *soum* hospital, and 13% the *aimag* hospital (with a small percentage thereafter going to the city hospital or a private hospital). Approximately half of the respondents (53%) felt that health services in their area are "good", while 29.9% felt these services are "average", and 9.1% indicated "bad". So, even though Bayankhongor *aimag* fairs poorly in comparison to other *aimag*s on geographical distribution of health services, the remote communities in Shinejinst and Bayan-Undur *soum*s appear to be generally satisfied with their access to and the availability of health services.

Feedback gathered from KIIs in Shinejinst and Bayan-Undur is presented below, with the key challenges consistent with those noted at a countrywide level, including lack of diagnostic equipment, poor distribution of healthcare roles and specialities, inefficiency in allocation of financial resources, and geographical barriers to access.

Key Community Concerns About Healthcare Services

Shinejinst *soum*:

- *"Insufficient number and high turn-over rate of doctors."*
- *"Need to improve living and working conditions to attract doctors to this rural area."*
- *"Need to improve the hospital capacity – increase the number of beds, establish water and sewerage system, and improve the hospital building conditions."*
- *"Limited budget for the soum hospital – barely enough to respond to emergencies."*
- *"Budget is only large enough for preventative check-ups."*
- *"Doctors use motorbikes in summer to visit households every 2 months"*

Bayan-Undur *soum*:

- *"Hospital is in urgent need of a portable X-ray machine, and equipment for new-born ultrasounds."*
- *"The hospital has only one doctor who must travel to remote areas and serve 25 – 30 people per day at the hospital."*
- *"Hospital does not have sewerage system or freshwater sanitation system."*
- *"Insufficient number and high turn-over rate of doctors. Need improved working conditions to retain doctors".*

KIIs in AoI *Soums*

1.4 Public Health Profile

The average life expectancy of Mongolia's more than 3 million people has increased to 69.57 years, with women living almost 10 years longer than men. In the 2000s, Mongolia successfully reduced deaths among infants, children under 5 years of age and mothers, and also improved nutrition among children. The country has maintained its polio-free status, eliminated tetanus and achieved regional targets for hepatitis B control. However, Mongolia continues to have the world's highest rates of illness and death due to liver cancer, with over 95% of liver cancer cases associated with hepatitis B and C infection. These can be directly attributed to the limited capacity to detect communicable diseases and monitor treatment at the primary healthcare level, which results in delays in accessing health care, treatment failure and a high number of patients who do not receive follow-up care.

Ischemic heart disease, stroke, liver cancer, and cirrhosis are among the top causes of mortality in the country. Many of these diseases are associated with unhealthy lifestyle behaviours, including diet and substance abuse. People are also living longer with chronic illness and the effects of non-communicable diseases (NCDs), such as diabetes, stroke and heart disease. Among countries in the Western Pacific Region, Mongolia has the seventh-highest burden of NCDs – and the toll is increasing. At the same time there are limited domestic funds available for NCD programmes (IHME 2017).

Emerging diseases in Mongolia include those associated with air pollution in urban areas, such as cardiovascular diseases. Further, water, sanitation and hygiene are a key part of Mongolia's unfinished development agenda, in addition to challenges around soil contamination, poor management of wastewater treatment and disposal, and improper open-pit latrines in ger areas.

In Bayankhongor *aimag*, a total of 2,074 children were born in 2018, an increase of 73 births from 2017 (MSIS 2019). Of these births, 90.3% occurred in *aimag* general hospitals, while inter-*soum* and *soum* hospitals accounted for 9.7% of births. The infant mortality rate was 12 deaths per 1,000 live births in 2018. This is slightly less than the national infant mortality rate of 13 deaths per 1,000 live births in 2019. The trend nationally and within Bayankhongor *aimag* has been slowly decreasing infant mortality rates over the last 10 years. The maternal mortality rate in the *aimag* was 0 in 2018, versus the national average of 27.1 per annum (MSIS 2019). There is a high level of immunisation coverage for infants, with just over 99% in the *aimag* registered in 2018.

Regarding mortality, 505 deaths were registered in 2018, an increase of 62 from the previous year. Of these, 39.2% of deaths were due to cardiovascular disease, 20.8% due to cancer, 12.5% due to injury, 9.3% due to digestive diseases, 4.7% due to respiratory diseases, and 13.5% due to "other" causes (MSIS 2019). The largest increase was in cardiovascular disease, from 156 deaths in 2017 to 198 deaths in 2018. The death rate in the *aimag* was 6 deaths per 1,000 people in 2018, a small increase from 2017, and higher than the national average of 5.6 deaths per 1000 people.

A total of 1,460 communicable diseases were registered in the *aimag* in 2018, or 169 per 10,000 population. This was an increase compared to 2017 in which there were 131 per 10,000 population. In 2018, 31.2% of communicable diseases were recorded as flu-type colds, while 71.9% were cases of STIs, of which 31.2% were gonorrhoea, 24.3% were syphilis and 44.3% were trichomoniasis (BAG 2018b). While the incidence of communicable diseases is low, the statistics show that it is increasing (2017 to 2018), but there is insufficient evidence to indicate that this is a trend.

At the *aimag* level, respondents raised concerns over tuberculosis cases increasing, and people developing bad health habits due to the lack of healthy living information and changes in food consumption patterns. There are many cheap, poor quality, and low nutritional value food products that are imported and / or produced by poorly regulated companies and which are generally readily accessible to the population in Mongolia. Another concern was raised around men's health, as there is perceived to be a lack of knowledge, combined with procrastination among men in undergoing regular medical check-ups. Every Monday is a "Zero Alcohol Day" in the *aimag*, and there is a campaign to reduce salt and sugar usage in daily food consumption.

In Shinejinst *soum* the population was 2,449 in 2018 and 3 live births were recorded, versus 2 live births in 2017 (MSIS 2019). This is not surprising, as KIIs revealed that most women are sent to the *aimag* centre to give birth where there are better medical facilities, rather than staying at the *soum* hospital. This does present some hardship for these women, both in travelling and needing to find accommodation in the *aimag* centre. During a KII, the *soum* noted there were no cases of child mortality between ages 0-5 in 2018, but there had been one case so far in 2019.

With respect to mortality, 12 cases were registered in 2018, an increase from seven cases in 2017. Three of the deaths were caused by cardiovascular disease, four were due to injury, one was due to digestive disease, two were due to respiratory disease, one death from cancer, and one from "other" causes (MSIS 2019). The death rate was 5.3 deaths per 1,000 people in 2018, an increase from 3.3 deaths per 1,000 in 2017, but less than the death rate of 7.6 per 1,000 in 2010.

As reported during the KII with the *soum* hospital representative, there were 31 cases of communicable disease in 2018, an increase from 18 cases in 2017. The health official furthermore noted that respiratory diseases are common during September to March (coinciding with winter). It was also shared that awareness of STIs and TB among people living in the *soum* centre is generally good. Detection thereof in the *soum*, is low because people tend to go to the *aimag* centre for tests and treatment.

The *soum* shared that common public health issues in the *soum* include illnesses of the liver and gallbladder due to low quality drinking water.

In Bayan-Undur *soum*, the population was 2,668 in 2018. There were 18 live births in 2018, versus 17 live births in 2017. Although the population of Bayan-Undur *soum* is only slightly larger than Shinejinst *soum*, it appears a much larger proportion of women give birth in Bayan-Under *soum*. The *soum* hospital may refer fewer women to travel to the *aimag* centre for birth compared to the Shinejinst *soum* hospital, and some of these births are likely to be cases of unexpected pre-term delivery or difficulties travelling to the *aimag* centre.

There were 12 cases of communicable disease in the *soum* in 2018, a decrease from 21 cases in 2017 (KIIs in *soum*). Regarding mortality, there were 12 cases registered in 2018, the same as in 2017. Five of the deaths were caused by cardiovascular disease, one was due to injury, two were due to digestive disease, two were due to cancer, and two were from "other" causes (MSIS 2019). The death rate was 4.5 deaths per 1,000 people in 2018, a steady decrease from 4.9 deaths per 1,000 in 2017, and 6.4 deaths per 1,000 in 2010.

The KII in Bayan-Undur noted that the key health concern for residents of the *soum* include teeth issues; diseases of the kidney and internal organs; the increase in diarrhea in recent years; and respiratory tract infection increases during cold season. The excessive use of salt and unsaturated fat, as well as deficiencies in essential minerals and vitamins were also noted to be high among the *soum* population due to the general lack of healthy eating habits and changes to

eating habits. The interviewee also indicated that health education among the *soum* population is not regarded as high.

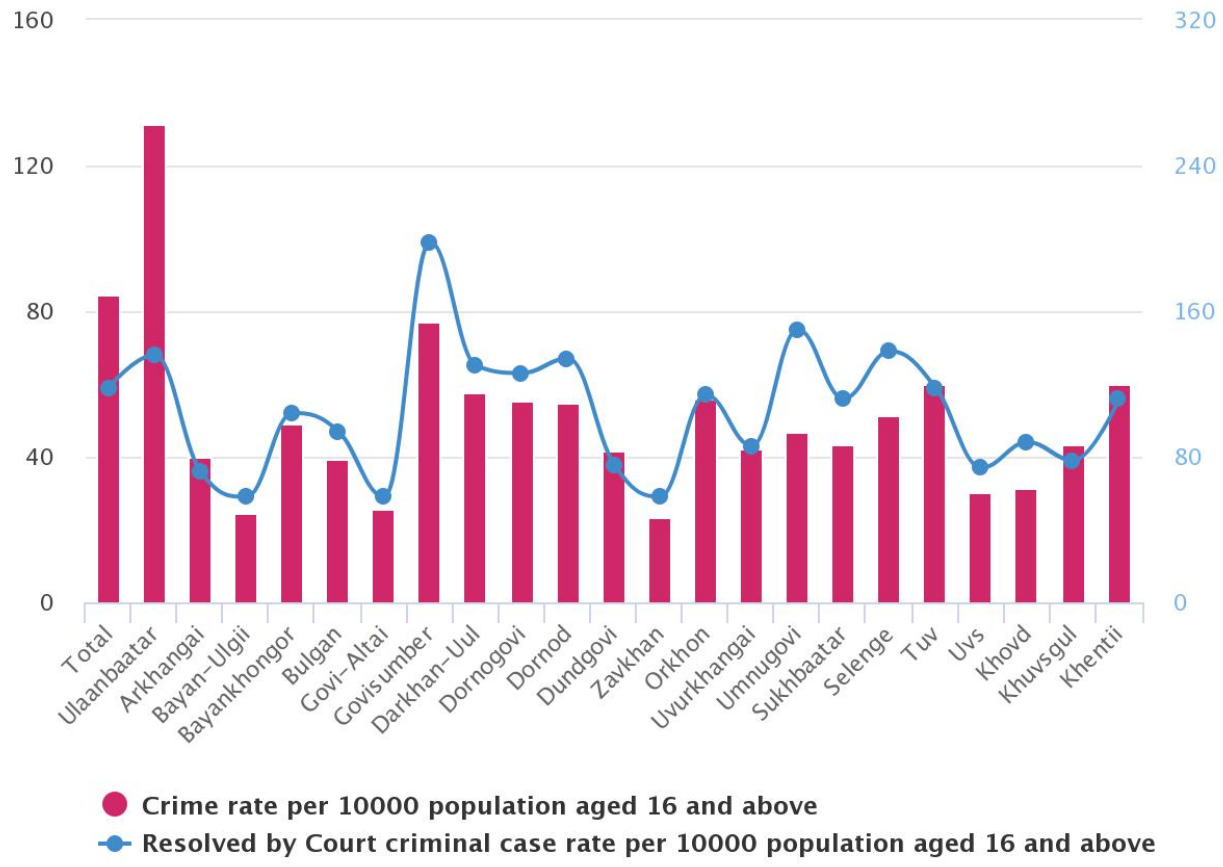
The Household Survey found that 73% of respondents did not have any health issue concerns. Those that did, cited blood pressure and heart problems as their biggest concerns.

1.5 Crime and Security

Crime and Policing

There is a network of police stations across Mongolia at the regional and local levels. Community inspectors are responsible for keeping social order. A community inspector is a person authorised to prevent or stop administrative offences, such as assaults, illegally owning firearms and knives, and littering in inappropriate areas, among others.

In 2018, 36,200 crimes were reported in Mongolia, an increase of 4,000 (12.3%) from the previous year. This increase was due to an increase in fraud by 2,376 (79.3 %), theft by 1,202 (9.8%), crimes against human health / immunity by 322 (3.7%), robbery by 264 (21.4%), embezzlement of property by 193 (52.3%) and rape by 143 (38.0%). Crime rates by *aimag* and in the capital in 2018 are shown in *Source: MSIS 2019*
Figure 2. It can be noted that Bayankhongor is about average in terms of both the crime rate and resolution thereof in court.



Source: MSIS 2019
Figure 2 Crime Rate per 10,000 Population Aged 16 and Above, by *Aimag* and Capital

Bayankhongor *aimag* The national average in 2018 was 177 crimes per 10,000 people aged 18 and above, while in Bayankhongor *aimag* the rate was 104 crimes per 10,000 people, which is significantly lower than the national average. In 2018, 581 crime were registered, an increase of 18 cases or 3% compared to 2017. Crime decreased in 12 *soum*s and increased in 8 *soum*s in 2018. In total, 396 people were convicted, a 15% decrease compared to 2017. A total of 580 people were noted to be victims of crime; 12 people died as a result of crime, while 210 were injured.

Note, that the disaggregated *soum*-level data were not available for 2018, and therefore Table 2 presents the data for 2016 and 2017. The most frequent crimes at the *aimag* level are crimes against human health and life, of which occasioning injury to someone's body is most prevalent. Crimes against rights of ownership, specifically theft was the second most recorded crime.

Table 2 Number of Recorded Crimes by *Aimag* and *Soum*, 2016-2017

Type of Crime	Administrative Unit	2016	2017
Crimes against national security	Bayankhongor	0	0
Crimes against human health and life, of which:	Bayankhongor	148	242
	Bayan-Undur	1	3
	Shinejinst	4	1
Intentional Homicide	Bayankhongor	4	3
Other acts of assisting or instigating suicide	Bayankhongor	1	5
	Bayan-Undur	0	1
	Shinejinst	-	-
Inflicted injury to someone's body	Bayankhongor	127	231
	Bayan-Undur	0	3
	Shinejinst	4	1
Crimes against rights of ownership	Bayankhongor	145	234
	Bayan-Undur	-	-
	Shinejinst	0	2
Theft of property	Bayankhongor	131	191
	Shinejinst	0	1
	Bayan-Undur	-	-
Crimes against public security	Bayankhongor	8	17
	Bayan-Undur	-	-
	Shinejinst	1	0
Crimes against environmental protection rules	Bayankhongor	7	16
	Bayan-Undur	1	1
	Shinejinst	-	-
Crimes against the rules of safety of traffic and use of motor vehicles	Bayankhongor	20	28
	Bayan-Undur	0	1
	Shinejinst	-	-

Source: MSIS 2019

In the *aimag* reporting year 21,188 violations were registered in 2018, an increase by 9,009 or 74% compared to 2017[1]. A total of 20,488 violations were fined. With respect to driving licenses, 550 were cancelled and fined, an increase of 49 or 9.8% compared to 2017. There were also 466 arrests by the local police, an increase of 53 cases or 12.8% compared to the last year (BAG 2018a).

One of the greatest safety and security concerns for the *aimag* is the high level of domestic violence at the *aimag* level, which is apparently under-reported, along with increasing trends of young adult suicides and adolescent births. The *aimag* noted an increase in traffic accidents and

[1] Violations are not the same as crimes, and reflect less serious offenses.

cases of fraud, while crimes committed by children decreased. The department of Infrastructure, Road and Transport shared concerns that theft of livestock is common in the *soum*s, especially along areas of paved road.

In Shinejinst soum, few crimes were reported in the *soum* during the KIIs. Crime at the *soum* level is mainly associated with the consumption of alcohol, including social nuisance and domestic violence offences. There were 5 officially recorded cases of crime in 2018, of which all 5 were considered minor (MSIS 2019). As noted above, for 2016 and 2017, the disaggregated data is available, indicating similarly low crime levels, mainly occasioning injury to someone's body and theft-related crimes. The *soum* shared the following about community safety and security:

- Crime does not have a big impact on community safety and security due to the remoteness of the area and absence of strangers;
- Livestock theft is low;
- Alcohol consumption is relatively high and most small shops have a license to sell alcoholic beverages; and
- Crimes happen mostly due to alcohol consumption.

During an FGD in Shinejinst *soum* participants agreed that alcohol consumption is high in the *soum* and causes problems. During the KII it was mentioned that the most common crime is against human health (occasioning injury) in the *soum*, usually due to alcohol consumption. The police department provides training and information to citizens for the purpose of reducing and preventing crime. A concern was expressed during FGDs that the Project may result in an increased crime as a result of Project workers drinking alcohol within the *soum* centres and also drinking with local community members. In contrast, Erdene Mongol has operated an alcohol and drug free exploration camp under a zero tolerance policy throughout its entire time operating in the soums. Whilst there is little current experience of this type of behaviour in the *soum*, this concern is founded on the already high levels of alcohol-related crime in the area, and perceptions of mining impacts in other areas of Mongolia.

In Bayan-Undur soum, there were 5 recorded crimes in 2018, of which 4 were considered minor and 1 serious. The *soum* shared that the 1 serious crime was domestic violence, and 3 other violent crimes were registered including domestic theft, fighting over pasture use (see further discussion in Chapter B13), and domestic violence.

The governor also mentioned that in 2014, a Chinese citizen was taken hostage in the *soum* as a result of a dispute between a herder and a mining company (company unnamed, note it was not Erdene). The dispute is reported to have been resolved without violence. It was indicated that the incident may have occurred due to mutually suspicious relations between Mongolians and Chinese nationals. This incident indicates pre-existing sensitivities among local community members in the Project area of influence to the use of Chinese workers (or the perception that Chinese workers are getting work ahead of locals).

During a KII it was shared that violence is common in the *soum*. This is especially the case for domestic violence, which tends to be under-reported or not reported at all. It was noted that cases of domestic violence occur 1 to 3 times a month on average. The KII shared that while people know where to go when a crime is committed, or abuse occurs, the response to crime is poor. Traffic rule violations are also noted to be common, especially related to the use of motorcycles. The KII noted that normally a service license for alcoholic beverages is standardised in Mongolia as 1 serving point per 4,000 people, which would restrict the soum to a single point of sale.

However, Shinejinst *soum* has around 13 stores and Bayan-Undur soum has around 7 stores that sell alcohol, and this exacerbates the problems associated with alcohol.

The Household survey also asked questions about perceptions of crime, safety and human rights. Figure 3 shows the crimes most respondents were worried about over the last two years. The worries about crimes related to drinking match with official records and information shared by *soum* officials. Despite concerns about crime, just over 96% of respondents had not been victims of crime or any other violations over the last two years. More than 89% felt that the *soum* government and law enforcement bodies were good or fair at combating crimes and violations.

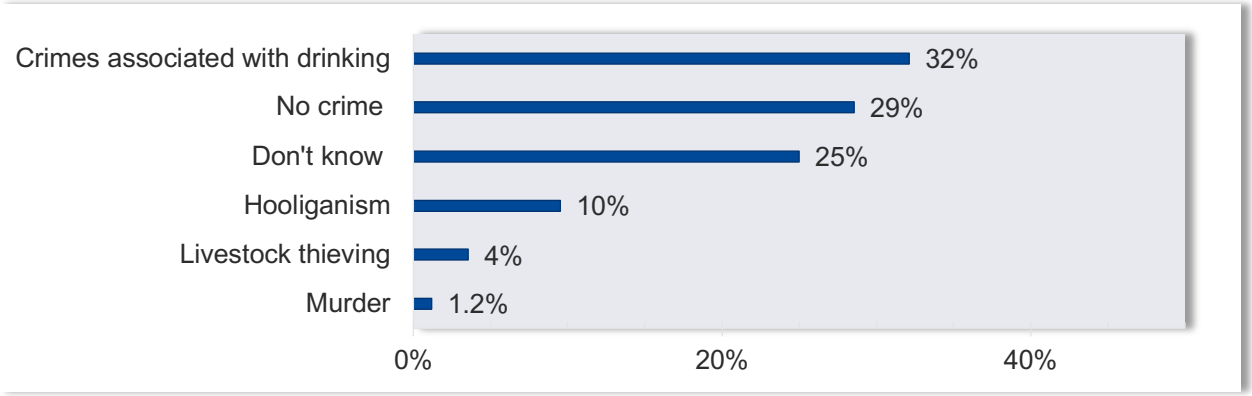


Figure 3 Crimes Causing Most Concern in Project Area

More than 80% of Household Survey respondents did not perceive community safety as a problem, but the main safety issues shared were car and motorcycle accidents. Respondents were also asked whether they think any human rights violations are occurring in their area. Their responses indicate that most don't know (46%), and thereafter that none are occurring (23%), while 10% reported child abuse and 9% domestic violence. Under-reporting of these types of crimes is common, in addition to low levels of awareness of human rights issues in general. As noted in the above sections though, there is awareness about the prevalence of domestic violence at the *aimag* and *soum* levels, although local measures in place to support victims were not mentioned.

In relation to domestic violence, Mongolia's first nationwide survey on gender-based violence was conducted in 2017, and the findings published in 2018. The study revealed high rates of violence against women in Mongolia. One in 10 women experienced non-partner sexual violence before the age of 15. Among married women or those with an intimate partner, nearly 60% experienced one or more forms of violence — whether physical, sexual, emotional, economic, or controlling behaviour. More than 30%, meanwhile, have experienced physical and/or sexual violence in their lifetime. Many victims of gender-based violence do not report or seek help. As per the survey estimation, only a small fraction of cases come to the attention of the police, therefore the level of under-reporting in Mongolia is high (UNFPA 2018).[2]

[2] In 2017, Mongolia's newly amended Law to Combat Domestic Violence entered into force. Mongolia's first law on domestic violence was adopted in 2004, but proved to be largely ineffectual because of a lack of adequate budgetary support and its provisions conflicted with existing laws, preventing proper implementation. For the first time, with this change in the Law, domestic violence can incur criminal punishment. The Law provides that while the first instance of domestic violence will not be deemed a criminal act, the second instance will be.

Injury and Accidents

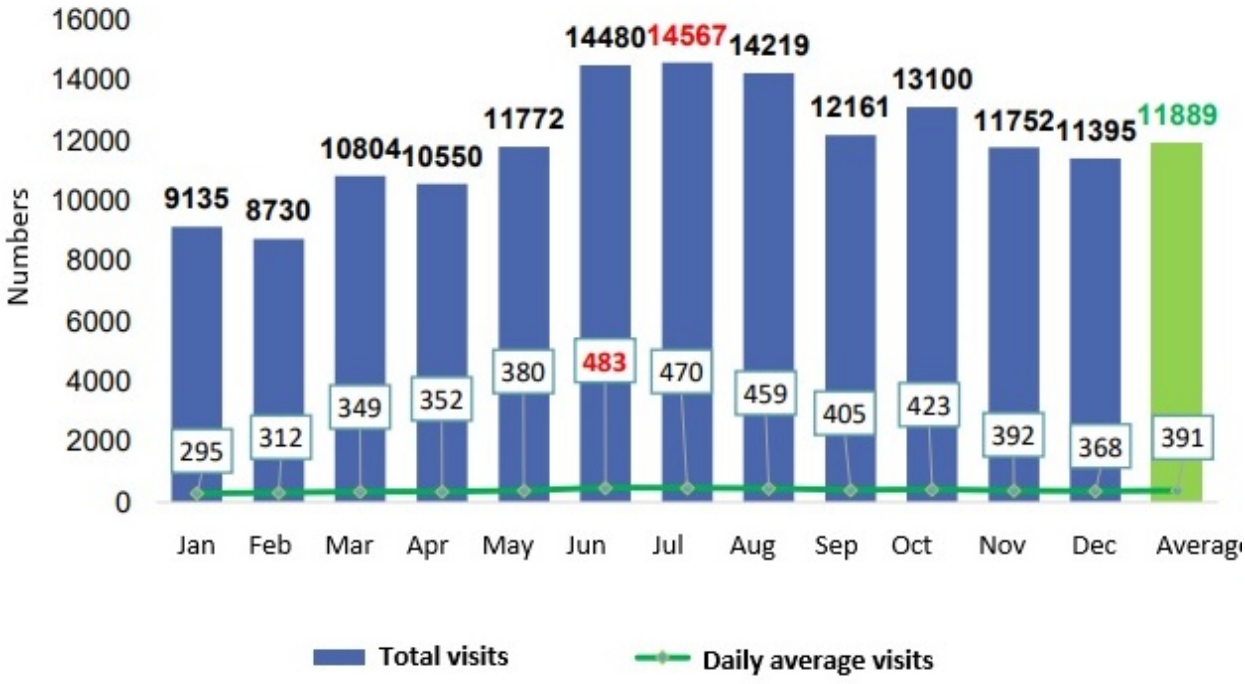
Injury is the third leading cause of mortality in Mongolia. Road traffic injuries claim the largest number of adult lives, while falls and burns are the leading causes of injury-related deaths among children. The National Traumatology and Orthopaedics Research Centre reports a total of 142,665 injures of which, 2,923 deaths were due to injuries in Mongolia in 2018. This is a 23.7% increase in injures and an 11.2% increase in deaths from the previous year. Of the total number of injuries, 83% were reported in Ulaanbaatar and 17% in the *aimags.* Therefore, the distribution of injuries was 818 people in Ulaanbaatar and 148 people in the *aimags* per 10,000 population (NTORC, 2018).

Table 3 Top Five Causes of Injuries and Death Caused by Injuries in Mongolia, 2018

Top 5 Causes of Injuries	Top 5 Causes of Death Due to Injuries
1. Fall - 39.2%	1. Poisoned[3] – 28.3%
2. Exposure to inanimate mechanical forces – 16.5%	2. Transport accident – 18.1%
3. Transport accidents - 14.3%	3. Suicide – 15.3%
4. Assault – 12.5%	4. Deadly natural phenomenon – 7.5%
5. Exposure to animate mechanical forces – 6%	5. Homicide or assault - 7.3%

Source: NTORC, 2018

Causes differ based on age group. Death due to injury among men is four times higher than women, 15.1 and 3.8 respectively per 10,000 population. On average, 391 people visited hospitals per day due to injury and/or accident. The occurrence rate was lowest in January and highest in June and July (as illustrated in Figure 4).



Source: NTORC, 2018

Figure 4 Patients That Visited Hospitals Due to Injury, by Month, Nationwide, 2018

[3] Most commonly in relation to alcohol poisoning.

In Bayankhongor aimag, in 2018, there were 1,026 people injured (120 cases per 10,000 population) and 52 people died due to injury or external factors. The top five causes of injury in Bayankhongor were transport accidents, falls, violence, exposure to inanimate mechanical forces, and burns. The top five causes of death were transport accidents (23 deaths), poisoning (10 deaths), suicide (8 deaths), suffocation and choking (7 deaths) and deadly natural phenomenon (5 deaths) in 2018 (NTORC, 2018).

The number of transport accidents in Mongolia has been continually increasing in both urban and rural areas (Table 4). In Bayankhongor aimag, 40 people were injured due to transport accidents per 10,000 population.

Table 4 Number of Injuries Caused by Road Accidents, 2018

#	Area	2016	2017	2018	2018 (cases per 10,000 population)
1	National	17,197	17,603	20,345	65.2
2	Ulaanbaatar	11,504	11,495	13,564	94.2
3	Rural	5,693	6,108	6,781	40.4
4	Bayankhongor	310	278	338	39.9

Source: NTORC, 2018

In terms of the type of passengers involved in accidents, the most common nationwide, were sedan drivers (34.2%), pedestrians (23%), motorcycle users (18.8%) and horse or cart users (10.9%) (NTORC, 2018).

It was noted by both *aimag* and *soum* officials, and community members that the extensive use of motorcycles is a major factor in road accidents and injuries. In 2018, there were 23 deaths reported due to transport accidents in Bayankhongor *aimag*. Of these, 14 deaths were motorcycle accidents, which placed Bayankhongor second highest behind Uvurkhangai (18 deaths) (see Chapter B16 on Traffic and Transport for further discussion on traffic accidents).

Discrimination

While social unrest and violence are generally uncommon in Mongolia, some segments of the population are subject to discrimination and harassment, particularly in rural areas. These may include discriminatory beliefs about ethnic minorities, such as Kazaks or Chinese, amongst some portion of the population.

Lesbian, Gay, Bisexual, Trans-gender, and Intersex (LGBTI) people also face societal discrimination and harassment. According to the report “Being LGBT in Mongolia”, published by the United Nations Development Programme (UNDP) in 2014, discrimination persists in all parts of society, with the workplace being the most serious offender. “Challenges include difficulties finding work if open about one’s sexual orientation, stress about others finding out one’s sexual orientation, firings, and a lack of redress if one experiences discrimination at the workplace (UNDP 2014)”.

Human Trafficking and Prostitution

Mongolia is a country of origin and destination for human trafficking. The victims of sexual exploitation are mostly runaway girls from families with violence and alcoholism, school drop-outs, homeless, street children or orphans, children of poor or divorced migrant families, child labourers in street markets, and daughters of families where a stepfather is present (OSCE 2018).

As a country of destination, forced labour in Mongolia primarily involves foreign migrant workers. Among the workers, the groups most vulnerable to forced labour are North Korean and Chinese nationals who are exploited in the agricultural, construction, forestry and mining sectors. There are also increased trafficking risks in the areas bordering China, such as Gashuun Sukhait and Zamiin-Uud border points due to the recent mining boost to traffic in the region (OSCE 2018).

While Mongolian law does not outlaw prostitution, it does outlaw the organisation and recruitment of sex workers. UNICEF reports that the number of sex workers in Mongolia is growing with more younger entrants into the sex business in the capital city, other large cities and border areas (DOS 2019).

There was no indication or mention of the issues of human trafficking and prostitution in Shinejinst and Bayan-Undur during the social baseline study in August 2019.

1.6 Project Affected People

Project Affected People (PAP) are defined as the social groups and/or communities whose characteristics, including vulnerability and means of sustaining livelihoods, may be affected directly or indirectly by actions associated with the construction, operation and/or closure and decommissioning of a Project. People who are most likely to experience impacts from the KGP Project within the area of influence are:

- communities in proximity to the KGP Project;
- herders and their families; and
- people with disabilities and those suffering from chronic illnesses.

1.7 Conclusion

The key themes associated with community health, safety and security in the Project can be summarised as follows.

- The geographical distribution of physicians and nurses in Bayankhongor is among the worst in Mongolia.
- The scope and quality of medical services is limited in Shinejinst and Bayan-Undur. There are difficulties in service delivery due to inefficiency in allocation of financial resources, lack of diagnostic equipment, poor distribution of healthcare roles and specialities, and geographical barriers to access.
- While the incidence of communicable diseases is generally low, STIs accounted for over 70% of total communicable diseases in 2018 in Bayankhongor. There was an increase in communicable disease recorded between 2017 and 2018, although insufficient information to know if this is a trend.
- Mortality data indicates that the leading causes of death are cardiovascular disease, stroke, cancer, and cirrhosis, and a similar pattern is observed at the *aimag* and *soum* levels. There is concern reported at the *soum* and *aimag* level of the increase in people developing bad health habits due to the lack of healthy living and changes in food consumption patterns.
- The most frequent crimes in the *aimag* are occasioning injury to someone's body and theft. Crime in Shinejinst and Bayan-Undur *soum*s is mainly associated with the consumption of alcohol, including social nuisance and domestic violence offences. High levels of domestic violence was noted as a key concern.

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Appendix A: Additional Data, Tables, and Figures

Table 5 Summary of Service Packages at Each Level of Healthcare in Mongolia

Provider	Service delivered
Primary Level – Government funded	
Bagh feldsher (rural)	Trained mid-level health personnel that provide the following services: home visits; antenatal and postnatal care; health promotion and education; early detection; disease surveillance and epidemiological monitoring; referral of cases to *soum* hospitals; prescription of essential drugs; public health services In 2018, total number of *bagh* 1198, Physicians are 933.
Soum health centres and inter-*soum* hospitals (rural)	Average 14 beds; provide 24 hour services with doctors (primary care, family medicine specialists or generalists), nurses, midwives, and support staff; health promotion and education; preventive care (e.g. immunisations and screening); disease surveillance and epidemiological monitoring; outpatient services including prescriptions; inpatient services including delivery of babies; minor surgery; diagnostic tests, home visits; emergency care; public health services; palliative care; rehabilitative care. *Soum* health centres are classified into three categories depending on the distance from the *aimag* centre and its population.
Family health centre (urban, and private practices)	The Family Health Centre is a state contractor registered at the voluntary basis of providing health care services to the population in urban areas. Staffed by family physicians and nurses during working hours. Outpatient services including prescriptions, preventive care (e.g. immunisations and cancer screening), disease surveillance and epidemiological monitoring, diagnostic tests, home visits, emergency care (limited), public health services, palliative care; rehabilitative care. As of 2018, there are 219 FHCs; 135 FHCs in Ulaanbaatar and 84 FHCs in 21 *aimag*s. 1 000 physicians, 940 nurses and 2 766 doctors and medical staff are providing health care services.
Secondary Level (10% co – payment required)	
District hospitals	280 beds, Total 3274 medical employees; with 869 doctors, 981 nurses, 327 midwives and support staff 24 hours a day Services include internal medicine, surgery, obstetrics, gynaecology, psychiatry, dermatology, and neurology; outpatient services including prescriptions; diagnostic tests (including X-ray and ultrasound); emergency care, public health services
Aimag hospitals	227 beds, Total 5124 medical employees; with 1163 doctors (specialists and generalists), 1783 nurses, 662 midwives and support staff 24 hours a day. Specialised care: internal medicine, surgery, obstetrics, gynaecology, psychiatry, dermatology, and neurology; outpatient services including prescriptions; diagnostic tests (including X-ray and ultrasound); emergency care, public health services
Tertiary Level (15% co – payment)	
Regional diagnostic and treatment centres (5 in total)	The Regional Diagnostic and Treatment Centre is a health organization that is responsible for providing medical care and service to the regional population and providing professional medical advice and training to other health organizations. In 2018, hospitals of Orkhon, Dornod, Uvurkhangai, Khovd and Umnugovi *aimag*s are carrying out health services according to the status of the RDATC. Average 336 beds. Total number of beds in 5 *aimag*s are 1682. Total 2050 medical employees; 481 doctors, 730 nurses, 279 medical and technical staff. Specialised care: internal medicine, surgery, obstetrics, gynaecology, psychiatry, dermatology, orthopaedics, neurology and outpatient services including prescriptions; diagnostic tests; and emergency care
Central Hospitals and Specialized centres	The Central Hospitals provide specialized in-country medical services in outpatient and inpatient care, training and research, and providing professional methodological reference to other health care organizations. Services vary depending on specialisation, e.g. cardiovascular surgery, neurosurgery, colorectal surgery, haematology, communicable diseases, mental health and

	narcology, traditional medicine and maternal and child health; other specialised care not found at the secondary level; inpatient and outpatient services and diagnostic tests, and emergency care. In 2018, there are 13 central hospitals, Total 5988 employees with 1258 doctors, 2035 nurses, 492 medical and technical specialists. Average number of beds 306 (Total 3990 in 13 central hospitals and specialized centres)
Private Sector (fee-for-service)	
Private hospitals	In 2018, 243 beds and 1 340 private hospitals are operating, 32.3 percent in rural areas and 67.7 percent in Ulaanbaatar city.
Sanatoriums	Rehabilitation and traditional medicine services. In 2018, Total number of Sanatoriums 107; 58 in Ulaanbaatar city; 49 in rural area.



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

B16: Transport Baseline

April 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
EBRD	European Bank for Reconstruction and Development
ESIA	Environmental and Social Impact Assessment
EU	European Union
IFC	International Finance Corporation
PRC	Peoples Republic of China

16. TRANSPORT

16.1 Introduction

The Project is located approximately 980 km south-west of Ulaanbaatar, the capital of Mongolia, in Bayankhongor *aimag* (province). The Project is 300 km south of the Bayankhongor *aimag* centre. Bayankhongor aimag centre had a population of 30,545 people in 2018.

Bayankhongor *aimag* includes three distinct geographic areas: the mountainous and wooded Khangai in the north, the central steppe region, and the arid Gobi Desert in the south. The Project is within the Gobi Desert sub-region.

The nearest *soum* centres (towns) are Shinejinst and Bayan-Undur, located 70 km northeast and 80 km to the north, respectively. In 2018, the population of Bayan-Undur *soum* was 2,668 people, while Shinejinst *soum* had a population of 2,449 people.

The area is sparsely populated with a recorded population density for the *aimag* in 2018 of only 0.8 persons per square km. In 2018, the total population of the Bayankhongor *aimag* was 88,359 persons.

Nomadic pastoral activity is the main industry in Bayankhongor *aimag*, with the region previously receiving Government accolades for livestock, meat, and wool production.

The distance between the two properties that comprise the Project, the Bayan Khundii and Altan Nar deposits, is approximately 19 km on an unsealed road. Since 2016, field work has been carried out from an exploration camp located at the Bayan Khundii site. A temporary exploration camp was located at Altan Nar from 2013-2016.

While the Bayankhongor *aimag* region is one of the most sparsely populated areas globally, infrastructure to access south-western Mongolia's natural resources from China is developing rapidly.

The Project is located approximately 200 km northwest of the Nariin Sukhait coal mining complex (which includes the Ovoot Tolgoi coal mine) from which several mining companies all produce coal and transport product through the Shivee Khuren (Mongolia)/Ceke (PRC) border point by road and rail.

16.2 Road Transport

The Project area is accessible from the north east via sealed roads from Ulaanbaatar to Bayankhongor (approximately 610km away), followed by unsealed regional gravel/dirt roads from Bayankhongor to Shinejinst *soum* centre (approximately 300km), then another approximately 70km on unsealed tracks to site.

The photographs in Appendix A highlight the variable standard of the access route from Ulaanbaatar to the site.

The Project is also located approximately 200km north from the Chinese Mongolian border. The Ceke (PRC)/Shivee Khuren (Mongolia) border crossing includes a paved highway heading south into the Peoples Republic of China (PRC).

The road heading north from the border point into Mongolia is sealed to the Nariin Sukhait coal mining district. It then becomes unsealed with similar characteristics to the roads around the mine site.

16.3 Rail Transport

The Ceke (PRC)/Shivee Khuren (Mongolia) border point also includes a major automated railcar coal loading facility with three railway terminals where coal trucked in can be loaded onto trains and shipped out over the Jiayuguan–Ceke, Ejin–Hami or Linhe–Ceke Railways. Planning is also underway to extend the rail to connect directly with the Nariin Sukhait coal mining district to the south east of the Project area.

16.4 Air Transport

Ulaanbaatar, the nation's capital, contains an international airport. Bayankhongor is served by one weekly flight to and from Ulaanbaatar that varies from season to season. Bayankhongor airport has two runways and is serviced by Mongolian regional airlines.

An existing unsealed airstrip at the Project site is used for any emergencies that may be dictated by the exploration camp.

16.5 Proposed Road Transport Routes

16.5.1 Introduction

There are two distinct routes that will service the Project. These are set out below and shown on *Source: Monrud LLC 2019*
Figure 1:

- Ulaanbaatar-Arvaikheer-Bayankhongor-Shinejinst-Bayan Khundii camp.
- Shivee Khuren border-Bayan Khundii camp.

Baseline characteristics of these two routes are discussed below.

16.5.2 Ulaanbaatar- Arvaikheer-Bayankhongor- Shinejinst- Bayan Khundii camp.

The length of this route is approximately 1,045km (one way). The route passes through numerous *soum*s and remote countryside. Erdene commissioned a preliminary study of this route (Monrud LLC 2019).

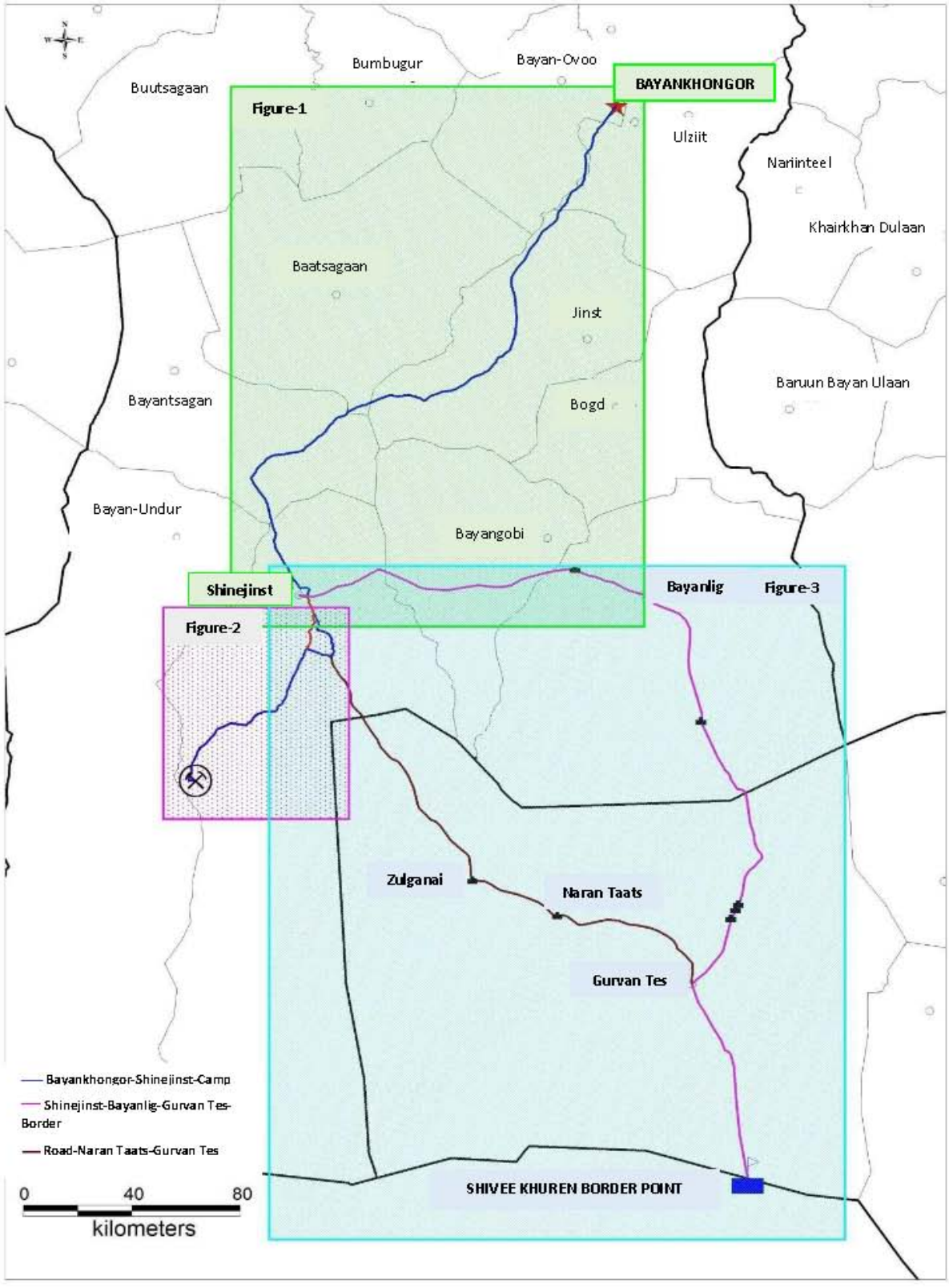
The Monrud study highlights the remote and under developed nature of most of these areas. It also highlights portions of the route that are in poor condition – refer to photographs in Appendix A.

Erdene collected baseline traffic data to provide an understanding of the existing traffic characteristics of the provincial road network. Data was collected on the roads between Bayankhongor *aimag* centre and Shinejinst *soum*. between 12 June and 05 August 2019 (an 8-week period) counting traffic in both directions. This period is considered to be representative of typical traffic volumes.

Key outcomes from the data collected include:

- The road between Bayankhongor *aimag* centre and Shinejinst *soum* accommodates low volumes of traffic.
- Over the 8-week data collection period, the busiest day saw 103 vehicles use the road over a 24-hour period; an average of about 4 vehicles per hour over the 24-hour period.

- The lowest traffic volume recorded per day was 29 vehicles, indicating significant variation in traffic using the road from day to day.
- The average daily count for the 8-week period was 55 vehicles per day which is about 2 vehicles per hour.



Source: Monrud LLC 2019

Figure 1 Proposed Transport Routes for Khundii Gold Project

The data collected to date does not extend to the types of vehicles counted. However, information received via the social baseline study indicates that motorcycles and small passenger vehicles are the predominant vehicles used, particularly in and around the *soum*s. Heavier vehicles, such as trucks and buses, provide a smaller component of the total traffic on the road network. Further data collection prior to and during construction will provide additional details on vehicle type and will include data collection during the winter period, November to January, see *D15 Traffic and Transport Management Plan*.

The social baseline study has shown that road transport issues are considered very important by the community. The key issues raised by the community centred on the remote nature of the *aimag* and poor road conditions, resulting in high transport costs for both businesses and individuals.

A second and related issue, is the impact of road transport on the livelihoods of herders. The concerns are about the potential impact of increased dust and additional indiscriminate tracks on herder activities and limited pasture.

16.5.3 Shivee Khuren border to Bayan Khundii camp.

The length of this route is approximately 499 km (Monrud 2019). The route through the Mongolian-Chinese border utilises the Shivee Khuren border station and uses existing unimproved roads that go through the western portion of the Gobi Gurvansaikhan National Park. The park, at nearly 27,000 square kilometres, is the largest national park in Mongolia, stretching 380 km from east to west and 80 km from north to south. The park lies on the northern edge of the Gobi desert. The higher elevations contain areas of steppe, and reach elevations of up to 2,600 meters. Several rare plants and animals are found in the park.

Traffic counts have not been undertaken of the transport routes immediately north of the Mongolian-Chinese border. Anecdotal evidence from social baseline studies suggests the total numbers are likely to be similar (2 vehicles per hour). The use of this route by trucks hauling coal into the PRC is highly variable depending on coal markets and the ongoing development of regional coal mines. Erdene is committed to gathering further data on the existing use of the proposed transport routes prior to construction and operations to ensure that the traffic variability is adequately considered in transport planning for the Project.

16.6 Conclusions - Transport Impacts and Management

Receiving Environment

The study area is a remote desert environment, sparsely settled with subsistence herding as the predominant agricultural land use. The *aimag* is also defined by smaller *soum*s (about 3,000 inhabitants) with little safety/traffic management where the extensive use of motorbikes is prevalent, with drivers typically having minimal PPE.

The poor standard of existing roads is a key issue in the *aimag*. The impacts from soil erosion and the prevalence of undefined multiple vehicle tracks on the landscape is evident. The impacts from the lack of suitable road transport infrastructure are exacerbated by the presence of highly erosive poor soils with little structure.

There are low existing vehicle traffic volumes on the roads that are proposed to be used by the Project. Monitoring undertaken during baseline studies has confirmed the very low traffic numbers from local vehicles. This data will be further verified from ongoing traffic monitoring prior to and during construction in accordance with *D15 Traffic and Transport Management Plan*.

16.7 References

Monrud LLC. July 2019. A study of road utilisation during the Bayan Khundii camp operation.

RPM Global. January 2019. Technical report for the preliminary economic assessment of the Khundii Gold Project.

Appendix A: Photographs



Photograph 1 – The turn-off to unsealed roads 7km south of Bayankhongor *Aimag*
Source: Monrud Report, July 2019.



Photograph 2 – an improved road condition 10km north of Bayan Khundii
Source: Monrud Report, July 2019.



Photograph 3 – The road condition 20km north of Bayan Khundii – sandy and rocky tracks
Source: Monrud Report, July 2019.



Photograph 4 – The road condition 110km north of Shinejinst accommodating a 45-seater bus
Source: Monrud Report, July 2019.



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

C1: Impact Assessment Introduction

April 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

Erdene	Erdene Resources Development
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management System
Project	Khundii Gold Project

1. INTRODUCTION

This Section of the Environmental and Social Impact Assessment (ESIA) provides an assessment of the expected environmental and social impacts of the Erdene Resource's (Erdene) Khundii Gold Project (Project). Impacts assessments are determined for each phases of the Project from construction through operations to decommissioning.

Each Chapter presents the following information:

- Introduction to the potential key issues and impacts;
- References to any relevant policy and standards;
- Description of approach to impact assessment;
- Description of potential impacts and hierarchy of mitigation measures;
- Assessment of any potential residual impacts and effects following the application of mitigation measures;
- Plans for monitoring of performance; and
- Summary of the impact assessment in tabular format.

1.1 Impact Categorisation and Significance

The key focus of the impact assessment was to define the significance of residual impacts and effects following application and/or consideration of mitigation measures. Therefore, for consistency, it is important to use common approaches to assess, categorise, and report the potential impacts across different environmental and social domains.

For this ESIA, impact categorisation and significance have been evaluated with reference to definitive standards, accepted/published criteria and legislation, where available. Where it was not possible to quantify impacts and effects, qualitative assessments were carried out, based on expert knowledge and professional judgement. Where uncertainty exists, it has been noted in the relevant assessment chapters.

The significance of impacts and effects was determined by using the Impact Categorisation and Significance methods described in *ESIA A3: Methodology* chapter. The impact significance method takes expected magnitude of the impacts and sensitivity of the impact receptors into account when determine the impact significance.

1.2 Design of Mitigation Measures and Monitoring Plans

Mitigation measures that are generally consistent with Good International Industry Practice have been built into the Project design and are expected to be implemented throughout construction, operations and closure. For each area of impact, mitigation measures have been prepared describing the steps and actions to be taken.

The following hierarchy of mitigation measures has been followed:

- "Designing-out" impacts by adopting an initial design that avoids impacts;
- Assessing alternatives and, where feasible, adopting those with fewer or less intense impacts;

- Modifying the initial design to reduce any remaining impacts;
- Applying mitigation measures to manage remaining impacts and/or developing offsets to ensure no net loss of biodiversity resources; or
- Establishing offsetting measures to address residual impacts that remain after the implementation of the steps above.

Monitoring and mitigation of the residual impacts have been specified in the respective Environmental and Social Management Plans (ESMP) of the ESIA.

1.3 Structure of the Impact Assessment

The impact assessments covered the biophysical and human environment. Impacts covering multiple areas within and between the environmental and social domains have been highlighted in each impact chapters and management plans.

The Impact Assessment Section comprises the following Chapters:

C2: Climate and Air Quality;

C3: Noise and Vibration;

C4: Topography, Landscape, Geology Soils and Seismicity.

C5: Water Resources;

C6: Biodiversity Conservation;

C7: Waste;

C8: Population and Demographics;

C9: Economy and Employment;

C10: Land Use;

C11: Cultural Heritage;

C12: Occupational and Community Health, Safety and Security;

C13: Traffic and Transport; and

C14: Cumulative Impacts.



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

C2: Climate and Air Quality

April 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
AQMP	Air quality management plan
CO	Carbon monoxide
CO_2-e	Carbon dioxide equivalent
EBRD	European Bank for Reconstruction and Development
ESIA	Environmental and Social Impact Assessment
EU	European Union
GLCs	Ground level concentrations
KGP	Khundii Gold Project
MNS	Mongolian National Standards
NO	Nitric oxide
NO_2	Nitrogen dioxide
PM_{10}	Particulate Matter of size less than 10 microns in aerodynamic diameter
$PM_{2.5}$	Particulate Matter of size less than 2.5 microns in aerodynamic diameter
ROM	Run-of-mine
SO_2	Sulphur dioxide

1. CLIMATE AND AIR QUALITY

1.1 Introduction

The Kundii Gold Project (KGP; the Project) is a proposed gold mining project under development by Erdene Mongol LLC (Erdene). The site is located in Bayankhongor Aimag, in southwestern Mongolia. The combined development consists of two deposits, the Bayan Khundii and Altan Nar deposits, 16km apart. This air quality impact and greenhouse gas assessment focusses on impacts from the Bayan Khundii open pit and infrastructure components of the Project. Altan Nar ore is expected to be processed at the BK processing plant. However, the air quality impacts of the Altan Nar pits as well as the haul road from AN to the BK processing plant have not been considered beyond a conceptual level.

The Project is located approximately 1000 km southwest of Ulaanbaatar and 350 km south of the Aimag capital, Bayankhongor City, 85 km south west of the center of Shinejinst soum and 140 km from the border of the Inner Mongolia province of China. A map of the Project area with the nearest winter camps and Soum center is shown in Figure 1.

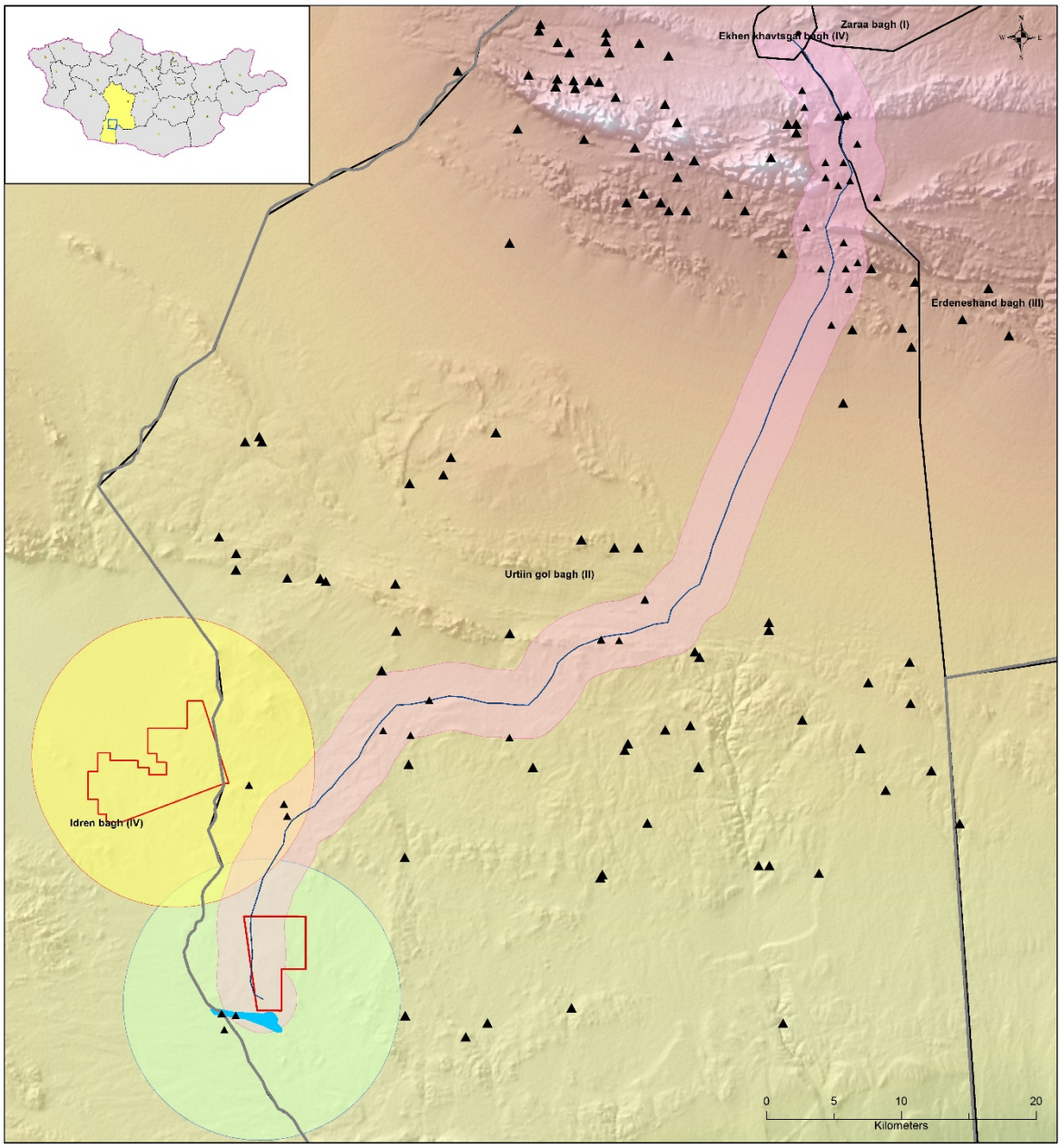

Figure 1 Khundii Gold Project Location and Nearest Camps and Settlements

1.2 Mining operation

The Project proposes an open-cut gold mining operation of 600,000 tonnes of processed material over an 10-year mine life (Tetra Tech, 2019). The total mineable mineralised plant feed has been estimated as 3.5 million tonnes at an average diluted head grade of 3.73 g/t gold and strip ratio of 10.2:1 (waste tonne: plant feed tonnes).

The mine plan proposes to drill and blast rock material. The material will be loaded to haul trucks using excavators. Waste rock will be deposited in dumps adjacent to the pits and plant feed will be hauled either directly to a crusher or stored at a run-of-mine (ROM) stockpile adjacent to the processing plant (Figure 2).

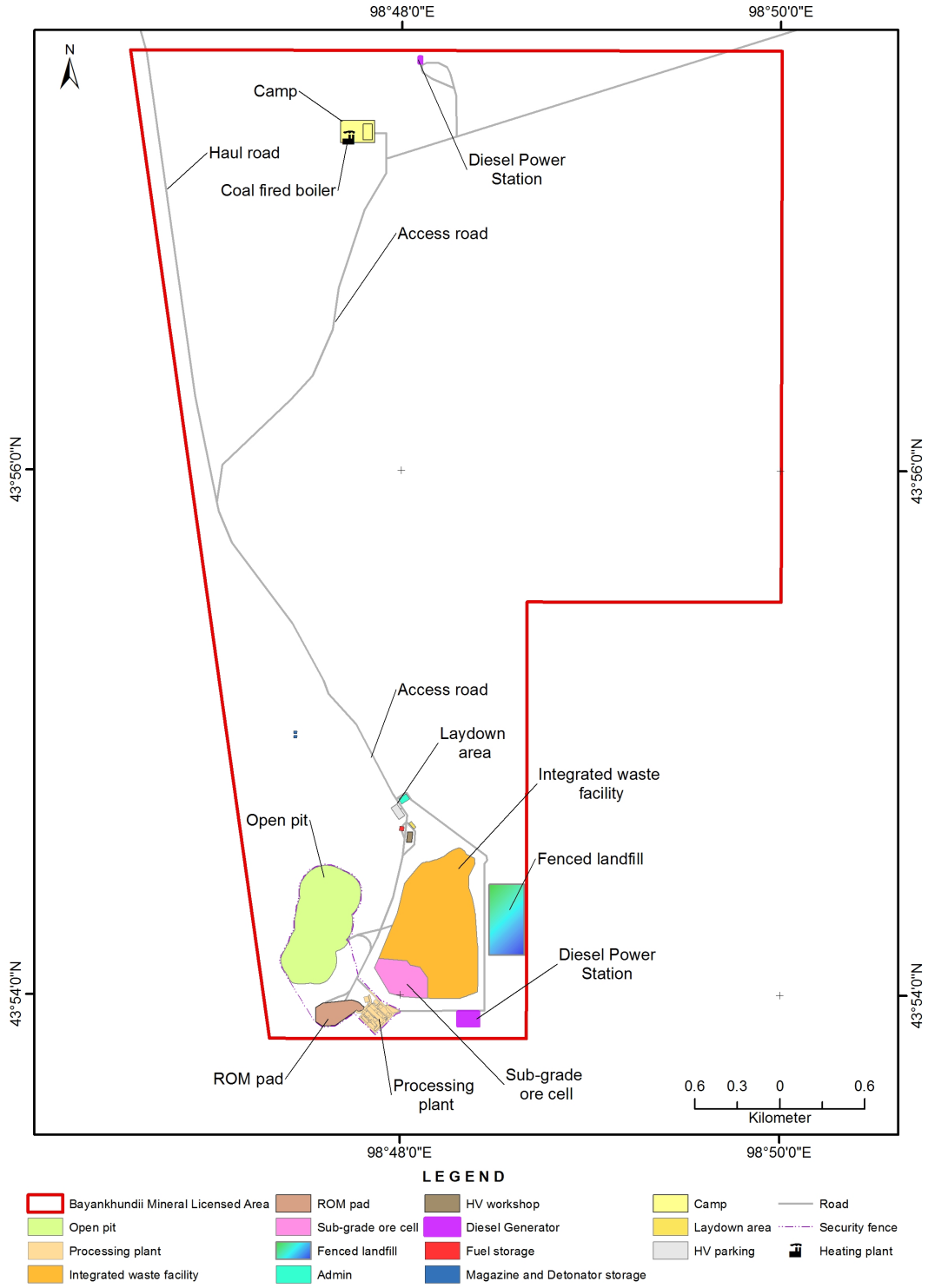

Figure 2 Bayan Khundii Mining Operation With Primary Air Emissions Sources

1.3 Potential Air Emissions Impacts

Emissions sources have been identified through the proposed mine plan as outlined in the Bayan Khundi Pre-Feasiability Studay and Altan Nare Preleminary Economic Assessment (Tetra Tech,

2019) and information provided by Erdene. Pollutants of concern for the mining operation and associated operations have been identified as:

- Particulate matter (PM; typically assessed and measured as PM_{10} and $PM_{2.5}$, that is, particulate matter of less than 10 micrometers and 2.5 micrometers of aerodynamic diameter);
- Nitrogen dioxide (NO_2);
- Sulfur dioxide (SO_2); and
- Carbon monoxide (CO).

Additionally, dust deposition may be of concern for amenity value, where larger dust particles deposit on surfaces including vegetation.

2. POLICY, STANDARDS AND LENDER REQUIREMENTS

2.1 Ambient air quality standards

The European Bank for Reconstruction and Development (EBRD) requires European Union (EU) limits to be achieved unless there are more stringent local requirements.

The ambient air quality standards to be used in this ESIA are:

- Mongolian Air Quality Guidelines (MNS 4585:2007); and
- EU Directives 2008/50/EU.

The relevant ambient air quality standards for this Project are outlined in Table 1.

Table 1 Ambient Air Quality Standards

Pollutant	Averaging Period	EU Limit Value (µg/m^3)	Mongolian Limit Value (µg/m^3)	Selected Standard for KGP (µg/m^3)	Notes
SO_2	Annual	20	20	20	-
	24-hour	125	50	50	-
	1-hour	350	-	350	EU not to be exceeded more than 24 times per year
	20-minute	-	450	450	-
NO_2	Annual	30	40	30	-
	24-hour	40	50	40	For the protection of vegetation
	1-hour	200	-	200	EU value not to be exceeded more than 18 times per year
	20-minute	-	200	200	-
PM_{10}	Annual	40	50	40	Allows natural sources to be taken into account
	24-hour	50	100	50	Not to be exceeded more than 35 times per year
$PM_{2.5}$	Annual	20	25	20	-
	24-hour	-	50	50	-
Carbon Monoxide	8-hour	10,000	10,000	10,000	-
	1-hour	-	30,000	30,000	-

Sources:
(a) EU air quality requirements from EU Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
(b) Mongolian Values from MNS 4585:2016 Source: Mongolian Agency for Standardization and Meteorology (2016)

In addition to the pollutants discussed here, the Mongolian air quality standards specify permissible concentration levels for ozone (O_3), lead (Pb), and benzo(a)pyrene (BaP). However, an assessment of these air quality standards has been scoped out of the ESIA because ozone is not emitted directly into the atmosphere but is formed as a result of a series of complex chemical reactions. Information on the ambient concentrations of its precursors (in particular the large number of different natural and anthropogenic volatile organic compounds) is required to estimate concentrations. This information is not available for the area around the KGP Project, but concentrations of these ozone precursors in the region are expected to be low. There are no known significant sources of lead or BaP in the region or expected as part of this project.

2.2 Occupational exposure standards

Consideration should be given to occupational health and safety. Under European standards, there are two types of occupational exposure limits for chemical agents:

- EU community exposure limits; and
- National exposure limits.

The community limits are set by the European Agency for Safety and Health at Work. The Member States are required to establish national occupational exposure limit values for listed chemical agents, taking into account the community values. National exposure limit values may be different from the community values. In the absence of applicable Mongolian guidelines, the occupational exposure guidelines used in this ESIA are the EU community exposure limit time weighted average (TWA; eight-hour TWS) and/or a Short-Term Exposure Limit (STEL; 15-minute average).

The occupational health and safety guidelines relevant to this Project are presented in Table 2.

Table 2 Ambient European Community Occupational Exposure Limits

Pollutants	Short Term Exposure Limit (µg/m^3)	Time Weight Average (µg/m^3)
Sulphur Dioxide	2,700	1,300
Nitrogen Dioxide	1,910	960
Carbon Monoxide	117,000	23,000

2.3 Emissions standards and control

Particulate matter generated by mining operations at the site will be controlled and managed in accordance with the controls measures outlined in the Air Quality Management Plan (AQMP).

Recommended control methods for emissions sources include:

- Dust control through application of water or chemical suppressants on stockpiles, haul roads and wind erosion sources. Erdene has already undertaken dust control activities during its seasonal exploration activities. Erdene has planned for water trucks and supply for dust control at the mine site;
- Extraction (e.g. bag house or cyclone) for material handling sources, such as the crushing circuit; and
- Sprays on conveyors and plant equipment, with a focus on crushing and grinding equipment.

Similarly, combustion sources in use at the Project shall be managed in accordance with the control measures specified in the AQMP, which may include:

- Implementation of manufacturer recommended engine maintenance and repair programs for all plant and vehicles, as appropriate;
- Replacement of fuel filters, air filters and oil filters in accordance with manufacturers recommendations on diesel generators;
- Use of low sulphur coal and diesel where practicable for boilers and diesel generators;
- Undertaking of a feasibility study for the displacement of coal and diesel with renewable technologies where possible;
- Design of site buildings to incorporate maximum thermal efficiency to reduce energy consumption; and
- Enclose plant equipment, where feasible.

3. ASSESSMENT METHODOLOGY

3.1 Scope of Assessment

The Project Area of Influence (AoI) has been defined as a 10km circular area centred around the processing plant and the area defined as being within 2.5 km of the Project access road as shown in Figure 1. This area is considered sufficient to adequately define and assess the impacts associated with key construction and operational activities that are expected to impact air quality including those activities associated with open pit mining, mineral processing, mine waste disposal, power generation and road transportation. The temporal scope covers the complete Project cycle, including the construction, operation and decommissioning phases.

The project activities relevant to potential air quality impacts are outlined in Table 3.

Table 3 Point source parameters and emissions estimates

Emission source	Location	Pollutants
Fugitive sources		
Drilling	Pits	PM_{10}, $PM_{2.5}$
Blasting	Pits	PM_{10}, $PM_{2.5}$, NO_2
Loading haul trucks with excavators	Pits	PM_{10}, $PM_{2.5}$
Dumping from haul trucks	Stockpiles; ROM pad; IWF	PM_{10}, $PM_{2.5}$
Crushing material	Process plant	PM_{10}, $PM_{2.5}$
Wind erosion	All areas	PM_{10}, $PM_{2.5}$
Point sources		
Coal fired boiler A	Accommodation camp	CO, SO_2, NO_2, PM_{10}, $PM_{2.5}$
Coal fired boiler B	Process plant, administration office and other buildings	CO, SO_2, NO_2, PM_{10}, $PM_{2.5}$
Coal fired boiler C	Heavy vehicle workshop	CO, SO_2, NO_2, PM_{10}, $PM_{2.5}$
Solar-diesel generator hybrid power station	Accommodation camp	CO, SO_2, NO_2, PM_{10}, $PM_{2.5}$
Solar-diesel generator hybrid power station	Process plant	CO, SO_2, NO_2, PM_{10}, $PM_{2.5}$
Mobile sources		
Hauling on unpaved roads	Haul roads; stockpiles; ROM pad; IWF; pits	PM_{10}, $PM_{2.5}$
Engine emissions	Haul roads; stockpiles; ROM pad; IWF; pits	CO, SO_2, NO_2, $PM_{2.5}$

The potential impacts are exposure to airborne pollutants. A sensitive receptor is defined as places where people are likely to reside or other recreational areas where people are likely to spend significant periods of time. Air quality impacts were assessed by the risk associated with likely impacts of emissions from Project sources at these locations. Generally, the closer the nearest sensitive receptors, the higher the risk of impacts from air emissions sources.

Overall the Project is located in a sparsely populated region, estimated as <0.8 per person per square km in 2018. The nearest permanent settlements to the Project are Shinejinst and Bayan-Undur, located 70 km northeast and 80 km to the north, respectively.

The proposed accommodation camp for mine works will be the nearest permanently inhabited sensitive receptor, located within the Project boundary, approximately 4 km to the north of the processing plant.

Nomadic pastoral activity occurs in the region, and there are known seasonal herder camps in the vicinity of the Project. The nearest winter camp is located 1.8 km from the processing plant to the south-west of the Project boundary. These camps are not continuously inhabited and lack permanent facilities but would be considered medium sensitivity receptors for the purposes of assessing air quality impacts.

3.2 Significant and Magnitude of Impacts Approach

The significance of impacts and effects were determined by establishing the magnitude of the impact combined with the sensitivity of the receptor. The magnitude of an impact is a measure of the scale of a change from baseline conditions for a given receptor.

Impact magnitude can therefore be determined by a combination of:

- Any increase in air pollutant concentrations due to the Project (Project contribution) at sensitive receptors; and
- Total air pollutant concentrations (i.e. baseline plus Project contribution) or cumulative impacts at sensitive receptors.

Criteria for determining air quality impact magnitude are presented in Table 4.

Table 4 Magnitude of air impact criteria

Magnitude of Impact	Type of Impact
High	Project emissions result in ground level concentrations (GLCs) cumulatively >100% of AAQS or Occupational Exposure Standards at receptor locations; and Noticeable impacts which are: • **Extent:** national or transboundary • **Duration:** long-term • **Frequency:** constant • **Reversibility:** irreversible
Medium	Project emissions result in GLCs cumulatively >100% of AAQS or Occupational Exposure Standards at receptor locations; and Noticeable impacts which are: • **Extent:** regional • **Duration:** short to medium-term • **Frequency:** periodic to constant • **Reversibility:** reversible
Low	Project emissions result in GLCs <100% of AAQS or Occupational Exposure Standards at receptor locations
Very Low	Project emissions result in indiscernible GLCs at receptor locations

The air quality receptor sensitivity criteria are defined in Table 5.

Table 5 Air Quality Receptor Sensitivity Criteria

Receptor Sensitivity	Type of Receptor
High	• Permanent herder winter/spring shelters, Soum centres or other areas that could include vulnerable populations (children, the elderly, those with chronic health conditions); or • Critical habitats or ecosystems of international importance that may be affected by air pollutant concentrations exceeding the AAQS.
Medium	• Temporary herder winter/spring shelters; or • Workplaces and worker site accommodation; or • Natural habitats or ecosystems of national importance that may be affected by air pollutant concentrations exceeding the AAQS.
Low	• An area where members of the public are not expected to be present over regular intervals; or • Modified habitats or ecosystems which are not likely to be affected by air pollutant concentrations.

Impact magnitude and receptor sensitivity results were combined to determine impact significance. Using the Project impact significance matrix (*C1: Introduction*), an impact of low magnitude affecting a receptor of medium sensitivity would result in an overall impact significance of Minor. Conversely, an impact of high magnitude affecting a receptor of medium sensitivity would result in an overall impact significance of Major.

To provide a consistent approach to the presentation of the significance of effects, the following terminology will be used throughout the KGP ESIA:

- adverse: detrimental or negative effect to an environmental resource or receptor;
- neutral: no effect to an environmental resource or receptor; and
- beneficial: advantageous or positive effect to an environmental resource or receptor.

3.3 Screening Level Model

A screening assessment was completed using the United States Environmental Protection Agency (USEPA) recommended screening model AERSCREEN. AERSCREEN is based on the refined gaussian dispersion model AERMOD. It produces an estimate of a “worst-case” 1-hour concentration based on emissions from a single source without the need for hourly meteorological data. The model predicts worst case concentrations that are likely to result in predicted concentrations than those predicted by a more refined modelling process, because of the conservative nature of the modelling assumptions and approach.

The aim of the modelling was to establish the minimum placement distance of the proposed accommodation camp from emissions sources. The model does not consider the influences of prevailing meteorology.

3.4 Greenhouse Gas Assessment Methodology

The greenhouse gas assessment for the Project has been completed by applying the EBRD protocol for assessment of greenhouse gas emissions (EBRD, 2017). This assessment has considered only Scope 1 and Scope 2 emissions from the Project. Scope 3 emissions have been excluded as the Project does not result in significant changes in expected upstream or downstream emissions. This aligns with the principles of the protocol.

A brief explanation of the scopes of emissions is provided below:

- Scope 1 emissions relate to direct greenhouse gas (GHG) emissions from sources owned or controlled by the company. Examples include emissions from boilers and fuel combustion in vehicles owned by the company;
- Scope 2 emissions relate to indirect GHG emissions resulting from the generation of purchased electricity; and
- Scope 3 correspond to emissions that result as a consequence of the activities in the company and occur from sources not owned or controlled by the company. Examples include shipping of product to customers.

Relationship between the three emission scopes can be understood from Figure 3.

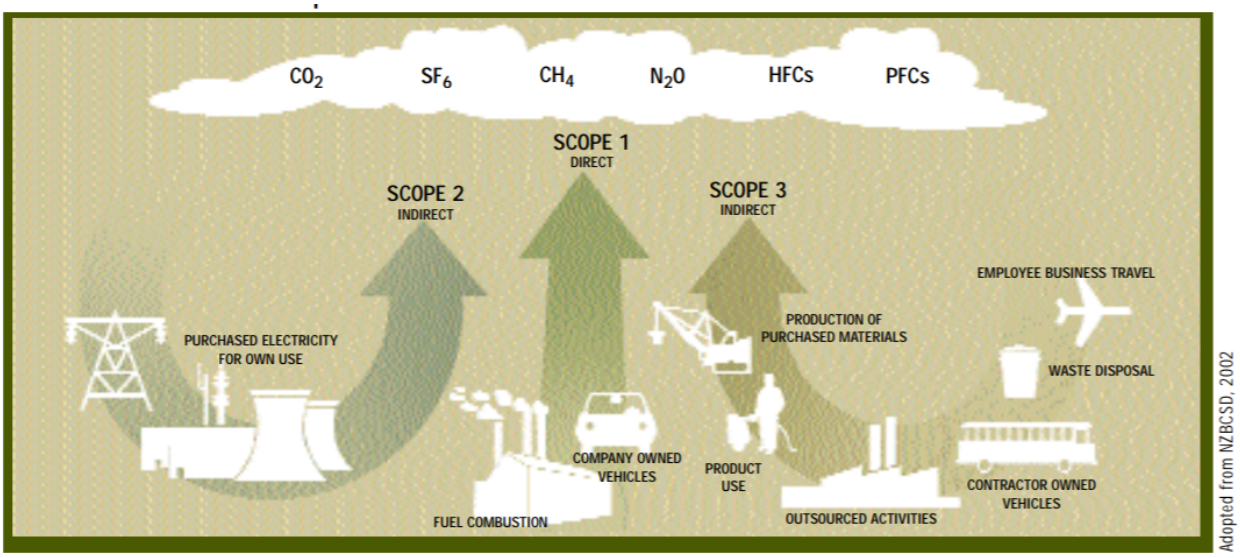

Figure 3 Scopes of greenhouse gas emissions (WBCSD&WRI, 2015).

4. POTENTIAL IMPACTS

Emission source details and assumptions for each of the emissions sources is presented in Table 6.

Table 6 Emission Source Details

Emission source	Location	Details
Fugitive sources		
Drilling	Pits	• 57,545 holes drilled per annum • Effective time drilling per day of 15 hours; average of 5,115 hours/annum over first six years
Blasting	Pits	• 600,000 tonne/annum ROM • Blasting area = surface area of ultimate pit limit approx. 1,000m x 500m
Loading haul trucks with excavators	Pits	• 600,000 tonne/annum ROM • 24 h/day, 365 days/annum = 8,760 hours/annum
Dumping from haul trucks	Stockpiles; ROM pad; IWF	• 600,000 tonne/annum ROM • 24 h/day, 365 days/annum = 8,760 hours/annum
Crushing material	Process plant	• Primary crushing throughput = 74 dry tonne/hour • 24 h/day, 365 days/annum at 92% availability = 8,059 hours/annum
Wind erosion	All areas	• 24 h/day, 365 days/annum = 8,760 hours/annum
Point sources		
Coal fired boiler A	Accommodation camp	• 20m tall stack • 4,672 tonnes/coal per annum • Operational during cold months October to March. 24 h/day, 183 days/annum = 4,392 hours/annum • Calorific value of coal used (Joules/kg): 15MJ/kg • Boiler type: Chain grate stoker boiler
Coal fired boiler B	Process plant, administration office and other buildings	• 20m tall stack • 4,672 tonnes/coal per annum • Operational during cold months October to March. 24 h/day, 183 days/annum = 4,392 hours/annum • Calorific value of coal used (Joules/kg): 15MJ/kg • Boiler type: Chain grate stoker boiler
Coal fired boiler C	Heavy vehicle workshop	• 20m tall stack • 4,672 tonnes/coal per annum • Operational during cold months October to March. 24 h/day, 183 days/annum = 4,392 hours/annum

		• Calorific value of coal used (Joules/kg): 15MJ/kg • Boiler type: Chain grate stoker boiler
Solar-diesel generator hybrid power station	Accommodation camp	• 1 MW capacity • 1.6 ML/annum diesel fuel • 40% assumed efficiency (factored from process plant power station figures) • 24 h/day, 365 days/annum = 8,760 hours/annum
Solar-diesel generator hybrid power station	Process plant	• 6 MW capacity • 9.3 ML/annum diesel fuel • Fuel use estimated on 4.6 MW average power @ 40% efficiency • 24 h/day, 365 days/annum = 8,760 hours/annum • Calorific value of fuel (J/kg): 42.7 MJ/kg
Mobile sources		
Hauling on unpaved roads	Haul roads; stockpiles; ROM pad; IWF; pits	• 600,000 tonne/annum transported from pit to ROM • Haul truck capacity: 38t ore, 54t waste • Weight of trucks: 36t ore, 51t waste • Silt content assumed 10% • Moisture content from watering regime assumed 50% control • Travelling speed of vehicles: loaded ramp 12km/hr; loaded flat 45 km/hr; unloaded ramp 30 km/hr; unloaded flat 45 km/hr • 24 h/day, 365 days/annum = 8,760 hours/annum
Engine emissions	Haul roads; stockpiles; ROM pad; IWF; pits	• 600,000 tonne/annum ROM • Mine fleet fuel = 3.65 ML/annum • 24 h/day, 365 days/annum = 8,760 hours/annum

4.1 Other Regional Emission Sources

The project is isolated, with no known townships or existing industrialised activity in the region. The area surrounding the Project Site is subject to seasonal strong winds, and the fine desert soils generate particulate matter through wind erosion. Naturally elevated ambient air concentrations of particulates are common in the region.

The key background sources of air pollution in the region are:

- Wind erosion of particulate matter from desert soil; and
- Particulate matter generated from vehicles on unsealed roads.

The process of mining nearby Altan Nar will involve the use of road trains to haul material to the processing plant, located within the Bayan Khundii Project boundary. The operational overlap between these two projects is expected to be only three months from 1 July 2028 to 30 September 2028, whereas the construction period will overlap for a longer period.

4.2 Existing Air Quality and Meteorology

There are no data available from continuous air quality monitoring stations in vicinity of the Project. The nearest known air quality monitoring stations are in Ulaanbaatar, approximately 755 km to the north-east of the Project and Hami in East Xinjiang, China, approximately 455 km to the west-south-west. Given the distances and the differences in land use in these locations, neither location would be considered representative of the conditions surrounding the Project.

Short monitoring campaigns were completed measuring particulate matter (PM_{10} and $PM_{2.5}$) in the vicinity of the Project during 2016 and 2019, and for SO_2 and NO_2 in 2019. Meteorological data is measured in Bayun-Undur, located approximately 83 km to the north of the Project and Jinst, located approximately 200 km to the north-east. While these data do not describe local conditions at the Project, they can provide an indication of prevailing regional conditions. The Company intends to install a site meteorological station in 2020 to determine local meteorological conditions.

Data from each of these monitoring programs are described in the following sections:

- Air quality monitoring 2016, Section 4.2.1;
- Air quality monitoring 2019, Section 4.2.2;
- Meteorological conditions, Section **Error! Reference source not found.**; and
- Summary, Section 4.2.3.

4.2.1 Air Quality Monitoring 2016

During 2016, monitoring of particulates (PM_{10} and $PM_{2.5}$) was undertaken for a 24-hour period at each of five locations. Figure 4 presents the locations of the monitoring points in relation to the proposed pit operations and camp.

presents the statistics for the concentrations of PM_{10} and $PM_{2.5}$ measured during the campaign. When compared against the relevant air quality standards (refer to Section 2.1), the concentrations of both PM_{10} and $PM_{2.5}$ were below the standards.

The data are limited, involving one 24-hour period of monitoring at each location, as required by Mongolian regulations. Typically, ambient air quality monitoring would be conducted over a longer period to understand changes to air quality during a range of meteorological conditions and varying source contributions. Further air quality data will be undertaken continuously for at least a three month period prior to Project development to validate the air quality baseline and compare with relevant ambient air quality standards. This additional monitoring is committed to in *D1 Air Quality Management Plan*. It should be noted that this greenfield site – much like others in Mongolia and globally – is operated seasonally and sporadically, far from existing infrastructure and without the resources (people, money, equipment) to enable such continuous yearlong monitoring to date.

It is not clear which instruments have been used to collect these data, and whether the measurement technique is suitable for the application. There is no validation or calibration data available for review alongside the results, so it is not clear what post-processing (if any) or calibration processes are in place to ensure the data integrity and validity. The data collected at each location is not contemporaneous, as monitoring was only conducted at a single location at any one time. On that basis, it is not recommended that the monitoring data from each of the locations is compared against itself to understand variability across the Project area.

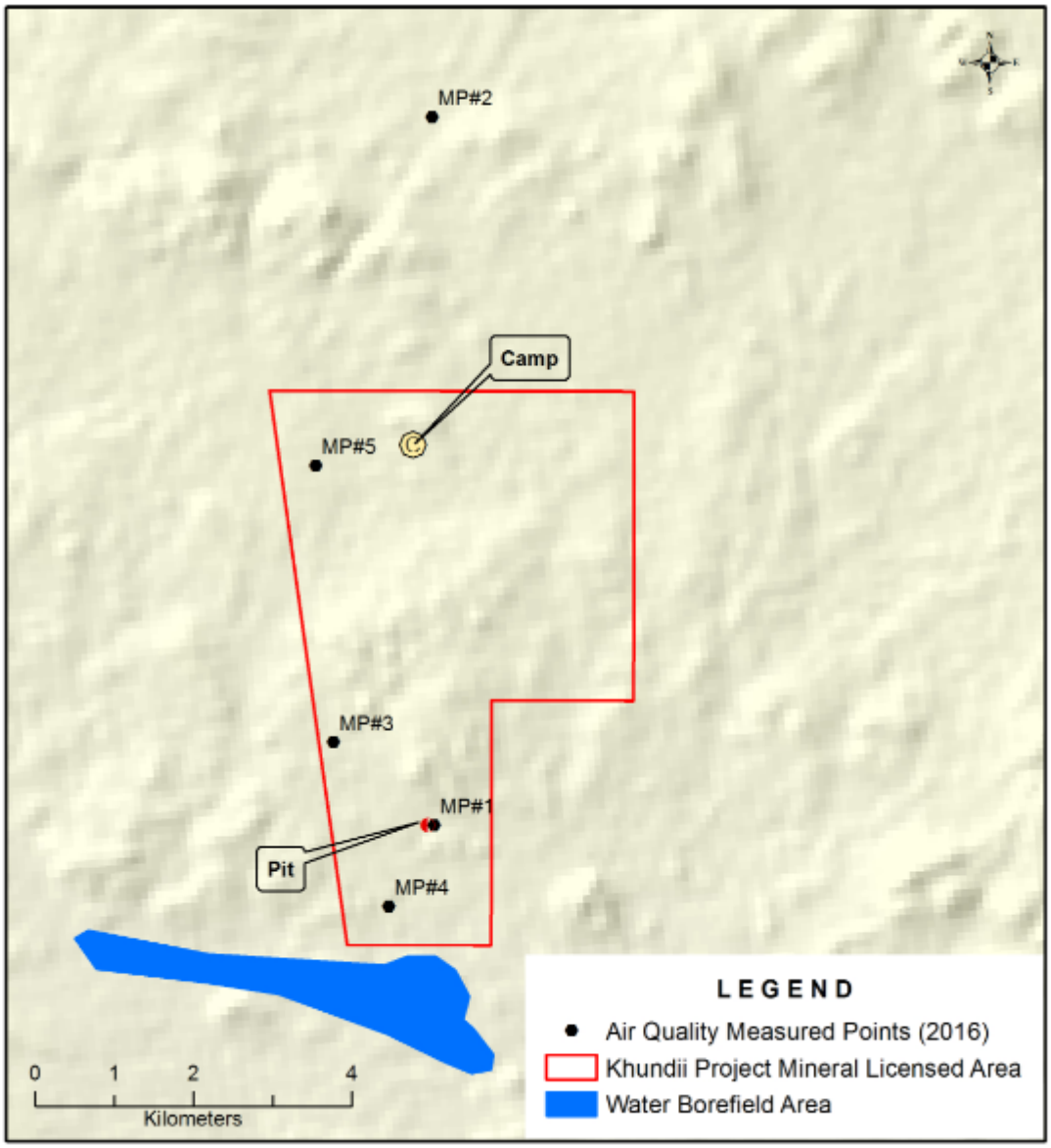

Figure 4 Locations of 2016 Air Quality Monitoring Campaign

Table 7 Monitored 24-hour Average Concentrations of PM_{10} in Area of Influence - 2016

#	Sampled date	24hr Average µg/m³	EU Limit[(a)] 24hr Average µg/m³	Mongolian Limit 24hr Average µg/m³	Adopted 24hr Average µg/m³
1	2016.05.30	4	50	100	50
2	2016.06.01	3			
3	2016.06.02	4			
4	2016.06.03	3			
5	2016.06.04	3			

Sources
(c) EU air quality requirements from EU Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
(d) Mongolian Values from MNS 4585:2016 Source: Mongolian Agency for Standardization and Meteorology (2016)

Table 8 Monitored 24-hour Average Concentrations of $PM_{2.5}$ in Area of Influence - 2016

#	Sampled date	24hr Average µg/m³	EU Limit[(a)] 24hr Average µg/m³	Mongolian Limit 24hr Average µg/m³	Adopted 24hr Average µg/m³
1	2016.05.30	5	-	50	50
2	2016.06.01	3			
3	2016.06.02	5			
4	2016.06.03	1			
5	2016.06.04	3			

Sources
(a) EU air quality requirements from EU Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
(b) Mongolian Values from MNS 4585:2016 Source: Mongolian Agency for Standardization and Meteorology (2016)

Particulate matter is measured by aerodynamic diameter. $PM_{2.5}$ is a subset of PM_{10}, where particles less than 2.5 µm aerodynamic diameter (i.e. $PM_{2.5}$) are captured in the PM_{10} measurement for particles of less than 10 µm. In the 2016 dataset $PM_{2.5}$ is measured at higher concentrations than PM_{10} on two of the five sampling days, which brings the accuracy and validity of the sampling into question.

4.2.2 Air Quality Monitoring 2019

Monitoring of PM_{10}, $PM_{2.5}$, SO_2 and NO_2 were undertaken in 2019 for 24-hours at six locations. The monitoring locations are presented in Figure 5 and the results are presented in Table 9, Table 10, Table 11 and Table 12 for each pollutant respectively.

The results indicated that on the days of the monitoring concentrations of PM_{10} and $PM_{2.5}$ were below the nominated standards. The NO_2 and SO_2 concentrations were below the standards but were elevated compared to the expected concentrations in a region with no significant sources of industrial pollution.

Elevated concentration of NO_2 and SO_2 could be explained by:

- Impacts from nearby vehicles and generators;
- Impacts from fires;
- Impacts from long range transportation of pollutants from other regional sources;
- Impacts from unknown sources in the region;
- Equipment error; and
- Incorrect implementation of sampling methodology.

As with the 2016 monitoring campaign, the data were limited to one 24-hour period per sample and these data is not contemporaneous between locations. No quality assurance of calibration data was available for review. Instrument specifications were not provided. The sample date for the 2019 monitoring campaigns were not presented with the data.

A similar issue was identified with the PM_{10} and $PM_{2.5}$ for one sampling day, but details of the sampling campaign were limited so further scrutiny was not possible.

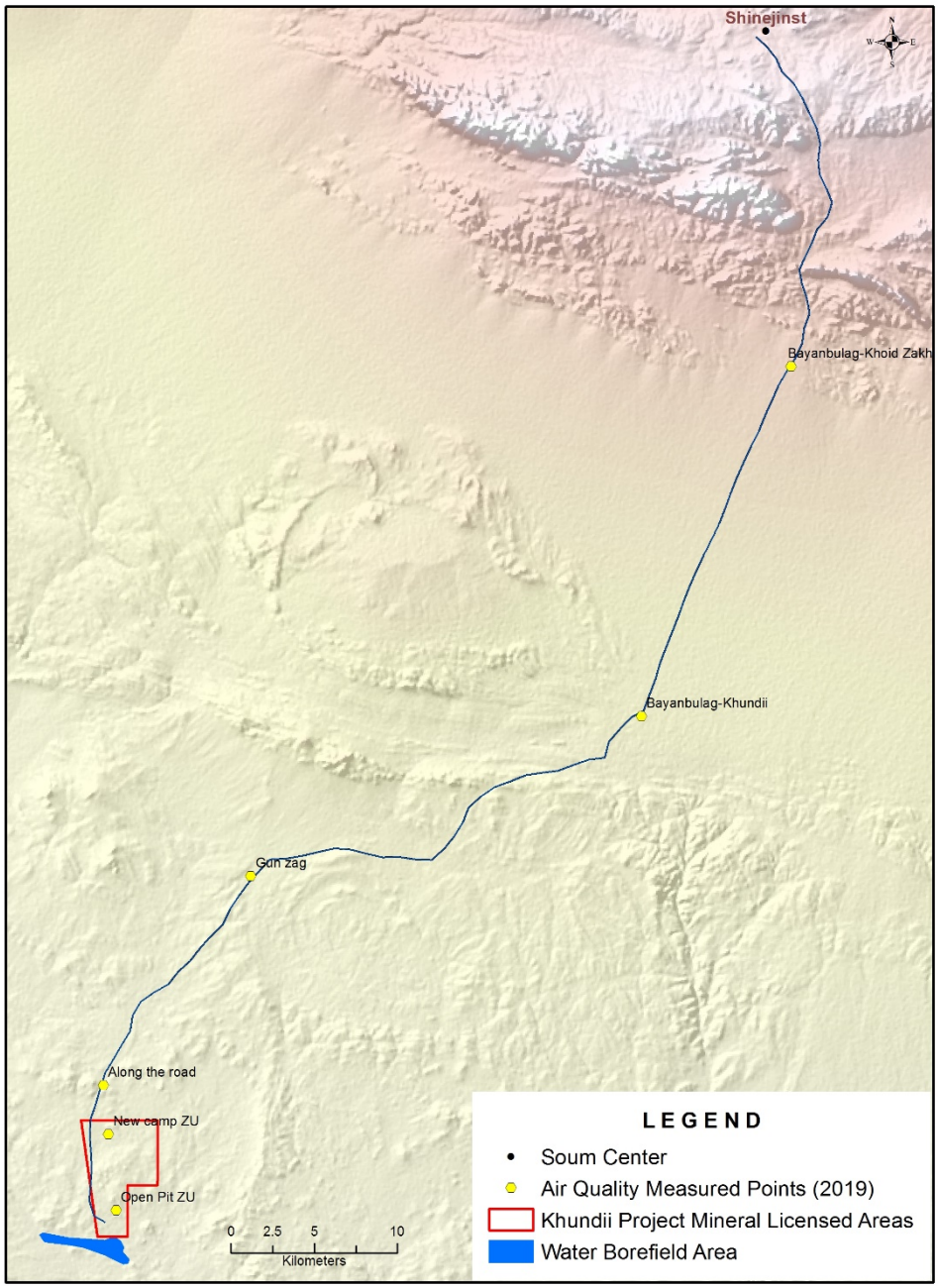

Figure 5 Locations of 2019 air quality monitoring campaign

Table 9 Monitored 24-hour Average Concentrations of PM_{10} in Area of Influence - 2019

Sample ID	24hr Av PM_{10} µg/m^3	EU Limit[(a)] Value µg/m^3	MNS 4585:2016 µg/m^3	Adopted limit µg/m^3
Bayanbulag-Khoid Zakh	14	50	100	50
Bayanbulag-Khundii	17			
New camp ZU	1			
Along the road	4			
Open Pit ZU	0			
Bayanbulag-Khoid Zakh	3			

Sources

(a) EU air quality requirements from EU Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
(b) Mongolian Values from MNS 4585:2016 Source: Mongolian Agency for Standardization and Meteorology (2016)

Table 10 Monitored 24-hour Average Concentrations of $PM_{2.5}$ in Area of Influence - 2019

Sampled ID	24hr Av $PM_{2.5}$ µg/m³	EU Limit[a] Value µg/m³	MNS 4585:2016 µg/m³	Adopted limit µg/m³
Bayanbulag-Khoid Zakh	4	-	50	50
Bayanbulag-Khundii	5			
New camp ZU	1			
Along the road	5			
Open Pit ZU	0			
Bayanbulag-Khoid Zakh	1			

Sources
(a) EU air quality requirements from EU Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
(b) Mongolian Values from MNS 4585:2016 Source: Mongolian Agency for Standardization and Meteorology (2016)

Table 11 Monitored Average Concentrations of SO_2 in Area of Influence - 2019

Sample ID	Av SO_2 µg/m³	EU Limit[a] 1hr Average Value µg/m³	Mongolian Limit[b] 20-min Average µg/m³	Adopted 1hr Average µg/m³
Bayanbulag-Khoid Zakh	24	350	450	350
Bayanbulag-Khundii	36			
New camp ZU	28			
Along the road	9			
Open Pit ZU	8			
Gun Zag well	104			

Sources
(a) EU air quality requirements from EU Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
(b) Mongolian Values from MNS 4585:2016 Source: Mongolian Agency for Standardization and Meteorology (2016)

Table 12 Monitored Average Concentrations of NO_2 in Area of Influence - 2019

Sample ID	Av NO_2 µg/m³	EU Limit[a] 1hr Average Value µg/m³	Mongolian Limit[b] 20-min Average µg/m³	IFC[c] 1hr Average µg/m³
Bayanbulag-Khoid Zakh	93	200	200	200
Bayanbulag-Khundii	93			
New camp ZU	96			
Along the road	102			
Open Pit ZU	98			
Gun Zag well	144			

Sources
(a) EU air quality requirements from EU Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
(b) Mongolian Values from MNS 4585:2016 Source: Mongolian Agency for Standardization and Meteorology (2016)

4.2.3 Summary of Existing Air Quality and Meteorological Conditions

Prevailing meteorological conditions influence air quality, particularly wind conditions which determine how quickly pollutants move from the source and the volume pollutants disperse into. Rainfall can influence air quality by 'washing out' pollutants from the atmosphere.

The Project area is a remote greenfield site with arid conditions. Ambient air particulate concentrations in the AoI are heavily influenced by climatic conditions. From the available air quality monitoring data collected (PM_{10}, $PM_{2.5}$, NO_2 and SO_2) during 2016 and 2019, all periods were below the relevant *Mongolian Air Quality Guidelines* (MNS 4585:2007) *and Ambient Air Quality Guidelines* (2007) and *EU Directives 2008/50/EU* (further outlined below). The monitoring campaigns are limited as they do not capture variability in meteorological conditions nor changes in source contributions over time.

Given the sporadic and short-term nature of the monitoring undertaken in the region it is unclear if the monitored concentrations are indicative of consistent concentrations at the monitoring locations and so it is not possible to definitively characterise the baseline of the region. However, given its remoteness from significant sources, it is likely that background concentrations of gaseous pollutants would be low or negligible and background concentrations of particulates would be elevated, albeit from natural sources. This will be further validated through additional continuous air quality monitoring undertaken by Erdene prior to Project development in accordance with *D1 Air Quality Management Plan.*

Meteorological data collected at Bayan-Undur (about 80 km to north) and Jinst (about 70 km to north-east) showed relatively consistent conditions for rainfall, air temperature, humidity, wind speed and wind direction. The lowest rainfall in the region occur from October to April, which is consistent with lower temperatures. Relative humidity is consistently dry throughout the year. Wind speeds peak in April and again in November, with calmer conditions occurring June/July and December/January. Winds prevail from the south-west and west throughout the year at both locations, indicating the impacts from emission sources are more likely to be experienced to the north-east and east of their location.

5. ASSESSMENT OF RESIDUAL IMPACTS

5.1 Impacts During Construction

The change from baseline for air pollution from construction of the mine would be at a site and local scale. The duration of the impacts would be short-term, as they would be limited to the construction period. Emission sources during construction will be limited, and will not include mining sources such as drilling, blasting, loading excavators or crushing. Nor will the heating or power sources be operating at full capacity, given the lower numbers of employees involved in the construction process. The key sources of air pollution during construction will be vehicle emissions, wind erosion, potentially hauling and use of the boilers and generators below operational capacity. This period will be characterised by alternating between periodic or constant sources of air pollution. The impacts from construction are reversible, as the airshed can be restored at the conclusion of construction. This combination of factors was deemed a low impact magnitude for air quality impacts during construction.

5.1.1 Winter Herder Camps

The nearest winter camps located approximately 1.8km to the south-west of the processing plant will not be resilient to air quality impacts and may be impacted above the applicable air quality standards. If the winter camps are inhabited, it is likely to be for less than a year during favourable prevailing wind conditions (i.e. located upwind of the mine). The receptor sensitivity of the winter camps are classified as high. Air quality impacts from construction of the Project for the winter camps receptors are classed as Moderate.

5.1.2 Project Worker Accommodation Camp

Mine workers will reside at the accommodation camp, which indicates the people residing there are less likely to be characterised as vulnerable populations (e.g. infants, young people, elderly, infirm etc). On that basis, the receptor sensitivity for this location is classed as medium. Air quality impacts from construction of the Project for the accommodation camp receptor is classed as Minor.

5.2 Impacts During Operation

The change from baseline for air pollution from operation of the mine would be at a site and local scale, with potential for some regional scale impacts during adverse conditions. The duration of the impacts would be long-term, as they would be continuous for the duration of the mine life. Many of the emissions sources are expected to be in operation 24-hours per day, 7 days per week. The impacts from operation are reversible, as the airshed can be restored at the conclusion of operations. This combination of factors was deemed a high impact magnitude for air quality impacts during operation.

5.2.1 Winter Herder Camps

The nearest winter camps located approximately 1.8km to the south-west of the processing plant may not be resilient to air quality impacts and may be impacted above the applicable air quality standards. The winter camps are only temporarily inhabited, for weeks or months of the year under favourable (i.e. lower impact) prevailing wind conditions (i.e. located upwind of the mine) however it is understood that they can go for long periods (months or years) without being inhabited. As the receptors sensitivity for temporary winter camps is classed as medium and the

magnitude of the impacts are likely to be medium. The impact significance at the winter camps during operations is classed as Moderate.

5.2.2 Project Worker Accommodation Camp

The accommodation camp is located approximately 4km to the north of the processing plant and is unlikely to be significantly impacted by mining and processing operations. There are however power generators and a boiler located in the vicinity of the accommodation camp that could potentially impact air quality at the accommodation camp if not mitigated effectively.

To provide recommendations to reduce impacts at the accommodation camp AERSCREEN was used to determine conservative separation distances between emission sources near the accommodation camp, so that air quality criteria are not likely to be exceeded. Table 13 presents the predicted ground level concentrations (GLCs) at the mining camp and provides recommended separation distances required from these sources in order to meet relevant ambient air quality standards at the accommodation camp.

Table 13 Predicted ground level concentrations (GLCs) at Mining Camp

Emission Source	Pollutant	Recommended separation distance	Maximum 1-hour concentration predicted at recommended separation distance	1-hour criteria ($\mu g/m^3$)	% of criteria
Boiler	SO_2	Greater than 25m	170	208	82%
	NO_2		43	200	21%
	PM_{10}		38	83	46%
	$PM_{2.5}$		12	42	29%
	CO		34	30,000	<0.1%
Generator	SO_2	Greater than 325m	142	208	68%
	NO_2		197	200	99%
	$PM_{2.5}$		6	42	14%
	CO		52	30,000	<0.2%
Co-located sources	SO_2	Greater than 775m	204	208	98%
	NO_2		140	200	70%
	PM_{10}		31	83	38%
	$PM_{2.5}$		12	42	29%
	CO		53	30,000	0.2%

The following recommendations are made to separate the boilers and generators from the accommodation camp:

- The coal fired boilers in isolation should be placed at least 25m from the accommodation camp to comply with all relevant criteria;
- The diesel fired generator in isolation should be placed at more than 325m from the camp to comply with air quality standard; and

- If both diesel generators and coal fired boilers were to be co-located, they should be located more than 775m from the accommodation camp.

Additional separation distances may need to be considered if the project were to be considered cumulatively with background concentrations of pollutants from the region. Air quality impacts during operation at the accommodation camp, if the recommended separation distances are implemented in the mine layout design, are classed as Minor.

5.3 Closure and Decommissioning

The change from baseline for air pollution from decommissioning of the mine would be at a site and local scale. The duration of the impacts would be short-term, as they would be limited to the decommissioning period. Emission sources during decommissioning will be limited, and will not include mining sources such as drilling, blasting, loading excavators or crushing. Nor will the heating or power sources be operating at full capacity, given the lower numbers of employees involved in the decommissioning process compared to operation. The key sources of air pollution during decommissioning will be vehicle emissions, wind erosion, potentially hauling and use of the boilers and generators below maximum capacity. The impacts from decommissioning are reversible, as the airshed can be restored at the conclusion of the operation. This combination of factors was deemed a low impact magnitude for air quality impacts during closure and decommissioning.

The nearest winter camps located approximately 1.8km to the south-west of the processing plant and the accommodation camp, located approximately 4km to the north of the processing plant will not be resilient to air quality impacts and may be impacted above the applicable air quality standards. If the winter camps are inhabited, it is likely to be for weeks or months of the year during favourable prevailing wind conditions (i.e. located upwind of the mine). The accommodation camp will be inhabited by people who work at the mine and on that basis, these receptors sensitivity for these locations is classed as medium.

Air quality impacts from closure and decommissioning of the Project for sensitive receptors within the AoI are classed as Minor.

5.4 Impacts from Greenhouse Gas Emissions

The main sources of emissions for the Project relate to the burning of fuel in mobile and stationary combustion engines, and these account towards Scope 1 emissions. Due to the Projects isolated location, energy will be generated on site. Therefore, there are no Scope 2 emissions associated with the facility.

It is estimated that the Project will generate approximately 61,599 tonnes of CO_2 equivalent per annum at its maximum throughput. The emission intensity of the Project is estimated to be

102.7kg CO_2 equivalent per tonne of ROM mined. Further details on the emission sources, input parameters and assumptions are provided in Table 14.

Table 14 GHG Emission Estimates

Emission source	Emissions (tonnes CO_2-e per year)	Assumptions
Stationary combustion source		
Power plant - Mining Camp	4,327	Approximately 1.6million litres (ML) of diesel used per year; based on diesel net calorific value of 43TJ/Gg, 0.846kg/litre density and Global Warming Potential (GWP) of 28 and 265 for CH_4 and N_2O respectively.
Power plant - Processing plant	25,151	Approximately 9.3ML of diesel used per year; calculation use diesel net calorific value of 43TJ/Gg, 0.846kg/litre density and Global Warming Potential (GWP) of 28 and 265 for CH_4 and N_2O respectively.
Coal boiler A	6,782	Boilers use 4,672 tonnes of coal per annum; emission factors used correspond to sub-bituminous coal; Net calorific value of 15MJ/kg and Global Warming Potential (GWP) of 28 and 265 for CH_4 and N_2O respectively.
Coal boiler B	6,782	Boilers use 4,672 tonnes of coal per annum; emission factors used correspond to sub-bituminous coal; Net calorific value of 15MJ/kg and Global Warming Potential (GWP) of 28 and 265 for CH_4 and N_2O respectively.
Coal boiler C	6,782	Boilers use 4,672 tonnes of coal per annum; emission factors used correspond to sub-bituminous coal; Net calorific value of 15MJ/kg and Global Warming Potential (GWP) of 28 and 265 for CH_4 and N_2O respectively.
Mobile combustion source		
Mining mobile sources	10,861	Approximately 3.65 ML of diesel used per year; calculations use diesel net calorific value of 43TJ/Gg, 0.846kg/litre density and Global Warming Potential (GWP) of 28 and 265 for CH_4 and N_2O respectively.
Plant mobile sources - off road	611	Approximately 0.2 ML of diesel used per year; calculations use diesel net calorific value of 43TJ/Gg, 0.846kg/litre density and Global Warming Potential (GWP) of 28 and 265 for CH_4 and N_2O respectively.
Plant mobile sources - on road	302	Approximately 0.1 ML of diesel used per year; calculations use diesel net calorific value of 43TJ/Gg, 0.846kg/litre density and Global Warming Potential (GWP) of 28 and 265 for CH_4 and N_2O respectively.
TOTAL	61,599	

5.5 Summary of Residual Impacts

A summary of the findings from the air quality impact assessment are outlined below.

1. Meteorology

a. Regional meteorology is characterised by low rainfall between October to April and lower temperatures during the same period (winter months). Lower rainfall generates conditions which are higher risk for air pollution.

b. The environment is relatively dry year-round, with consistently low humidity.

c. Wind speeds peak in April and again in November, with calmer conditions occurring in June/July and December/January. Calmer conditions create conditions which are higher risk conditions for air quality.

d. Winds prevail from the south-west and west throughout the year, indicating impacts are more likely to be experienced to the north-east and east of the operation where there are no known sensitive receptors.

2. Air quality

a. Mining operations (hauling, loading, crushing, drilling, blasting etc) are likely to contribute PM emissions to the airshed. Diesel generators and vehicles are likely to contribute NO_2, SO_2, CO and PM emissions to the airshed.

b. Air quality impacts from construction of the Project at the nearest winter herder camps are classed as Moderate.

c. Air quality impacts from construction of the Project at the accommodation camp are classed as Minor.

d. Air quality impacts from operation of the Project for the nearest winter camps are classed as Moderate.

e. Air quality impacts from operation of the Project at the accommodation camp, if the recommended separation distances are implemented between emission sources and receptor, are classed as Minor.

f. Air quality closure and decommissioning impacts from the Project for sensitive receptors within the area of influence are classed as Minor.

3. Greenhouse gas

a. The main sources of greenhouse gas emissions for the Project relate to the burning of fuel in mobile and stationary combustion engines, which are accounted for in Scope 1 emissions.

b. Energy will be generated on site for the Project therefore no Scope 2 emissions will be associated with the Project.

c. It is estimated that the Project will generate approximately 61,599 tonnes of CO_2 equivalent per annum at its maximum throughput. The emission intensity of the Project is estimated to be 102.7kg CO_2 equivalent per tonne of ROM mined.

6. SUMMARY OF MITIGATION AND MANAGEMENT METHODS

Table 15 presents a summary of impacts and mitigation measures.

Table 15 Summary of Impacts and Management: Climate and Air Quality

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
AQ01	Emission impacts from mining sources	Identified winter camps	X			a) Dust suppression on stockpiles, haul roads and wind erosion sources b) Use of extraction (e.g. baghouse or cyclone) for material sources such as crushing plant. c) Sprays on conveyors and plant equipment, with a focus on crushing and grinding equipment. d) Implementation of manufacturer recommended engine maintenance and repair programs for all plant and vehicles. e) Replacement of fuel filters, air filters and oil filters in accordance with manufacturers recommendations for diesel generators. f) Use of low sulphur fuels, where available. g) Enclose plant equipment where feasible. h) Implement blasting controls where mine blasting is likely to result in dust emissions that exceed Project standards.	Air Quality Management Plan	**Moderate Adverse**
AQ02	Emission impacts from boiler and diesel generators located near camp	Accommodation camp	X			a) Implementation of the recommended separation distance between camp and source. b) Use of low sulphur fuels, where available. c) Replacement of fuel filters, air filters and oil filters in accordance with manufacturers recommendations for diesel generators.	Air Quality Management Plan	**Minor Adverse**

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
AQ03	Emission impacts from mining sources	Identified winter camps		X		a) Dust suppression on stockpiles, haul roads and wind erosion sources b) Use of extraction (e.g. baghouse or cyclone) for material sources such as crushing plant. c) Sprays on conveyors and plant equipment, with a focus on crushing and grinding equipment. d) Implementation of manufacturer recommended engine maintenance and repair programs for all plant and vehicles. e) Replacement of fuel filters, air filters and oil filters in accordance with manufacturers recommendations for diesel generators. f) Use of low sulphur fuels, where available. g) Enclose plant equipment where feasible. h) Implement blasting controls where mine blasting is likely to result in dust emissions that exceed Project standards	Air Quality Management Plan	**Major Adverse**
AQ04	Emission impacts from boiler and diesel generators located near camp	Accommodation camps		X		a) Implementation of the recommended separation distance between camp and source. b) Use of low sulphur fuels, where available. c) Replacement of fuel filters, air filters and oil filters in accordance with manufacturers recommendations for diesel generators.	Air Quality Management Plan	**Minor Adverse (with separation distance)**
AQ05	Emission impacts from all sources	Identified winter camps and Accommodation camps			X	a) Dust suppression on stockpiles, haul roads and wind erosion sources b) Use of extraction (e.g. baghouse or cyclone) for material sources such as crushing plant. c) Sprays on conveyors and plant equipment, with a focus on crushing and grinding equipment.	Air Quality Management Plan	**Minor Adverse**

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						d) Implementation of manufacturer recommended engine maintenance and repair programs for all plant and vehicles. e) Replacement of fuel filters, air filters and oil filters in accordance with manufacturers recommendations for diesel generators. f) Use of low sulphur fuels, where available. g) Enclose plant equipment where feasible. h) Implement blasting controls where mine blasting is likely to result in dust emissions that exceed Project standards.		

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

C3: Noise and Vibration

April 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
KGP	Khundii Gold Project
MLA	Mineral Licenced Area
IWF	Integrated Waste Facility

3. NOISE AND VIBRATION

3.1 Introduction

The Khundiii Gold Project (KGP) Area of Influence (AoI) considered during the construction and operation phase covers 5 km buffer areas from the the Mineral Licenced Areas (MLA). This Chapter assesses potential noise and vibration impacts from the KGP to sensitive receptors within the AoI. Potential sensitive receptors that may be negatively impacted by an increase in ambient noise and vibration levels during the construction and operation are the mine site workers at the Project site, herder families temporarily camped close to the KGP sites.

The baseline noise and vibration levels and their sources have been identified in *Chapter B3: Noise and Vibration*. In this chapter the main noise and vibration sources related to the Project have been identified and their impacts assessed (i.e. mine and camp construction, operation of the open pit mine including blasting, processing plant activities, power station, etc.).

3.2 Policy, Standards and Lender Requirements

The standards applicable to the KGP have been defined in accordance with Mongolian national standards and Lender Requirements as outlined in *Chapter A2: Policy and Legal Framework*. The KGP is planned to adhere to the Project standards shown in Table 1. The following standards have been considered for noise and vibration standards for this study:

- IFC Environmental, Health, and Safety (EHS) Guidelines: Noise (2007);
- Mongolian Standard (MNS4585:2016);
- Technical Basis for Guidelines to Minimise Annoyances due to Blasting Overpressure and Ground Vibration. Australian and New Zealand Environmental Council (ANZEC, 1990); and
- Directive 2002/44/EC of the European Parliament and of the Council of 25 June 2002 on the Minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration) (sixteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Table 1 Recommended Noise and Vibration Standards for Khundii Gold Project

Impact	Receptor	Recommended Project Standards	Comments
Noise	Industrial/commercial (day and night-time)	85 dB(A) (8 hour average) 140 dB(C) (Peak/Instantaneous noise level)	Project Standard for all industrial noise levels at KGP based on IFC Environmental, Health, and Safety (EHS) Guidelines: Noise (2007)
	Residential (day-time)	55 dB(A) (16 hour average)	Noise level during 06:00-18:00 hours for workers camp and herders camp areas, based on IFC Environmental, Health, and Safety (EHS) Guidelines: Noise (2007).
	Residential (night-time)	45 dB(A) (8 hour average)	Noise level during 18:00-06:00 for workers camp and herders camp areas, based on IFC Environmental, Health, and Safety (EHS) Guidelines: Noise (2007)

Airblast Overpressure	Noise sensitive sites	115 dB with allowed exceedance on upto 5% of the total number of blasts for 12 months. No exceedance over 120 dB.	Recommended blasting time 9:00am-5:00pm based on *Technical Basis for Guidelines to Minimise Annoyances due to Blasting Overpressure and Ground Vibration* (ANZEC 1990)
Blast Ground Vibration	Vibration sensitive areas	5 mm/sec (peak particle velocity) on allowed upto 5% of the total number of blasts for 12 months. No exceedance over 10 mm/sec.	
Hand-arm vibration	Workers	0.5 m/s^2 for 8 hours	Based on EU Directive 2002/44/EC of the European Parliament and of the Council (2002)
Whole Body Vibration		1.15 m/s^2 for 8 hours	

There are no quantitative vibration thresholds set by Mongolian regulatory or Lender requirements. Therefore, vibration levels recommended by the *Technical Basis for Guidelines to Minimise Annoyances due to Blasting Overpressure and Ground Vibration* (Australian and New Zealand Environmental Council (ANZEC, 1990)), and EU Directive 2002/44/EC of the European Parliament and of the Council of 25 June 2002 on the Minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration) are recommended as a good industry practise threshold for vibration levels.

3.3 Assessment Methodology

3.3.1 Scope of Assessment

3.3.1.1 Geographical Scope

Sensitive receptors to noise and vibration impact are typically considered as sensitive business facilities (i.e. hospitals, nursing homes, audio studio etc.), residential areas (for example, permanent or seasonal residencies, campgrounds) and workers operating noise and vibration emitting equipment or working close the sources. There are no permanent residential or any other businesses around the KGP site due to its remote location. Six campsites located around the KGP that may be used occasionally by herders at temporary basis, temporary and permanent accommodation camps and mine site workers are identified as sensitive noise and vibration receptors for this study. Locations of the sensitive receptors are shown in Figure 1.

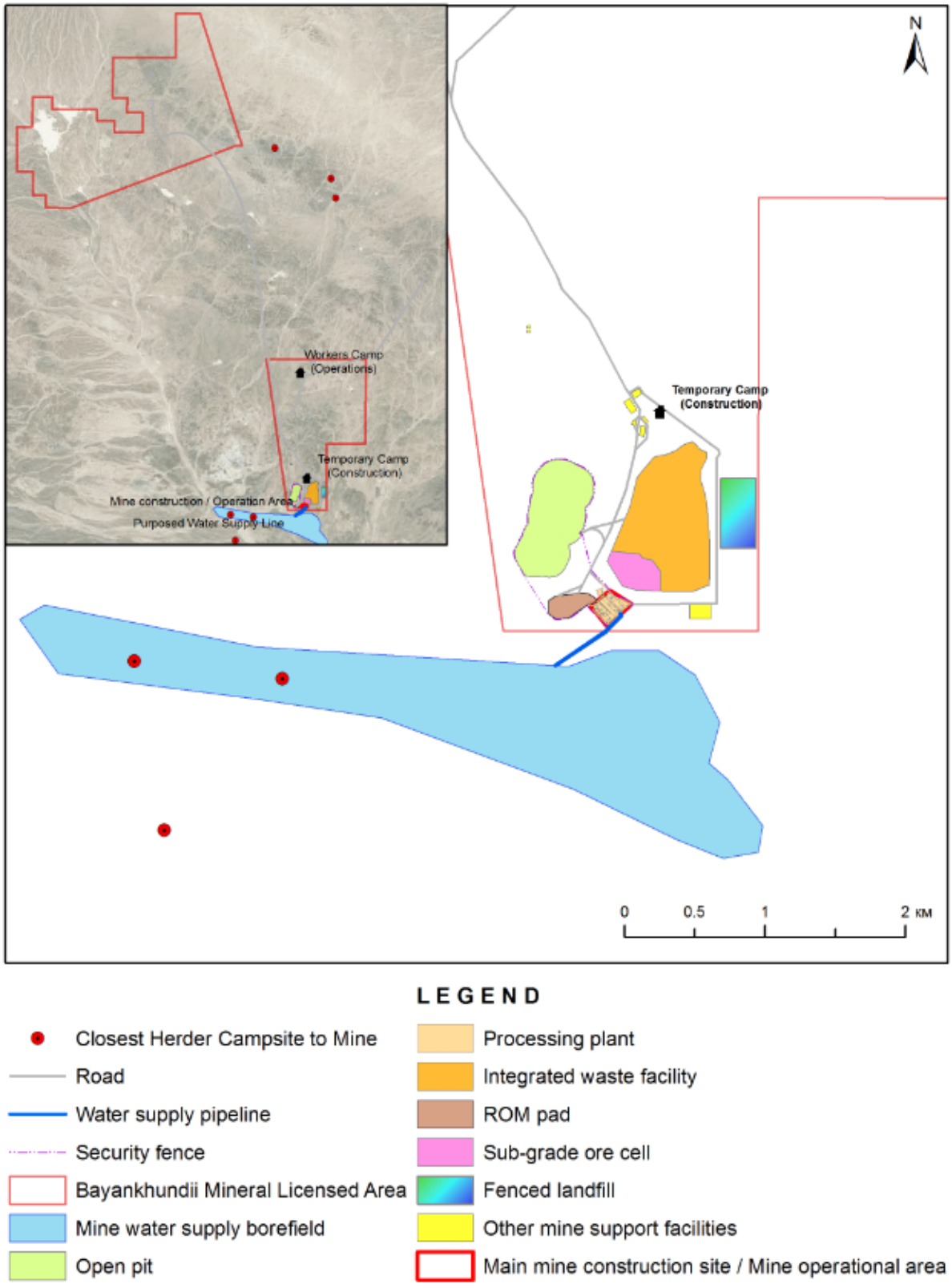


Figure 1 Sensitive Noise Receptors and Main Mine Construction and Operation Areas in Khundii MLA (Inset shows both Khundii and Tsenkher Nomin MLAs)

3.3.1.2 Temporal Scope

The temporal scope covers the construction, operation and closure phases of the KGP. After mine closure completed there will be no Project-generated noise and vibration.

3.1.1 Method of Assessment

The assessment of noise and vibration potential impacts during the construction phase has been undertaken based on the standard approach described in *Chapter A3: Methodology*, *Chapter C1: Introduction,* as well as guidance presented in British Standards Code of practice for noise and vibration control on construction and open sites (BS5228-1:2009).

BS5228-1:2009 provides recommendations for basic methods of noise and vibration control relating to construction and operating sites where work activities/operations generate significant noise and/or vibration levels. This standard provides guidance concerning methods of predicting and measuring noise and assessing its impact on those exposed to it. The assessment has focused on human-related receptors.

Simple noise attenuation calculations are used for estimating noise levels on sensitive receptors located various distances from the sources. The generic equation for adding noise levels is given below:

$$dBA = 10 \times log\left(10^{\frac{dBA_1}{10}} + 10^{\frac{dBA_2}{10}} + 10^{\frac{dBA_3}{10}} + \cdots + 10^{\frac{dBA_n}{10}}\right)$$

Where:

dBA – a total A-weighted sound level

dBA_1 – each individual source

As distance increases, noise level decreases according to the following formula:

$$L_2 = L_1 - 20 \times log\left({}^{R_2}/_{R_1}\right)$$

Where:

L2 – noise level at R2 distance from noise source

L1 – noise level at reference distance R1

Surrounding environmental parameters influence noise attenuation (e.g. air pressure, absorption and reflection by surfaces, etc.), but this assessment considered them as constant for simplicity.

The total number of mining equipment that potentially work simultaneously during the KGP construction and operation at any given time is estimated from the total equipment working hours on a quarterly basis. Noise levels for the construction and mining equipment are taken from reference sound levels for onsite equipment and activities (Annex C of British Standard BS5228-1:2009). Sound levels at different octave bands have been taken into account in the BS5228-1:2009 standard references, and are thus not considered separately for this assessment.

The KGP ESIA Baseline study confirmed no anthropogenic noise or vibration sources at the KGP site (Eco Trade, 2019). The natural background noise level driven by wind speed is highly variable and hard to predict due to other natural factors, such as ground surface and vegetation height and density.

3.4 Potential Impacts

3.4.1 Sensitive Receptors

Receptor sensitivity is determined according to the potential receptor's ability to adapt to the change in conditions and recover after exposed to noise and vibration impacts. Receptors, such as residential areas, hospitals and nursing homes, and recording studios are therefore usually considered as the most noise sensitive receptors.

KGP noise impact receptors determined in this assessment are described in Table 2.

Table 2. Noise and Vibration Receptor Sensitivity Criteria

Receptor Sensitivity	Type of Receptor
High	• No High sensitivity receptors are identified
Medium	• Herders potential winter campsite 1.6 km south west of the Khundii MLA. The campsite is potentially used temporarily depending on the seasonal pasture availability, but not continuously inhabited • KGP Workers' Temporary and Permanent Camps, 1.3 and 5 km, respectively, from the main mine Construction / Operation site
Low	• All other receptors not included above

3.4.2 Magnitude of Impact Criteria

This assessment used the British Standard 4142 (2014) guidance for industrial noise levels affecting mixed residential and industrial areas for determining the noise impact magnitude (see **Error! Reference source not found.**) in relation to the Project standards discussed in Section 3 .2.

Table 3 Magnitude of Noise and Vibration Impact Criteria

Magnitude of Impact	Type of Impact
High	• >10 dB(A) above the applicable noise limits
Medium	• 3 to 10 dB(A) above the applicable noise limits
Low	• 1 to 3 dB(A) above the applicable noise limits
Very Low	• below or up to the applicable noise limits

Source: British Standards Institution 4142 2014 (Amended 2019)

3.4.3 Construction Phase Noise Levels Estimate

During the KGP construction phase key mine and mine support infrastructures (i.e. ore processing plant, workers camp, offices, water supply pump stations and pipelines, warehouses and workshops etc.) will be built at the Khundii MLA with heavy construction machineries use.

The total noise level from simultaneous use of multiple construction equipment is estimated by adding reference noise levels of individual machinery based on their indicated power rating (in kW). The list of the expected construction machinery and their individual and combined noise levels are shown in Table 4.

Table 4 Estimated Construction Site Noise Level

Description	Sound Power Level dB (A) at 10 m From Source
Wheeled Crane (70 tn)	70
Dozer (310 kW)	85
Excavators (wheeled 75 kW)	71
Roller Compactor (20 kW)	73
Total	**85.5***

*Note: *Based on the assumption that all construction equipment works concurrently within close range to each other. British Standards BS5228-1:2009 Reference Values Used for individual equipment noise levels in dB(A).*

The total noise level of about 85.5 dB(A) is estimated based on conservative assumption that all five equipment simultaneously work at the mine construction site within close distance to each other. The likelihood of this situation happening at the construction site is very low.

3.4.4 Operation Phase Noise Level Estimate

Open pit mine, ore and waste rock handling at the ROM, integrated waste facility (IWF) and ore processing plant, and diesel power generators will be the main noise source areas during the KGP operation.

The main noise emitting sources of the ore processing plant include ore loading hopper, crusher, ore conveyer and ore milling. The main noise emitting equipment at KGP i.e. the ore crusher unit and the SAG and ball ore milling units, are located about 80 m apart within the ore processing plant. All process plant mechanical equipment, except the crushers, will be contained within several buildings and the ore conveyer system will be enclosed. The crushers are located in between the mine ROM and enclosed conveyer system. In addition to the enclosure around the noise emitting equipment, the entire ore processing plant area will be surrounded by other buildings and mine facilities in the south-west and north-east, ROM in the west, and integrated waste facility in the north-east. Noise propagation from the processing plant will be influenced by the above facilities functioning as sound barriers. Therefore, this assessment did not attempt to estimate the noise propagation from the ore processing plant area at this time.

All other operational phase noise sources in open environment i.e. open pit, integrated waste facility and diesel power stations are considered for this assessment. Estimated noise levels from other mining facilities are provided in Table 5.

Table 5 Estimated Operational Noise Levels

Description	Reference Sound Power Level dB(A) at 10 m
Open Pit Mining Operation	
Ore loader (311 kW)	77
Waste loader (606 kW)	86
Ore truck (365 kW)	83
Waste truck (509 kW)	90
Total	**92***

Integrated Waste Facility Area	
Dozer	85
Waste truck (509 kW)	90
Total	**91***
ROM Area	
Dozer	85
Ore truck (365 kW)	83
Total	**87***
Diesel Power Generators	
KTA50 x 6 Units at Mine site	**87***
KTA50 x 2 Units at Workers Camp site	**82***

*Note: *Based on the assumption that all construction equipment works concurrently within close range to each other. British Standards BS5228-1:2009 provided reference values used for individual equipment noise levels. Different octave band pressures considered in the BS5228-1:2009 standard.*

In this assessment the following are scoped out:

- The Project has been designed to use the unpaved road between the Bayan Khundii site and Shinejinst soum, which will be spot repaired and used for the main supply road during operation. Since there is no major construction work related with the road, it is not considered that repair of the access road will cause significant noise and vibration impacts;
- Construction-related vibration has also been scoped out as blasting will only be used on an exceptional basis during construction; and
- Operation of the powerline, water transmission, wastewater treatment plant, coal-fired heat only boilers, warehouses, workers accommodation camps and mining offices are scoped out as there are no significant identified noise and vibration impacts associated with their operations.

3.5 Assessment of Residual Impact

3.5.1 Construction Phase

3.5.1.1 Impacts to herder households

The combined noise level of 85.5 dB(A) at the main construction site will be decreased to 45 (night-time standard) and 55 dB(A) (day-time standard) levels at 950 and 300 meters, respectively, from the source. Figure 2 and Figure 3 provided as an example of noise level decrease estimate methods introduced in Section 3.1.1.

As the closest temporary herder camp site is located about 2.25 km away from the active construction site, it is concluded that the mine construction noise levels will not exceed the Project standards at the sensitive receptors.

Construction of the proposed water supply stations and pipelines will involve digging a trench of an estimated 1.5 m depth and refilling the trench after laying the PVC water pipes. The pipeline construction work may occur at a closer distance to the identified temporary herders camp sites;

however, it is not likely to cause significant noise level impacts due to the limited activities and temporary nature of the work with a potential duration of up to 1-3 weeks. The proposed water pipeline construction area is relatively flat with soft soil along the valleys, limiting the need of earthworks and heavy earth moving and trenching equipment. In addition to the temporary nature of the construction work, the herder camp sites lack any permanent or non-permanent structures and are not continuously occupied by nomadic herders. Therefore, it is concluded that the water supply pipeline construction noise will not impact the herder camp site residents even if the camps are occupied during the temporary construction work.

The KGP construction noise impact magnitude to the herders' camp site is, therefore, considered to be very low (below applicable noise limits) with **negligible** impacts to the receptors. Thus, no specific mitigation measures are recommended to reduce noise levels at the herder camp sites.

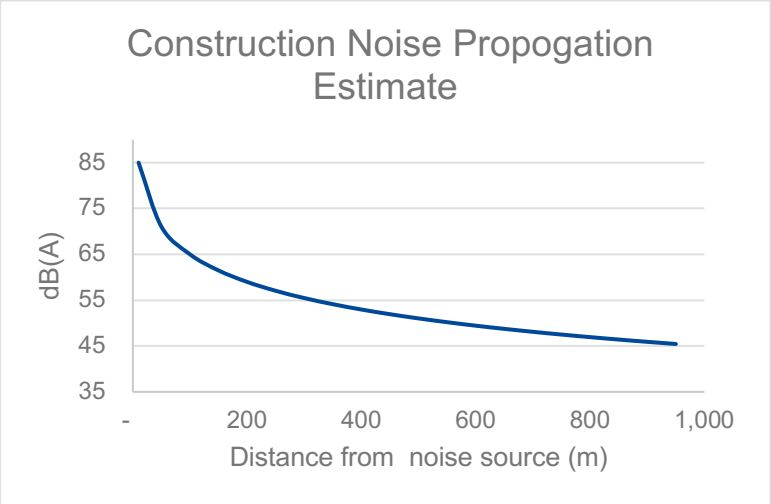
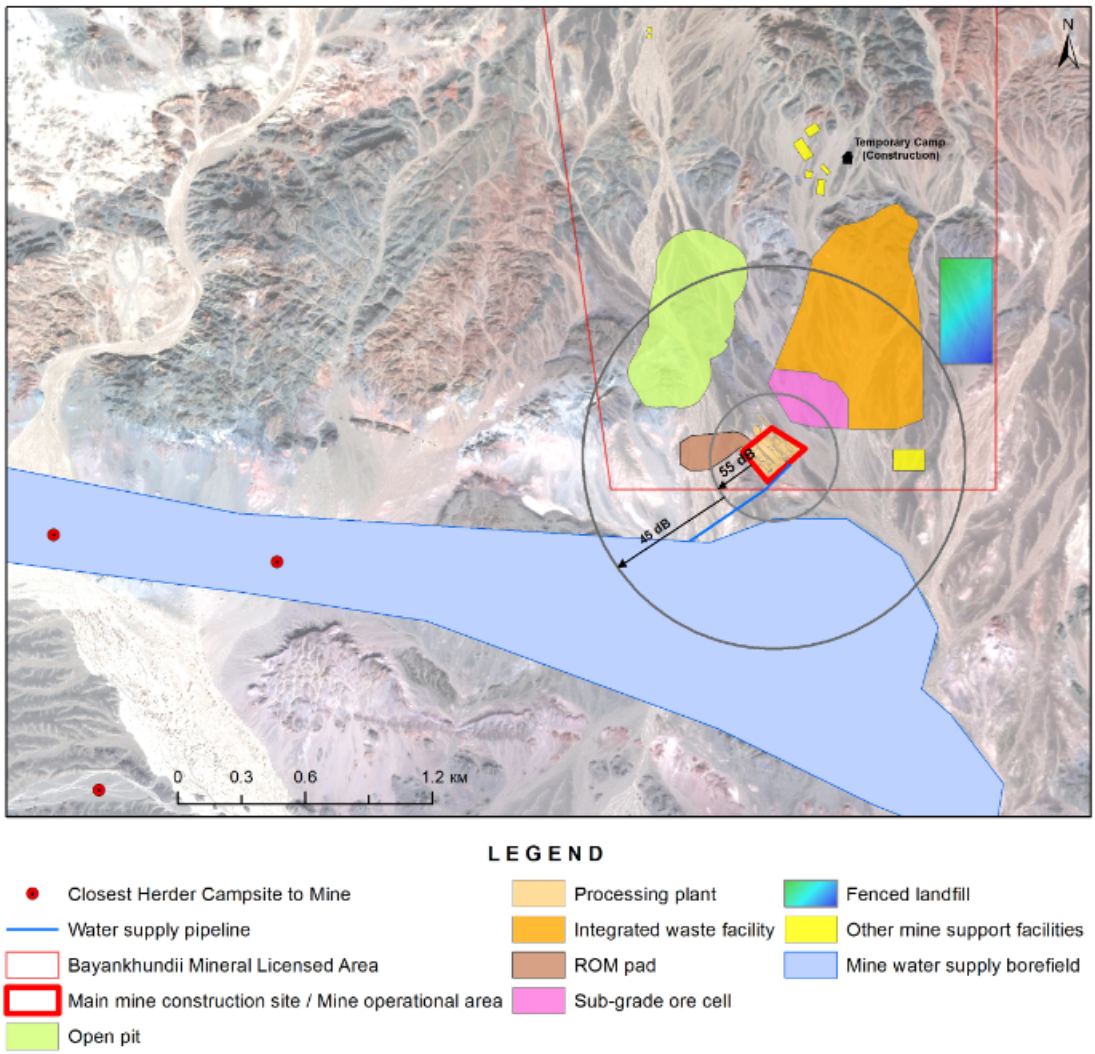


Figure 2. Construction Phase Sound Propagation Calculation



Note: This assessment did not consider the environmental factors affecting noise propagation

Figure 3 Construction Activities Noise Level Propagation

3.5.1.2 Impacts to Workers

The temporary workers camp to be used during the initial phase of construction is located about 1.3 km north of the main construction site at Khundii MLA, therefore, it is considered that the construction phase noise levels will not exceed the Project standards at the workers camp site.

On the other hand, the construction site machinery noise levels expected to produce more than 85 dB (A) within 10 meters range from the equipment when all equipment works simultaneously as conservatively estimated. Workers within the construction site may be temporary exposed to Low to Medium magnitude noise impacts.

Mitigation Measures

Recommended noise mitigation measures at the KGP construction site are listed below:

- Schedule the construction activities to minimise the number of heavy construction and earth moving equipment that need to work simultaneously;
- Select equipment with noise abatement technology, where feasible;

- Regular maintenance of construction equipment to the manufacturer's specifications;
- Restrict unnecessary engine idling of equipment and vehicles;
- Only authorised employees to work in the high noise level generating work areas;
- Place warning signs for all high noise level emitting equipment and work areas, and provide suitable PPE prior to entering the areas or using the equipment;
- Provide workers with suitable PPE that reduces the noise level to the Project standard;
- Monitor construction site noise levels periodically and adjust, as suited, working hours of site workers to minimise exposure to noise levels exceeding the Project standard.

With above mitigation measures in place and implemented, the overall noise impacts to the construction site workers are considered to be **negligible**.

3.5.2 Impact Assessment - Operation Phase

3.5.2.1 Open Pit Noise Impacts to Herder Households and Workers Camp

It is estimated that the combined noise level of 92 dB(A) from the open pit mining will be decreased to the Project night-time standard of 45 dB(A) at around 2,150 m from the open pit, whereas the day-time noise threshold 55 dB(A) will be contained within 750 m from the open pit area. Thus, noise levels from the open pit could potentially be close to the Project night time standard at the closest herder camp site (i.e. 2.250 m away) when the open pit operation starts. However, when the pit depth deepens more than the noise emitting equipment height, the pit walls will act as sound barrier reducing noise propagation outside of the pit. The Khundii MLA open pit dimension are 145 m (depth) by 400 m by 850 m. The small hills located 150-350 m south-west of the open pit are about 15 m higher than the open pit surface level (Figure 4). These hills will act as natural barrier for the open pit noise propagation to the south-west direction. Therefore, it is not expected that the open pit noise levels generate significant noise level increase to the surrounding environment when the pit development progresses. Based on these, it is considered that the open pit noise impact magnitude to the herders camp site will be very low (below applicable noise limits) with negligible residual impact.

KGP plans to construct and operate two pump stations located south-west (West Pump Station) and south (East Pump Station). Each pump stations will have a small generator and water pump with approximately 4 kW and 2.2 kW respective power ratings to supply the modest mine water demand of 6-7 L/s. Combined noise level of the equipment will be about 67 dB(A) at the pump stations when the generator and pump noise levels are estimated to be 65 dB (corresponds to 20 kW pump) and 61 dB (corresponds to 6.5 kW generator). With the conservative estimate above, the total noise levels at the temporary herder household camps will be about 33 dB from the West Pump Station, which is about 500 m from the closest camp sites (Figure 3), while the East Pump Station noise levels will not be significant given the longer distance and station's secluded location within a valley. In addition, both pumps stations will be enclosed in pump station buildings. Therefore, it is concluded here that the borefield operational noise levels will not impact the camp sites.



Figure 4 Location of the Hills South-West of the Open Pit at Khundii

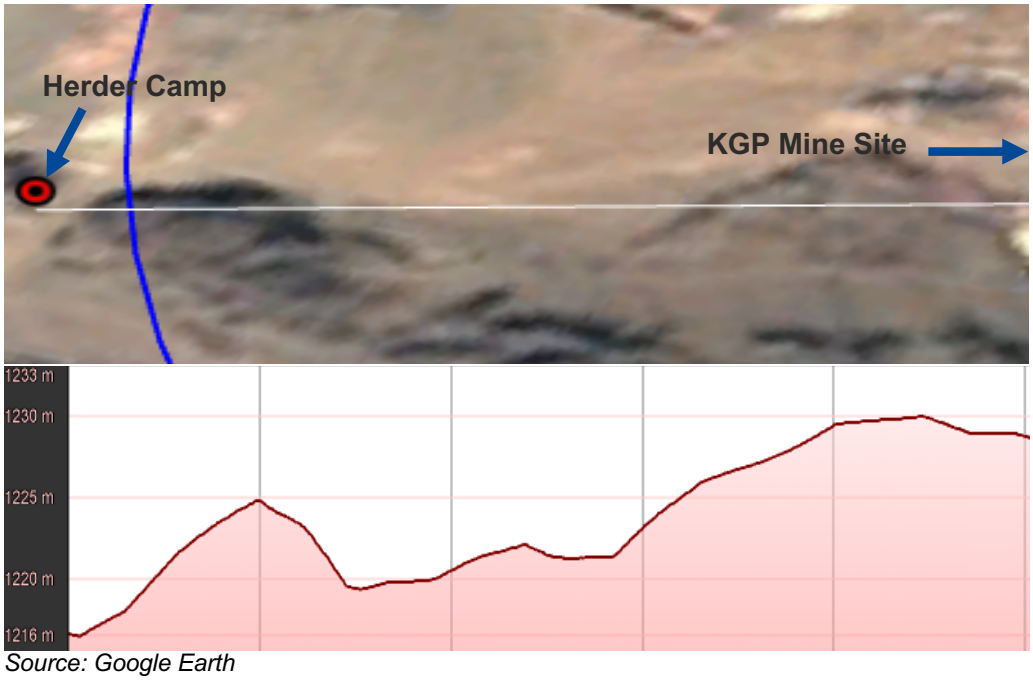
Estimated KGP operational phase noise levels to the closest herder's camp site and permanent workers accommodation area are shown in Table 6.

Table 6 Estimated Noise Levels at Herders Camp Site Area and Workers Accommodation

Noise Sources	Noise Levels dB (A) at Herders Camp Site	Noise Levels dB(A) at Permanent Workers Accommodation Camp
Integrated Waste Facility	42	NA
Mine ROM	41	NA
Diesel power station at mine site (6 Units)	34	NA
Diesel power station at workers camp (2 Units)	NA	47
Combined Noise Levels	**44.9**	**47**

The combined noise level from the main noise emitters at the herder's closest winter camp area may be close to the Project night time standard of 45 dB(A) without considering the surface elevation as sound barrier. In reality, the small hills (see Figure 5) located about 200 m from the herders camp to the KGP mine site in the north-east direction will likely shield the mine site noise propagation. In addition, south-westerly wind dominates in this area potentially reducing the noise

levels from the mine site at the herder camp areas. This assessment concludes that the total mine site noise impact to the temporary herder camp site will not exceed the Project standard, thus the residual impact will be **negligible.**



Source: Google Earth

Figure 5 Surface Elevation Changes Along the Lines Between the Herders Campsite to the Khundii Mine Site

The closest temporary herder camp site at Altan Nar site is 5 km east of the planned mine site with open pits and IWF. Therefore, it is assessed that the camp site will not be subjected to noise impacts from the Altan Nar site development.

3.5.2.2 Impacts to Workers Camp Residents

The KGP workers camp site is located about 5 km away from the mine area where the operation phase main noise sources are concentrated, thus no additional noise impacts are predicted (see Table 6).

The containerised two diesel power generators located at 375 m north east of the workers camp site will produce a combined noise level of 47 dB at the camp site, which is 2 dB higher than the Project night time noise levels at workers accommodation. However, the noise level within the sleeping quarters is expected to be even less due to the noise shield effects of the camp accommodations and the generator enclosures. Further, a natural hill feature directly north of the permanent camp site is expected to provide separation and sound buffer between the power station and camp. Therefore, the total noise level impact magnitude is considered very low (below the Project standard) with **negligible** residual impacts.

3.5.2.3 Impacts to Construction Site Workers

Measured noise levels at various mine sites exceeded the 85 dB(A) in some parts of the mine areas such as heavy earth moving machineries, belt conveyer, crusher working areas and close proximity loaded trucks (Deshmukh et al. 2018; Engel and Kosala 2007). The KGP operational

phase heavy mining equipment, for example, the waste loader, waste truck and dozers will likely produce noise levels higher than the Project standard (see Table 5) in their close proximity. However, the noise exceedance over the standard is subject to the length of the exposure time to high noise levels. For example, exceedance triggers if a worker needed to continuously work in an environment with more than 85 dB(A) noise level over 8 hours without any noise Personal Protective Equipment (PPE) use.

This assessment, based on the above, considers workers in some areas of the KGP operational site will be subjected to Low to Medium magnitude noise impacts.

Mitigation measures

The following mitigation measures can be implemented to reduce the general noise level during KGP mine operation:

- Optimise, if possible, the number of heavy earth moving equipment to reduce the resultant total noise levels;
- Select equipment with noise abatement technology, where feasible;
- Regular maintenance of equipment to the manufacturer's specifications;
- Erect, where required and feasible, noise shields around high noise generating equipment;
- Restrict unnecessary engine idling of equipment and vehicles;
- Place warning signs for all high noise level emitting equipment and work areas, and provide suitable PPE prior to entering the areas or using the equipment;
- Provide workers with suitable PPE that reduces the noise level to the Project standard;
- Monitor noise and vibration levels periodically and adjust, as suited, working hours of site workers to minimise exposure to noise levels exceeding the Project standard; and
- Use a grievance procedure to record and respond to any complaints in relation to noise emissions and conduct follow up actions.

With the above noise mitigation measures in place and implemented, it is considered that the residual noise impacts will be **negligible.**

3.5.2.4 Noise impacts from transportation

Ore and waste transportation will occur via ore and waste trucks with 83-90 dB (A) noise levels. The planned transport trucks (CAT740B, CAT773D) are anticipated to have interior noise levels between 70 and 74 dB(A) with the doors and windows closed with no impacts to the operators. There are no sensitive noise receptors along the haul road, thus no impacts are expected from the haul road at both Altan Nar and Khundii MLAs.

3.5.2.5 Vibration impacts

The KGP will carry out limited blasting with up to three times a week during peak operation. Noise levels from the blasting may be over the project standards, but it is unlikely to exceed the thresholds due to the short nature of the event. Thus, no significant impacts are expected from the blasting activities provided all other safety measures are in place.

Workers operating heavy machinery and hand equipment such as compacters are likely to experience vibration impacts. Excessive exposure to vibration impacts could cause health impacts to workers through joint and muscle stiffness, changes in the balance and vision and other types of injury. There are no quantitative vibration thresholds specified for vibration impacts in Mongolia or in the EBRD's Performance Requirements. Therefore, no specific recommendations has been proposed for the KGP. Generic recommendations for reducing potential vibration impacts include:

- Select equipment with vibration abatement technology, where feasible;
- Regular maintenance of construction equipment to the manufacturer's specifications;
- Place warning signs for all high vibration emitting equipment and work areas, and provide suitable PPE prior to entering the areas or using the equipment;
- Monitor vibration levels at sensitive areas and vibrating equipment, as applicable, and adjust, as suited, working hours workers to minimise exposure to vibration levels exceeding the recommended Project standard.
- Apply a dampening base to larger stationary vibrating equipment or areas, where feasible;
- Notify workers about the blasting schedule; and
- Use a grievance procedure to record and respond to any complaints in relation to vibration and conduct follow up actions.

3.5.3 Closure and Decommissioning

Potential high level noise sources during the closure period include non-heavy trucks for transportation of decommissioned equipment and demolition of some above ground installations. These activities will be temporary in nature, thus no significant noise impacts are expected during this period. It is anticipated that KGP detailed Mine Closure Management Plan will be developed three years prior to the decommissioning providing detailed management actions related to health and safety.

3.6 Summary of Residual Impacts

Table 7 presents a summary of the potential residual impacts and proposed mitigation measures for the KGP.

Table 7: Summary of Noise and Vibration Residual Impacts

ID	Impact	Receptor	Phase			Specific Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Construction	Operation	Closure			
NV 01	Project Standard exceeding noise levels at KGP construction sites	Construction Workers	x	x		• Schedule the construction activities to minimise the number of heavy construction and earth moving equipment that need to work simultaneously; • Select equipment with noise and vibration abatement technology, where possible; • Regular maintenance of construction equipment to the manufacturer's specifications; • Restrict unnecessary engine idling of equipment and vehicles; • Only authorised employees to work in the high noise level generating work areas; • Place warning signs for all high level of noise and vibration emitting equipment and work areas, and provide suitable PPE prior to entering the areas or using the equipment; • Provide workers with suitable PPE that reduces the noise level to the Project standard; and • Monitor work places with high level of noise and vibration sources periodically and adjust, as suited, working hours of site workers to minimise exposure to noise and recommended vibration levels exceeding the Project standard.	Noise and Vibration Management Plan	**Negligible**
NV 02	Project standard exceeding noise levels at KGP operational areas					• Optimise, if possible, the number of heavy earth moving equipment to reduce the resultant total noise levels; • Select equipment with noise and vibration abatement technology, where possible;	Noise and Vibration Management Plan Community HSE Management Plan	**Negligible**

ID	Impact	Receptor	Phase			Specific Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Construction	Operation	Closure			
						• Regular maintenance of equipment to the manufacturer's specifications; • Erect, where required and feasible, noise shields around high noise generating equipment; • Restrict unnecessary engine idling of equipment and vehicles; • Put warning signs for all high noise level emitting equipment and work areas, and provide suitable PPE prior to entering the areas or using the equipment; • Apply a dampening base to larger stationary equipment or areas with high vibration, where feasible; • Notify community member and workers on blasting schedule • Provide workers with suitable PPE that reduces the noise level to the Project standard; • Monitor noise and vibration levels in periodically and adjust, as suited, working hours of site workers to minimise exposure to noise levels or recommended vibration levels exceeding the Project standard; and • Use a grievance procedure to record and respond to any complaints in relation to noise and vibration emissions and conduct follow up actions.		

3.7 References

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

C4: Topography, Landscape, Geology, Soils and Seismicity

April 2020

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

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Acronyms and Abbreviations

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Acronyms and Abbreviations

ESIA	Environmental and Social Impact Assessment
EPRP	Emergency Preparation and Response Plan
IFC	International Finance Corporation
KGP	Khundii Gold Project
LDP	Land Disturbance Permit
TMP	Transport Management Plan
WMP	Waste Management Plan

Glossary

aimag	The Provincial unit of administration in the territory of Mongolia
soum	Sub-province area; The second level of administration in the territory of Mongolia
bagh	Sub-division of soum; The third level of administration in the territory of Mongolia

5. TOPOGRAPHY, LANDSCAPE, GEOLOGY, SOILS AND SEISMICITY

5.1 Introduction

This Chapter of the Khundii Gold Project (Project) Environmental and Social Impact Assessment (ESIA) considers the potential environmental impacts related to the local topography, landscape, geology, soils and seismicity which could result from the construction, operation and decommissioning phases of the Project.

The impact assessment has been carried out using the project-based methodology set out earlier in this ESIA document. This Chapter summarises sources of potential impacts, assesses residual impacts and identifies the receptors of these impacts including those which may be classified as sensitive.

Specific measures that will be implemented throughout the construction, operation and decommissioning phases to avoid adverse impacts are also described. The Chapter outlines the management measures required to avoid, mitigate, rehabilitate, or compensate for those impacts which have been identified as unavoidable.

For the purposes of defining impacts, the KGP Project Area includes:

- the Bayan Khundii and Altan Nar sites;
- newly constructed and upgraded roads; and
- borrow pits to support construction.

5.2 Significance Criteria

Receptor sensitivity varies according to the type, condition, and ability of the receptor to adapt to the change in conditions. For potential impacts on topography, landscape, geology, soils and seismic receptors, the importance of the receptors is described in Table 1. The magnitude of the impacts has been identified based on the permanence of the impact on a receptor. These criteria are provided in Table 2.

Table 1 Topography, Landscape, Geology and Soils Receptor Sensitivity Criteria

Receptor Sensitivity	Type of Receptor
High	• Topsoil resources within herder grazing areas or near herder wells • Topsoil that supports critical habitats, priority ecosystem services or priority species
Medium	• Other topsoils • Visual impact of views to the Project site to herders and local road users
Low	• Project site topography • Ephemeral stream bed landscape features • Desert Plain landscape features

Table 2 Magnitude of Topography, Landscape, Geology and Soils Impact Criteria

Impact Magnitude	Type of Impact
Beneficial	• Advantageous or positive effect to a resource or receptor
Very Low	• Short-term degradation or alteration to a resource/receptor (less than five years)
Low	• Temporary (less than the lifetime of the Project) degradation or alteration to a resource/receptor
Medium	• Temporary (lifetime of the Project, inclusive of closure and post-closure monitoring, as applicable) degradation or alteration to a resource/receptor
High	• Permanent degradation or alteration to a resource/receptor

5.3 Potential Impacts

5.3.1 Introduction

The potential impacts of the KGP are based on an appraisal of baseline information, sensitivities and conditions, as well as the current understanding of the construction, operations and decommissioning activities. The key sensitive receptors are, as follows:

- soils that support pasture or priority ecological values
- residents, herders and their animals.

5.3.2 Soil Disturbance

Construction activities will result in some impacts to, and loss of, soil resources. Topsoils in the area are sparse. Disturbance during construction will result in exposure of sub-soils to wind erosion, reducing organic and nutrient content and leading to the loss of soil structure. This in turn could impact on the pasture available to herders.

In addition, soils that are replaced after restoration are often less stable and have reduced structure with potentially lower value. Any restoration post-construction must be undertaken carefully and in accordance with a robust land disturbance and rehabilitation procedure.

Topsoils from the footprint of the permanent infrastructure within the Project will be stripped and stockpiled, where possible, for re-use in rehabilitation and site restoration. Soil structure beneath the permanent infrastructure and buildings will be lost for the duration of the project.

During operations, there may also be ongoing disturbance from vehicle movements to the surface soils of unsealed roads.

5.3.3 Soil Contamination

There is potential for soil contamination during the construction, operation and decommissioning of the Project as a result of:

- unintended run-off from the Integrated Waste Facility;
- accidental spills and leaks of chemicals, fuel or oil;
- inappropriate storage of hazardous materials;
- deposition of waste into the on-site landfill;

- poorly maintained vehicles; and
- deposition of dust from ore and waste stockpiles.

In addition to these potentially contaminating activities, naturally occurring high levels of arsenic and heavy metals have been found in soil samples from the Project Site. Arsenic, copper and molybdenum content in three samples were above the permissible level stated in the national standard for pollutant content in sandy soil, MNS 5850:2008 (Soil quality. Permissible level of soil pollutants).

5.3.4 Topographical Changes

The Integrated Waste Facility (IWF) will present the most significant topographical change resulting from the KGP. The IWF could potentially reach a height of 150m and would be visible to herder groups and other road users.

Open pit voids are likely to be another topographical impact. Changes to topography may impact site drainage, possibly impacting ecology and water supplies in the long term.

Minor topographical changes will occur due to site levelling and earthworks. Post construction, site levelling and clearance will be completed. Borrow areas will be recontoured and rehabilitated once construction is completed.

5.3.5 Geology

The mine will bring extracted material to the surface where it can oxidise and potentially form acid drainage. This is a natural process whereby sulphuric acid is produced when sulphides in rocks are exposed to air and water. The risk of potential acid generation appears very low for the Bayan Khundii deposit and low to medium for the Altan Nar deposit. However, the proponent should develop and implement Acid Rock Drainage Management Plan to mitigate any potential impacts. *Chapter C7: Waste* documents further details of the assessment and management of mining waste.

Foundations and sub-surface structures have the potential to impact local geology through excavation. However, such impacts are likely to be minimal. The geology is complex but overall, the sensitivity of the geology in environmental terms is low in relation to the construction and development of the Project Site.

5.3.6 Landscape

There is potential for seasonal nomadic herders and road users to be subject to landscape impacts during the construction, operation and decommissioning of the Project as a result of the introduction of an operational Gold mine and most significantly, the mine site waste stockpile, which may reach a height of up to 150m. Additionally, the mine voids may also create an impact to herders and road users.

5.3.7 Seismicity

According to the MSK-64 macro seismic intensity scale, the KGP survey area belongs to the 8-scale seismic zone with frequency of this standard of seismic activity occurring once in 10,000 years. The seismic hazard and risks across eastern Mongolia and the KGP Site are relatively low. Mitigation of seismicity risks will be managed through the design process.

5.4 Assessment of Impacts

5.4.1 Introduction

This section considers the impacts associated with construction and operation of the Project and establishes the mitigation measures that are required to reduce the magnitude of the potential impacts to acceptable levels. The residual impact significance, following the implementation of mitigation measures, is presented in Section 5.5.

5.4.2 Construction

5.4.2.1 Soil Disturbance

Topsoils are a sensitive receptor generally and more specifically, the topsoil resources within herder grazing areas and near herder wells are highly sensitive. General construction activities, including vehicle movements, stormwater management and earthworks, have the potential to cause soil erosion.

In relative terms, the area affected by construction disturbance is small. The area amounts to a maximum of 6% of the entire lease area. The area of permanent loss of topsoil is about 2% of the lease area. If this disturbance is considered in the context of the *bagh* or *soum* or *aimag,* then the relativity is more insignificant.

Subject to the implementation of the relevant plans and procedures, as set out in Section 5.5.1, the residual impact significance associated with construction are **Minor Adverse.**

5.4.2.2 Soil Contamination

There is potential for soil contamination to occur throughout the construction phase, primarily through accidental spills or release of fuel and/or oil from vehicles and other construction/mobile equipment and temporary storage of hazardous materials.

Topsoils are a sensitive receptor and have been classified as highly sensitive. Key locations where soil contamination is of increased importance include areas used by local herders, especially those areas in connectivity with grazing activities.

Figure 1 below shows the location of winter herder camps between Shinejinst and the KGP. As can be seen in the Figure, the potential for interaction of contaminated soil with herder activities is minimal.

The residual impact significance is **Minor Adverse**.

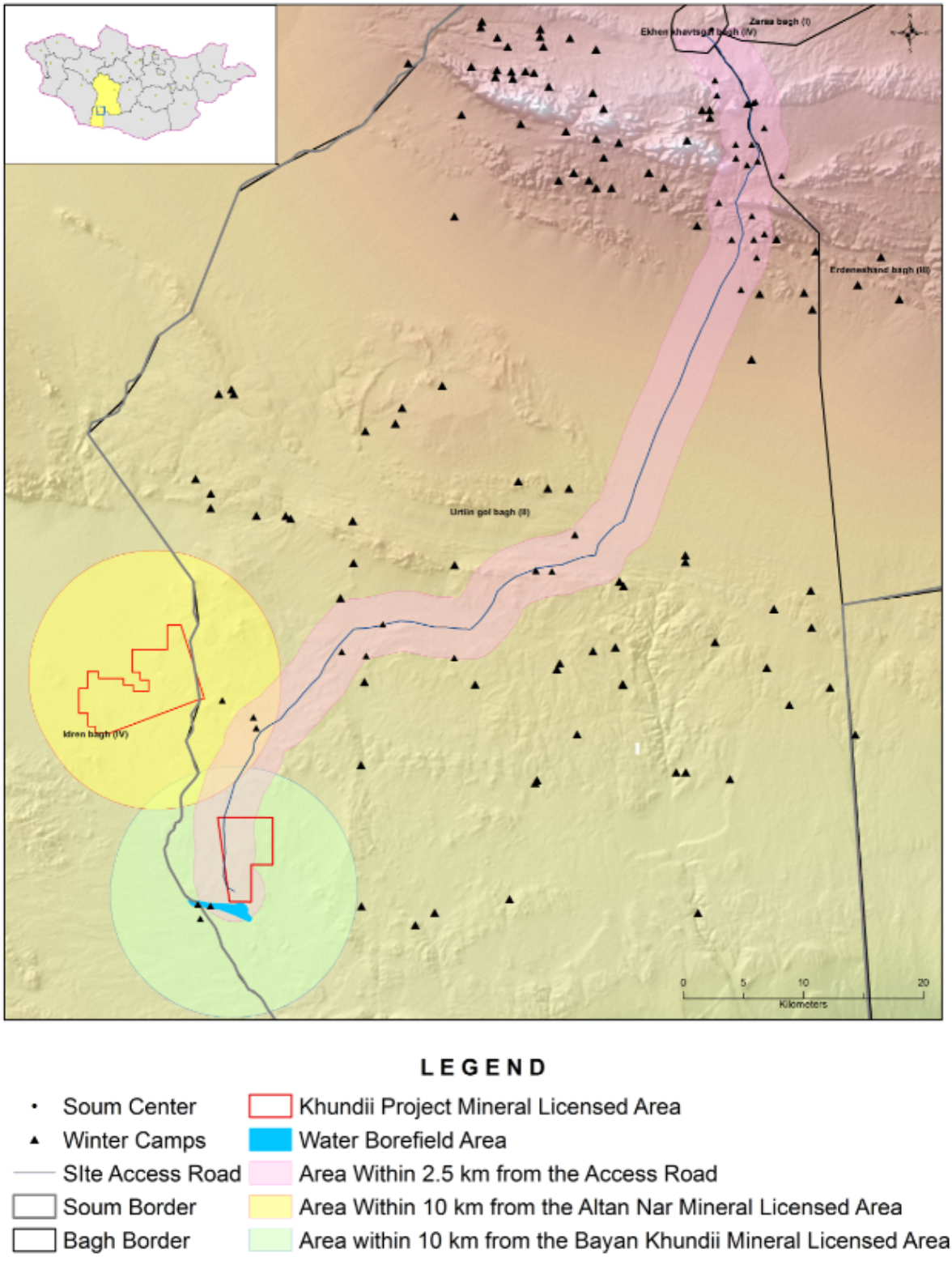

Figure 1 Winter Herder Camps

5.4.2.3 Topographical Changes

Site levelling and earthworks will be required to create uniform, levelled platforms for the above-ground structures for the Site.

Construction materials will be sourced from borrow pits which will be subject to rehabilitation and recontouring in accordance with Land Disturbance Procedure (LDP) and associated regulatory permits, some of which are expected to be derived from mine waste.

Possible changes to surface streams brought about by construction, including earthworks and excavation, could affect vegetation through alteration of water pathways.

Overall, the receptor sensitivity to the topographic changes is low. Any change to topography will be of short duration (less than 5 years) apart from changes associated with permanent earthworks. These, however, are likely to be small in extent and the magnitude of the impact is very low.

The residual impact significance of the topographical change associated with the construction is **Negligible**.

5.4.2.4 Landscape

As construction progresses, the landscape character of the Site will progressively shift from a desert landscape to an operational Gold mine. The construction phase will initially be characterised by loss of vegetation cover, the presence of construction equipment, vehicle movements and associated construction/development activities. The greatest potential for landscape impacts during construction will therefore be during the peak construction period.

The key views during construction will be from the topographical high points in the area with views across the Project from the access road looking south. These views are considered to have low receptor sensitivity due to the isolation of the site and infrequent use.

Construction will affect views for approximately one year. Given it is a short-term effect, the impacts on herders and residents is low.

The residual impact significance associated with landscape features and views during construction is therefore considered to be **Negligible.**

5.4.3 Operation

5.4.3.1 Soil Disturbance

Soil disturbance during operation may occur as a result of maintenance activities, especially along unsealed roads. Soils may also be impacted as a result of unauthorised access to previously undisturbed land and vehicular movements around the site.

Transport of operational materials is very modest and will occur on designated routes. Drivers will be prohibited from off-road driving and required to use designated pull-outs to avoid soil disturbance. Erdene has already initiated a process of traffic control during its seasonal exploration activities at the site. Local community consultation may include education on the sensitivity of the local environment and issues associated with off-road driving

Taking into consideration the measures embedded into the design and good practise in the relevant management plans, disturbance to soils is likely to be of short duration and less than five years. The magnitude of the impact is therefore considered to be very low.

Using the worst-case scenario of topsoils in key sensitive areas, the residual significance of the impact during operation is **Minor Adverse.**

5.4.3.2 Soil Contamination

Spills and Leakages

Soil contamination during operation of the Project may occur through spills and leaks of chemicals, reagents (e.g. sodium cyanide), fuel or oil, and the storage and deposition of hazardous and non-hazardous waste. To prevent direct spills or releases to soil, all chemical and fuel storage tanks as well as diesel generators and other equipment will have appropriate secondary containment as per the Hazardous Materials Management Plan.

Non-mineral waste will be deposited in an on-site engineered landfill designed to meet the Project Standards, and in accordance with the Waste Management Plan, reducing impacts to soils.

Key management measures to prevent and manage contamination of soils from disposal and accidental release are identical to those in the construction phase and are described in Section 5.5.2.2.

Topsoils have been identified as a receptor of high sensitivity. Key locations where topsoil contamination is of importance include areas used by local herding communities.

The implementation of effective spill response procedures as part of the Emergency Preparation and Response Plan (EPRP) will ensure that impacts are of short duration (less than five years) and therefore the Impact Magnitude is expected to be very low.

Naturally Occurring Metals

The baseline data collected for the site has shown that in certain locations there are high natural levels of heavy metals occurring, including arsenic and molybdenum. The details of this naturally occurring contamination are set out in Section 5.3.3 and baseline *Chapter B7*: *Waste*; Section 2.4.8.

The excavation of the soil in these locations could create contamination impacts if these metals were exposed. In addition, there are potential risks in terms of pathways for contamination including windblown dry tailings and run-off from the IWF.

Given the naturally occurring elevated levels, ongoing sampling should be undertaken during any ground breaking to ensure that contamination will not spread or create additional impacts.

The residual significance of Impacts during operation from accidental release of contamination is therefore **Minor Adverse**.

5.4.3.3 Landscape

The impacts to landscape will be largely associated with the waste landform at Bayan Khundii, which has been designed to a maximum possible height of 150m, and Altan Nar, which has not yet been designed due to its planned subsequent development. This is a significant variance to the scale of the current landscape. Also, the mine pit void will create a significant change to the existing landscape.

As shown on Figure 2 below, the operations are situated in a relatively flat area between a wide valley and low hills and at 150 m in height the stockpile will be visible to road users and potential nomadic herders. However, the Site will be seen in the context of the mine and associated infrastructure. In addition, the number of people that will be affected by the visual impact of the waste landform is very low.



Figure 2 Bayan Khundii Site Plan

Additionally, it must be noted that the higher the stockpile, the smaller the spatial extent of the waste landform footprint. The overall environmental impact is reduced when the footprint is smaller because there is less potential for disturbing soils, clearing pasture and creating dust.

Whilst there is no engineering mitigation for this impact, the views should begin to be seen in context with the other mining infrastructure in the area, including the plant, the stockpiles and the various buildings. Consequently, any visual sensitivity will reduce over time. Based on the discussion above, the residual significance of the impact on views across to the Site is **Minor Adverse.**

5.5 Residual Impacts and Management/Mitigation Measures

5.5.1 Construction

5.5.1.1 Soils Disturbance

Soil Disturbance in the construction phase will be managed in accordance with a Land Disturbance Permit Procedure. This procedure will set out the details associated with the planning, stripping, storage and use of topsoil which include:

- Pre-disturbance assessment;
- Assessment of topsoil type and depth;
- Conformance with a Land Disturbance and Rehabilitation Management Plan; and
- Placing topsoil in approved topsoil stockpile locations for future use.

Impacts from vehicle movements along roads will be mitigated through built-in design (including measures to accommodate any stormwater runoff and maintain local hydrology), dust suppression activities and road maintenance. All employees, contractors and visitors to site will be informed of the harm caused by off-road driving as part of the site induction and will be instructed to stay on designated roads and adhere to sign posted speed limits. Training will be provided to all employees and all driving undertaken in line with the Transport Management Plan.

5.5.1.2 Soil Contamination

All construction activities will be managed in accordance with the requirements set out in the EPRP, Hazardous Materials Management Plan (HMMP) and Waste Management Plan (WMP). These plans define the key mitigation measures for the management of bulk hazardous materials to prevent spillage and environmental contamination and ensures secure materials storage and transport. These measures are commensurate with risks to the environment and will ensure that environmental impacts due to spills or other releases are minimised.

Key management measures include:

- storage of liquid hazardous materials (including waste oil and solvents) will be provided with at least 110% capacity secondary containment which will involve above ground storage with low permeability features;
- spill kits, protective equipment, and other necessary equipment will be available onsite, where hazardous materials are stored and handled, to clean and mitigate spills;
- hazardous materials will only be transported by operators licensed and/or approved by Erdene for the specific material;

- all hazardous wastes for which there is not an engineered and approved treatment or disposal method available will be properly stored on site until a treatment and/or disposal route becomes available;
- wastes will not be sent off-site for disposal or treatment other than for recycling by licensed recycling Contractors, until such time as licensed waste disposal facilities that meet the requirements of the Project have been identified in Mongolia;
- all spills will be managed in accordance with the EPRP and the Spill Response Procedure.

Following implementation of these measures, and prompt remediation of any spills, the magnitude of the impact for soil contamination is very low.

5.5.1.3 Topography

Any change to topography will be of short duration (less than 5 years) apart from changes associated with permanent earthworks. These however are likely to be small in extent and the magnitude of the impact is very low.

The impact significance of the topographical change associated with the construction phase is **negligible**.

5.5.1.4 Landscape

Construction will affect views for a limited timeframe of approximately one year. Given it is a short-term impact, the impacts on herders and residents is low.

The residual impact significance associated with landscape features and views during construction is therefore considered to be **negligible**.

5.5.2 Operation

5.5.2.1 Soil Disturbance

Impacts from vehicle movements along roads will be mitigated through built-in design (including measures to accommodate any stormwater runoff and maintain local hydrology), dust suppression activities and road maintenance. All employees, contractors and visitors to site will be informed of the harm caused by off-road driving as part of the site induction and will be instructed to stay on designated roads and adhere to sign posted speed limits. Training will be provided to all employees and all driving undertaken in line with the Transport Management Plan.

Transport requirements for operational materials are modest and will occur on designated routes. Drivers will be prohibited from off-road driving and required to use designated pull-outs to avoid soil disturbance. Local community consultation will include education on the sensitivity of the local environment and issues associated with off-road driving.

All land disturbance activity will be managed in accordance with the Land Disturbance Control and Rehabilitation Management Plan. This plan sets out the requirements for land disturbance via the internal approvals process. Regular monitoring will be undertaken to ensure no uncontrolled land disturbances occur.

Topsoil will be managed in accordance with the Top Soil Handling Procedure and Land Disturbance Procedure (LDP). This procedure sets out the details associated with the planning, stripping, storage and use of topsoil. All topsoils will be segregated and stored appropriately to minimise erosion. Topsoils will be reused for on-site rehabilitation of the area once maintenance has been completed.

5.5.2.2 Soil Contamination

Spills and Leakages

Key management measures to prevent and manage contamination of soils from disposal and accidental release are identical to those discussed in the construction phase and are described in Section 5.5.2.2.

Key locations where soil contamination is of increased importance include areas used by local herding communities.

The implementation of effective spill response procedures as part of the EPRP will ensure that impacts are of short duration (less than five years) and therefore the Impact Magnitude is very low. Furthermore, whilst regular maintenance inspections are anticipated, the frequency of maintenance activities/works in these sensitive areas during operation is likely to be undertaken, in accordance with manufacturer specifications or as required by preventative measures, further reducing risk of impact to the topsoils.

Naturally Occurring Metals

Given that the situation with elevated levels of heavy metals is naturally occurring, Erdene proposes a management approach whereby ongoing sampling is undertaken during any ground breaking to ensure that contamination will not result and create ongoing impacts.

5.5.3 Summary of Mitigation and Management Methods

Table 5.3 presents a summary of impacts and mitigation measures.

Table 5.3 - Summary of Impacts and Management: Topography, Landscape, Geology, Soils and Seismicity

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/ Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
TLGS01	Loss of topsoil resource across the footprint of the Project	Soil resources	X	X	X	a) Land Disturbance Permit (LDP) to be obtained through an internal Erdene process prior to commencement of any works requiring topsoil removal, or excavation of material. b) Topsoils to be stored separately to minimise erosion, and to be re-used on site for rehabilitation and remediation. c) Stockpile monitoring to be undertaken to ensure soils are being stored effectively.	Topsoil Management Plan	**Minor Adverse**
TLGS02	Loss of topsoil resource from borrow pit excavation	Soil resources	X	-	-	a) Land Disturbance Permit to be obtained prior to regulatory permit application and commencement of any works. b) Locations to be screened for environmental and social	Topsoil Management Plan	**Minor Adverse**

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/ Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						risks as part of the LDP Procedure (c) LDP Procedure to: • outline required mitigations to minimise environmental and social impacts; • comply with Mongolian regulatory requirements for access to mineral resources; and • provide the requirements for the recontouring and rehabilitation of the borrow pit prior to contractor demobilisation.		
TLGS03	Contamination of soil from hazardous materials, accidental fuel spills and leaks	Topsoils	X	X	X	a) Storage of liquid hazardous materials (including waste oil and solvents) will be provided with a minimum of 110% capacity secondary containment. b) Spill kits, protective equipment, and other necessary equipment will be available onsite, where hazardous materials are	Hazardous Materials Management Plan	**Minor Adverse**

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/ Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						handed, to clean and mitigate spills. c) Hazardous materials will only be transported by operators licensed and/or approved for the specific material.		
TLGS04	Contamination of soil from hazardous wastes, accidental spills and leaks	Topsoils	X	X	X	a) All hazardous wastes, for which there is not an engineered and approved treatment or disposal method available, will be properly stored on-site until a treatment and/or disposal route becomes available. b) Wastes will not be sent off-site for disposal or treatment other than for recycling by licensed recycling contractors, until such time as licensed waste disposal facilities that meet the requirements of the Project are identified in Mongolia.	Waste Management Plan	**Minor Adverse**
TLGS05	Contamination from exposure to naturally occurring heavy metals	Soil resources	X	X	X	Where possible, avoid areas where known heavy metal concentrations are shown to have been found.	Land Disturbance Control and Rehabilitation Management Plan	**Minor Adverse**

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/ Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						Consider the results of ongoing monitoring of excavated soils to confirm that there is no exceedance of the baseline conditions Ensure that excavated soils are subject to a grid sampling process at varying depths		
TLGS06	Impact of vehicles on surrounding topsoil quality	Soil resources	X	X	X	a) Dust suppression to be implemented especially through sensitive locations, or along unpaved roads. b) Training and awareness for all employees, as part of the site induction. c) Adhere to designated roads and sign posted speed limits.	Transport Management Plan	**Minor Adverse**
TLGS07	Topographical changes during construction cut and fill/ levelling	Topographic features within the Site	X	-	-	a) Site levelling to create uniform levelled platforms. b) All excavations to be rehabilitated and recontoured in line with the LDP process prior to leaving the site.	Land Disturbance Control and Rehabilitation Management Plan	**Negligible**
TLGS08	Landscape and visual changes introduced by Erdene	Nomadic herders and road users	X	X	-	All excavations and temporary land disturbance to be rehabilitated and recontoured in line with the	Land Disturbance Control and Rehabilitation Management Plan	**Moderate Adverse**

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/ Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						LDP Procedure prior to leaving the site.		



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

Erdene Mongol LLC

Chapter C5 – Water Resources

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AN	Altan Nar
AoI	Area of Influence
BS	Bosgyn Sair
BK	Bayan Khundii
EBRD	European Bank for Reconstruction and Development
ESIA	Environmental and Social Impact Assessment
EU	European Union
IFC	International Finance Corporation
KGP	Khundii Gold Project
KT	Khuren Tsav
RoI	Radius of Influence

5. WATER RESOURCES

5.1 Introduction

This Chapter provides an assessment of potential water resources impacts likely to arise from the Khundii Gold Project (KGP) during the construction, operations and closure phases. The Chapter also presents specific mitigation and management measures that may be implemented to avoid or minimise those impacts.

5.2 Policy, Standards and Lender Requirements

Chapter A2: Policy and Legal Framework outlines the requirements that will be followed for the KGP. In summary, the Policy and Legal framework for water resources in Mongolia is detailed and provides significant guidance for water resource management.

5.3 Project Water Demands

Information regarding the project water demand presented within this section was sourced from Tetra Tech, Technical Memo, Water Supply Evaluation (Tetra Tech, December, 2019).

During the project construction phase there will be elevated domestic requirements as there will be more personnel on site during construction than during the operational or closure phases. There will also be water demands during construction (concrete mixing and dust suppression) but these volumes will not be as high as the commissioning/operational water requirements. It is expected a significant proportion of water demand will be attributed to the process plant, with the current expected process plant water requirement being approximately 15 m^3/hr or 4.2 L/s. If the proposed water supply for commissioning and operations is sufficient, then there will be enough water to meet construction needs.

A summary of the project water demand is provided in Table 5.1.

Table 5.1 Summary of Project Water Demands

Water Use		**Item**	**Amount of water needed**	**Units**
Domestic Uses	Drinking water, cooking, laundry, showers, sanitation	Water use per capita	180	L/person/day
		Camp population	380	
		Percentage of water recycled (grey water)	60	%
		Total water usage per day	**68,400**	**L/day**
Operations	Dust Suppression	Truck capacity	10,000	L
		Number of trucks	2	
		Loads (April through October)	8	/day
		Daily water use (April through October)	160,000	L/day
		Loads per day (November through March)	3	/day
		Daily water use (November through March)	60,000	L/day
		Average annual daily water use (dust suppression)	118,333	L/day

Water Use		Item	Amount of water needed	Units
		Water recycled from domestic use	41,040	L/day
		Make-up water required for dust suppression (daily dust suppression total minus 60% of daily domestic use) (maximum)	**77,293**	**L/day**
	Drilling		Assumed within dust suppression estimate above	
	Vehicle Maintenance	Estimated amount of water used per vehicle wash	10,000	L
		# vehicles washed	30	/day
		Amount of water recycled	80	%
		Amount of water lost to vehicle washing	**60,000**	**L/day**
	Process Water	Ore processing	**362,880**	**L/day**
Tailings	Dry Stack Tailings and Waste Dump	Water retained in the tailings (comprises process water)	362,800	L/day
Reclamation	Cultivation of Seedstock and Saplings	# of greenhouses	3	
		Water usage per greenhouse (April through October)	4,000	L/day
		Total water usage per day (April through October)	12,000	L/day
		Average annual daily water use	**7,077**	**L/day**
Total Water Demand			**575,650**	**L/day**
			6.67	**L/s**

[1] Data sourced from Tetra Tech, September 19, 2019. *Technical Memo*: *Water Supply Evaluation*, *Table 1: Summary of Project Water Demand.*

Tetra Tech's assumptions in the establishment of the water use demand did not include technical water losses during milling and ore processing, as such losses within the process plant are expected to be very low. Water use during processing is highly dependent on the specific ore composition at the Project and the processing options selected. Bayan Khundii ore composition is relatively uniform, while Altan Nar ore may be expected to present some level of variability, due its polymetallic and intermediate sulfidation properties in certain zones. Consequently, these assumptions are unlikely to result in significant water balance estimate variation or subsequent Project water demand. Should water losses associated with ore processing require additional water, the maximum permitted flow rate for the Project water supply would would allow for an approximate 50 percent increase in Project water demand.

Table 5.1 also does not include water used for core drilling during the development and operation of the mine. Although generally limited, the amount of water used for drilling will vary, based on the types of drills used. For the purposes of this assessment, it is assumed that drill water is adequately covered in the estimated water requirement for dust suppression.

For domestic water use, approximately 45,600 L/day will be supplied from the production bore adjacent to the camp ("new camp well", 0.75 L/s) and the reserve "old camp well" west of the camp (0.25 L/s). Therefore, the "new camp area" aquifer (as defined in the Mongolian statutory water reserve report) is required to yield an estimated 0.5 L/s. The Khuren Tsav (KT) and Bosgon Sair (BS) aquifers will supply domestic and non-domestic water needs, therefore the well field in the KT and BS aquifers is required to yield approximately 7 L/s.

5.3.1.1 Groundwater Inflow Estimates to the proposed Open Mine Pit

As part of the Pre-Feasibility Study (PFS) an estimate of the likely range of groundwater inflow to the open pit was assessed and reported by Tetra Tech. Pit inflow estimates are required to determine the anticipated level of effort required to manage groundwater inflows to the proposed open pit.

Tetra Tech created a transient groundwater flow model using GeoStudio's SEEP/W modelling software (Version 8.16, 2016) to estimate groundwater inflow into the pit at the end of the seven years of mining at Bayan Khundii. The inflow at the end of mining was assumed to be the time period when the largest flux of groundwater would occur as it is when the largest head differential will be present.

The groundwater model was based on the geological model developed for the mine resource evaluation. The geometry of the model was adapted from the open pit geotechnical model built by Tetra Tech's Geotechnical Group for the north-eastern section of the pit. This geometry was applied in an axisymmetric manner to represent the flow towards the open pit.

During the hydrogeological investigations in both the BK and AN deposits, a total of six holes were drilled, three in each deposit. Only one hole in each deposit (BKHGD-02 and TNHGD-02) produced measurable quantities of water. This suggested that much of the rock mass in the deposits is relatively low hydraulic conductivity with water being produced from fractured zones.

A single pumping test conducted in an open borehole (BKHGD-02) by Okhi-US (Okhi-Us, 2017) was analyzed to establish physical aquifer hydraulic properties.

The estimated range of groundwater inflow to the ultimate open pit was estimated to be a factor of 50. This is typical where a wide range of hydraulic conductivity values are applied to a model as predicted groundwater flow rates are sensitive to the magnitude of the hydraulic conductivity applied.

Scenario 4 of the modelling was the most representative of likely site conditions and predicted a groundwater inflow into the ultimate BK open pit of approximately 33 m^3/day.

5.3.1.2 Water Supply Evaluation

Tetra Tech provided a preliminary water-supply assessment for the Project (Tetra Tech, December, 2019). From this assessment it was established that in April 2019, out of 12 boreholes drilled, five boreholes produced water yielding between 2 L/s to 4 L/s. From this data it was inferred that the groundwater reserves within the KT, BS and Camp Well aquifers were in the order of 10.5 L/s, based on inferred aquifer dimensions and the projected life of the mine (Okhi-Us 2019).

As previously established, the water requirements from the KT and BS aquifers are in the range of 6 L/s. Assuming that these water use estimates are accurate, the inferred groundwater reserves in the KT and BS aquifers could provide water for the Project (Tetra Tech, December, 2019).

5.3.1.3 Bayan Khundii Pit Lake Formation Study Methodology

Tetra Tech conducted a study to determine if a lake will form following the conclusion of mining operations in the BK pit and was in support of the Technical Report (Tetra Tech, December, 2019). Additionally, as part of this assessment a preliminary analysis of the likely range of groundwater inflow into the BK pit was calculated. The analysis considered five scenarios using a transient, axi-symmetrical, 2D flow system over a period of eight years. Tetra Tech used these models as a basis to inform the water balance executed for this assessment. Multiple scenarios were modelled to bound the assessment, as hydraulic properties of the geological materials were based upon a single aquifer test conducted in the BK deposit and one in the AN deposit.

This study considered the analysis of five scenarios of pit lake formation, post-closure of the Bayan Khundii mine. Variations in the water inflow quantities, evaporation and hydraulic conductivity were considered to represent a range of potential in-situ conditions following the cessation of mining activities. The model results described the formation of a pit lake which reaches equilibrium at 35m depth after a period of 30 years.

Subsequent scenario analysis, incorporating variation in evaporation rates and water inflows, showed a range of pit lake depth values and equilibrium timelines, varying from 20m to 90m, with respective equilibrium timelines of 5 to over 120 years. Based on this analysis and the associated assumptions related to the five scenarios considered, Tetra Tech concluded that there is a high probability that a pit lake will form post-closure of the Bayan Khundii mine and predicted the pit lake would reach a depth of approximately 35m and enter dynamic equilibrium around 38 years post mine closure.

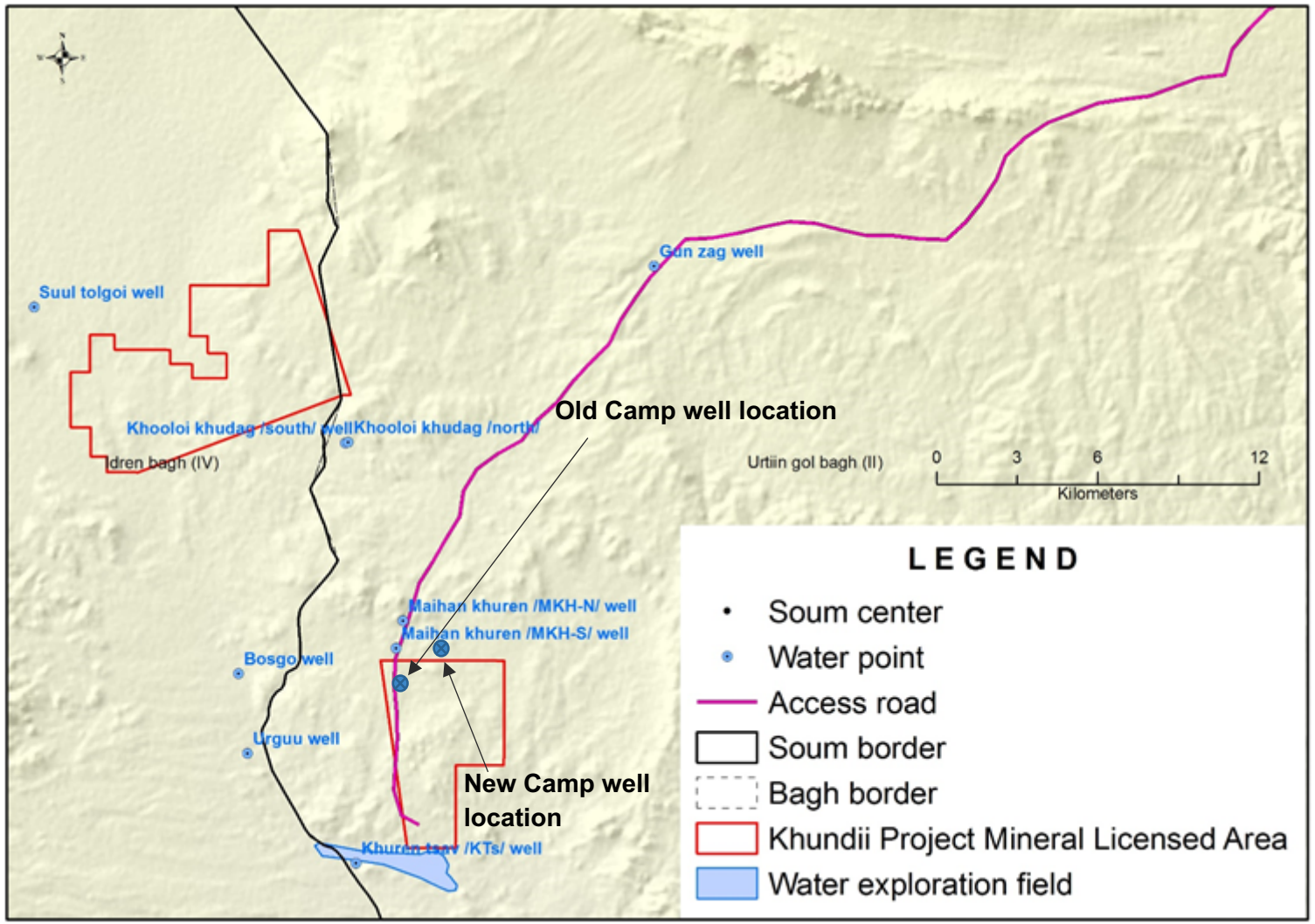

Figure 1 **Location of the water exploration field, Camp Wells and herder wells**

5.4 Assessment Methodology

5.4.1 Scope of Assessment

5.4.1.1 Geographical Scope

The Project AoI encompasses the BK and AN Sites, the Khuren Tsav (KT) and Bosgyn Sair (BS) borefields, water supply pipeline and covers the geographical extent of the Project's potential impacts on sensitive water resource receptors and as such includes the following:

- The ephemeral watercourse systems passing through and downstream of the Project AoI.
- Shallow groundwater beneath and downstream of Project Sites and within a groundwater pumping Radius of Influence (RoI), which requires further detailed hydrogeological investigation and groundwater modelling to establish.
- The Project's water supply drawn from the KT and BS borefields and a groundwater abstraction RoI.

At this stage, the extent of drawdown associated with the proposed groundwater abstraction from the KT and BS borefields and the Camp Wells cannot be reliably estimated, as detailed in the discussion below. These calculations will require further data and groundwater modelling. Groundwater monitoring data collected pre construction and during early operational phases will be used to assess and predict temporal groundwater drawdown propagation associated with the proposed groundwater abstraction program. The Water Resources Management Plan (WRMP) presents the framework and methodology for assessment of the abstraction RoI for the duration of the project and timeframes for groundwater recovery post groundwater abstraction.

Error! Reference source not found. presents the Project AoI.

5.4.1.2 Temporal Scope

The temporal scope covers the complete KGP Project lifecycle including the construction, operation, decommissioning and post groundwater abstraction recovery phases. The approach is detailed in *Chapter A3: Methodology*.

5.4.1.3 Technical Scope

The technical scope covers the potential direct and indirect (secondary) impacts on water resources in relation to the various elements of the KGP Project and namely:

- construction phase activities;
- operation phase activities (including power plant related water supply, waste water, water treatment); and
- decommissioning phase activities.

5.4.1.4 Groundwater Drawdown Assessment Methodology

Simulations of groundwater drawdown associated with the proposed groundwater abstraction program were undertaken using Aqtesolv™ (ROMA, 2020). The estimates of drawdown (m) in the proposed pumping wells were calculated for the duration of the project (7 years or 2,555 days) at pumping rates specified by Okhi-Us, 2019 (Table 5.2). The drawdown estimations were calculated using varying hydraulic conductivities (K) which were based on Aqtesolv™ reanalyses of the pumping tests reported in ROMA, 2020 which had not reached a steady-state.

Table 5.2 Proposed groundwater abstraction program

No.	Exploration bore, well ID	Reserve (by C grade) Degree of production of potential groundwater resources	
		L/s	m^3/day
West KT-BS borefield			
1	BKW30	3.5	300
2	BKW44	1.7	150
3	BKW16	3.9	340
	Total	9.1	790
East KT-BS wellfield			
4	BKW21	0.9	77
	Total	0.9	77
Industrial use		10	867
New Camp Area			
5	New Camp well	0.75	65
6	Old Camp well	0.25	21
	Total	1.0	86
Domestic use		1.0	86

Drawdown estimates are a function of aquifer characteristics (K and Storativity (S)) and abstraction rate. Lower apparent K, typical of the KT-BS fractured rock aquifers, increase drawdown. Estimated drawdowns (Figure 3) were based on the aquifer having constant hydraulic properties for the duration of the simulation i.e. 7 years. However, the hydraulic parameter estimates from pump tests completed to date are an indication of the hydraulic properties near the pumping well and not necessarily representative of the larger system i.e. fracture interconnectivity and their spatial extent. In addition, the hydraulic properties used were based on reanalyses of pumping data where a steady-state was not necessarily reached (ROMA, 2020).

5.4.2 Method of Assessment

The assessment of potential water resources impacts during the construction, operation and decommissioning phases has been undertaken based on the standard approach described in *Chapter A3: Methodology and Chapter C1*: *Introduction*.

An assessment of the BK Basin hydrogeology has been undertaken via aquifer pumping and recovery testing and detailed groundwater modelling of aquifer response to the proposed groundwater abstraction.

Constant rate tests conducted on exploration production bores within the KT and BS borefields, incorporated data collected from surrounding observation bores for interpreting aquifer conditions and hydraulic parameters. Well equations were used to evaluate aquifer data and determine physical aquifer parameters.

5.4.3 Significance Criteria

The significance of a potential impact is determined by a combination of the sensitivity of water resource receptors and impact magnitude. The criteria used for allocating sensitivity and impact magnitude are provided in Table 5.3 and Table 5.4, respectively. The matrix for combining

sensitivity and impact magnitude to allocate the level of significance to an impact is presented in *Chapter A3: Methodology*.

5.4.4 Receptor Sensitivity

Receptor sensitivity varies according to the type, condition, and ability of the receptor to adapt to the change in conditions. Changes in water quality and flows can affect the overall health of water dependent ecology and available groundwater and water quality for herders within the water resources AoI. Receptors such as herder wells within a predicted groundwater abstraction RoI are therefore highly sensitive to effects from drawdown of the aquifer and pollution of water sources. Table 5.3 presents receptor sensitivity criteria for water resources.

Table 5.3 Water Resources Sensitivity Criteria

Level of Importance	Description
High	• a high-quality watercourse that is in a natural state or close to it • a watercourse that is an important component of a habitat or assemblage of species which has designated conservation status at an international or national level or comprises critical habitat under International Finance Corporation Performance Standard 6 (IFC PS6) • a watercourse used for abstraction for industrial, irrigation, watering livestock or potable uses by many users • an area lacking water resources where there is significant competition for the existing water supply, and declining recharge within the catchment
Medium	• a watercourse that is non-potable for humans but suitable for irrigation and watering livestock by a small number of users • a watercourse that is a component of a habitat or assemblage of species which comprises natural habitat under IFC PS6 • ephemeral surface water flows within the KGP Site and along the water pipeline that are a component of a habitat or assemblage of species which comprises natural habitat under IFC PS6 • KT and BS borefield aquifers (used for, watering livestock and possibly for supporting vegetation and wildlife in low-lying areas with shallow groundwater)
Low	• a watercourse that is not suitable for drinking, agricultural or industrial uses • a watercourse that is a component of a habitat or assemblage of species which comprises modified habitat under IFC PS6 • ephemeral water flows that may support ecological values at and downstream of the KGP Site, water pipeline during construction

5.4.5 Magnitude of Impact Criteria

The magnitude of the impact on water resources has been based on the relevant national water quality standards. These criteria are provided in Table 5.4.

Table 5.4 Magnitude of Impact Criteria

Impact Magnitude	Type of Impact
High	• project discharges (planned or unplanned) exceed effluent quality standards or cause breaches of quality standards in the receiving waterbody, which has limited dilution capacity

Impact Magnitude	Type of Impact
	• an event where the potential for natural recovery of water quality, quantity and/or physical disturbance through natural processes is limited and the impact is predicted to be long-term (>1 year)
Medium	• project discharges (planned or unplanned) exceed effluent quality standards or cause breaches of quality standards in the receiving waterbody but are rapidly diluted • an event where the water quality, quantity and condition of the receiving waterbody is likely to recover through natural processes and the impact is predicted to be medium-term (6 to 12 months)
Low	• project discharges (planned or unplanned) do not exceed effluent quality standards or cause breaches of quality standards in the receiving waterbody • an event where the water quality, quantity and condition of the receiving waterbody is predicted to recover rapidly through natural processes and the duration of impact is short-term (<6 months)
Very Low	• no changes distinguishable from natural variability • impacts to water quality that are below applicable limits
Beneficial	• An advantageous or positive impact.

5.5 Potential Impacts

5.5.1 Introduction

The potential impacts of the KGP are based on an appraisal of baseline information, sensitivities and conditions, as well as the current understanding of the construction, operations and decommissioning activities. The key sensitive receptors of water resources within the AoI are, as follows:

- surface and groundwater resources that support ecological values;
- herders and their animals' dependant on shallow groundwater; and
- groundwater dependent ecology.

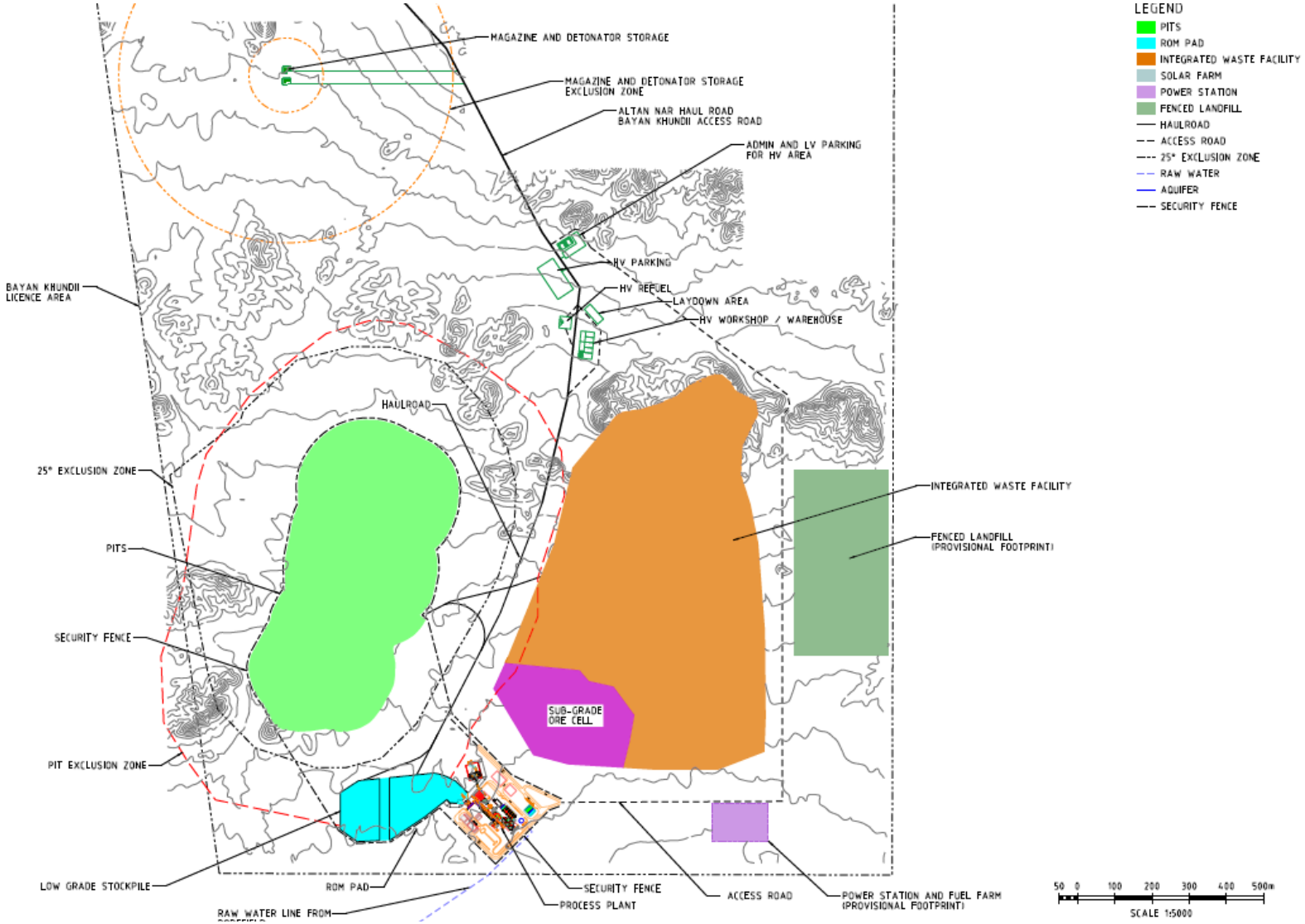

Figure 2 Bayan Khundii Site Plan

5.5.2 Sensitive Receptors

Sensitive receptors to potential Project construction and operation are presented in the following sections.

5.5.2.1 Bayan Khundii Site

KGP construction and operation may impact ephemeral surface water flows and quality, that may support downstream ecology, including vegetation communities and wildlife.

Groundwater at the BK Site has been measures at approximately 10m below ground surface (Tetra Tech, December 2019).

Two Herder Wells, Maihan Khuren North (MKH-N) and Maihan Khuren South (MKH-S) are in the north-western portion of the BK project mine licensed area and within close proximity of the access road. Any herder communities dependant on these wells are considered potential sensitive receptors.

Potential sensitive ecological receptors include shrub and semi-shrub plant species, which may be dependent on shallow groundwater resources with the BK project mine licensed area surrounds.

5.5.2.2 Altan Nar Site

KGP construction and operation may impact ephemeral surface water and shallow groundwater flows and quality, that may support downstream ecology including vegetation communities and wildlife at the AN Site.

Groundwater at the AN Site has been measured at approximately 14.5m below ground surface (Tetra Tech, December 2019) at borehole TNHGD-02.

KGP construction and operation may impact ephemeral surface water flows and quality, that may support downstream ecology including vegetation communities and wildlife.

There are no Herder Wells located within the AN mine licensed area; however nested herder well pair Khooloi khudag south and Khooloi khudag north are located approximately 2km to the south of the AN mine licensed area's southern boundary and herder well Suul Tolgoi located approximately 3km to the north-west of the AN project mine licensed area's north-eastern boundary. Any herder communities dependent on these wells are considered potential sensitive receptors.

Potential sensitive ecological receptors include shrub and semi-shrub plant species, which may be dependent on shallow groundwater resources with the AN project mine licensed area surrounds.

5.5.2.3 KT and BS borefields

Within the KT and BS borefields and an associated groundwater abstraction RoI, the potential exists for impacts to herder wells and groundwater dependent ecology. Reliable estimates of groundwater distance-drawdown associated with proposed groundwater abstraction from the KT and BS borefields are not able to be made at this stage.

The WRMP will provide a framework for further assessment of these potential receptors for project operation phase.

5.5.3 Potential Impact Sources – Construction

Groundwater for construction use is proposed to be provided from a borefield within the KT and BS basins, which will provide the raw water supply for the Project, located approximately 1-3 km to the south of the BK mine licence area in Urtiin gol *bagh*, Shinejinst *soum*.

5.5.3.1 Construction Water Use Impacts

Water will be required for construction activities such as dust suppression and site preparation including concrete mixing. Volume estimates for the construction phase are minimal relative to operational water demand and impacts associated with the abstraction of groundwater from the KT and BS for construction purposes are negligible.

5.5.3.2 Impacts from Disturbance to Surface Water Regime

During construction activities, there is the potential for impacts associated with alterations or disturbance of the natural ephemeral surface water regime. Any borefield construction related impacts to surface water regimes including trenching are considered minor to negligible, however have to potential to impact surface water flow and replenishment of shallow aquifers.

The construction of hard stand surfaces and buildings, civil infrastructure, such as stormwater control drains, culverts and pipes along with the construction of the water pipeline footings have the potential to alter the natural flows across the Project AoI and impact surface water dependent ecology and shallow groundwater at the BK and AN Sites.

Linear below ground infrastructure including buried pipelines have the potential to disrupt natural surface water drainage. Where these excavations intersect ephemeral stream beds, there is the potential to create preferential pathways for water flow and divert natural drainage that may support ecological values such as shallow groundwater dependant ecology and herder's dependant on shallow alluvial groundwater, recharged by these flows.

5.5.3.3 Impacts to Water Quality

Construction and operational activities with the potential for impacts to water quality in the Project AoI include:

- accidental spills and/or releases of fuel and oil from vehicles and construction equipment;
- loss of hazardous chemicals (e.g., hydrocarbons, oil and grease and other construction chemicals including cement and concrete additives and acids and bases) during loading and transportation; and
- ground disturbance resulting in increased sediment loading.

5.5.4 Potential Impact Sources – Operation

The domestic water demand for the project is 45,600 L/day, which will be supplied from "an area near the camp and not drawn from the bore-field". This Camp Well (New Camp Well) is located between the BK and AN mine licenses and near the camp (Figure 1). Based on this domestic water demand, the aquifer "near the camp" is required to yield 0.5 L/s (Tetra Tech, December 2019).

The KT and BS aquifers supply non-domestic water needs including operations water (dust suppression and drilling, vehicle maintenance and process water (ore processing)). Based on these water demands, the well field in the KT and BS aquifers is required to yield 7 L/s (Tetra Tech, December 2019).

5.5.4.1 Groundwater Abstraction Impacts

Aquifer test analysis and estimated drawdowns at proposed pumping bores for the proposed 7 year project at pumping rates specified by Okhi-Us, 2019 were simulated in ROMA, 2020 and the drawdown ranged between 10 and 90m for lower hydraulic conductivity (K) values, decreasing to between 2 to ~30m for higher K values (Figure 3). Drawdowns anticipated for the camp wells ranged between 2 to 6m for higher K values and between 6 to 19m for lower K values.

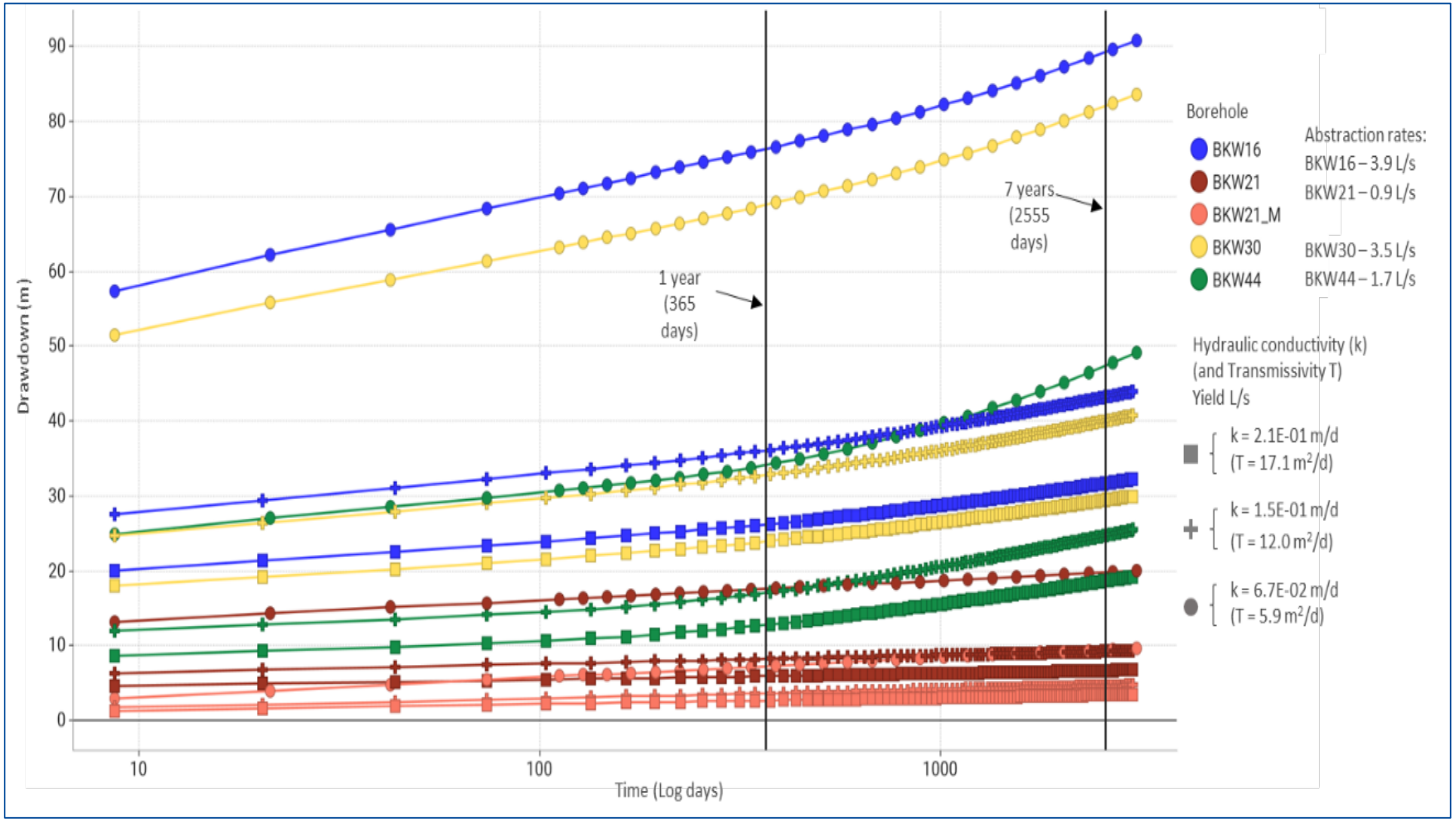

Figure 3 Estimated drawdown for each pumping well (KT-BS borefield).

The KT-BS fractured rock aquifers are low yielding and likely constrained to discrete fracture sets, therefore it can be expected they will display a highly varied and unreliable hydraulic response to abstraction (ROMA, 2020). Further monitoring data from a sustained pumping effort is required to predict with certainty the long term performance.

For the purposes of this impact assessment, it has been considered that the proposed groundwater abstraction program may result in the drawdown of shallow groundwater at several herder sites within the Project AoI, with greater drawdown to occur at sites located closer to abstraction bores.

Current drawdown estimates (ROMA, 2020) are limited to the production bores and the most conservative analysis estimated a drawdown range of 10 - 90m, seven years from abstraction commencement, the extent of which would decrease with distance from respective pumping bores. The two production bores with the highest predicted drawdown (BKW16 and BKW30) were located in the western KT-BS borefield. These estimates indicate that drawdown of the water table is likely to be observed at herder well Khuren Tsav located immediately to the south of the KT - BS Borefield and may propogate further northward and towards several other herder wells located within the Project AoI.

It is conservatively assumed that shallow groundwater sourced by herders and groundwater dependant ecology has measurable hydraulic connection to deeper semi-confined/confined aquifers across the Project AoI, from where abstraction will take place. This assumed hydraulic connection would allow for potential depletion of shallow groundwater resources accessed by herder wells and potentially supportive of groundwater dependant ecology.

Calculations of distance-drawdown associated with proposed groundwater abstraction regimes will be undertaken following additional hydrogeological testing and subsequent modelling and facillitae estimates of time-drawdown at recpetors including all identified herder wells.

Groundwater abstraction impacts are further assessed in the WRMP. This document presents the approach and detailed methodologies to obtain necessary information to assess and manage impacts associated with groundwater abstraction.

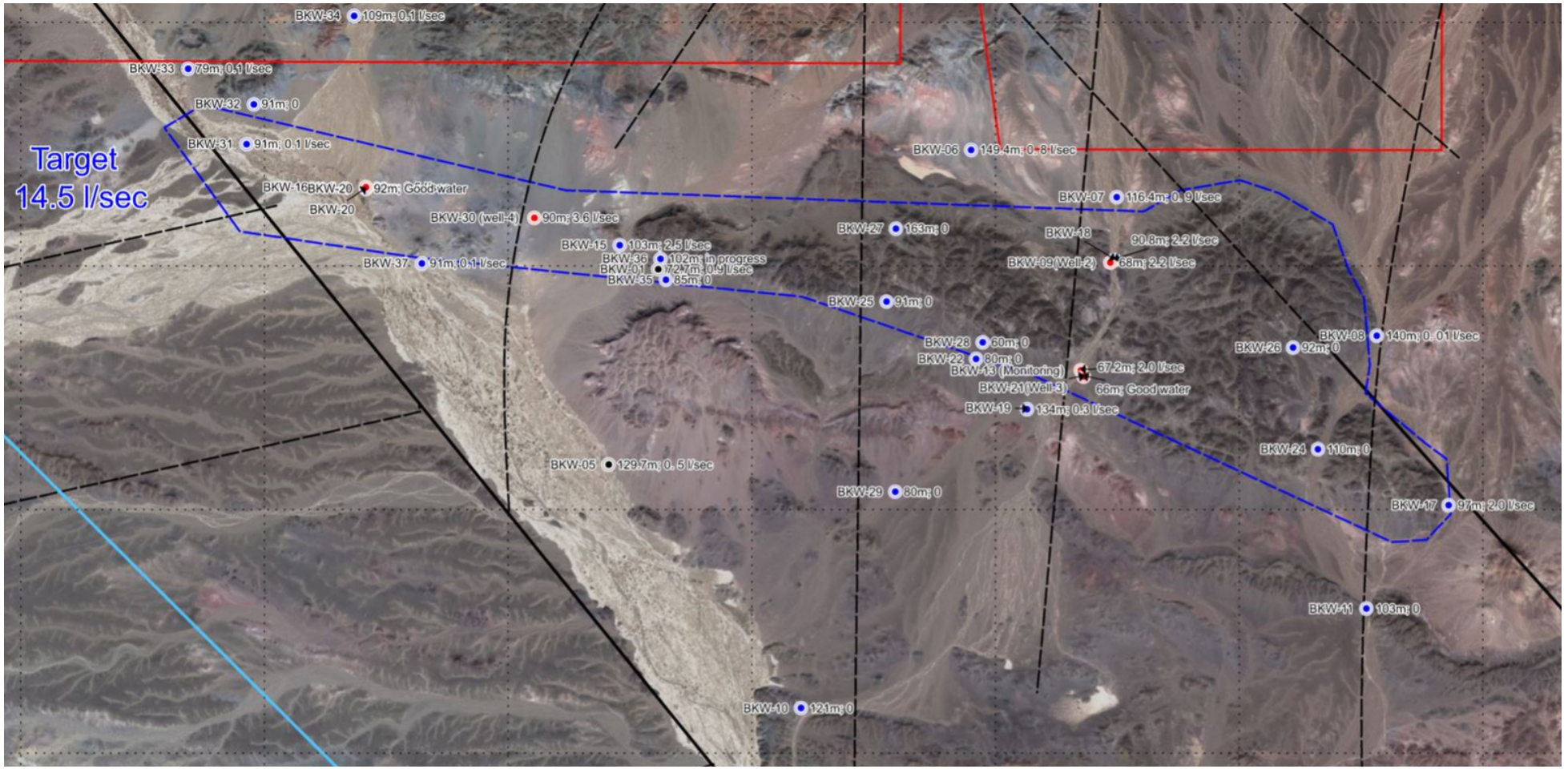

Figure 4 Khuren Tsav and Bosgyn Sair Borefields

5.5.4.2 Impacts from Disturbance to Surface Water Regime

KGP Site hard stand surfaces, structures and civil infrastructure, including stormwater controls such as drains, culverts and pipes, may impact the natural and local hydrological regime and alter surface water flows downstream of the Project sites. These flows may support local ecosystems and, if altered, may adversely impact surface water dependant ecology and any herders dependant on shallow alluvial aquifers recharged by ephemeral flows.

Linear infrastructure including pipeline trenches that intersect ephemeral drainage lines may result in the diversion of natural flows along the excavations. This may result in a decrease in surface water flows supportive of local beneficial users including ecological receptors (semi-shrubs and shrubs) and herders' dependant on shallow alluvial aquifers that are recharged by these surface water flows.

Pit Intersection, Mine Water and Sediment Control Dams

Natural drainage paths that cross the active mining area will be intercepted to catch any fresh water that enters the site. This water will be stored in a retention basin , with the overflow directed away from the pit. Due to the arid nature of the surrounding area, surface water flows are expected to be minimal and highly seasonal, and the required basin size relatively small.

Water pumped from the active mining areas will be collected in a pit top mine water dam that forms part of the pit dewatering system. This water will be reused on site for dust suppression and other miscellaneous tasks.

These disturbances of surface water flow across Project sites may impact natural ephemeral surface water flows potentially supportive of ecological and potable use values.

Any precipitation runoff from the IWFs at both BK and AN will carry some sediment that needs to be collected before it enters the local environment. Each waste dump will be constructed with a dirty water drain along the dump toe allowing run off water with sediment to be collected in local sediment control dams. Water in these dams will be held allowing any sediment to settle. Dams will be designed to allow overflow to occur only in the event of high-water flows which result in low sediment concentrations.

5.5.4.3 Potential Water Quality Impacts

There is potential for impacts to surface and groundwater quality during the construction, operation and decommissioning of the Project as a result of potential sources of contamination including the:

- ROM pad;
- Integrated Waste Facility (IWF);
- power station;
- heavy vehicle refuelling area;

- wash-down bay;
- workshop;
- the magazine;
- ANFO Storage;
- sewerage plant (BK);
- chemical toilets (AN);
- the Landfill (non-mineral waste);
- heating plant;
- heat and power stations for camp;
- tailings transfer station (at plant, awaiting transfer to IWF); and
- chemicals and reagents storage area.

Possible contaminant exposure pathways from these potentially contaminating landuses include:

- run-off and leaching from contaminated mine waste;
- accidental spills and leaks of chemicals, fuel or oil;
- inappropriate storage of materials;
- deposition of waste into the on-site landfill (non-mineral waste), surface run-off and potential generation and release of leachate to the surrounding environment;
- poorly maintained vehicles; and
- deposition of dust from waste stockpiles to ephemeral drainage lines.

Additionally, the mine will bring extracted material to the surface where it can oxidise and potentially form acid drainage. This impact is discussed in ***Chapter C7 – Waste***.

5.6 Assessment of Impacts

5.6.1 Introduction

This section considers the impacts associated with construction and operation of the Project and establishes the mitigation measures that are required to reduce the magnitude of the potential impacts to acceptable levels. The residual impact significance, following the implementation of mitigation measures, is presented within the following sections.

Mitigation of impacts associated with abstraction of water for the KGP Project from the KT and BS borefields, including the mitigation of potential impacts to near surface groundwater and herder wells, are primarily addressed in the respective management plans. The WRMP will present: water monitoring requirements for the KGP Site inclusive of: objectives, rationale, monitoring locations inclusive of the establishment of hydrometeorological stations and

methodologies for surface water and groundwater monitoring along with impact thresholds and required actions during construction and operation of the Project. Water monitoring will include measurement of groundwater levels and water quality, the results of which will be screened against specified trigger levels, where exceedances will require implementation of defined contingency actions.

The initial water management planning will include the need to develop and implement criteria on water abstraction, dewatering, and effluent water-quality, based on government regulations, relevant standards and monitoring data.

Groundwater abstraction impact action criteria presented within the WRMP will include defined groundwater drawdown thresholds at receptors. Response actions to be implemented should thresholds be met/exceeded may include alteration of the groundwater abstraction regime through changes in the pumping rates from individual water supply bores or provision of assistance or infrastructure to ensure access to water for herders is maintained to the same extent to which access is available prior to groundwater abstraction. Although there are no foreseen impacts to biodiversity associated with proposed groundwater abstraction works, mitigation measures will additionally ensure that there is no net habitat loss within the Project AoI.

5.6.2 Construction

During construction of the KGP Project infrastructure the impacts of activities on water receptors are anticipated to be limited to the direct Project area for the duration of construction. However, specific water management measures required to mitigate any impacts to water receptors are documented under the relevant management plans. Mitigation measures and residual impacts for the construction period are detailed in the following sections.

5.6.2.1 Construction Water Use Impacts

Construction activities will require relatively small volumes of water for a short timeframe and the magnitude of impact is very low. The most sensitive receptors are classed as having high sensitivity and include the KS and BT borefield aquifers and herder wells/bores within the water resources AoI.

Mitigation Actions

During construction, water consumption impacts may be minimised by employing the following measures:

- water will only be used for dust suppression on an ‘as needed’ basis;
- cleaning of equipment and plant during construction will be by vacuum sprays to conserve water;
- construction generated wastewater will be reused for dust suppression or concrete production;
- waste water will be stored for possible re-use; and

- routine reviews will be undertaken of the effectiveness of water conservation measures.

Residual Impact

The residual impact significance for construction groundwater use, following consideration of mitigation, is **Minor Adverse**.

5.1.1.1 Impacts from Disturbance to Surface Water Regime

Impacts associated with the alteration of surface water regimes may include a decrease of surface water flow to the downstream surface water dependent ecology and the magnitude of impact is anticipated to be low. The downstream surface water dependent ecology has a medium sensitivity.

Mitigation Actions

During construction activities, potential impacts associated with disturbances to the natural surface water regime may be minimised by employing the following measures:

- civil infrastructure will be designed to minimise interference with natural flow regimes; and
- where necessary, roads will be constructed with gutters to accommodate any stormwater runoff and maintain local hydrology.

Residual Impact

The residual impact significance from disturbance to surface water regimes, following consideration of mitigation, is **Minor Adverse**.

5.6.2.2 Impacts to Surface and Groundwater Quality

Construction impacts to surface water and groundwater quality are of low magnitude. Surface water and groundwater receptors have medium sensitivity.

Mitigation Actions

During construction, impacts to surface and groundwater quality may be minimised by employing the following measures:

- All hazardous wastes for which there is not an engineered and approved treatment or disposal method available will be properly stored on site until transfer, treatment and/or disposal.
- Vehicles and machines used during construction and operation will be subjected to regular mechanical inspections to minimise any leaks and spills of fuels, oils and hydraulic fluids.

- Fuel, oil and chemical storage tanks will include impervious secondary containment (such as concrete bunding) to prevent direct spills or releases to the soil.
- Soil contamination from spills or leaks will be remediated through removal of contaminants, neutralisation or remediation.
- The landfill design includes environmental monitoring wells and secure perimeter fencing.
- Drainage construction and engineering controls will be implemented to prevent uncontrolled stormwater runoff during the construction of the KGP Project.
- Clean stormwater will be diverted and allowed to runoff to the surrounding area.
- The IWF will be designed as landforms that shed precipitation off the waste dumps without pooling.

Residual Impacts

The residual impact significance to surface and groundwater quality, following consideration of mitigation, is expected to be **Minor Adverse**.

5.6.3 Operation

5.6.3.1 Groundwater Abstraction Impacts

Given that the water supply for the project will be provided via groundwater abstraction, environmental impacts are possible. The receptors identified for these impacts have moderate to high sensitivities. They include the KT and BS aquifer(s) and groundwater receptors including nine herder wells shown on Figure 1 and groundwater dependant ecology within the water resources AoI.

Mitigation Actions

The key focus for mitigation of any impacts of groundwater abstraction during KGP Project operation will be to implement appropriate management plans including the WRMP. A key instrument in the management plans will be a bore monitoring program as presented in the WRMP.

Additional hydrogeological investigations and groundwater modelling yet to be commissioned are necessary to provide a quantitative assessment of potential drawdown at specific monitoring sites within the Project AoI, and inclusive of herder wells. Erdene already monitors some of the groundwater issues in the AoI but more intensive monitoring will be commissioned prior to KGP Project construction and operation. Further baseline data obtained during this period will provide additional information regarding natural seasonal variability in groundwater levels. These data will inform an ongoing assessment of KT and BS borefield operation impacts to the hydrogeological regime and to herder wells. An objective of groundwater monitoring will be to enable identification of impacts attributable to groundwater abstraction works and additional to natural variability.

The WRMP will present water monitoring requirements inclusive of: objectives of monitoring, rationale, monitoring locations and methodologies for surface water and groundwater monitoring along with required actions during operation of the KGP Project. Water monitoring will include measurement of groundwater levels and water quality, the results of which will be assessed against specified trigger levels and where exceeded will require implementation of defined contingency actions.

Groundwater monitoring of the water resources AoI will comprise routine water level measurement, monitoring extraction rates and sampling of groundwater bores. These monitoring works will allow for the assessment of the groundwater elevation at nominated locations to assess any drawdown of the water table along with sampling for water quality parameters and general water chemistry to monitor any impacts potentially associated with groundwater abstraction works.

The identification of impacts associated with groundwater abstractions works will be based on notional triggers such as a sustained drop in water levels greater than the seasonal norm and/or sufficient to present the user with issues for supply; or a statistically significant variation in water elevation/quality when compared to long term trends.

Should monitoring identify exceedances of action criteria defined in the WRMP, response actions would be triggered to mitigate impacts.

Action criteria will include defined groundwater drawdown thresholds at receptors. Response actions to be implemented should thresholds be met or exceeded may include alteration of the groundwater abstraction regime through changes in the pumping rates from individual water supply bores. The provision of assistance or infrastructure to ensure access to water for herders is maintained to the same extent to which access is available prior to the operation of the KT and BS borefields may also be considered. Additionally, a reserve water bore has been installed at the KT aquifer area that may supplement herder water supply, as necessary, should the Project's drawdown constrain supply at the existing herder well. This process, including response triggers and actions will be specified in the WRMP.

Residual Impacts

The residual impact magnitude from groundwater abstraction on herder water users is predicted to be low considering that mitigations will address any changes to water availability due to the borefield abstraction within a period of less than 6 months. The groundwater used by herders is considered a highly sensitive receptor and therefore the significance from groundwater abstraction, following consideration of mitigation, is expected to be **Moderate Adverse**.

5.6.3.2 Water Quality Impacts

Potential impacts to water quality would be localised to the BK and AN Sites, including downstream from these locations, and would be of medium magnitude. Receptors have a medium sensitivity and would include surface water dependant ecology downstream of the BK and AN Sites.

Mitigation Actions

During the KGP operation phase, impacts to surface water quality may be minimised by employing the following measures:

- All hazardous wastes for which there is not an engineered and approved treatment or disposal method available will be properly stored on site until a treatment and/or disposal route becomes available.
- Vehicles and machines used during construction and operation will be subjected to regular mechanical inspections to minimise the occurrence of leaks and spills of fuels, oils and hydraulic fluids.
- A concrete slab and water supply will be provided for the cleaning of heavy vehicles in the vicinity of the heavy vehicle workshop. Washdown water from this facility will be captured and treated through sediment traps and oily water separators prior to release.
- Fuel, oil and chemical storage tanks will include impervious secondary containment to prevent direct spills or releases to the soil.
- Soil contamination from spills or leaks will be remediated through removal of contaminants, neutralisation or remediation.

Impacts to surface water quality specific to the KGP Project will be minimised by employing the following measures:

- impermeability requirements and structural details of the proposed wastewater/stormwater storage dams will be designed in accordance with Mongolian standards;
- impacts to surface water quality will be monitored through the collection and analysis of a fit-for-purpose set of water samples by an approved laboratory at an appropriate frequency;
- storage sites for hazardous construction materials, fuel, oil and chemicals will be constructed to be impermeable and above-ground storage tanks will be regularly inspected;
- hazardous chemical storage facilities to comply with Mongolian standards. The plant will include secondary containment made from appropriate chemical resistant materials, such as concrete. The storage will be designed such that spills, or leaks can be contained and collected, including collection from valves, hoses and filling points;
- surface water contamination from accidental spillages and hazardous waste will be managed in accordance with appropriate management plans. Bulk hydrocarbon storage will include adequate secondary containment.

- the BK IWF will incorporate best practice landform design principles to prevent drainage of rainfall and surface water flows through the dry tailings/waste rock and will shed water away from the stockpiled waste, incorporating chemically inert overburden materials.

5.6.3.3 Residual Impacts

The residual impact significance to surface water quality, following consideration of mitigation, is **Minor Adverse**.

5.6.3.4 Impacts from Disturbance to Surface Water Regime

Impacts associated with the alteration of surface water regimes will include a decrease of surface water flow to the downstream surface water dependent ecology. The magnitude of this impact is anticipated to be low. The downstream surface water dependent ecology has a medium sensitivity.

Mitigation Actions

During the KGP Project operation phase, potential impacts associated with disturbances to the natural ephemeral surface water regime will be minimised by employing the following measures:

- project infrastructure will be designed and constructed to minimise interference with natural flow regimes;
- where necessary, roads will be constructed with gutters to accommodate any stormwater runoff and maintain local hydrology;
- the major drainage system will be protected and maintained to ensure no impact to downstream, natural flow regimes;
- the water pipeline will be buried below ground and will incorporate leak detection and regular inspection to minimise uncontrolled releases that may erode drainage systems; and
- stormwater will be diverted from operational areas at the Site and directed to natural downstream drainage in a way that prevents increased rates of sedimentation and erosion.

Residual Impacts

The residual impact significance, following consideration of mitigation, is expected to be **Minor Adverse**.

5.6.4 Summary of Mitigation and Management Methods

Table 5.5 presents the summary of the water resources residual impacts and mitigation measures.

Table 5.5 Summary of Impacts and Management: Water Resources

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Construction	Operation	Closure			
WR001	Water Use Impacts	KT and BS basin aquifer Herder wells/bores within the Project AoI	X			a) Implement routine monitoring of groundwater elevations during construction. This monitoring is required to establish a robust baseline hydrogeology record to monitor the impacts associated with the operation of the borefields and camp well during operations. b) Water conservation measures will be applied through re-use of wastewater for dust suppression c) Adherence to water licence conditions	*Water Resources Management Plan*	**Minor Adverse**

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Construction	Operation	Closure			
				X	X	d) Routine monitoring of groundwater elevations during operations and implementation of management actions including borefield operation management and compensatory measures, as appropriate, where groundwater thresholds are exceeded due to KT and BS borefield and camp well groundwater abstraction.	*Water Resources Management Plan*	**Moderate Adverse**

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Construction	Operation	Closure			
WR002	Impacts to Surface and Groundwater Quality	Surface water and groundwater within and downstream of the KGP Site and water pipeline from the KT and BS borefield	X	X	-	a) All hazardous wastes for which there is not an engineered and approved treatment or disposal method available will be properly stored on site until a treatment and/or disposal route becomes available b) Vehicles and machines used in the construction will be subject to regular mechanical inspections to minimise the occurrence of leaks and spills of fuels, oils and hydraulic fluids. c) Fuel, oil and chemical storage tanks will include impervious secondary containment to prevent direct spills or releases to the soil. d) Soil contamination from spills or leaks will be remediated through removal of contaminants or remediation. e) Stormwater runoff will be diverted away from potential sources of contamination including the IWF stockpile via landform design.	*Water Resources Management Plan* *Hazardous Materials Management Plan* *Waste Management Plan*	**Minor Adverse**

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Construction	Operation	Closure			
WR003	Impacts to the surface water regime	Ecology including shrub and semi-shrub plant species, shallow alluvial aquifers and herder's dependant on shallow groundwater.	X	X		During construction and operational activities, potential impacts associated with disturbances to the natural surface water regime will be avoided where possible or minimised by employing the following measures: (a) roads will be constructed with drainage design to accommodate any stormwater runoff and maintain local hydrology; (b) areas of natural drainage will be protected from disturbance using barriers and other land disturbance controls; (c) Short term disturbance of drainage systems associated with construction, including trenching, temporary roads and other earthworks will be restored and stabilised on completion of works; (d) erosion and sediment controls will be applied to prevent increased sediment transport following rainfall; and (e) drainage construction and engineering controls to prevent uncontrolled stormwater runoff will be included.	*Water Resources Management Plan*	**Minor adverse**

ID	Impact	Sensitive Receptors	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Construction	Operation	Closure			
WR004	Impacts to Groundwater and Surface Resources	Groundwater and surface water within Project AoI	X	X		Develop and implement criteria on water abstraction, dewatering, and effluent water-quality, based on government regulations	*Water Resources Management Plan* *Waste Management Plan*	**Minor Adverse**
WR005	Impacts to water resources throughout the AoI	Groundwater and surface water	X	X		(a) All KGP Employees and Contractors working on the Project, in water resource-related management activities, shall be subject to routine toolbox training. This will include details on the importance of water resource conservation and management. (b) Specialist training shall be provided to key personnel involved in environmental water monitoring and sampling. (c) All Hydrogeologists/Environmental Officers undertaking monitoring and/or water sampling will be trained in the sampling protocols and QA/QC project plan.	*Water Resources Management Plan*	**Minor Adverse**

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

C6: Biodiversity Conservation

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
CHA	Critical Habitat Assessment
ESIA	Environmental and Social Impact Assessment
DEIA	Detailed Environmental Impact Assessment
GGSPA	Great Gobi Strictly Protected Area
GGSNP	Gobi Gurvan Saikhan National Park
KGP	Khundii Gold Project
MLA	Mineral Licence Area
TTNR	Tost, Toson Bumba Nature Reserve

6. BIODIVERSITY

6.1 Introduction

This Chapter of the Environmental and Social Impact Assessment (ESIA) describes the potential impacts on biodiversity during the construction, operation and closure phases of the Khundii Gold Project (KGP).

Project-related direct and indirect impacts are assessed in terms of the nature of the impact, the planned mitigation measures, the potential significance of the impact to biodiversity and the residual impacts and significance after mitigation measures have been implemented. All residual impacts and respective mitigation measures, impact management plan references and significance of residual impacts are summarised in Table 5 at the end of this Chapter.

6.2 Policy and Standards

Chapter *A2: Policy and Legal Framework* outlines the statutory national and lenders requirements that are expected to be applicable to the KGP.

6.3 Impact Assessment Approach

For the purpose of this assessment, the standard approach described in *Chapter A3: Methodology* has been adopted to characterise the significance of likely effects on biodiversity.

6.3.1 Scope of Assessment

6.3.1.1 Geographical Scope

The Project footprint Area of Influence (AoI) was determined as the area covering the following project components around the KGP Mineral License Areas (MLA):

- 10 km buffer areas covering both Khundii and Tsenkher Nomin MLA;
- 10 km buffer area covering the water exploration bore field area; and
- 500 m buffer area covering both sides of the mine site access road from Shinejinst *soum.*

Total overlapped area of the above areas is 1,230 km^2 and it covers the proposed haul road connecting the Tsenkher Nomin and Khundii MLAs, and proposed water supply pipeline between the water exploration field about three km south of the Khundii MLA and the Processing Plant (Figure 1).

The entire areas of Great Gobi Strictly Protected Area (GGSPA) Part A, Gobi Gurvan Saikhan National Park (GGSNP) and Tost, Toson Bumba Nature Reserve (TTNR) areas are determined as the KGP indirect potential AoI for large migratory mammal species..

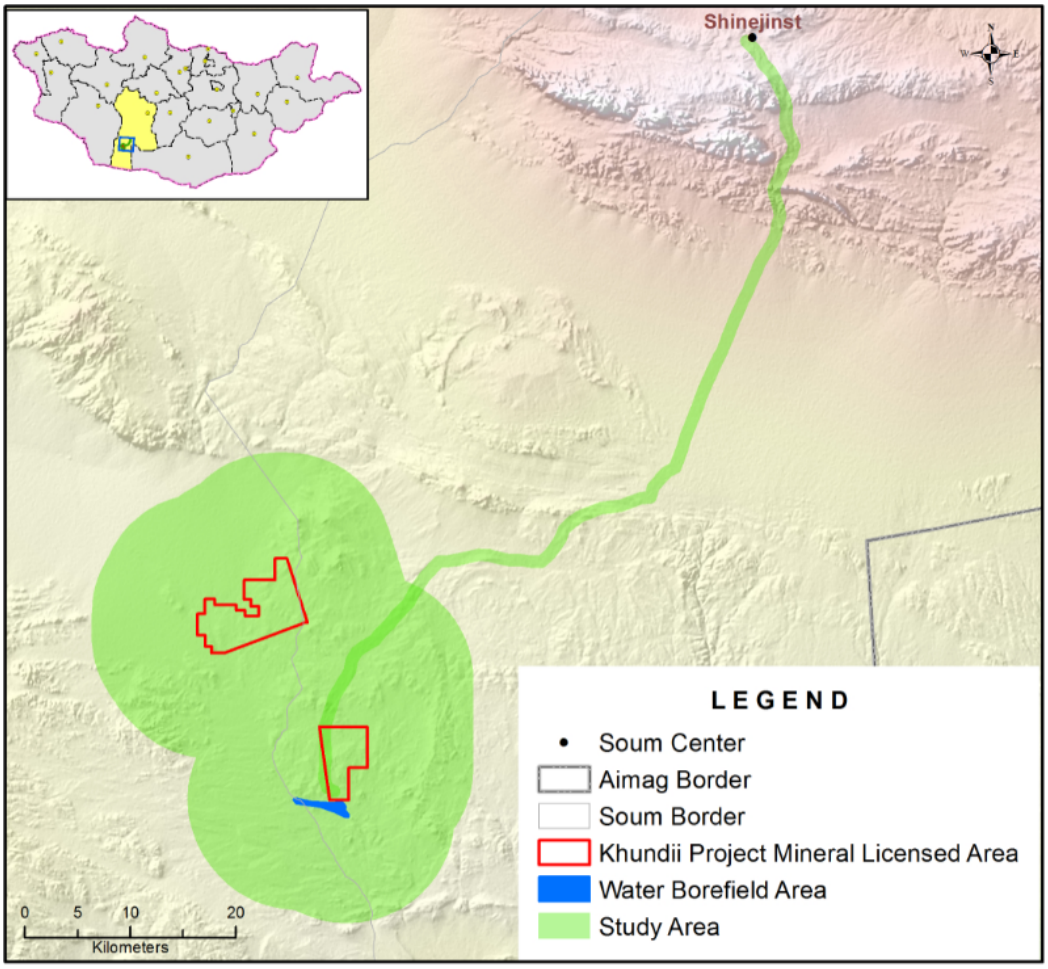

Figure 1 Khundii Gold Project Area of Influence on Biodiversity Species

6.3.1.2 Temporal Scope

The temporal scope covers the complete Project cycle, including the construction, operational and closure phases of the KGP.

6.3.1.3 Technical Scope

This Chapter assesses potential direct and indirect impacts on biodiversity features (i.e. flora and fauna) from the KGP activities during its construction, operation and closure phases. Proposed mitigation actions for each identified impact and assessment of residual impacts after mitigation are also included in this Chapter.

6.3.2 Significance Criteria

The significance of an impact is determined by a combination of the potential impact magnitude and sensitivity of the impact receptors. The matrix for combining sensitivity and impact magnitude to allocate the level of significance to an impact is presented in *Chapter A3: Methodology*.

The criteria used for allocating impact magnitude and receptor sensitivity are provided in Table 1 and Table 2, respectively.

Table 1 Magnitude of Biodiversity Impact Criteria

Impact Magnitude	Type of Impact
High	Impacts to biodiversity features that cause irreversible loss of species at regional level or habitat degradation that is not expected to recover to baseline within 10 years after rehabilitation.
Medium	Impacts to biodiversity features that cause reversible loss of species at regional level or habitat degradation that is expected to recover to the baseline condition within 3 - 10 years after rehabilitation.
Low	Noticeable impacts to biodiversity features that cause reversible loss of species at site level of habitat degradation that is expected to recover to the baseline condition with expected recovery period of 1-2 years following a completion of rehabilitation.
Very Low	Changes to the biodiversity species are indistinguishable to the natural background variation or habitat degradation that is expected to recover to the baseline condition with expected recovery period of less than 1 year after rehabilitation is completed.
Beneficial	The activities result in advantageous or positive effects to a resource or receptor

Table 2 Sensitivity of Biodiversity Receptors to Impacts

Impact Magnitude	Description
High	Biodiversity features listed as Critically Endangered (CR) or Endangered (EN) on the IUCN and Regional Red List of threatened species. All Critical Habitat Qualifying features (Table 3)
Medium	Biodiversity features listed as Vulnerable (VU) on the IUCN and Regional Red List of threatened species, All Priority Biodiversity Feature qualifying features (Table 4)
Low	All other biodiversity species not included in the threatened species lists or not designated as rare/very rare by Mongolian regulations

6.4 Potential Impacts

6.4.1 Sensitive Receptors

Sensitive receptors are defined as critical habitat trigger species or priority biodiversity features identified in the *Critical Habitat Assessment Report* (Appendix E1).

Sensitive receptors for the Critical Habitat and Priority Biodiversity Features are listed in Table 3 and Table 4, respectively. The sections below discuss the potential impacts to these receptors as a result of the construction and operation activities of the KGP.

Table 3 Sensitive Critical Habitat Biodiversity Receptors

Biodiversity Feature	EBRD Critical Habitat Criteria	Assessment Justification
Mammal		
Camelus bactrianus	ii. Habitats of significant importance to endangered or critically endangered species	IUCN **CR** species Mongolian Red List **EN** species
Equus hemionus		Mongolian Red List **EN** species

Biodiversity Feature	EBRD Critical Habitat Criteria	Assessment Justification
Uncia uncia		Mongolian Red List **EN** species
Ovis ammon		Mongolian Red List **EN** species
Ursus arctos gobiensis	iii. Habitats of significant importance to endemic or geographically restricted species	Mongolian Red List CR species
Gazella subgututurosa	iv. Habitats supporting globally significant (concentrations of) migratory /congregatory species	Listed as VU on both the IUCN and Mongolian Red List Rare species by Mongolian regulation
Reptile		
Cyrtopodion elongatus	iv. Habitats of significant importance to endemic or geographically restricted species	Known habitat meets restricted Range criteria of 50,000 km^2

Note: CR-Critically Endangered; EN-Endangered; VU-Vulnerable

Table 4 Sensitive Priority Feature Biodiversity Receptors

Biodiversity Feature	EBRD Priority Biodiversity Feature Criteria	Assessment Justification
Plants		
Amygdalus Mongolica	ii. Vulnerable species	**Rare** species by Mongolian regulation
Amygdalus pedunculata		**Rare** species by Mongolian regulation
Arnebia guttata		**Very Rare** species by Mongolian regulation
Asterothamnus centrali-asiaticus		**Very Rare** species by Mongolian regulation
Cistanche deserticola		**Very Rare** species by Mongolian regulation
Cynomorium soongaricum		**Rare** species by Mongolian regulation
Ephedra equisetina Bunge.		**Very Rare** species by Mongolian regulation
Iljinia Regelii		**Very Rare** species by Mongolian regulation
Incarvillea potanini Batal.		**Very Rare** species by Mongolian regulation
Oxytropis acanthacea		**Very Rare** species by Mongolian regulation
Oxytropis mongolica Kom		**Rare** species by Mongolian regulation
Peganum harmala L		**Very Rare** species by Mongolian regulation
Phragmites communis		**Rare** species by Mongolian regulation
Populus diversifolia		**Very Rare** species by Mongolian regulation
Saussurea involucrata Bip		**Very Rare** species by Mongolian regulation
Stellaria dichotoma L		**Rare** species by Mongolian regulation
Zygophyllum Potaninii Maxim.		**Very Rare** species by Mongolian regulation
Mammal		
Vormela peregusna	ii. Vulnerable species	IUCN VU species Mongolian Gov't designated **Rare** species
Capra sibirica		Mongolian Gov't designated **Rare** species
Birds		
Falco cherrug	ii. Vulnerable species	IUCN **EN** species
Chlamydotis undulata		**Very Rare** species by Mongolian regulation
Podoces hendersoni		**Rare** species by Mongolian regulation
Reptile		
Coluber spinali	ii. Vulnerable species	**Rare** species by Mongolian regulation
Eremias multiocellata		**Rare** species by Mongolian regulation
Phrynocephalus versicolor		**Rare** species by Mongolian regulation

Biodiversity Feature	EBRD Priority Biodiversity Feature Criteria	Assessment Justification
Habitat		
Saxaul forest	iv. Ecological structure and functions needed to maintain the viability of priority biodiversity features	Ecological structure and functions needed to support the **Very Rare** *Cistanche deserticola* species
Amygdalus Mongolica habitat		Ecological structure and functions needed to support the **Rare** *Podoces hendersoni* species

Note: CR-Critically Endangered; EN-Endangered; VU-Vulnerable

6.4.2 Construction and Operation Impacts

6.4.2.1 Impacts to Plants

Construction and operation activities have the potential to degrade or destroy terrestrial habitat directly through excavation, compaction or modification of soil that result in loss of vegetation or through contamination of soil or vegetation cover from accidental release of hazardous substances.

The construction of the KGP mine infrastructure, such as buildings, roads and open pit, may cause long term to permanent habitat loss. Total estimated disturbance area at KGP is about 213 ha (62 ha at Altan Nar and 116 ha at Khundii and 35 ha under site roads). About a one-third (29.9% or 63.6 ha) of the disturbance will be permanent under open pits. All other disturbance areas (i.e. buildings, waste rock dumps etc) are expected to be rehabilitated progressively during the mine operation (Figure 2).

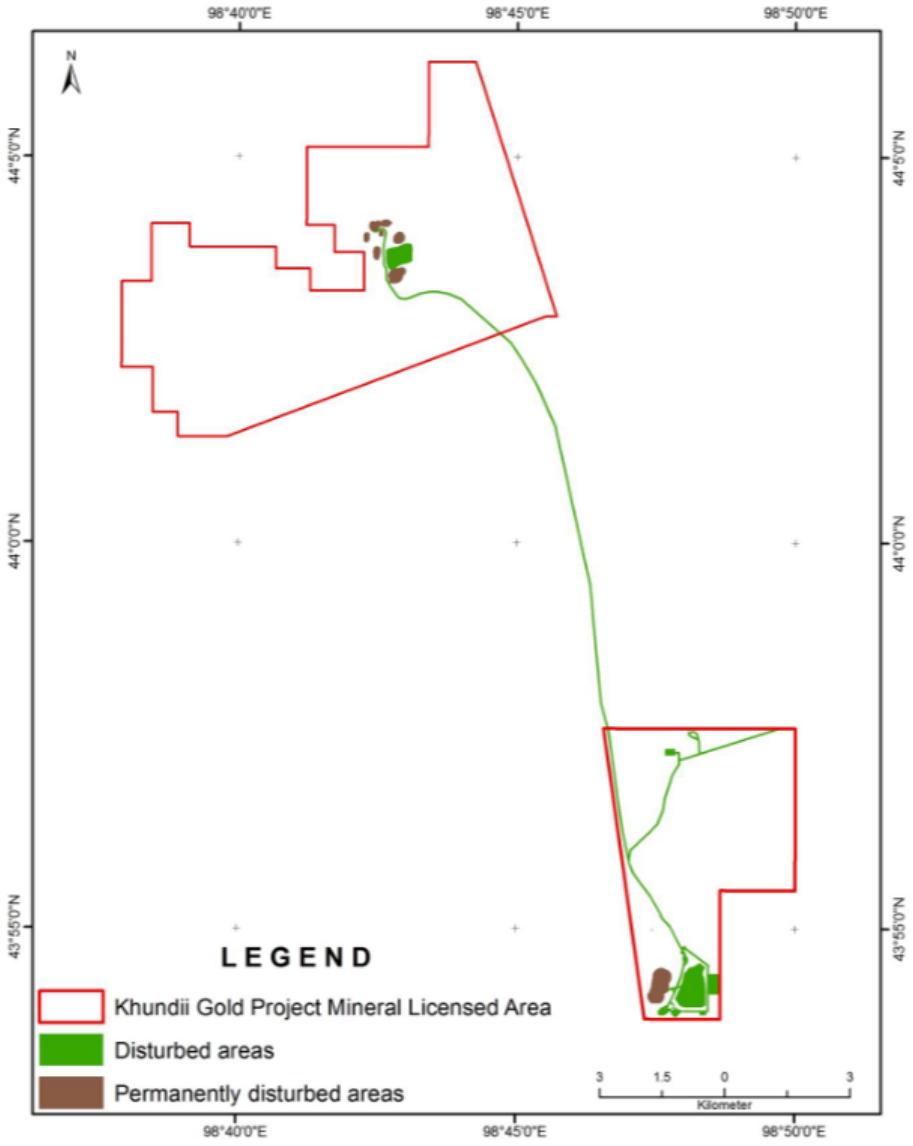

Figure 2 Locations of Main Disturbance Areas at KGP

Habitats supporting at least two priority plants species, i.e. brittle budara (*Iljinia Regelii*) and Potanin's bean caper (*Zygophyllum Potaninii Maxim*) may be lost under the KGP direct footprint (Figure 3). Other potential priority plant species likely to occur within or around the direct disturbance footprint are Acanthus oxytrope or whorled spiny oxytrope (*Oxytropis aciphylla*), Mongolian almond (*Amygdalus Mongolica*) and Central Asian Asterthamnus (*Asterothamnus centrali-asiaticus*). These species are designated as Rare or Very rare by Mongolian regulations and considered as Medium sensitivity receptors for this assessment.

During construction there will be additional areas (such as construction materials laydown area) that are likely to be temporarily disturbed. However, it is important to note that habitat loss will occur only in the direct footprint area of the Project infrastructure and this loss will persist until the completion of site rehabilitation during decommissioning. The land disturbance activities from construction of mining infrastructure will decrease significantly, if not completely cease, once the Project has embarked on the operation phase. Other direct potential impacts to vegetation include direct habitat loss from increased traffic during construction and accidental leaks or spillages from hazardous materials transport, storage and use. Direct vegetation habitat loss from vehicles traffic will be decreased significantly during mine operation as the mine traffic will be limited to existing haul roads during this period. These types of impacts could be mitigated, if not avoided altogether, by establishing and implementing suitable management plans.

Indirect potential impacts to priority plant species may include increase from the unauthorised gathering of rare or beneficial species by KGP Project workers. Potential increase in local population or changes in demographics due to resource development projects such as the KGP could also trigger elevated collection of beneficial species for trading for economic benefit. However, for the KGP, likelihood of sensitive plant species collection by community members is assessed to be very low as the Project site is located in remote areas with no other settlements within 70 km radius. There will be no economic activities around the project site that may attract in migration other than formal employment of on-site residents.

Uncontrolled dust emissions from vehicle movements and earthworks during the construction and operation of the mine could have potential impacts to vegetation. Increased dust deposition on plant foliage potentially impacts plant health by affecting photosynthesis, respiration, transpiration and causing decreased productivity or changes in community structure. Increased dust on pasture is of great concern for local herders in the region, as informed by the Social baseline survey in August 2019. Operational traffic dust impacts will be limited to the active mining areas as opposed to the construction phase.

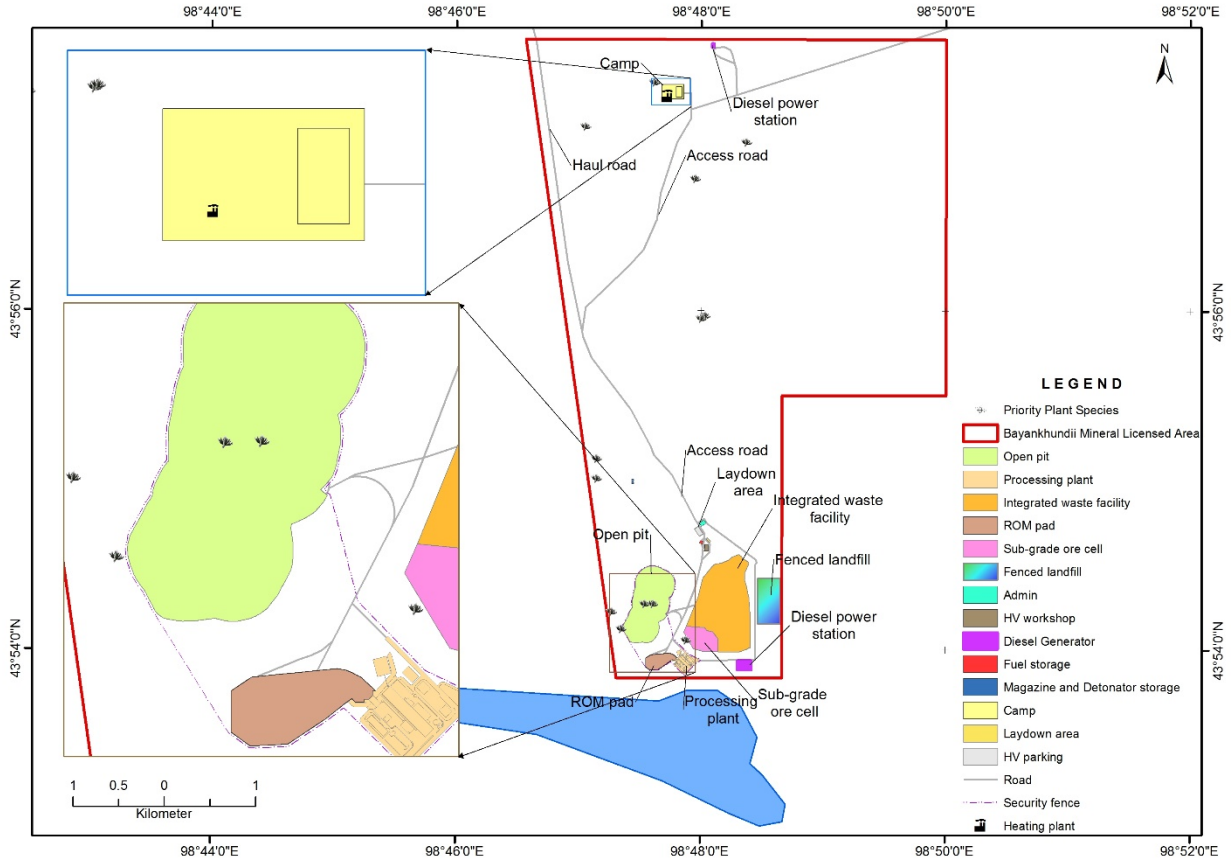

Figure 3 Observed Priority Plant Species and Mine Footprint Areas at Khundii

Mitigation Measures

Avoiding impacts to plants during construction and operation will entail different strategies for different components of the project. In all cases, the Project will implement the Land Disturbance Permit that requires conducting a fit-for-purpose pre-disturbance survey to identify Priority plants and soil types; and evaluating potential engineering and design changes to avoid impacts to plants. Priority plants found in the areas disturbed by the KGP will be subject to relocation where possible. Where relocation of individual species is not practical, these species will be subject to revegetation trials of disturbed areas after construction. During exploration at Bayan Khundii, Erdene established an onsite greenhouse nursery to test growing rare and local plant species by collected seeds. Rehabilitation and revegetation will occur for areas of temporary disturbance due to Project construction activities to the extent possible and where vegetation can exist.

The planned water supply pipeline and some access roads within the mine site may present the most flexibility for avoiding impacts to plant communities in general and Priority Plant species in particular due to the relatively small percentage of the area that will be occupied with infrastructure and required construction activities. In contrast, the KGP mine infrastructures present the least amount of flexibility for avoiding impacts, due to fairly constrained specifications for siting different project elements.

The KGP will develop and enforce policies for using only designated roads and limiting speeds for all Project related vehicles for onsite and offsite traffic to avoid unnecessary habitat degradation and dust generation. Erdene already started regulating site traffic during the exploration phase at the Project site by closing some roads and directing and requiring all site

traffic to use approved roads with erected warning and direction signs. New unpaved roads tend to widen over time as new tracks are developed to go around deeply rutted areas. The Project may minimise this risk by implementing best management practices in the construction and maintenance of unpaved roads, to prevent the formation of impassable sections. Other mitigation actions include restricting vehicles from parking beside roads, or leaving roads, except in an emergency or to manage fatigue and to engage with stakeholders to encourage the same behaviours, and watering of active dust generating areas such as mine site roads for dust suppression.

The KGP will develop fit-for-purpose biodiversity induction training for all Project employees and site visitors for awareness that is focused on the significance of priority biodiversity features, company policy and requirements for priority species management.

Residual Impact

After the application of mitigation and rehabilitation actions, the magnitude of construction impacts to vegetation is determined to be Low due to the absence of critical habitat for plants. In addition, all areas that are temporarily disturbed during construction will be rehabilitated following the construction phase. The KGP activities are therefore determined to have **Negligible** to **Minor Adverse** residual impacts to the sensitive receptor plant species as the impacts are likely to cause noticeable changes to the baseline conditions, but are not expected to cause hardship degradation, or impair the function and value of the species for longer term.

6.4.2.2 Impacts to Mammals

Wild camel or *khavtgai* in Mongolian (*Camelus bactrianus*), khulan (*Equus hemionus*), snow leopard (*Uncia uncia*), argali (*Ovis ammon*), Gobi bear or *mazaalai* (*Ursus arctos gobiensis*) and goitered gazelle (*Gazella subgututurosa*) species are considered for this assessment as mammal species with High sensitivity. Marbled polecat (*Vormela peregusna*) and Siberian ibex (*Capra sibirica*) species are considered as Medium sensitivity species for this assessment.

Resource development projects in remote greenfield areas could fragment wildlife habitat by constructing linear infrastructure, such as roads. Proposed linear infrastructure at the KGP site include localized water supply pipeline with combined length of about 5 km and on-site electricity transmission overhead line. Habitat fragmentation assessment was scoped out for this assessment considering the proposed linear infrastructures' limited coverage within a few kilometres around the KGP mine development area in the Khundii MLA.

Khavtgai

According to the IUCN Assessment (Hare 2008) the closest existing khavtgai range is about 100 km to the south-west range in Nomin and Shargiin Gobi south of the Edrengiin Nuruu. In rare occasions, mostly during winter, khavtgai moves to Ingen khuuvriin hooloi and Nemegtiin hooloi Gobi (MET 2014). These places are about 70 – 150 km south-east to east of the KGP site.

The main threats to this species are hybridisation with domestic camels (IUCN 2019) inadvertently or advertently by local herders to raise racing camels. Hybridisation with domestic camels poses potential threats to this species through disease transmission (Walzer and Kaczensky 2005). Other threats to khavtgai include habitat lost from domestic animals, decreasing surface water

resources due to climate change, predation on young camels by wolves, and habitat avoidance from traffic (IUCN 2019; MET 2014).

The potential threats from KGP Construction activities to khavtgai and its habitat are limited to indirect impacts via avoidance, and potential mortality risk from traffic collision during construction materials transport from the Chinese border via Gurvantes soum of Umnugobi aimag, in winter. However, likelihood of this happening is very low owing to the fact that Khavtgai move to these areas in rare occasions during winter, and the limited number of population and construction traffic. Leisure or subsistence hunting of this species by Project personnel is highly unlikely due to the great distance between the mining site and khavtgai habitat and the fact that this species is not known for sport hunting (World Bank 2006). Therefore, it is concluded that the KGP construction activities potential impact magnitude to khavtgai will be Very Low.

The KGP operation is not expected to create significant direct or indirect impacts to khavtgai species due to the long distance (about 100 km) between the species habitat and the mine activities which will be limited to the mine site area.

Khulan

The khulan range in Mongolia includes steppe, semi-desert, and desert habitats, from the extreme west of the country to the Mongolian-Russian-Chinese border in the extreme north-east. Khulan experienced a major decline in population and range size and are currently only found in the Trans Altai Gobi Desert, Northern Gobi, Alashan' Gobi Desert and Dzungarian Gobi Desert, and as far north as Ikh Nartiin Chuluu Nature Reserve in Eastern Gobi (Clark et al. 2006). There are important populations in the GGSPA Part B in Dzungarian Gobi, and GGSPA Part A.

Due to the variability in plant productivity in its habitat khulan migrates between suitable pastures, particularly in times of drought or harsh winters. Khulan has not been reported close to the KGP area, but it is well-observed to occur in its known habitat to the south and south-west. The closest khulan range to the KGP site is about 25 km in the south-west of the KGP MLAs, in the south of the Edrengiin Nuruu.

No direct habitat loss is expected from the KGP development to khulan habitat. Potential indirect impacts to khulan may include temporary habitat loss due to avoidance from the mine construction materials transport from the Chinese border during construction phase. However, considering the limited volume of construction transport with an average traffic volume of 4-5 trucks per day[1] the indirect avoidance impact magnitude is assessed to be Very Low.

Traffic collision is a potential impact to large mammals from increased traffic during construction, but given the khulan species behaviour to avoid traffic and the limited traffic on open terrain with good visibility, the likelihood of these impacts occurring is very low.

Changes in local population demographic from in migration is seen as potential indirect impact to rare species such as khulan through increased hunting and gathering, but this impact is considered very low for KGP case due to the remoteness of the Project *soums* end limited economic opportunities to attract more people in the area.

[1] Bulk of the materials and equipment transport is planned to be completed within the first six months of construction

The KGP operational traffic impacts to khulan habitat are expected to be negligible, given the very low volumes (4 truck per year) of traffic.

Considering the temporary nature of the potential habitat avoidance and low likelihood of the potential indirect impacts occurring, the magnitude of KGP impacts to khulan species is assessed Very Low.

Snow leopard

Snow leopard distribution range in Mongolia is estimated to be around 103,000 km^2, with most sightings occurring in central Trans Altai Gobi Desert and the northern Gobi Altai Mountain Range. Gichgenii nuruu and Jinst uul in the north-east and Edrengiin nuruu in the south-west, about 10 – 20 km, respectively, from the KGP site are the closest snow leopard habitat to the KGP.

The main threats to this species' population globally and within Mongolia are reported to be illegal hunting for traditional medicine, decreasing population of its prey (i.e. Siberian ibex and argali), habitat loss from increasing number of domestic animals and resource development projects (Clark et al. 2006, MET 2014).

No direct loss is expected from the KGP construction and operation on snow leopard habitat as this species occurs in mountainous areas and the KGP footprint AoI does not overlap with its habitat. Temporarily, habitat loss through avoidance of construction materials transport through the Tost, Toson Bumba Nature Reserve area may present some indirect potential impact to snow leopard habitat during the mine construction and operation period. Likelihood of snow leopard traffic mortality is very low due to this species' elusive behaviour to avoid human and its preferred habitat of rocky hills and mountains. The KGP project construction is not expected to impact on snow leopard's prey species. Therefore, it is concluded that the magnitude of the KGP construction and operation impacts to snow leopards is Low to Very Low.

Argali

The current distribution of argali in Mongolia covers large areas including the mountains of Mongol Altai, Gobi Altai, Dzuungarian Gobi Desert, Trans Altai Gobi Desert, Alashan Gobi and Dornod Gobi from the north of the Gobi Region, to the south of steppe, forest steppe and mountain taiga. There are also some argali populations around the Central Khalkha Mountains, Khan-Khukhiin Mountain, Khangai Mountain, and the Arsain River in Khuvsgul Province.

The principal anthropogenic threat to argali is illegal or unsustainable hunting, particularly for trophy hunting, while severe weather conditions (droughts and harsh winter) cause high mortality for this species (Clark et al. 2006).

The KGP area is located in the Argali habitat range in south-western Mongolia. Direct habitat loss to argali habitat in the region is considered low due to the small direct footprint (i.e. about 1.15 km^2) of the Project. KGP's planned mining infrastructure will have little direct footprint in rocky-outcrop hills, which is known habitat for argali. Direct mortality from collision with vehicles is a potential risk, but its likelihood of occurring is considered to be very low owing to the lack of roads in argali preferred habitat in rocky-outcrops. Poaching of argali by the Project personnel during the construction period is considered very unlikely given the remoteness of the site, and fly-drive-in, drive-fly-out and bus in, bus-out personnel transfer with on-site accommodations.

The main impact to argali habitat during the KGP construction is likely to be temporary indirect habitat loss from avoidance. The preliminary traffic study for the KGP construction identified a

potential transport routes between the Shivee Khuren border point in Gurvantes soum and the KGP site via Bayanlig and Shinejinst soums (Monrud 2019). Sections of the route overlap with potential argali habitat in the region in two areas, between Bayanlig and Shinejinst soums, and Shinejinst and Khundii MLA. The maximum estimated length of these overlaps is about 200 km, but magnitude of this avoidance impact is considered to be Low given the fact that these roads already exist, the temporary nature of the potential impact and the low traffic volume of 4-5 trucks a day, including return trips. Operation phase traffic impacts to argali are expected to be negligible as the total traffic volume is expected to be very low.

Mazaalai

Mazaalai's estimated home range in Mongolia is about 18,000 km^2 within the GGSPA Part A (MET 2014). Mazaalai occurs in the Atas Bogd, Shar Khulsan and Tsagaan Bogd mountains in areas with oases. Distance between the mazaalai known habitat range in the GGSPA Part A and the KGP MLAs is about 80 km .

Inbreeding and low reproductive rates due to small population size make the Gobi bear vulnerable to environmental change and biotic factors, such as disease (Clark et al. 2006). Harsh environmental conditions and decreases in surface water (i.e. drying of oases) and potentially exacerbated with climate change are also reported as threats to this species' survival (Clark et al. 2006).

No direct or indirect significant impacts are expected from the KGP construction and operations to this species as the Project footprint AoI is located sufficiently away from Mazaalai's restricted range, and no KGP construction traffic is expected to overlap with this species' habitat.

Goitered gazelle

Goitered gazelle is considered a migratory species due to its migratory movement searching for pasture and water. The goitered gazelle range stretches from south-eastern Mongolia to the south Caucasus, and through northwest China, Central Asia, Iran, Afghanistan and Pakistan. Illegal hunting is the primary cause for this species' population decline, but competition for resources from increased livestock numbers and habitat fragmentation from large scale infrastructure projects such as fenced roads and railway and human disturbances are also known threats to this species.

This species' Mongolian range is estimated to be over 500,000 square kilometres covering much of the Dzungarian Gobi Desert, Great Lakes Depression, Valley of the Lakes, Trans Altai Gobi Desert, Eastern and Alashan' Gobi Desert areas. The KGP footprint AoI is located on the goitered gazelle species habitat range. The 2017 and 2019 Environmental baseline surveys recorded goitered gazelle presence in the KGP area (Eco Trade 2019).

Increased traffic between the KGP site and the Chinese border in Gurvantes soum of Umnugobi aimag during construction may cause temporary indirect habitat loss along the transport corridor through avoidance and potential direct mortality from collision with transport vehicles.

It has been reported that goitered gazelles are accustomed to stay within close proximity of mining infrastructure in remote areas, even residing in mining fenced areas for longer periods without avoiding roads and traffic (WCS 2015). This behaviour increases the risk of vehicle collision with the 'resident' animals onsite as was observed on paved roads around some mining sites in southern Mongolia (WCS 2015). Direct mortality risk from vehicle and goitered gazelle collision is

low to medium for KGP given the fact that the construction and operation traffic roads are unpaved which limits vehicle speed, and the proposed mitigation measures in place.

The KGP mine infrastructure footprint is expected to cause some limited direct habitat loss to goitered gazelle habitat, while an increased traffic and human presence will likely create habitat avoidance indirectly during both construction and operation. Direct habitat loss is assessed as Negligible due to its small footprint within the mine site and this migratory behaviour, but the avoidance impacts may be larger initially including the areas along the construction roads.

It is concluded that the magnitude of the KGP construction phase impacts to goitered gazelle is Low.

Marbled polecat

Marbled polecat is listed as Vulnerable on the IUCN Red List, Near Threatened on the Mongolian Red List of threatened mammals, and designated as a 'rare' species by Mongolian regulations. The KGP site overlaps with this species' habitat range in Mongolia, occupying the entire southern and south-western Gobi regions and the Great Lakes depression areas.

Loss of habitat from cultivation and decline in its prey species are the main threats to this species globally, but occasional accidental mortality through traps intended for other species is the main threat to this species in Mongolia (Clark et al. 2006). There is no known sale or trade for this species fur or meat.

Marbled polecat is not a migratory species; thus, the Project potential impacts are conservatively expected to be local - within the direct footprint AoI for this assessment. Potential direct KGP impacts to this species include habitat loss from construction footprint and vehicle collision. Avoidance from increased and permanent human presence during construction activities could potentially cause indirect habitat loss impacts. However, with the localised potential impacts and low likelihoods of occurring, the impact magnitude is assessed as Low.

Siberian ibex

Siberian Ibex (*Capra sibirica*) is not listed as threatened on either the IUCN (LC) or Mongolian Red List (NT), but designated as 'rare' by Mongolian regulations.

Its Mongolian habitat range is fragmented in central and eastern Mongolia, with the main habitat being the rocky outcrops or steep terrain throughout Trans Altai Gobi Desert throughout south-western and eastern parts of Gobi Altai, Hangai and Khuvsgul mountain ranges. The closest Siberian ibex habitat to the KGP are the Edrengyn Nuruu, about 20 km to the south-west, and Jinst Uul, about 50 km in the north-east of the KGP site.

Illegal hunting for meat or trophies, and habitat loss from increased livestock grazing and resource development are believed to be the main man-made threats to this species population in Mongolia (Clark et al. 2006).

The KGP site and its footprint AoI are not located on the Siberian ibex habitat range in south-western Mongolia, thus no direct habitat loss to Siberian ibex is expected. Other potential direct impacts may include mortality from traffic collision, however given the unlikely overlaps between the mining related roads and the species rocky-outcrop habitat, the collision risk is considered low.

Potential indirect impacts from KGP construction to Siberian ibex may include poaching by the Project personnel and temporary habitat avoidance from construction traffic. But, the likelihood of poaching by the Project personnel during the construction period is considered very unlikely given the remoteness of the site, and fly-drive-in, drive-fly-out and bus in, bus-out personnel transfer with on-site accommodations with permanent security personnel at the site.

Construction materials transport from China to the KGP site will pass through Siberian ibex habitat in the Nemegt Uul area (about 40 km stretch) in Gurvantes soum. The existing route is a public access road and the KGP's limited construction transport is not likely to cause additional impact to Siberian ibex habitat.

The Ulaanbaatar to KGP site route passes through Siberian ibex habitat in three areas; part of the Khangai mountain (about 50 km stretch) south of Bayankhongor city, stretches between Bayantsagaan Mountain and Ikh Bogd (about 70 km), and Jinst Mountain (about 30 km stretch) near Shinejinst soum. However, the construction traffic is not expected to increase significant avoidance on these roads by ibex as these roads have been public roads linking the aimag and soum centres for decades. The additional traffic increase on these roads during the construction will be about 7-8 vehicles per day including return trips for building material and people transport during the construction period of 12 months. Operation traffic increase of maximum of 4 trips per day on the existing public road is not expected to create avoidance by Siberian ibex.

Based on the above, magnitude of the KGP construction and operation impacts to Siberian ibex is considered to be Low to Very Low.

Mitigation Measures

A range of measures have been proposed to mitigate the potential impacts on mammal species from the KGP construction and operation activities. Traffic and transport related impact mitigation actions are important due to the greater potential impacts related to potential mortality from vehicle collision and avoidance by large ungulate species.

Measures to mitigate potential impacts to mammals species are:

- Only designated roads will be used, and vehicle speed limits will be enforced to minimise the risk of road accidents with wildlife;
- Vehicles are restricted to travel during daylight hours only wherever possible;
- Construction materials traffic to be organised in convoys to reduce the avoidance impact duration;
- Vehicle speeds restricted through driver education and enforcement;
- All Project personnel are provided with biodiversity awareness training including information on all Critical Habitat and Priority Biodiversity Feature Species;
- Vehicles are restricted from parking beside roads, or leaving roads, except in an emergency or to manage fatigue;
- Consultation on traffic awareness with community groups affected by the Project and related traffic;

- Identify road sections with wildlife crossings through informal or formal observations and erect warning signs or impose vehicle speed limits if deemed necessary;
- No food waste left open or accessible to avoid wildlife gathering around the site and along the transport routes by the Project vehicles;
- Pre-clearance site inspection to be carried out for marbled polecat den presence in direct footprint areas; if found, ensure the safe capture and release of marbled polecats
- No domestic pets (dogs or cats) to be kept onsite by Project personnel to prevent preying on wildlife such as marbled polecat; and
- No-hunting policy to be developed and enforced including periodic inspection of Project and contractors vehicles for wildlife products.

Residual Impacts

Potential impacts of the KGP construction and operation activities to the mammals species of concern will be mainly through habitat avoidance from increased human presence at the mine site and building materials transport. No direct impacts are expected except potential vehicle collision with goitered gazelle and marbled polecat. However, duration of construction is limited to an anticipated maximum of 12 months, and the direct footprint of the mine is relatively small compared to the wider habitat distribution of the mammals. Therefore, residual impacts to the mammal species in this study are assessed to be Negligible to Minor adverse after the mitigation measures are applied. Impacts of Minor significance are not expected to cause hardship, degradation, or impair the function and value of the receptor, while the Negligible impacts are expected to be within natural variation.

See Table 5 for summary of the mitigation measures and residual impacts on biodiversity species.

6.4.2.3 Impact to Birds

Three species of birds, saker falcon (*Falco cherrug*), houbara bustard (*Chlamydotis undulata*) and Mongolian ground jay (*Podoses hendersoni*) have been identified as Priority Biodiversity Features for the KGP due to their high value conservation status. Sensitivity of these receptors are considered as Medium for houbara bustard and Mongolian ground jay, but High for the saker falcon.

The saker falcon is listed as EN on the IUCN Red List and Vulnerable on the Mongolian Red List due to its decreasing global and regional population. Saker falcon habitat range stretches from eastern Europe to China in the east, central Siberia in the north, to the Arabian Peninsula to the south. The KGP area and its footprint AoI is located 40 km outside of the known habitat (IUCN 2019) for saker falcon. However, this assessment conservatively treated the KGP AoI as part of the saker falcon range given the species mobility.

Houbara bustard is listed as VU on both IUCN and the Mongolian Red List. In Mongolia, overgrazing at breeding and feeding sites, impacts from mining extraction activities on breeding success, habitat loss from infrastructure development and mortality from power line collision etc. are identified as the major threats to this species (Gombobaatar and Monks 2011). The KGP and its AoI overlaps with the houbara bustard distribution range. The environmental baseline survey, by Eco Trade (2019) observed this species on four occasions in the Khundii MLA area.

Mongolian ground jay is listed as LC on the IUCN Red List, but assessed as VU by the Mongolian Red List of threatened bird species. This species' Mongolian habitat distribution covers south-western and western parts of Mongolia including desert and desert steppe areas, Mongol-Altai and Gobi-Altai mountain ranges, Uvs and Great Lakes depressions. Threats to Mongolian ground jay include illegal hunting due to misunderstandings that its meat can be used for healing purposes, and loss of habitat, especially decreases in bush-type vegetation which provide nesting habitats for this species (MET 2014).

Mine construction and operation activities may have a variety of adverse impacts to birds, ranging from avoidance of high activity areas during overflights to destruction of nesting habitat and disruption of breeding behaviour including nest abandonment. Electrocution from overhead power transmission line is also known to have a potential impact.

Nest destruction for saker falcon due to the KGP construction activities is unlikely as this species typically nest in trees or other structures which the KGP site is currently lacking. On the other hand, the construction phase may impact nests and nesting habitat of Houbara bustard and Mongolian ground jay as they use small bushes and saxaul often for their nesting and resting. For example, in southern Mongolia the Mongolian ground jay almost exclusively uses Mongolian almond (Amygdalus mongolica) for its nesting habitat (134 out of 142 nests) followed by saxaul (*Haloxylon ammodendron*) and other bushes (8 out of 142 nests) (Valentin et al. 2017). Houbara bustard breeds and rests in saxaul forest or bushy areas, so any threat to these species directly impacts this species habitat (Gombobaatar and Monks 2006).

Bird nest conservation importance varies, dependent on the species, but all nests are highly sensitive[2]. However, bird nest destruction or nest abandoning impacts are readily avoidable using best practices prior to and during construction. Nest destruction or abandonment is an adverse, medium magnitude impact (birds may successfully nest at alternate locations later in the breeding season), it is short-term (likely only during one nesting season), and it is reversible (birds may return to nest in the area once construction is complete). The extent of the impact to bird nests is generally limited to direct footprint areas under construction including laydown areas. Thus, direct bird habitat loss from KGP construction is not expected to be significant when appropriate mitigation measures are in place.

Collisions and electrocution of raptors is well known in Mongolia due to their habit of perching on elevated infrastructures such as electricity transmission towers to look for prey (Dixon et al. 2017). The impact of potential collision with powerlines at KGP site is considered severe and irreversible, but the likelihood is low as the powerlines are to be erected within the mine development area and for the workers camp, which the sensitive bird species are expected to avoid anyway.

The main indirect impact to bird species from the KGP construction is avoidance of habitat due to the increased and permanent presence of people and other construction related impacts such as increased levels of noise, light and dust. Increases in other predatory species such as common raven (*Corvus corax*) may also indirectly impact other birds species through predation. The indirect avoidance impacts are not expected to present significant impacts to sensitive bird receptors due to the limited size of the mine site mobility of the species concerned and the

[2] Guidance Note: EBRD PR6 recommended Bird Directive bans all activities that directly threaten the survival of wild birds including the destruction of nests

Based on the above assessment it is concluded here that the magnitude of KGP impacts to bird species is Low as the impacts are local with limited duration and are reversible, except for potential electrocution and collision.

Mitigation Actions

Instances of electrocution of birds along power lines due to simultaneous contact with conductors is avoidable by spacing conductors sufficiently far apart. Other sources of electrocution can also be avoided by implementing modern design and construction methods (e.g., Dixon et al. 2018). Bird diverters on powerlines can be effective at reducing the frequency of collisions with powerlines, but diverters can be expensive to install and have a high failure rate (e.g., Dashnyam et al. 2016 and Sustainability and WCS 2018).

The following measures will be implemented to mitigate the potential impacts from the KGP construction to bird species, in particular to sensitive species:

- Undertake pre-disturbance ground surveys especially in areas with Mongolian almond and saxaul species to avoid nest destruction;
- Dissuade nesting activity in the construction areas with large bushes such as Mongolian almond and saxaul where Mongolian ground jay and houbara bustard may breeds prior to nesting season by using fit-for-purpose bird dispersal methods;
- Provide biodiversity awareness training to all employees on sensitive bird species and their identification;
- Use avian friendly design for the site power towers and lines to prevent electrocution especially for saker falcon;
- Monitor bird mortality onsite and take necessary additional mitigation actions to minimize the identified threats if necessary; and
- Limit, as possible, the accessibility of food waste to birds such as ravens that prey on other bird species eggs and nestlings.

Residual Impacts

Impacts of the Project to birds are limited to those arising from construction activities and potential disruption to non-priority ground-nesting birds and potential collision of birds with the distribution line at the final stages of construction and operation. Given the small mine site area, compared to the species distribution range, and the limited power lines within the mine site, the KGP impact magnitude to the sensitive bird species is considered Very Low.

With above mitigation measures in place and enforced, and taking into consideration the limited footprint of overhead powerlines (i.e. about 5 km) and the Project AoI, it is concluded that the overall impacts to the sensitive bird species is to be **Negligible**. The residual impacts are not expected to create distinguishable changes to the sensitive bird species habitats or population from the baseline level.

6.4.2.4 Impact to Reptiles

Four species of reptiles that occur in the KGP AoI are identified as sensitive reptile species. These species are slender racer *(Coluber spinali*), multi-oscillated racerunner *(Eremias multiocellata),*

tuva toad-head agama (*Phrynocephalus versicolor*), and the gobi naked-toed gecko (*Cyrtopodion elongatus*). These species are assessed as Priority Biodiversity Features or Critical Habitat Trigger species in the *Critical Habitat Assessment Report* (Annex E1).

The Mongolian distribution range of slender racer, tuva toad-head agama and multi-oscillated racerunner species mostly overlaps on the southern and south-western Gobi regions with desert landscape with small bushes. Tuva toad-head agama and multi-oscillated racerunner species habitat extends from the southern Gobi region to the Great Lakes Valley to the north-west. These species are the most abundant reptiles in Mongolia with a stable population (Terbish et al. 2006). On the other hand, the gobi naked-toed gecko is considered a restricted range species due to its limited habitat range of about 28,500 km^2, and listed as Vulnerable on the Mongolian Red List of Threatened Reptile species.

The main threat to these species is believed to be consecutive years of drought, which reduces these species food source insects. Unsustainable use of bushes for fuel use and habitat loss from resource development projects are also potential threats to reptile species in southern Mongolia (Terbish et al. 2006; MET 2014).

The KGP footprint and its AoI overlaps with the sensitive reptile species habitat. Thus, the development of the mine will impact species habitat through direct land clearance. Accidental vehicular mortality may also be a potential impact.

Indirect impact to the reptile species during construction and operation may include increases in their predatory species such as common ravens and long-eared hedgehog, which are attracted to open food waste from mining camps or the presence of domestic cats or dogs onsite.

Magnitude of the KGP impacts to the sensitive reptile species is assessed as Very Low to Low.

Mitigation Actions

The following mitigation measures will be implemented to reduce the potential impacts to the sensitive reptile species:

- Provide biodiversity awareness training to all employees on sensitive reptile species and their identification;
- Undertake pre-disturbance ground survey for areas to be disturbed and remove reptile species of concern;
- Identify potential reptile collision areas along the mine site roads and erect warning road signs or restrict vehicle speed to safe level to avoid accidental vehicular mortality; and
- Limit the accessibility of food waste to scavenging species, as possible, that prey on reptile species.

Residual Impacts

With the mitigation actions applied to avoid the potential impacts, the residual impacts of KGP construction to the sensitive reptile species are determined as Negligible for this assessment, as the potential residual impacts are not expected to cause significant changes to the baseline conditions beyond natural level of variation.

6.4.2.5 Impacts to Existing Protected Areas

There are no IUCN listed Threatened Ecosystems, Important Bird Areas (IBA) or Ramsar Convention sites in the KGP area. The closest IBAs to the KGP project site are the Ikh Bogd Mountain and Gobi Gurvan Saikhan IBAs situated about 140 km north-east and 270 km east, respectively, of the site. The Valley of the Lakes Ramsar Convention site is situated about 170 km north of the KGP site.

The closest protected areas (Figure 4) to the KGP site are:

- Great Gobi Strictly Protected Area Part A (27 km south-east);
- Gobi Gurvan Saikhan National Park (48 km east); and
- Tost, Toson Bumbiin Nature Reserve Area (70 km south-east).

Bor Khairkhan and Nogoon Tsav locally protected areas are located in close proximity to the KGP site.

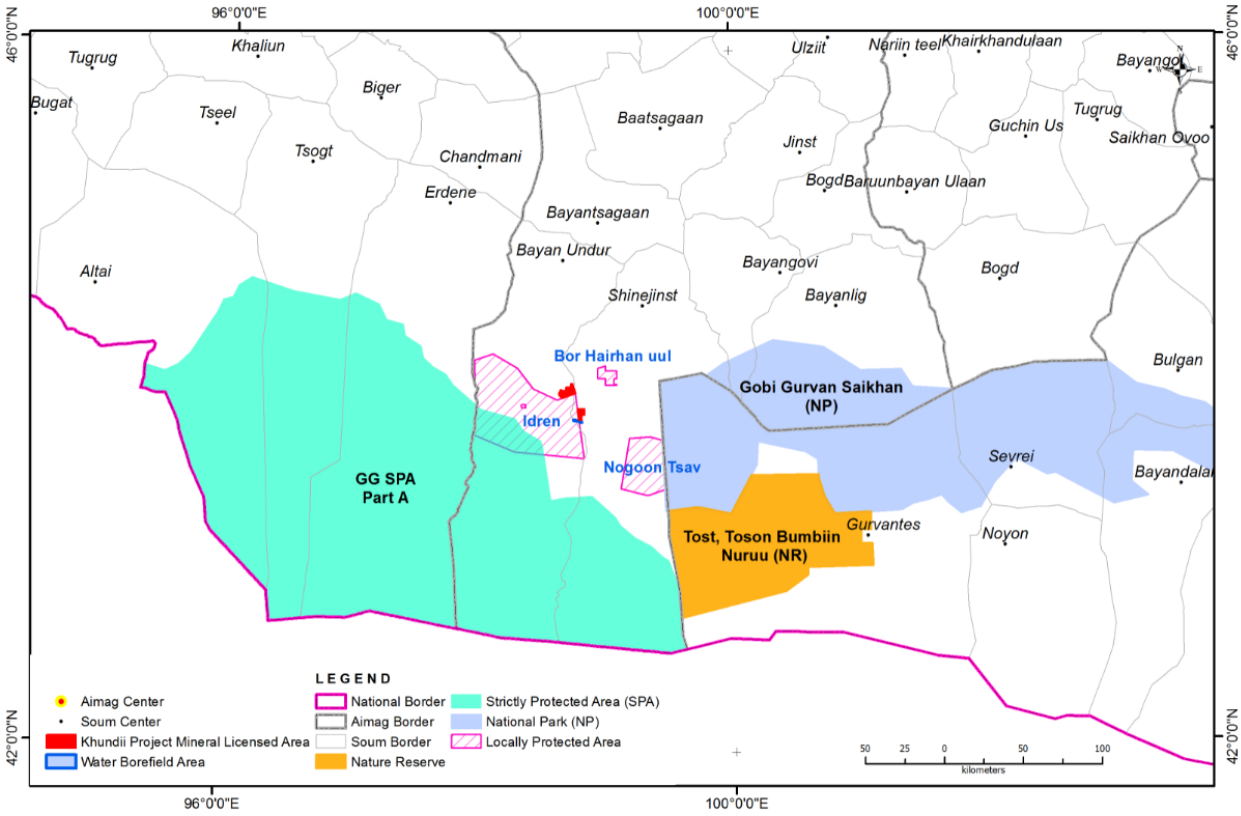

Figure 4 Location of Khundii Gold Project Site and Protected Areas in South-Western Mongolia

Potential impacts associated with the KGP construction activities to protected areas are those related to increased vehicular traffic during construction through the Gobi Gurvan Saikhan National Park with an estimated average daily traffic 4-5 trucks during six months of construction. The construction materials transport will use existing roads within the protected area without creating any new tracks. Some limited spot upgrading of existing tracks may be required to enable safe passage (Monrud LLC 2019). Site access road from Shinejinst soum does not cross any

existing protected areas. Based on the limited volume and duration of the traffic it is concluded that no significant habitat loss or degradation will be caused by the KGP activities to the protected areas.

No other adverse physical impacts are expected from the KGP construction activities to the other protected areas as the construction activities will be limited within the project footprint AoI. Nevertheless, potential stakeholder concerns surrounding the KGP transport activities in the protected areas, need to be considered.

The below mitigation measures are recommended to be implemented to avoid potential impacts to protected areas and address stakeholders concerns:

- Consult with the Strictly Protected Area Management about potential traffic impacts and management plans of the Project;
- Only use existing roads;
- Organise the construction traffic in convoys;
- Restrict vehicle speeds through driver education and enforcement;
- Plan long distance travels by KGP and contractors during daylight hours, as possible; and
- No off-road driving or parking beside roads except in an emergency or to manage fatigue.

Residual Impacts

With above mitigation measures in place and enforced, magnitude of the construction traffic on protected areas will be Very Low because the degradation or loss to the viability or function of the protected areas is deemed to be indistinguishable from its baseline condition after the construction period traffic.

The receptor protected areas are ranked as having Medium sensitivity taking into account the temporality of the impact. The residual impact following mitigation is assessed as Negligible.

6.5 Summary of Residual Impacts to Sensitive Biodiversity Features

The KGP potential impacts to relevant sensitive biodiversity features, proposed impact mitigation measures and residual impacts are summarised in Table 5.

Table 5 Summary of Khundii Gold Project Potential Impacts to Biodiversity, Mitigation Measures and Residual Impact

ID	Impact	Sensitive Receptors	Phase			Pre-mitigation Impact	Enhancement/Management/ Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo				
Plants									
BD01	Direct habitat loss from mine construction, and potential land disturbance activities during construction	*Amygdalus Mongolica* *Amygdalus pedunculata* *Arnebia guttata* *Asterothamnus centrali-asiaticus* *Cistanche deserticola* *Cynomorium soongaricum* *Ephedra equisetina Bunge.* *Iljinia Regelii* *Incarvillea potanini Batal.* *Oxytropis acanthacea* *Oxytropis mongolica Kom* *Peganum harmala L* *Phragmites communis* *Populus diversifolia* *Saussurea involucrata Bip* *Stellaria dichotoma L*	X	X		Moderate	Conduct pre-construction survey for all land disturbance activities Based on pre-construction surveys, avoid areas containing priority plant species where possible Implement Priority Plant Protection Procedure, prior to the start of any land clearing Implement rehabilitation and restoration practice Continue stakeholder engagement to minimize off-road vehicle traffic. Implement no off-road driving policy that also sets suitable speed limits onsite and offsite of the mine Implement road maintenance and improvement work to	Land Disturbance and Rehabilitation MP Biodiversity MP Transport MP	Minor adverse

ID	Impact	Sensitive Receptors	Phase			Pre-mitigation Impact	Enhancement/Management/ Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo				
		Zygophyllum Potaninii Maxim.					avoid creating multiple lines of earth road by Project traffic		
BD02	Uncontrolled dust emissions from vehicle movements and earthworks during the construction and operation of the Project on vegetation in the mine site area	All Plant Species	X	X	X	Minor	Implement no off-road driving policy that also sets suitable speed limits onsite and offsite Watering of onsite roads for dust suppression	Transport MP Air quality MP	Negligible
BD03	Accidental leaks or spillages that impact soils and flora	All Plant Species	X	X	X	Minor	Develop and provide biodiversity awareness training to all Project employees and visitors Provide bunding for hazardous materials to prevent accidentals spills	Transport MP Waste MP Biodiversity MP	Negligible
BD04	Unauthorised gathering of rare or beneficial species by Project workers or increased access to the region due to the KGP development	*Cistanche deserticola* *Zygophyllum potaninii*	X	X	X	Minor	Develop and provide biodiversity awareness training to all Project employees and visitors Develop and enforce no hunting and gathering policy	Biodiversity MP	Negligible

ID	Impact	Sensitive Receptors	Phase			Pre-mitigation Impact	Enhancement/Management/ Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo				
Mammals									
BD05	Direct habitat loss	*Vormela peregusna*	X			Minor	Conduct pre-construction survey for marbled polecat den presence in direct construction footprint areas Engage with specialists to safely capture and release of marbled polecats if this species active dens are found within the direct footprint areas	Biodiversity MP	Negligible
BD06	Indirect habitat impact via avoidance by wildlife, particularly by large migratory ungulate species	*Camelus bactrianus* *Equus hemionus* *Uncia uncia* *Ovis ammon* *Capra sibirica*	X			Minor	Implement no off-road driving policy that also sets suitable speed limits onsite and offsite of the mine All Project related traffic are restricted to daytime whenever possible Construction materials traffic to be organised in convoys Develop and provide biodiversity awareness training to all Project employees and visitors	Biodiversity MP Transport MP	Negligible
		Gazella subgututurosa	X	X		Moderate		Biodiversity MP Transport MP	Minor

ID	Impact	Sensitive Receptors	Phase			Pre-mitigation Impact	Enhancement/Management/ Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo				
BD07	Increased mortality from traffic collision with wildlife;	*Gazella subgututturosa*	X	X		Moderate	All Project related traffic are restricted to daytime whenever possible Vehicle speeds are restricted through driver education and enforcement Develop and provide biodiversity awareness training to all Project employees and visitors Traffic and wildlife crossings are monitored, and records are kept of all collisions Erection of warning signs in road sections with potential wildlife crossings	Biodiversity MP Transport MP	Minor
		Vormela peregusna							
BD08	Increased leisure hunting of wildlife by Project personnel	*Gazella subgututturosa* *Capra sibirica* *Ovis ammon*	X	X	X	Minor	Develop and provide biodiversity awareness training to all Project employees and visitors Develop and enforce No hunting and gathering policy Undertake periodic inspection of all Project vehicles for wildlife products	Biodiversity MP	Negligible

ID	Impact	Sensitive Receptors	Phase			Pre-mitigation Impact	Enhancement/Management/ Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo				
BD09	Increased mortality of sensitive fauna species by scavenger species attracted to the Project area.	*Vormela peregusna*	X	X	X	Minor	Develop and provide biodiversity awareness training to all Project employees and visitors No domestic pets (dogs or cats) to be kept onsite to prevent predation No food waste left accessible to predatory species	Biodiversity MP	Negligible
Birds									
BD10	Direct habitat loss through destruction of nests	*Chlamydotis undulata* *Podoses hendersoni*	X			Low	Provide biodiversity awareness training to all employees on sensitive bird species and their identification; Undertake pre-disturbance ground surveys especially in areas with Mongolian almond and saxaul species to avoid nest destruction Dissuade nesting activity in the construction areas with large bushes or trees such as Mongolian almond and saxaul where Mongolian ground jay and houbara bustard may breeds prior to nesting season by using fit-for-purpose bird dispersal methods	Biodiversity MP Waste MP	Negligible

ID	Impact	Sensitive Receptors	Phase			Pre-mitigation Impact	Enhancement/Management/ Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo				
BD11	Collision and Electrocution from powerlines	*Falco cherrug* *Chlamydotis undulata*	X	X			Use avian friendly design for the site power towers and lines to prevent electrocution especially for safer falcon Monitor bird mortality onsite and take necessary additional mitigation actions to eliminate the identified threats if necessary		
BD12	Increased mortality of bird chicks by scavenger species attracted to the Project area.	*Podoses hendersoni* *Falco cherrug* *Chlamydotis undulata*					Limit, as possible, the accessibility of food waste left to predatory birds such as raven that prey on other bird species eggs and nestlings		
Reptiles									
BD13	Loss of habitat from mining construction activities	*Cyrtopodion elongatus*	X			Minor	Provide biodiversity awareness training to all employees on sensitive reptile species and their identification Undertake pre-disturbance ground survey for areas to be disturbed and remove reptile species of concern	Biodiversity MP	Negligible
BD14	Increased mortality of sensitive reptile species by scavenger species attracted	*Coluber spinali* *Eremias multiocellata*	X	X		Minor	Limit the food waste left accessible to scavenging species that prey the reptile species	Biodiversity MP Waste MP	Negligible

ID	Impact	Sensitive Receptors	Phase			Pre-mitigation Impact	Enhancement/Management/ Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo				
	to the Project area.	*Phrynocephalus versicolor* *Cyrtopodion elongatus*					No domestic pets (dogs or cats) to be kept onsite by Project personnel to prevent predation on sensitive species		
BD15	Mortality from vehicular accidents	*Cyrtopodion elongatus*	X	X		Minor	Erect warning road signs to mark areas with high density of reptiles to avoid accidental vehicular mortality	Biodiversity MP Transport MP	Negligible
Protected areas									
BD16	Habitat degradation	Habitat and supporting	X			Minor	Only use existing and approved roads Restrict vehicle speeds through driver education and enforcement	Biodiversity MP Transport MP	Negligible
BD17	Negative stakeholder perception	Concerned stakeholders (Herders, Rangers, PA Management)	X			Minor	Engage with the Protected Area Management and seek their opinion on suitable routes than can be used for the construction traffic Engage and inform the relevant stakeholders about KGP's potential impacts and impact management;	Stakeholder and Communications Engagement MP	Negligible
BD18	Impacts to Sensitive mammal species	Sensitive mammal species discussed in this assessment	X			Minor	Same as for the large mammals	Biodiversity MP Transport MP	Negligible

6.6 Conclusion Regarding the Need for Biodiversity Offsets

Paragraph 5 of EBRD's PR6 and Paragraph 3.8 and 5.2 of Guidance Note: EBRD PR6 refers to the expectation that a project will fully implement the mitigation hierarchy with an emphasis on the avoidance of impacts, and the need for implementing a biodiversity offset in the event there are "significant adverse residual impacts" to biodiversity after the mitigation measures are implemented. The purpose of the biodiversity offset is to ensure 'no net loss' or 'net gains' are achieved for Priority Biodiversity Features and Critical Habitat, respectively, to compensate the significant adverse residual impacts. Based on the consideration of the mitigation measures for the potential impacts to Priority Biodiversity Features and Critical Habitat, no sensitive biodiversity receptors are expected to experience "significant residual adverse impacts" during construction and operation of the KGP.

Sensitive plants, marbled polecat and goitered gazelle species may experience minor adverse impacts due to their overlapping habitat with the KGP footprint. However, the residual effects are not expected to cause hardship, degradation, or impair the function and value of these species. The KGP construction and operation potential impacts will cause negligible residual impacts to all other sensitive biodiversity species after the mitigation hierarchy is implemented. However, for plants, implementation of the rehabilitation procedures is expected to result in no net loss of biodiversity over the long-term.

Therefore, biodiversity offsets are not recommended at this time for KGP to meet the EBRD PR6 requirements, but should be evaluated on the basis of analysis of biodiversity monitoring of actual impacts, if any. According to this assessment outcome, the KGP activities does not pose significant risks to Critical Habitat biodiversity species that requires additional offset measures (Guidance Note: EBRD PR6) to achieve net gains or no net loss. Hence, it is considered that a stand-alone Biodiversity Action Plan (BAP) is not required for KGP at this time.

Meantime, it is recommended that KGP to undertake additional biodiversity conservation actions such as supporting research studies in the SPAs, or providing food and water to rare species to support their existing habitat and survival, especially during environmental hardship, to demonstrate a good practice and commitments to biodiversity conservation in the area it operates.

The additional biodiversity conservation actions recommended for KGP are included in the *D4:Biodiversity Management Plan*.

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SUSTAINABILITY
EAST ASIA LLC

ERDENE MONGOL LLC

C7: Waste

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
DEIA	Detailed Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ICMC	International Cyanide Management Code
KGP	Khundii Gold Project
MLA	Mineral Licence Area
mln	Million
MP	Management Plan
OECD	Organisation for Economic Co-operation and Development
WMC	Waste Management Centre
WMPs	Waste Management Plans
WWTP	Wastewater Treatment Plant

7. WASTE

7.1 Introduction

This Chapter of the Khundii Gold Project (KGP or Project) ESIA describes the potential impacts of waste generated during the construction, operation and decommissioning of the Project and details the proposed waste disposal infrastructure and management practices.

The Chapter also describes the specific measures that have been implemented to "design-out" or avoid adverse impacts, and outlines the management measures aimed to minimise, mitigate, offset or compensate for those impacts which have been identified as unavoidable.

The following KGP management plans will be developed and implemented to manage potential impacts of the construction and operational phases of the KGP:

- Waste Management Plan;
- Hazardous Materials Management Plan; and
- Emergency Response Plan.

The closure and decommissioning of the KGP will be undertaken in accordance with the Mine Closure Plan.

For the purpose of this Chapter, waste is defined as solid and liquid mineral, non-mineral, hazardous and non-hazardous waste generated within the KGP Area of Influence (AoI). Waste emissions such as dust and gaseous pollutants are discussed in detail in *Chapter C2: Climate and Air Quality* and are therefore not repeated here.

A summary of residual impacts and effects is provided in Table 6 at the end of this Chapter.

7.2 Policy, Standards and Lender Requirements

Mongolian National Laws and National Standards, Applicable Lender standards and guidelines, and Erdene's Waste and Hazardous Materials Handling and Disposal Policy will form the Project Standards for Waste Management. The potentially applicable laws and standards include:

- Mongolian Law on Waste (2017);
- Mongolian Law on Hazardous and Toxic Chemicals (2006, amended in 2017);
- General Requirements for Non-hazardous Waste Categorisation, Collection, Transportation, Re-use, Recycling and Disposal (Annex to Order A/443 by the Minister for the Environment and Tourism, 2018);
- Guide for Non-hazardous Waste Disposal Facility Operation (Annex to Order A/445 by the Minister for the Environment and Tourism, 2018);
- Requirements for Hazardous Waste Transportation, Collection, Storage, Recycling, Disposal and Export Activities (Annex to Order A/18 by the Minister for the Environment and Tourism, 2018);

- Waste Coding and Categorisation at Waste Sources (Annex to Order A/349 by the Minister for the Environment and Tourism, 2017);
- Waste Management Requirements in the approved Detailed Environmental Impact Assessment (DEIA) for the KGP;
- Mongolian National Standard MNS4943: 2015. Environment. Water quality. Effluent water. General requirements;
- European Bank for Reconstruction and Development Environmental and Social Policy (2014); and
- Erdene's Waste and Hazardous Materials Handling and Disposal Policy.

7.3 Impact Assessment Methodology

7.3.1 Scope of Assessment

Geographical Scope

The geographical scope of the assessment considers the Project Area of Influence, as defined in *Chapter A1: Introduction.*

The following areas have been considered as the KGP Area of Influence (AoI) for waste:

- Khundii Mineral Licensed Area (MLA); and
- Water exploration field south of the Khundii MLA.

The AoI was determined with respect to the planned mining activities and potential sensitive receptors. Sensitive environmental and human receptors are those that have the potential to be impacted by inappropriate management of waste streams.

The Tsenkher Nomin MLA is not considered as part of the KGP waste AoI for this assessment as the Altan Nar deposit is proposed for development in Year 7 and subject to further impact assessment studies.

Temporal Scope

The temporal scope covers the complete Project cycle, including the construction, operational and closure phases of the KGP, currently expected over a ten-year period beginning in 2020.

Technical Scope

The technical scope of the assessment considers potential direct and indirect (secondary) impacts that could result from all the main elements of the KGP, namely:

- Construction activities;
- Operations activities; and
- Mine Closure activities.

A Wastewater Treatment Plant ('WWTP') will be constructed as part of the KGP Project to treat wastewater from within the AoI.

All waste water produced from the KGP will be discharged to the environment or where possible reused for dust suppression following pre-treatment to Mongolian Standards. Any bio-solids produced from waste water treatment plants will disposed to landfill.

Domestic waste from the KGP will be disposed at the Waste Management Centre (WMC) landfill site and hazardous waste will be transported to the WMC for storage in a bunded area until assessment for treatment, re-use, or disposal has occurred. Ash from the coal fired boilers will be disposed of at the integrated mineral waste facility or in a fit-for-purpose designated landfill.

Indirect and secondary impacts as a result of the handling and removal of waste materials from the KGP Site to the WMC (e.g. dust, vehicle movements, air emissions and noise) are considered within *Chapter C2: Climate and Air Quality, Chapter C5: Water Resources and Chapter C13: Transport. Cumulative impacts are discussed in Chapter C14: Cumulative Impacts*.

7.3.2 Method of Assessment

For the purpose of this assessment, the standard approaches described in *Chapter A3: Methodology* and *Chapter C1: Impact Assessment Introduction*, have been adopted to characterise the significance of likely effects on waste generated, disposal and management practices throughout the lifecycle of the Project.

7.3.3 Importance of Receptors to Waste

Receptor sensitivity varies depending on the receptors' ability to adapt to the change in conditions and the value attributed to the receptors by stakeholders or applicable regulations or policies. Sensitivities of the receptors for this assessment are shown in **Error! Reference source not found.**.

Table 1 Sensitivity of Receptors to Waste

Receptor Sensitivity	Type of Receptor
High	Groundwater – herder wells
Medium	Nomadic herders within the Project Area of Influence
Low	Soils and groundwater within KGP AoI KGP site workers

The magnitude of the impacts for waste have been identified based on the permanence of the impact on a receptor. These criteria are provided in **Error! Reference source not found.**.

Table 2 Magnitude of Waste Impact Criteria

Impact Magnitude	Type of Impact
High	Permanent degradation or alteration to a resource/receptor
Medium	Temporary (lifetime of the Project) degradation or alteration to a resource/receptor
Low	Temporary (less than the lifetime of the Project) degradation or alteration to a resource/receptor
Very Low	Short-term degradation/adverse alteration to a resource/receptor (less than five years)
Beneficial	Advantageous or positive effect to a resource or receptor

7.4 Potential Impacts

This section describes the potential impacts of the KGP based on an appraisal of baseline sensitivities and conditions, as well as current understanding of the construction, operations and decommissioning aspects of the Project.

7.4.1 Sensitive Receptors

As indicated within *Chapter B7: Waste*, the sensitive receptors considered within this assessment are:

- Groundwater;
- Soils;
- Local ecosystems;
- Employees of KGP who live and/or work on-site; and
- Nomadic herders within the Project Area of Influence.

There are no known priority plant or habitats, or sensitive soil receptors on direct footprint of the proposed landfill and WWTP at the KGP site. Inert waste from construction is likely to comprise the largest proportion of waste being disposed at the on-site facility with putrescible waste comprising a minimal volume. Odour from the landfill facility is expected to be minimal.

7.4.2 Construction Waste

7.4.2.1 Construction Waste Sources

During the construction phase, up to 500 workers may be on-site and accommodated temporarily within the AoI.

Construction materials and components will be delivered to the Site during the construction phase of the KGP. During the course of these works, potential direct impacts will include the generation of the following waste streams:

- non-hazardous construction waste such as concrete, timber etc.;
- domestic and sanitary waste and wastewater from the workforce residing at accommodation camps and from the construction site (inclusive of site offices); and
- hazardous waste (waste oil and residual chemicals including the packages) and effluent from on-site activities.

Table 3 outlines predicted construction, demolition and domestic waste production rates through KGP's construction phase.

Table 3 Khundii Gold Project Predicted Construction Phase Waste Quantities

Phase	KGP Domestic, Construction and Demolition Waste (tonnes)
Construction	1,825

Values calculated by multiplying the total employee numbers during the construction phase (500) by a waste generation rate 10 kg/capita/day based on comparative Mongolian mining operations and waste management databases (Solid Waste Standard Industrial Classification Database publications from the California Integrated Waste Management Board & OECD Waste Database), assuming a 12 month construction period.

As can be seen from **Error! Reference source not found.**, 1,825 tonnes of waste is estimated to be generated during the construction phase of the Project. Medical waste from the construction phase is considered to be negligible.

The inappropriate management of these waste streams has the potential to impact on soil, surface water, groundwater systems (through contamination) and human health (through consumption of contaminated drinking water supply and/or contact with contaminated soils).

7.4.3 Operation

7.4.4 Domestic Waste

During the operations phase, the Project is expected to employ approximately 337 personnel on site. For the purposes of this ESIA, an additional 25 percent personnel allowance has been included for a projected maximum total on-site workforce of 421 people to allow for a conservative assessment of potential impacts. Waste streams that will be produced during operations phase are detailed in Table 4.

Table 4 Khundii Gold Project Predicted Operational Phase Waste Sources and Types

Waste Stream	Primary Source	Types of Waste
Domestic wastes - non-hazardous	Kitchens, accommodation blocks and offices	• Paper and packaging • Food wastes/putrescible waste • Glass • Plastics • Cans • Used oil/grease • Treated sewage sludge
Domestic wastes - hazardous	Kitchens, accommodation blocks and offices	• Cleaning products • Paints • Toner cartridges • Fluorescent lights • Batteries
Industrial wastes - non- hazardous	Heating plant, workshops, maintenance areas	• Combusted waste from KGP operations comprised of ash (heating/boilers) • Packaging • Scrap metal • Timber • Drums

		• Tyres
Industrial wastes - hazardous	KGP operations, workshops, refuelling areas, maintenance areas	• Waste hydrocarbon oil • Spent oil/chemical containers • Contaminated rock/soil from accidental hazardous spills • Fuel and solvents • Oily rags • Paint • Vehicle batteries
Medical and laboratory waste	Medical and laboratory facilities	• Spent chemicals, bandages and non-combustible biological medical waste e.g. syringes and other sharps • Laboratory waste including organic (chemical) liquid waste and plastic solid waste
Wastewater	Kitchen, accommodation areas, KGP operations, workshops surface runoff	• Sewage water (black and grey waters) from kitchens, accommodation blocks and other work areas • Mechanical workshop wastewater

Table 5 outlines predicted construction, demolition and domestic waste production rates through the KGP's construction phase.

Table 5 Khundii Gold Project Predicted Operational Phase Waste Quantities

Phase	KGP Operational Waste (tonnes)
Operations	**4399.43**

Values calculated by multiplying the total employee numbers during the operational phase (421) by conservative waste generation rate (4.09 kg/capita/day) based on comparative Mongolian mining operations and waste management databases (Solid Waste Standard Industrial Classification Database publications from the California Integrated Waste Management Board & OECD Waste Database) assuming a 10-year operational period.

As can be seen from **Error! Reference source not found.**, about 4400 tonnes of waste are estimated to be generated during the operations phase of the Project. Medical waste from the operations phase is considered to be negligible.

The inappropriate management of these waste streams has the potential to impact on soil, surface water, groundwater systems (through contamination) and human health (through consumption of contaminated drinking water supply and/or contact with contaminated soils).

7.4.5 Mineral Waste

The total projected amount of mineral waste produced at the Bayan Khundii is 39.4 mln tonnes, including 35.6 mln tonnes of waste rock and 3.5 mln tonnes of mill feed during the operation of 6

years. About 15.5 mln tonnes of mineral waste (1.8 mln mill feed and 13.7 mln tonnes of waste rock) is expected to be produced from the future Altan Nar operation.

7.4.6 Closure and Decommissioning

The closure and decommissioning of the KGP will be undertaken in compliance with the requirements set out in KGP Mine Closure Plan which will be developed as part of the ESIA. The Mine Closure Plan will describe the KGP's closure objectives and associated actions. It should include a description of the monitoring plans which will be put in place to determine the effectiveness of mitigation. The potential decommissioning impacts are anticipated to mirror those identified for the construction phase and therefore similar measures to those discussed in 7.5.2 will be adopted during decommissioning.

7.5 Assessment of Residual Impacts and Effects

This section considers in turn the residual impacts of construction, operation and decommissioning of the Project, setting out the mitigation measures integral to the Project that aim to reduce the magnitude of the potential impacts.

7.5.1 Management Controls

The potential impacts associated with the disposal of wastes will primarily be managed through minimising waste generation, recycling of waste and appropriate disposal. Contractors will be expected to minimise wastage of materials and wastewater, and to reuse and recycle materials where possible. Waste will be segregated to allow appropriate handling, storage, treatment and disposal by waste stream. These will be classified using national standards and internationally accepted guidelines, such as non-hazardous waste (including domestic and inert wastes); hazardous waste and wastewater. Routine inspections of waste management areas will be implemented to ensure compliance with general housekeeping and waste management practices. Waste materials will be managed utilising the KGP Hazardous Materials Management Plan and Waste Management Plans.

A waste inventory will be maintained that will include a record of quantities of waste generated per month and the cumulative total including waste sent off-site for recycling or disposal, waste subject to hazardous waste treatment, and waste subject to non-hazardous waste disposal.

Training on waste management requirements will be implemented throughout all phases of the KGP.

7.5.2 Construction

7.5.2.1 Design Controls for Non-mineral Waste

Design controls for the construction phase have been embedded into the Project to ensure waste is minimised, managed and disposed of effectively. The controls include:

- Construction of a WWTP which incorporates:
    - Treated effluent suitable for reuse for dust suppression and/or discharge to the environment
    - Disposal of biosolids to landfill
- development of an on-site landfill for construction and domestic waste which incorporates:

  - a low permeability liner
  - leachate collection system
  - environmental monitoring wells
  - secure perimeter fencing
- designated recycling areas for wood, metals, plastics and other relevant materials; and.
- designated bunded storage area for hazardous wastes.

7.5.2.2 Domestic and Construction Waste

Inert construction and domestic waste will be placed into the KGP on-site landfill during the construction phase. The landfill design includes a low permeability liner, leachate collection and treatment, environmental monitoring wells, and secure perimeter fencing. Construction and domestic waste will be placed into the on-site landfill. Safely reusable materials (e.g., wood packaging materials, surplus paints) will be made available for re-use, including to the community through a controlled operation, as possible.

The on-site landfill at KGP will be designed to accommodate the waste generated from the Project. The nearest sensitive receptors are the KGP workforce and are identified as having a low sensitivity. The magnitude of the impact during construction will be temporary and is considered to be low. As such the residual impact significance on waste management from the KGP is expected to be **Negligible**.

7.5.2.3 Hazardous Wastes

Currently, the Ministry of Environment and Tourism has permitted several companies to dispose of hazardous waste, such as Tsetsuukh Trade LLC. Hazardous waste from the KGP construction phase with the exception of recyclable waste materials will therefore be transferred to the WMC for safe, temporary storage until being disposed of in accordance with applicable requirements in Mongolia. Recyclable wastes, including used oil, paints, anti-freeze, batteries, kitchen oil, and waste oils, will be collected, assessed and either re-used or sent off-site for recycling. Medical waste will be transferred to a local hospital for incineration.

Prior to recycling, spent lubricants including engine oils will be stored within the WMC with adequate containment to prevent contamination of soils and groundwater.

Hazardous waste will be managed in accordance with the Hazardous Materials Management Plan. In the event that there is an incident that results in the release of hazardous waste to the local environment, this will be dealt with in accordance with the measures provided in the Hazardous Materials Management Plans – as well as repeated in the Emergency Response Plan. This procedure will set out the emergency response process that will be in place to deal with any incident that could result in contamination of soils and/or groundwater.

Hazardous waste from the Project will be minimised through appropriate smart procurement process (e.g., reduce plastic packaging), smart selection of products (e.g., using less hazardous cleaning agents, use of LED lighting instead of sodium or fluorescent lighting), and recycling where feasible (e.g., waste hydrocarbons, batteries, kitchen oils).

Appropriate procurement procedures will be put in place to minimise hazardous waste. Stringent hazardous waste management measures and facilities will be implemented to ensure that waste

is appropriately stored until treatment solutions are identified or an appropriately licensed facility is available. Therefore, the potential for any significant impacts to arise from hazardous materials is considered to be low. The most sensitive receptors are the local herders where construction occurs and are of medium sensitivity. Accordingly, the residual impact significance is expected to be **Minor Adverse**.

7.5.2.4 Domestic Wastewater

Domestic wastewater from the KGP early construction activities and workers' accommodation will be collected and disposed at the existing temporary camp ablution facilities at Bayan Khundii. Following installation and commissioning of a WWTP at the permanent camp, treated effluent will be either used for dust suppression or discharged to the local environment. Any bio-solids produced from the WWTP will be disposed of to landfill.

The potential for contamination of soils and/or groundwater and herder wells (high sensitivity) from KGP wastewater, given the design of the facility, the treatment standards and the management procedures that will be adopted, is considered very low. Accordingly, the residual effect is considered to be **Minor Adverse**.

7.5.2.5 Surface Water Runoff

Refer to *C5: Water Resources and D3: Water Resources Management Plan* Chapters.

7.5.3 Operations

The design of the KGP and the implementation of a Hazardous Materials Management Plan and Waste Management Plan will ensure that wastage of resources is minimal during operations, with waste rock and tailings the primary waste streams being produced.

7.5.3.1 Design Controls for Mineral Waste

Proposed Approach

Erdene proposes an integrated approach to mine waste management through co-mingling of waste rock and filtered tailings. Key features of this approach are:

- Waste rock and filtered tailings co-mingled in a single Integrated Waste Facility (IWF);
- A designed and engineered landform with reduced permeability;
- High stability and less erosion through layered construction;
- Damp tailings in the form of solid substance from the tailings thickener to be deposited between the waste rock particles in a homogenous manner creating a single IWF.

Tailings Composition

The Bayan Khundii processing plant consists of conventional crush-grind-leach process that leaches gold from ore through a chemical process using cyanide. The BK processing plant has been designed to reduce the use of cyanide by:

- maximizing the re-use of pre-cyanided solution;
- minimizing the need for the addition of cyanide solution; and
- minimizing the amount of cyanide solution to be detoxified.

Tailings from the processing plant will undergo thickening (to recover water) and treatment to detoxify and destroy any residual cyanide bearing compounds, reducing the level of cyanide to no greater than 50 milligrams per liter Weak Acid Dissociable (WAD) cyanide. This is consistent with the requirements of the International Cyanide Management Code and Mongolian standards.

The thickened and detoxified tailings will then be filtered for the purposes of additional water recovery and disposal. As water is removed, the tailings increasingly exhibit mechanical properties like soil or sand, allowing for more stable disposal and landform construction.

The filtered tailings “cake” will be hauled by truck to the integrated waste facility and deposited and compacted within two-meter layers of waste rock. This process of “co-mingling” actively fills the void spaces of mine waste rock with tailings and creates a landform with maximum possible shear strength. The inclusion of tailings in waste rock also reduces permeability, significantly reducing the risk of oxygen filtration that can cause acid drainage or metals leaching. Consequently, the IWF is considered most safe and effective waste management method for mine operations and closure.

Cyanide **Management**
Ore grades remain within a relatively tight bandwidth during the life of mine. Cyanide consumption would be expected to increase marginally at higher mill feed grade. Forward planning of ore grades is planned. Further, in terms of mineral waste management, the waste facility is designed to accommodate fluctuations in cyanide content of tails to remain within the requirements of the International Cyanide Management Code (ICMC).

Assessment of Acid Mine Drainage Potential
One of the risks with the IWF waste management approach outlined above is the creation of Acid Mine Drainage. Ramboll has reviewed the usual standard acid base accounting methods to determine the potential for acid mine drainage from mine waste rock characterization sample results for BK. Based on this assessment the waste rock design will not have to address potential acid generation. However, there would be a need to ensure that saline materials and rock with high Arsenic concentrations are not used for cover materials.

Comparison of metals with average crustal abundance indicates some enrichment of barium, mercury and manganese, and high enrichment of arsenic (very common in Mongolia). Considering the low acid potential of the waste rock it is unlikely that this material will leach contaminants. However, care should be taken to have separation of waste rock from water supplies and the management of dust near receptors

Based on the results of the static geochemical test work for the AN waste rock, there is potential for acid generating waste rock from the AN deposit. Further characterisation of the waste is necessary to verify the potential for acid generation and mobilisation of metalloids from the waste landforms proposed for the AN waste. This is considered to be in the low – medium risk level and will be confirmed or otherwise by further testing and design prior to the construction of AN in Year 7 of the overall mining program.

Integrated Waste Facility (IWF) Design

The waste rock and tailings management strategy for BK has been developed from Erdene's closure objectives and waste characterisation and is based on constructing an IWF which will contain:

- All waste rock from Bayan Khundii;
- All tailings from Bayan Khundii;
- Potentially tailings from early production at Altan Nar.

The initial IWF design was placed on the landscape as a simple polygon, with the following key features:

- Spatial foot print is 57 ha;
- Maximum RL is 1290 (IWF is up to 150m high);
- Capacity of 20,000,000 m^3; and
- Outer batter slope of ≤180.

IWF Management

The IWF is proposed to be constructed in layers to maximise placed density of the co-mixed tailings and waste rock. A nominal layer thickness of 2 metres has been proposed with layers being compacted using a vibrating roller to optimise compaction. Maximising placed density reduces the permeability of the structure which in turn reduces the amount of leachate seepage from the structure. It also minimises the footprint of the IWF.

The outer benign cover system is built up at the same time in similar thickness layers. By constructing the IWF in this manner, at closure all that remains is for the final upper surface cover system to be put in place.

Given that much of the clean waste material is generated during the first two years of mining the BK pit it will be necessary to stockpile some to ensure that enough is available for closure of the IWF.

Mongolian regulators typically require that sub-grade material >0.3 g/t is stockpiled. As the sub-grade is expected to be mineralised to some degree, it will need to be managed and contained in the same manner as other mineralised waste material. This can be accommodated in the most efficient manner by incorporating it into the IWF. By placing it in a discrete section of the IWF, this will allow, should it be necessary, to be reclaimed in future without significant disruption to the overall integrity of the IWF.

Figures 1 and 2 below provide conceptual schematics of how the IWF would be constructed from the initial layer through to completion, including containment of sub-grade material.

Bayan Khundii Integrated Waste Facility

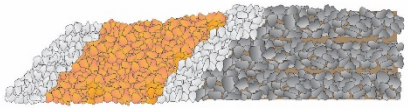
Conceptual Construction Sequencing

Initial starter lift approx 1,100,000 m^3 per 2metre thick lift



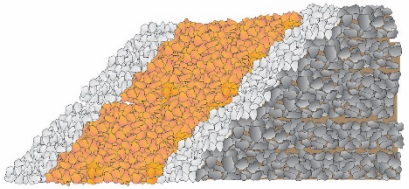
1

Starter lift (2.0 m)



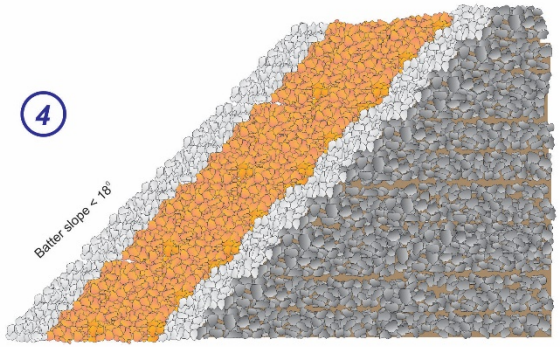
2

End of year 1



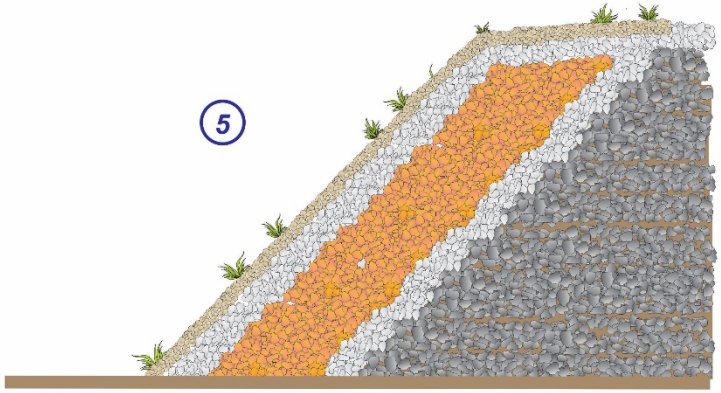
3

Ongoing construction continuing in 2.0 m lifts



4

Final year of construction



5

Mining ceased & remediation completed

Key

- Growth supporting & erosion resistant layer
- Benign waste rock
- Sub-grade material
- Co-mixed waste rock & tailings layers

Source: Erdene, NI 43-101 Technical Report for Khundii Gold Project, December 2019

Figure 1 Conceptual Design for KGP Integrated Waste Facility

Regular sampling and testing of the composition of waste rock and tailings should be undertaken to ensure that the chemistry of the material meets appropriate standards. Particular attention should be given to potential enrichment of barium, mercury and manganese, and high enrichment of arsenic (which is very common in Mongolia). Considering the low acid potential of the waste rock it is unlikely that this material will leach contaminants. However, care should be taken to have separation of waste rock from water supplies.

A comprehensive dust management protocol must be implemented at the IWF to ensure the management of dust near receptors. While the nature of the tailings will be of a “wet cake”, the moisture content should be monitored to ensure consistency.

Given the above discussion, the residual impact significance of tailings and waste rock management from the KGP is expected to be **Negligible**.

7.5.3.2 Domestic Waste

The non-mineral waste generated during the operations phase of the Project will be disposed of at the landfill within the AoI. The non-hazardous waste landfill design will include appropriate stormwater drainage, environmental monitoring infrastructure, and secure perimeter fencing. Considering this, the residual impact of domestic waste is considered to be **Negligible**.

7.5.3.3 Hazardous Wastes

Hazardous wastes (from accidental oil and fuel spills etc.) will be transported to the WMC for storage and assessment for future re-use, treatment and/or disposal. All oil containing equipment will have secondary containment that will contain any oil spills. Waste oils will be taken off-site for recycling or disposal. Bulk storage areas for hydrocarbons will be designed according to required standards. Ongoing operations will be governed by the Hazardous Materials Management Plan.

The mismanaged purchase of materials may create unnecessary hazardous waste streams that are problematic to dispose of. To prevent this, waste prevention and smart purchase guidelines including a list of hazardous materials to be avoided will be utilised throughout operation of the KGP.

The residual impact of hazardous waste is considered to be **Negligible**.

7.5.3.4 Sanitary Wastewater and Industrial Effluent

The operational phase will utilise the WWTP, with treated effluent either used for dust suppression or discharged to the local environment. Any bio-solids produced from the WWTP will be disposed of to landfill.

The potential for contamination of soils and/or groundwater from KGP wastewater, given the design of the facility, the treatment standards and the management procedures that will be adopted, is considered low. Accordingly, the residual impact is considered to be **Negligible**.

7.5.3.5 Surface Water Runoff Management

Refer to *C5: Water Resources and D3: Water Resources Management Plan* Chapters.

7.5.4 Closure and Decommissioning

The closure and decommissioning of the KGP will be undertaken in compliance with the requirements set out in the Mine Closure Plan.

The Mine Closure Plan will describe the KGP's objectives with respect to decommissioning and the actions which will be undertaken to achieve these and prevent adverse impacts. It will include a description of the monitoring plans which will be put in place to determine the effectiveness of mitigation.

The potential decommissioning impacts are anticipated to mirror those identified for the construction phase and therefore similar measures to those discussed in construction section will be adopted during decommissioning.

For mineral waste, the closure strategy will involve the final stage of the IWF process as outlined in Sketch 5 on Figure 1.1. Essentially this will result in a sealed and vegetated hill as depicted in Sketch 5. Ongoing monitoring will confirm the benign nature of the IWF feature.

7.5.5 Summary of Residual Impacts and Mitigation Measures

During the construction and operation of the KGP, the potential impacts associated with the disposal of wastes will primarily be managed and minimised under the Hazardous Materials Management Plan and Waste Management and related procedures where guidance on waste management measures will be outlined. The key management controls for avoidance, mitigation, management and monitoring waste will include:

- Applying waste hierarchy of a) waste avoidance and reduction at source; b) waste re-use and recycling; and c) waste storage, treatment and/or disposal at the stages of construction and operation of Project;
- Classification of wastes according to criteria and based on internationally accepted regulations, guidelines, definitions and methodologies;
- Segregation of wastes at source (generation) and secure containment and monitoring pending further treatment, transportation or disposal;
- Where possible, making recyclable materials available to community for reuse as wood, tyres, scrap metal, and cardboard as per consultation with the communities;
- Pre-assessed and monitored waste recycling by licensed recycling Contractors,
- Disposal of non-hazardous waste carried out in the WMC landfill;
- Disposal and storage of hazardous waste in line with applicable national and international requirements, and
- Maintaining a waste inventory for waste quantity generated per month and cumulative totals, wastes sent for off-site recycling, wastes subject to hazardous waste treatment, wastes subject to nonhazardous waste disposal and unrecyclable hazardous wastes stored.

7.6 MONITORING AND PERFORMANCE

On-going monitoring of waste generated, reused and recycled from the KGP will be carried out as part of both construction and operational monitoring programmes. This will include regular inspection of designated waste segregation and housekeeping practices, as well as waste storage locations.

Surface, groundwater and WWTP monitoring will be undertaken in accordance with the Waste Management Plan, Hazardous Materials Management Plan and the Water Resource Management Plan.

7.7 IMPACTS SUMMARY TABLE

Table 6: Summary Waste Impacts

ID	Impact	Sensitive Receptors	Phase				Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Pre-Construction	Construction	Operations	Closure			
WM01	Increased quantity of waste to manage	On-site employees, water resources	X	X	X	X	a) Use of on-site landfill b) Implementation of the waste hierarchy c) Provision of safely reusable materials to the local community d) Smart procurement to reduce waste e) Develop and maintain waste inventories to include quantities by stream and disposal location f) Internal audits of the Project's waste management facilities to ensure facilities are suitable and used in accordance with WMPs g) Undertake routine inspections of general housekeeping and waste management	Hazardous Materials Management Plan Waste Management Plan	**Negligible**
WM02	Contamination of soil and groundwater resources from mismanagement of hazardous waste disposal	Herders within AoI, on site employees, soil and groundwater		X	X		a) Disposal in accordance with Hazardous Materials and Non-Mineral Waste Management Plan b) Smart procurement processes to reduce the amount of hazardous materials that are purchased and seek alternatives i.e. non-hazardous materials wherever possible c) Storage of hazardous materials in designated bunded areas until a treatment solution is identified or disposal is available when a certified hazardous waste facility becomes available in Mongolia d) Recycle hydrocarbons at the Waste Management Centre	Hazardous Materials Management Plan Waste Management Plan	**Minor Adverse**

WM03	Contamination of soil and groundwater including herder wells	Groundwater – herder wells Soils and groundwater within KGP AoI, employees	X	X	X	X	a) Waste water from early construction works to be sent to municipal WWTP b) KGP WWTP to be installed and commissioned for use during construction, operations and closure c) Waste water to be treated in accordance with national standards prior to re-use for dust suppression or discharge to environment	Hazardous Materials Management Plan Waste Management Plan	**Minor Adverse**
WM04	Contamination of soil and groundwater resources as a result of leaching from the IWF	Soils and groundwater within KGP AoI,			X		Sampling and testing program to be developed for the waste rock and tailing materials deposited at the IWF.	Land Disturbance and Rehabilitation Management Plan	**Negligible**
WM05	Generation of dust as a result of drying out of tailings stacked at the IWF	Herders within AoI, on site employees,			X		A comprehensive dust management program to be implemented at the IWF to ensure the management of dust near receptors.	Air Quality Management Plan	**Negligible**

7.8 References

California Integrated Waste Management Board 2019, Waste Generation Rates, accessed on 14 November 2019 < https://www2.calrecycle.ca.gov/WasteCharacterization/General/Rates>, <https://www2.calrecycle.ca.gov/WasteCharacterization/>

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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

Erdene Mongol LLC

C8 – Population and Demographics

March 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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1. POPULATION AND DEMOGRAPHICS

1.1 Introduction

This Chapter provides an assessment of potential impacts on population and demography arising from the Khundii Gold Project (KGP or the Project) during the construction, operations and closure phases. This Chapter also presents specific mitigation measures that will be implemented to avoid or minimise negative impacts, and enhancement measures to maximise beneficial impacts.

1.2 Policy, Standards, and Lender Requirements

Chapter A2: Policy and Legal Framework outlines the requirements that will be followed for the KGP. There are no specific legal instruments related to population and demographics.

1.3 Assessment Methodology

1.3.1 Scope of Assessment

1.3.1.1 Geographical Scope

The geographical scope of the assessment covers the KGP Area of Influence (AoI) as defined in *Chapter B9: Demography*. Within the KGP AoI, the locality expected to be exposed to impacts from planned in-migration are Shinejinst and Bayan-Undur *soum* centres (being the closest towns to the KGP Site). Unplanned Project-related in-migration of individuals / households who hope to exploit the employment and / or economic opportunities likely to be created is also expected to focus on Shinejinst and Bayan-Undur *soum* centres.

1.3.1.2 Temporal Scope

The temporal scope covers the construction, operation and decommissioning phases of the KGP.

1.3.1.3 Technical Scope

The scope of the socio-economic assessment for the KGP has been defined through a scoping process undertaken from June to September 2019, which identified potentially affected people / communities and expected impacts. The potential impacts on population and demographics due to the KGP have been assessed based on the scoping results.

The assessment is primarily focused on impacts related to Project-induced in-migration into the KGP AoI, including the workforce that will be engaged by the KGP Project and its contractors, as well as economic migrants from other parts of Mongolia who may be attracted to Shinejinst or Bayan-Undur *soum* centres in search of employment and / or associated business opportunities.

1.3.2 Method of Assessment

The potential impacts were assessed and evaluated using the general methodology outlined in *Chapter A3: Methodology*. The application of this methodology has been informed by the following:

- ESIA team observations during fieldwork conducted August 2019;
- results of stakeholder consultations (see *Chapter A6: Stakeholder Engagement*);
- expert knowledge and judgement; and
- previous experience from ESIA work on similar projects or projects in similar social and environmental settings.

1.3.3 Significance Criteria

The significance of an impact is determined by a combination of the sensitivity of Project-affected people (PAP) and impact magnitude. The criteria used for allocating sensitivity and impact magnitude are provided in Table 1 and Table 2, respectively. The matrix for combining sensitivity and impact magnitude to allocate the level of significance to an impact is presented in *Chapter A3: Methodology*.

Table 1 Population and Demographics Sensitivity Criteria

Project Affected People Sensitivity	Project-Affected People
High	Already vulnerable potentially PAP with very little capacity and means to adapt to a given change and maintain/improve quality of life.
Medium	PAP with resilience to adapt to a given change and maintain/improve quality of life.
Low	PAP with some capacity and means to adapt to a given change and maintain/improve quality of life.

Table 2 Magnitude of Population and Demographics Impacts Criteria

Impact Magnitude	Type of Impact
High	An impact that is likely to affect a large number of people/communities (with number depending on the local context) irrespective of both time-scale and reversibility.
Medium	An impact that is likely to affect a moderate number of people/communities (with number depending on the local context) and which may or may not be reversible.
Low	An impact that is likely to affect a small number of people/communities (with number depending on the local context) and which is likely to be temporary (up to two years) and reversible.
Very Low	An impact that is unlikely to have a measurable or noticeable effect on people/communities so that the baseline conditions will be materially unchanged.
Beneficial	A positive impact (irrespective of magnitude).

1.4 Potential Impacts

1.4.1 Project-Affected People

In the context of population and demographic changes, the following types of people are considered sensitive when attempting to adjust to demographic changes and to increased usage of infrastructure and utilities in the two *soums*:

- All residents of Shinejinst and Bayan-Undur *soums,* but predominantly those living in the *soum* centres; and
- staff and users of schools and hospitals in Shinejinst and Bayan-Undur and *soums*.
- Soum / bagh officials that would be required to manage a larger population;

Particular vulnerability to impacts associated with population and demographic changes may be experienced by:

- Low income earners in Shinejinst and Bayan-Undur soums;
- Individuals that require ongoing medical attention / care;

- Women (see also Chapter C12 Occupational and Community Health, Safety and Security).

1.4.2 Impact Sources – Construction and Operations Phases

Workforce and Accommodation

The KGP construction phase will involve a small construction workforce of up to 506 people (including contractors) for an estimated construction period of up to 12 months. During the operations phase, the Project is expected to employ approximately 337 personnel on site. For the purposes of this ESIA, an additional 25 % allowance has been included for a projected maximum total on-site workforce of 421 people to allow for a conservative assessment of potential impacts. Not all of the workforce will be on site at the same time, with fewer workers on site on any given shift (maximum of 190 on site at a time). Workers will be flown to Bayankhongor *aimag* centre, and then transported to the site via buses. Local workers, from Shinejinst and Bayan-Undur *soums*, will also be transported to site by bus and will be housed at the mine site accommodation, returning to their home base upon completion of their roster via bus.

During construction and operations the approach to worker accommodation will be to house all workers on the KGP at the purpose built accommodation camp located at Bayan Khundii (approximately 4 km away).

Existing Infrastructure and Services

The KGP will use some existing infrastructure and services, where possible. However, additional permanent and temporary facilities at the KGP Site location will be required (see *Chapter A5 Project Description*). These existing infrastructure elements include:

- Ulaanbaatar and Bayankhongor airport; and
- Roads.

1.4.2.1 Potential Impacts

The potential impacts discussed in this Chapter are:

- Population increase due to KGP-induced in-migration of workers and / or economic opportunity seekers.

Increased pressure on health services due to the presence of the Project workforce and potential in-migrants to the local area are discussed in *Chapter C12 Occupational and Community Health, Safety, and Security,* in addition to discussion of social fracture issues. Additionally, *Chapter C11 Cultural Heritage* discusses the potential impacts on intangible cultural heritage values as a result of interactions between local communities, potential migrants and the Project workforce.

1.5 Assessment of Residual Impacts

1.5.1 Construction and Operations Phase Impacts

Construction and operations phase impacts are considered to be similar in nature and therefore are discussed together.

1.5.1.1 Population Increase Due to KGP-Induced In-migration of Workers and / or Economic Opportunity Seekers;

The presence of KGP and contractor personnel in the two *soums* as well as Project-induced in-migration into the area may result in a small increase in population within the KGP AoI and

specifically Shinejinst and Bayan-Undur *soums*. The potential for negative impacts to demography of in-migration and an increase in population may include:

- an increased burden on social infrastructure through the life of the Project;
- social fracture and reduction in wellbeing through increased competition for jobs and other differences between the host community and foreign workers / non-local in-migrants;
- contribution to poor public health outcomes (e.g. increase in sexually transmitted and infectious diseases and alcohol-induced violence, including gender-based violence and harassment (GBVH); and
- contribution to localised inflation.

It is anticipated that planned in-migration of employees to Shinejinst and Bayan-Undur *soums* (both direct and indirect) will be of a small number of employees (and their families). Prioritisation of employment will be given to those who live in the Project Area who meet the necessary skills and experience requirements, as described in *Chapter C9 Economy and Employment*. Erdene plans to conduct targeted recruitment of talented local diaspora to attract skilled workers back to the Project area. Targeted recruitment will also consider previous seasonal employees from the local area and Erdene scholarship graduates for recruitment.

There is also potential for speculative opportunity migrating into the Project area, resulting in an increase in local population. The International Finance Corporation (IFC) has established a tool to determine project-induced influx based on the qualitative analysis of three factors; existence of a mobile population within the context, project characteristics, and capacity of the area to meet project needs (IFC, 2019)[1].

Population Mobility: Population mobility[2] is a key indicator of the probability of spontaneous migration, and is assessed at a broader regional and national level. Application of the IFC tool suggests that the population mobility is moderate to high based on the following factors. Both regionally and nationally, there is a presence of a significant rural population that is reliant on agriculture and subsistence livelihoods. While unemployment at a national and regional level is low to moderate (in comparison to similar developing countries), under-employment, particularly of youth is a key issue locally and regionally. Even though GDP per capita[3] in Mongolia has approximately trebled over the past 25 years, the country falls on the average to lower end when looking at global GDP per capita rankings. Development in Mongolia is highly concentrated in Ulaanbaatar, as well as in the South Gobi region associated with mining development (especially the Oyu Tolgoi and Tavan Tolgoi projects). Additionally, experience in the South Gobi region mining projects has shown a propensity for population influx.

While population mobility can be considered moderate to high at a macro level, there are a number of factors that combine to reduce the potential for influx in the Project area. There is minimal net migration into or out of the *aimag*, and at the *soum* level. Static in-migration can be attributed to the lack of industrial activity (limited to provision of basic goods and services) and economic opportunities and jobs other than herding. This is largely due to the remoteness of the

[1] IFC Risk Assessment https://www.ifc.org.
[2] High levels of spontaneous internal migration towards economic opportunity is linked to the presence of a significant rural population, practicing and reliant on agricultural and subsistence livelihoods, high unemployment and underemployment, highly concentrated development, and a low per capita GDP.
[3] GDP per capita can provide an indication of a country's standard of living, or how prosperous a country feels to each of its citizens.

two *soums* from the Bayankhongor *aimag* centre and Ulaanbaatar, and the related difficulties in establishing businesses. Poor social infrastructure is another factor that drives low migration into the *soum*. Both *soums* have very basic infrastructure and services, including poor roads, educational facilities provided only up to the 9th Grade, poor access to and provision of water and sanitation infrastructure, and intermittent connection to the central energy supply grid, among others (see *Chapter B12 Social Infrastructure*).

Out-migration from the *soums* tends to be to the *aimag* centre and Ulaanbaatar, particularly in relation to the pursuit of further education and diversified job opportunities. Those local residents that have attained higher education are more likely to be based in these urban centres. Feedback as part of Focus Group Discussions (FGD) held during the social baseline fieldwork indicated that recently there have been cases of local graduates returning to the *soum* or *aimag* for work, and to be close to family. This trend may be strengthened by the existence of the Project, as these, and other locals who have left to seek educational and / or economic opportunities at the *aimag* or national level but with family in the Project Area, may be induced to return, strengthen family units and seek direct, indirect or Project-induced economic opportunities.

Project Characteristics: The Project characteristics refer to core project attributes that may have a "pull" factor. The main "pull" factors associated with a project relate to the demand for labour and goods and services (level and duration of such demand). The KGP requires a relatively small workforce, both during construction and operations, as noted above. The duration of construction, which has a slightly higher labour requirements is short, at up to 12 months, with operations commencing for an expected initial mine life of 10 years. As discussed in *Chapter C9 Economy and Employment*, the Project will require a mix of skilled, semi-skilled and unskilled labour for both the construction and operations phase, some of which may be filled by locals from the Project AoI, but which is likely to be largely resourced from urban centres such as Bayankhongor city centre and Ulaanbaatar (as well as internationally). The same is true for goods and services required by the Project. While the Project will improve local and regional road infrastructure (from Bayankhongor to the KGP), there is limited additional influence on regional infrastructure that may induce influx to the area as the Project is largely self-contained due to its remoteness and the concomitant requirement to provide utilities and services (e.g. medical) on site. This means that there is a realistically limited "pull" factor .

Capacity of the area to meet project needs: This is relevant in that project development in areas without adequate capacity usually require project investment to strengthen them. The selected development strategy and the resulting improved local capacity may serve to attract in-migrants, thereby stimulating further economic development that supports additional in-migration. As noted above, the two *soums* are among the least populated in the *aimag*, and there is limited capacity of the local population to meet the Project workforce requirements (especially for skilled labour) in the absence of skills development programmes. Both *soums* are remote from the nearest economic centre – Bayankhongor *aimag* centre, and there are no other major economic or sectoral activities with common demands locally. The availability, quality, quantity and reliability of supply of goods and services from within Shinejinst and Bayan-Undur *soums* is currently limited. Although the demand for various materials and services will support growth and diversification of local businesses, the level of demand created by the Project is not considered large enough to exceed the local capacity to meet that demand to the extent that it results in high or even moderate in-migration.

The Project is anticipated to place some additional stress on local social infrastructure (specifically schools, hospitals, and roads), which currently has little capacity to absorb additional stress in the

event of influx. Project hiring and procurement, and community development activities, building on Erdene's existing programme of activities, will contribute to additional improvements in areas including water, health, education and SME development, among others. Improved local development and economies may provide some "pull", however consideration of migration trends and characteristics as noted above, serve to inherently minimise the strength of this "pull".

There is also the potential that the Project may increase the risk of GBVH due to population influx. As noted above, population influx is not anticipated to occur in any significance, and therefore the risks of an associated increase GBVH is correspondingly low. *Chapter B15 Community Health, Safety and Security* indicates that GBVH is a current issues, with both KIIs and FGDs noting instances of GBVH. One KII noted GBVH tends to be under-reported or not reported at all, and further indicated that cases of domestic violence occur 1 to 3 times a month on average in the soum (Bayan-Undur). GBVH may also be exacerbated by Project employment and associated economic benefits, that may facilitate higher levels of disposable incomes and associated alcohol consumption. Chapter B15, further notes that most crime (including GBVH), in the Project AoI is associated with alcohol consumption.

As noted in *Chapter B8 Demography*, migrants are generally viewed positively in the two *soums*, and a small increase in population as anticipated to occur on the KGP is therefore considered to have a pre-mitigation impact significance of Minor (medium sensitivity and low magnitude).

Mitigation Measures

The potential negative effects in communities of demographic changes (specifically population increase) are proposed to be managed primarily through the measures described in detail in *Chapter C9 Economy* and *Chapter C12 Occupational and Community Health, Safety and Security*. These are not repeated here, but broadly they include stipulation of a period of residence and / or proof of diaspora status in order to qualify as priority 'local' employment. This requirement will also be shared with relevant Government departments and agencies to extend communications of this message and minimise speculative in-migration. Monitoring of demographic changes, in particular, any negative impacts of in-migration or relations between or within the workforce and the community, with the *soum* governments to enable tracking and appropriate response development where required will also be conducted. Specific measures in relation to GBVH are provided in Chapter C12 Occupational and Community Health, Safety and Security.

Contractor workforces are required to comply with the KGP requirements, and this includes matching the preference for local labour hiring to ensure maximum local benefits are achieved through the construction and operations phase, in addition to compliance with community health safety and security requirements, among others. Liaison by the Project with government agencies will include issues of law enforcement requirements to address increased Project-induced in-migrants, and Erdene will also work with the police and relevant Government agencies if required, to address any Project-induced antisocial behaviour.

Specific additional measures proposed include:

- Undertake an annual check on published information as well as relevant information received from stakeholders to check for any evidence of noticeable in-migration and associated issues and impacts. Subject to data availability, the following information should be monitored within the *Community Health Safety and Security Management Plan* (it is not considered necessary to develop a specific in-migration management plan):

- net change in registered population by gender and *soum*;
- estimated total registered and unregistered population by *soum*;
- ratio between capacity of the school / kindergarten and actual number of students;
- capacity issues reported by hospital health professionals during ongoing engagement;
- net change in number and type of registered / unregistered businesses by size (number of employees) by *soum*;
- information related to in-migration recorded through the grievance procedures and incident records;
- reported crime rates (including specifically GBVH);
- reported traffic incident rates;
- Information related to individual and household incomes recorded through stakeholder engagement records;
- number and proportion of people from local communities employed as skilled / unskilled workers (relative to total numbers available for work, disaggregated by gender); and
- number of small and medium-sized enterprises (SMEs) established and registered in local communities.

Residual Impacts

The mitigation measures outlined above (and in the relevant Chapters referenced) will be integrated in conjunction with the *Stakeholder and Communication Management Plan* and will result in an impact magnitude rating of low and a sensitivity rating of medium. The residual impact of increase in population and changes to population characteristics is therefore Minor.

1.5.2 Closure Impacts

During closure of the KGP it is considered that the above discussed impacts with the potential to occur during construction and operations will be reduced / eliminated due to the absence of a Project workforce, and lack of mining activities. At this stage no significant impacts on population and demographics are expected in the closure phase of the KGP. There may be limited potential for out-migration due to the loss of jobs associated with closure of the mine. Impacts of closure on the mine workforce are assessed in further detail in *Chapter C9 Economy and Employment*.

A comprehensive KGP *Closure Management Plan* will be prepared prior to planned closure. Potential impacts from the closure and decommissioning of the KGP will be further defined and assessed in accordance with the *Closure Management Plan*.

1.6 Summary of Population and Demographic Impacts

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
POP 01	Population increase due to KGP-induced in-migration	Residents of all *soums*, but predominantly, those living in Shinejinst and Bayan-Undur *soum* centre; schools and hospitals (staff and users) in the two *soums*	X	X	-	The measures outlined in *Chapter C9 Economy and Employment* and *C12 Occupational and Community Health, Safety and Security* will be applied.	• *Stakeholder and Communications MP* • *Occupational Health, Safety and Security MP* • *Community Health Safety and Security MP* • *Community Development MP* • *Contractor and Procurement MP* • *Crisis and Emergency Response MP* • *HR MP*	**Minor**
			X	X	-	Undertake an annual check on published information and information received from stakeholders to check for any evidence of noticeable in-migration. Subject to data availability, the following information should monitored within the *Community Health Safety and Security Management Plan* (it is not considered necessary to develop a specific in-migration): • net change in registered population by gender and *soum*; • estimated total registered and unregistered population by *soum*; • ratio between capacity of the school / kindergarten and actual number of students;	• *Community Health Safety and Security MP* • *Stakeholder and Communications MP*	

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						• capacity issues reported by hospital health professionals during ongoing engagement; • net change in number and type of registered / unregistered businesses by size (number of employees) by *soum*; • information related to in-migration recorded through the community and worker grievance mechanisms and incident records; • reported crime rates (including specifically GBVH); • reported traffic incident rates; • information related to individual and household incomes recorded through stakeholder engagement records; • number and proportion of people from local communities employed as skilled / unskilled workers (relative to total numbers available for work, disaggregated by gender); and • number of small and medium-sized enterprises (SMEs) established and registered in local communities. • Residual Impacts		

1.7 References

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International Finance Corporation (IFC). Projects and People: A Handbook for Addressing Project-Induced In-Migration. Accessed online



SUSTAINABILITY
EAST ASIA LLC

Erdene Mongol LLC

C9 – Economy and Employment

March 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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1. ECONOMY AND EMPLOYMENT

1.1 Introduction

This Chapter provides an assessment of potential impacts on economy and employment arising from the Khundii Gold Project (KGP or the Project) during construction, operation and closure phases. This Chapter also presents specific mitigation measures that will be implemented to avoid or minimise negative impacts, and enhancement measures to maximise beneficial impacts.

1.2 Policy, Standards and Lender Requirements

Chapter A2: Policy and Legal Framework outlines the requirements that will be followed for the KGP.

1.3 Assessment Methodology

1.3.1 Scope of Assessment

1.3.1.1 Geographical Scope

The geographical scope of the assessment covers the KGP Area of Influence (AoI) as defined in *Chapter B10: Employment and Livelihood*. The assessment covers direct and indirect impacts on employment and economy within Shinejinst and Bayan-Undur *soums*, together with the wider Bayankhongor *aimag*. Also, due to the KGP's labour and supply chain requirements, employment and economic impacts are anticipated to occur at the regional / *aimag* level.

1.3.1.2 Temporal Scope

The temporal scope covers the construction, operation and closure phases of the KGP.

1.3.1.3 Technical Scope

The scope of the socio-economic assessment for the KGP has been defined through a scoping process undertaken from June to September 2019, which identified potentially affected people / communities and expected impacts. The potential impacts on employment and the economy due to the KGP have been assessed based on the scoping results. Impacts are considered for both direct and indirect labour as defined in EBRD Performance Requirement 2 (EBRD PR 2): Labour and Working Conditions. The following definitions have been used:

- Employees – This includes direct employees (staff / personnel) of Erdene Mongol LLC (Erdene) employed to perform activities related to the KGP. These include national (non-local) and foreign workers (including expatriates) that are directly employed by Erdene.
- Contractor workers – This refers to workers who are engaged on the KGP through Contractors or other intermediaries, and who perform work directly related to core functions and activities essential to Erdene's products or services for a substantial duration of time.
- The supply chain – These workers are employed by suppliers providing materials, components, goods or products to the KGP. . Erdene has no direct power in terms of oversight of suppliers; however, Erdene has the responsibility to work with suppliers to ensure that they comply with EBRD requirements.

The assessment of livelihood impacts on herder activities is addressed within Chapter C10: Land Use.

1.3.2 Method of Assessment

The potential impacts were assessed and evaluated using the general methodology outlined in *Chapter A3: Methodology*. The application of this methodology has been informed by the following:

- Environmental and Social Impact Assessment (ESIA) team observations during the social baseline study fieldwork conducted in August 2019;
- results of stakeholder consultations (see *Chapter A6: Stakeholder Engagement*);
- expert knowledge and judgement; and
- previous experience from ESIA work on similar projects or projects in similar social and environmental settings.

1.3.3 Significance Criteria

The significance of a potential impact is determined by a combination of the sensitivity of Project affected people (PAP) and impact magnitude. The criteria used for allocating sensitivity and magnitude are provided in Table 1 and Table 2, respectively. The matrix for combining sensitivity and impact magnitude to allocate the level of significance to an impact is presented in *Chapter A3: Methodology*.

Table 1 Employment and Economy Sensitivity Criteria

Project- Affected People Sensitivity	Project-Affected People
High	PAP with very little capacity and means to adapt to a given change and maintain/improve quality of life.
Medium	PAP with limited capacity and means to adapt to a given change and maintain/improve quality of life.
Low	PAP with some capacity and means to adapt to a given change and maintain/improve quality of life.

Table 2 Magnitude of Economy and Employment Impact Criteria

Magnitude of Impact	Type of Impact
High	An impact that is likely to affect large numbers of people and/or businesses (with number depending on the local context) irrespective of both time-scale and reversibility.
Medium	An impact that is likely to affect a moderate number of people and/or businesses (with number depending on the local context) and which may or may not be reversible.
Low	An impact that is likely to affect a small number of people (with number depending on the local context) and which is likely to be temporary (up to two years) and reversible.
Very Low	An impact that is unlikely to have a measurable or noticeable effect on the wellbeing of affected people so that baseline conditions remain materially unaffected.
Beneficial	An advantageous or positive impact.

1.4 Potential Impacts

1.4.1 Project Affected People

The following PAP are relevant for assessing a range of economic impacts:

- Employees and contractor workers (Mongolian and international);

- local soum residents;
- local bagh herders; and
- local soum businesses and entrepreneurs.

In the context of employment, the following types of people are considered as being potentially vulnerable to impacts when attempting to gain employment in a developing economy such as that of Bayankhongor *aimag*, and specifically Shinejinst and Bayan-Undur *soums* (in which there is little experience of mining):

- people with low levels of education;
- women;
- people with a limited non-agricultural (including herding) skills base; and
- people without easy access to information on job opportunities.

Likewise, in an economy experiencing economic growth and associated inflationary effects, the following groups of people are potentially vulnerable to a relative decline in income and wellbeing:

- disabled and chronically sick people;
- families and people dependent on fixed welfare payments; and
- elderly people who are dependent on State pensions.

1.4.2 Impact Sources

The key impact sources during construction and operations will primarily be due to the beneficial effects of Project-related taxes and royalty payments, direct and indirect employment, and procurement of goods and services. With the exception of local-level, sustainable development Project investments, decline of many of these economic benefits are anticipated to coincide with mine closure.

In addition, indirect employment and associated business opportunities will arise, collectively resulting in induced employment.

Note that herder livelihoods and related impacts are considered in *Chapter C11 Land Use*.

1.5 Assessment of Residual Impacts

This section provides a detailed description of impacts, including the residual construction, operation and closure impacts of the KGP. It also sets out the mitigation measures integral to the Project that aim to reduce the magnitude of the potential impacts.

1.5.1 Construction and Operations Phase Impacts

1.5.1.1 Direct, Indirect and Induced Employment Generation and Business Opportunities

Employment is considered a positive impact of the KGP and will be generated through direct, indirect and induced employment opportunities, primarily through the construction and operations phases, including:

- Direct job opportunities, both permanent and temporary;
- Indirect job opportunities with contractors and suppliers; and
- Induced employment arising from increased disposable income and demand for additional goods and services.

The KGP will require highly skilled, semi-skilled and unskilled workers to undertake construction, operational and closure activities. The Project will create positive economic impacts as a result of direct wage payments to employees and contractors. There will be a small construction workforce required, with a peak workforce of approximately 506[1] people (including contractors) for an estimated construction period of up to 12 months. Not all of the workforce will be on site at the same time, with fewer workers on site on any given shift. The KGP is likely to have a higher proportion of international personnel during construction (for engineers and specialist supervisory positions), and subsequent reduction in international positions as the KGP moves into operations, where at least 90% of positions will be filled by Mongolian nationals, under Mongolian statutory requirements.

The operations phase of the mine will create jobs for a mix of skilled, semi-skilled and low / unskilled workers. These jobs will exist with Erdene, the contractors and a range of sub-contractors plus suppliers. Some of the construction workforce will go on to employment during operations. The workforce will comprise a maximum of approximately 420 people, including direct and indirect employees[2]. The operations phase jobs will be longer term, for the operational life of the KGP which is currently estimated at 10 years. Table 3 below provides the estimated breakdown of Erdene (direct) and contractor (indirect) employees during the operations phase of the KGP. The total value of direct benefits to Mongolia from the

Table 3 Direct and Indirect Employment on the KGP

Direct Employment Positions with Erdene	**Number of Positions**
Management	10
Administration	20
Finance	2
Processing Technical	6
Processing Production	33
Mining Technical	6
Maintenance and Engineering	30
Training	4
Information Technology	2
Surveying	6
Health, Safety, Environment, and Community	13
Geology	9
Supply	11
Laboratory	9
Projects	2
Power Station	10
Offsite Employees (Ulaanbaatar, Bayankhongor *aimag* centre)	17
Total	**190**
Contractor Employment Positions	**Number of Positions**
Mobile Maintenance	33
Mining Production	77
Camp	45
Total	**155**

Local procurement opportunities that may arise from the KGP include goods such as aggregates / sand, concrete, building materials, food, and personal protective equipment. In addition, Erdene

[1] A 50% contingency for additional personnel beyond expected has been applied for the purposes of estimating impacts of the construction phase.
[2] A 25% contingency for additional personnel beyond expected has been applied for the purposes of estimating impacts of the operations phase.

and its contractors require numerous vendors, suppliers and service providers to meet the needs for materials and the provision of services, including food supplies, transportation services, as well as catering, laundry, cleaning and sanitary services on-site for the construction and operations workforce.

Although the demand for various goods and services will support growth and diversification of local businesses, it should be noted that the availability, quality, quantity and reliability of supply of goods and services from within Shinejinst and Bayan-Undur *soums* will be limited by a lack of depth in local businesses' capability. As a consequence, most goods and services for the KGP will need to be outsourced from urban centres such as Bayankhongor, Ulaanbaatar or imported from China or other countries.

The local agricultural sector has historically focused on subsistence or small-scale production based upon meat and milk, with minimal growing of commercial crops (limited to vegetables and small-scale processing thereof, including pickling in the Ekhiin Gol area). There is therefore limited (current) potential to source agricultural foodstuffs for use by the mine camp catering services. The social baseline also indicated the small number of registered businesses in the *soums*, focused primarily on small-scale retail and wholesale, and community, social and personal service activities.

The amount of induced employment arising from increased disposable income and demand for additional goods and services is considered a positive impact of the Project. Induced employment is likely to occur during both the construction and operations phases with increased demand for goods and services. There may be a slightly greater impact anticipated during construction given the higher number of workers. The number and location of indirect / induced jobs will depend on the scale of the multiplier effect. In the KGP geographic and economic context, the leakage of wages and supplier payments outside of the local area, and Bayankhongor *aimag*, will be high. This is because many workers / suppliers will likely be based in Ulaanbaatar, and internationally, and will spend wages and payments in these locations. The employment created by the circulation of these monies may not be local, but a proportion is likely to remain in Mongolia. Many of the indirect and induced jobs are likely to be located regionally, and also outside of Mongolia. Therefore, a conservative multiplier[3] of 1 operational mine position (contractors and employees) to 0.1 induced jobs, suggests that around 42 additional jobs may be created arising from increased disposable incomes and demand for goods and services.

Mitigation Actions

The following enhancement measures will be applied:

- Develop and implement a *Human Resources (HR) Management Plan*, the provisions of which will apply to all personnel (including contractors). The *HR MP* will be consistent with Erdene's overarching *Human Resources Management Policy*, which establishes policies that will be followed by all employees (and contractors), including a *Hiring Policy*; and *Training and Professional Development Policy*.
- Prioritise local and Bayankhongor *aimag* construction employees for operations phase roles and provide them with training during the construction phase to help

[3] Estimates in the sector indicate that for every job created directly by an extractives industry operator, there are between one and four jobs created. Reports on this figure vary. Anglo American has advised its sites that induced employment should be assumed to be 5 to 20% of the sum of direct and indirect employment (Anglo American 2012).

them enhance the skills required for successful transition from construction to operations phase positions.

- Develop and implement a training plan as part of the *HR Management Plan* that takes into consideration the following aspects:
  - educational and skill levels of local labour pool;
  - ability of existing local teaching institutions to participate in and/or deliver training; and
  - possible forms of assistance to local teaching institutions in delivering training programs.
- Provide training for personnel and contractors to ensure that the KGP has access to an appropriately skilled and trained workforce, with training ranging from task specific on-the-job training to more formal vocational training, depending on the needs of the individual Erdene or contractor employee.
- In accordance with its annual training plan, organise training of employees to upgrade employees' skills and provide further practical experience as required.
- Conduct an inventory and pre-qualification survey, in addition to additional engagement with local communities and authorities, on local sourcing opportunities (meat, vegetables, dairy products) to identify potential suppliers
- Investigate, through consultation with local communities and authorities, potential for a Supplier Development Programme that provides targeted support and assistance to develop local businesses' as part of the *Local Cooperation Management Plan*.

Residual Impacts

KGP will have a Positive impact on direct, indirect and induced employment locally and more widely in Bayankhongor *aimag* and Ulaanbaatar during the construction and operations phases of the Project.

1.5.1.2 Community Expectations About Employment

Expectations of employment are high among local community members in Shinejinst and Bayan-Undur *soums*. Unfulfilled expectations for employment could potentially cause discontent locally during both the construction and operations phases. This impact is considered of major significance given high sensitivity of PAPs on this issue. Consultation with the community members and local officials during the social baseline fieldwork revealed that many consider they can't meet the minimum requirements for employment at the KGP, and will therefore be unable to pursue employment opportunities without further training and development. The social baseline survey found that only a small percentage of Household Survey respondents had a higher education (16%) or a technical / vocational (8%) education, indicating that there is potentially a small pool of local skilled labour, and a larger pool of unskilled and semi-skilled labour.

Mitigation Measures

The measures provided in Section 1.5.1.1 will help to mitigate this impact, in addition to the following:

- The *HR Management Plan* will document requirements and management activities relevant to ensuring that local people have the opportunity to apply for available roles. This will include the following provisions.
    - Implement a preferential hiring policy, with preference given to local citizens if they meet the knowledge, skill and experience requirements of the position. The policy will prioritise employment applicants from Shinejinst and Bayan-Undur *soums*, thereafter applicants from Bayankhongor *aimag*, then beyond.
    - Establish eligibility for 'local hiring preference' through a specific timeframe of residency in the Project AoI and / or proof of diaspora status.
    - Conduct targeted recruitment of talented diaspora (of Shinejinst and Bayan-Undur *soum*) to attract skilled workers back to the Project area. Targeted recruitment will also consider previous seasonal employees and Erdene scholarship graduates for recruitment.
    - Advertise vacancies in locally appropriate and mutually agreed ways.
    - Engage and coordinate with local training institutions to encourage applications from potentially suitable local job seekers.
- Clearly communicate employment estimates, timeframes and skills requirements to local communities on an ongoing basis through trained Community Relations personnel, including, for example, specifying particular heavy licence type and years of experience in truck driving in order to receive a site driving licence.

Residual Impacts

The risk of unmet community expectations for jobs may result in local discontent and loss of the KGP's social licence to operate. After the application of the above mitigation measures, this is considered to be of Minor residual significance.

1.5.1.3 Ability to Source Appropriately Skilled Workforce

Current market conditions suggest that suitably qualified workers are likely to be available at the national level. However policy changes at the national Government level, or commodity prices, are two external factors which can change this situation, through influencing labour market conditions (demand and supply thereof) in the country. The influence of this would be felt keenly by Erdene in being able to deliver on the Project schedule. Availability of skilled personnel may be limited at the local level (as discussed in Section 1.5.1.1 and 1.5.1.2). The social baseline found that due to remoteness of the *soums*, skilled locals tend to move to the *aimag* centre or Ulaanbaatar to obtain employment other than herding. This is further exacerbated by the low attractiveness of the two *soum* centres as a place to live due to their remoteness from urban centres, associated lack of business opportunities other than herding, and poor social infrastructure and services.

There is little local experience in, or knowledge of large-scale mining and the types of skills and experience required for employment therein. Potential recruits may be sourced from within those 15 local residents that have had seasonal employment during the KGP exploration activities. The Company may also be able to recruit some skilled staff from the Shinejinst and Bayan-Undur diaspora that are living in the *aimag* centre and Ulaanbaatar. Recruitment from Bayankhongor *aimag* centre institutions may also be possible, providing graduates and qualified youth with the

opportunity to apply their skills at the Project. Erdene's scholarship programme graduates may also offer a potential pool of local talent for the construction and operations phase of the Project.

It is noted that the social baseline found that there are a higher number of female attendees at the TVET in Bayankhongor *aimag* (consistent with national further education and training patterns). This may facilitate higher levels of skilled female recruitment and labour force participation in the KGP. It also raises the possibility for the Project to provide local impetus toward the process of closing the gender pay gap, at least in the Project AoI. In addition to semi-skilled and skilled labour recruitment, there will be a range of jobs related to the mine camp and servicing thereof that are expected to attract more female than male applicants. This is an additional area in which local female recruitment may be successful.

While there are limited training options for the mining sector in the Project AoI, local training institutions have some limited experience in preparing students in work readiness, however on-the-job training will remain an important means of supporting citizens of the Project AoI who have not had access to such training to develop their vocational skills.

As noted above, the KGP is likely to have a higher quota of international personnel during construction, and subsequent reduction in international positions as the Project moves into operations. Difficulty in sourcing an appropriately skilled workforce may therefore be exacerbated moving into the operations phase, where there is a national requirement for a higher proportion of Mongolian nationals in the workforce. The sensitivity rating is high, leading to a pre-mitigation significance of Major, for both the construction and operations phases.

Mitigation Measures

In addition to those measures outlined in Section 1.5.1.1 and 1.5.1.2, the following mitigation measures will be applied:

- Use an international workforce for a term-limited period for compliance and training purposes, where a national personnel cannot be sourced.
- Develop and implement a *Local Cooperation Management Plan* that includes initiatives on upskilling of local people to facilitate potential local recruits in meeting skills and experience requirements (e.g. internship, scholarship program for trades and professionals). Such initiatives will build on Erdene's previous community development initiatives, subject to additional engagement with local communities and authorities.
- Promote employment and career development of women, including for managerial and technical / engineering positions.
- Actively encourage women to apply for a diverse range of jobs. The KGP will aim for jobs other than in unskilled or semi-skilled roles (such as cleaning and catering) to be available to, and pursued by women candidates.
- Apply a strict policy of non-harassment to reduce workplace risks to women.
- Work with local *soum* Government to identify opportunities to increase women's participation in the KGP. The Project will also explore opportunities for induced employment to support local enterprises that support employment for women, such as dairy products manufacturing and vegetable processing / pickling, which are largely conducted by women in the Project AoI.

Residual Impacts

With the application of the mitigation measures outlined above, the significance of this impact is considered to be reduced, leaving a residual significance of Minor, for both construction and operations phases.

1.5.1.4 Disputes Concerning Labour, Accommodation and Working Conditions

The KGP aims to provide international standard working conditions for a predominantly national workforce. Workforce-related risks will require management throughout the mine life cycle from pre-development through closure. Unions are not common in Mongolia, and the potential for a unionised workforce is low at the KGP, given the small size of the Project. While the potential for labour disputes on the KGP is low, disputes may cause disruption to Project scheduling and could potentially have significant impacts on the overall Project timeline.

Furthermore, workers housed in accommodation camps are likely to have limited opportunity to leave the camp for non-work purposes. This is designed to help mitigate a number of potential impacts on local communities, and also due to the remote nature of the site. Any controls on worker movement could create adverse impacts on worker rights and wellbeing, as well as compliance gaps with the requirements of EBRD PR2. Impacts could range from denial of freedom of movement to allegations of modern slavery if workers do not feel able to exit the site to leave their jobs. These risks may be higher for any foreign workers who have - or perceive that they have - lower recourse to legal protections.

This impact is considered of Moderate pre-mitigation significance.

Mitigation Measures

Erdene is committed to meeting national labour law and selected international requirements (specifically EBRD PR2) for protecting the rights and duties of employers and employees in relation to collective agreements, collective bargaining, collective and individual labour disputes, labour conditions, terms and conditions of work liabilities for legislative breaches and gender equality (see *Chapter A2 Legal Framework*). The *HR Management Plan* commits Erdene to work in good faith with trade unions and any other employee group seeking formal representation.

All workers (as specified above) will be managed in accordance with the *HR Management Plan*. This plan will include commitments to ensure that all Project-provided worker accommodation complies with the IFC / EBRD guidance note on workers' accommodation (IFC / EBRD 2009) and that there will be no discrimination, by gender or any other personal attribute, in terms of hiring, promotion opportunities or pay (applying the principle for equal pay for equal work). Key requirements on worker accommodation are as follows:

- Living facilities are located to avoid flooding and other natural hazards.
- Where possible, living facilities are located within a reasonable distance from the worksite.
- Transport from the living facilities to worksite must be safe and free.
- The living facilities are built with adequate materials, kept in good repair and kept clean and free from rubbish and other refuse.

All workers will be advised of the site conditions, and specifically the remote location of the mine from any urban areas, prior to contracting.

Erdene will implement an *Employee Complaint Mechanism* at the KGP, accessible to all personnel.

Erdene will prohibit the withholding of workers' passports or identity cards and the employment of people under the age of 18 for hazardous work (with ages to be verified). All workers will be provided with awareness training on workers' rights and issues such as modern slavery as part of induction training. Disciplinary procedures will be clear and penalties for breaking the rules should be proportional and implemented through a procedure allowing workers to defend themselves and to challenge the decision taken.

Erdene will also require contractor compliance with the *HR Management Plan*. Contractors will be managed through the *Contractor and Procurement Management Plan*, which provides for ongoing monitoring of compliance by contractors on a regular basis to ensure compliance of EBRD PR2 requirements and the Mongolian Labour Code by all contractors.

Erdene will ensure employment contracts are in place, monitored and enforced, including of contractor employees for consistency and equity across the Project.

In addition to the *HR Management Plan* and the *Contractor and Procurement Management Plan*, mitigation of the potential negative impacts associated with labour and working conditions, among others, are included in a package of human resources policies and procedures within the Erdene *Human Resources Management Policy*, including, among others:

- *Behaviour in the Workplace Policy;*
- *Sexual and General Harassment Policy;*
- *Whistleblower Policy;*
- *Code of Business Conduct and Ethics.*

Residual Impacts

Overall, the residual impact of will be adverse, of low magnitude and medium sensitivity. The overall impact significance is Minor.

1.5.1.5 Local Inflation

The potential for local price inflation may be an indirect adverse impact from the Project. Price inflation is caused by the influx of 'new' money into an economy, increasing the demand for (and price of) locally available products and putting pressure on scarce resources. Local inflation is likely to occur but will be limited as workers housed in the KGP accommodation camp have limited opportunity to leave the camp for non-work purposes given the remoteness of the site from any urban areas (closest is Shinejinst *soum* centre, 70 km away). Inflation may result from extra money injected into the local economy from an increase in disposable household incomes of local construction and operations workers, and to a limited extent from other non-local Project workers spending money locally. In extreme cases this can lead to teachers, nurses and other essential government workers leaving their jobs to seek work in mining, which was evident during the mining industry-wide boom in Mongolia in 2009, rather than a result of a single project of the scale of the KGP.

A small or moderate increase in the inflation rate may occur during the early years of the Project (one to two years). Moderate steady inflation is part of normal economic growth; however, escalated increases adversely affect people on fixed incomes, such as those reliant on

remittances and / or state welfare payments such as pensions (which can lag inflation). Often, such people are also disabled, sick or elderly and therefore vulnerable.

As noted in the social baseline study, there is sensitivity in the Project AoI to price fluctuations, and 40 households (51% of Household Survey respondents) indicated that have a family member in the household who receives social welfare payments. This impact is considered to be of medium sensitivity by PAPs, and is likely to affect a moderate number of people and / or businesses locally. Pre-mitigation impact significance is therefore Moderate.

Mitigation Measures

There are no realistic mitigation measures entirely within the control of Erdene that can manage escalated local-level inflation. However, Erdene will conduct ongoing engagement with *soum* authorities and local communities, and particularly vulnerable groups, to monitor inflationary pressures / trends and, depending upon the results, collaborate to implement targeted and time-bound remedial measures.

Erdene will also pay salaries commensurate with comparable Projects (in line with national benchmarks and industry standards).

Residual Impacts

The Project is prioritising hiring locally and will pay market-benchmarked wages, as such inflationary impacts are considered less likely. Likewise, the positive economic impacts outlined in Section 1.5.1.1, 1.5.1.6 and 1.5.1.7 will contribute to ameliorate such adverse effects. However, there remains a potential for a residual impact to vulnerable groups, such as pensioners and other fixed income earners, which would result in Minor adverse residual significance.

1.5.1.6 Increased Revenue to the State and Local Budgets

The major components of the economic investments from the KGP to the Mongolian economy will comprise local purchases, taxes and royalties, and salaries, which would accrue during the construction and operations phases of the Project and to a lesser extent in Project closure.

National Level Investment and Direct Benefits: The construction and operations phases of the KGP would provide an injection of capital into the Mongolian economy, building on the investment Erdene has already made during its exploration activities thus far. Approximately USD $50 million was spent on exploration projects in Mongolia since 2004, of which approximately USD$10 million invested in the KGP.

The total estimated initial capital cost for the design, construction, installation, and commissioning of the Project is estimated to be approximately USD $39.9 million. Sustaining capital of USD $1.21 million is included in the mine plan and closure costs are estimated at USD $1.31 million. Revenues to the Government budget will comprise predominantly royalties and taxes, and are anticipated to total approximately USD $81.8 million over the life of mine.

Additionally, and as noted in *Chapter B10 Economy*, Erdene, was the first foreign-listed company to cross list its shares on the Mongolia Stock Exchange (MSE). As part of the cross listing, Erdene personnel worked with local government officials to have Shinejinst and Bayan-Undur *soums* subscribe to the offering. Erdene then registered a portion of the MSE-listed shares to over 5,000 residents of the *soums*. Consequently, local residents may receive economic benefit from share price appreciation.

Indirect Economic Benefits: In addition to these direct payments from the Project, other indirect economic opportunities would be created from Project and worker expenditure in the Project AoI

and at the national level, particularly in Ulaanbaatar (as noted in Section 1.5.1.1). This may include expenditure for services such as food, transport and accommodation

The Project may also have the impact of private sector investment promotion. The successful development of the KGP will positively contribute to the perception of Mongolia as a safe country for mining investment and could build market confidence that the country is a stable investment destination for mining and other industries alike.

Mitigation Measures

Erdene does not realistically have control over the revenues paid to the state and *aimag* budgets and how these are spent. Mongolia is a member of the Extractive Industries Transparency Initiative (EITI) and mining revenues are tracked and published through this mechanism.

Erdene will disclose payments to government through its financial reporting obligations. Erdene is also committed to conducting dedicated engagement with local *soum* governments about public investment, particularly associated with establishment and operation of a Local Cooperation Agreement (LCA), which is a statutory obligation, and which the Company has a key role in the implementation thereof (see also Section 1.5.1.7 for enhancement measures).

Erdene also commits to conducting ongoing communications and engagement with local communities on the Project and its financial payments and contributions at state and local levels, to assist in fostering community level awareness of the KGP and its local economic contribution.

Residual Impacts

Increased revenues to the state and local budget are a Positive impact of the KGP.

1.5.1.7 Community Development Initiatives

Erdene is committed to delivering lasting shared value with and for communities and other stakeholders influenced by and contributing to the success of their business. The implementation of community development initiatives in partnership between the Project and key stakeholders is a potential positive impact of the Project.

Erdene has entered into formal LCAs with Bayankhongor, Shinejinst, and Bayan-Undur governments since 2014 (6 calendar years cumulatively), although the Company's community relations date back earlier to 2006. The objectives of these LCAs are to have Erdene's projects contribute to the development of the local area and the livelihoods of citizens, consistent with local development priorities. As noted in further detail in *Chapter B9 Social Structures* and *Chapter B10 Economy*, the key activities and programmes implemented under the LCAs have aimed to improve local education and health facilities, provide support to students to pursue higher education, and improve livelihood strategies for herder households.

Significantly, in 2017 the Company engaged in a research partnership with the University of British Columbia (UBC) to investigate how exploration companies can maximise the benefits of resource development for host nations and affected communities. The research programme examines ways in which mining projects can create and share value by working collaboratively with stakeholders[4]. This partnership is helpful to Erdene in delivering the KGP consistent with its Vision and good international practice, as well as with the perspectives of the communities it seeks to

[4] See Fraser, J., Kunz, N., & Batdorj, B. (2019). Can mineral exploration projects create and share value with communities? A case study from Mongolia . Resources Policy, 101455, and Fraser, J., Batdorj, B., & Kunz, N. (2018). Creating and sharing value with communities in the early mine life-cycle: The case of Erdene Resource Development Corporation in Mongolia. The University of British Columbia.

support. During the social baseline study conducted in August 2019, respondents were interviewed to hear their ideas about projects and themes they view as important from the community perspective to be considered for future investment. The key themes identified were consistent with Fraser et al (2019), and included:

- Employment – local hiring and training and provision of opportunities for local people.
- Education – continuation of the Erdene scholarship programme, and provision of training and partnership programmes to upskill locals;
- Water – assistance / activities that promote water quality, quantity, and accessibility, maintenance of water wells, and programmes that foster understanding of mining impacts on water;
- Economic development – fostering local SME development and procurement; programmes that promote herder livelihoods and herd health;
- Infrastructure - shared infrastructure and improvements of local infrastructure, and focus on renewable energy;
- Environment – activities to enable communities to mitigate soil erosion and desertification, specifically focusing on pasture quality and availability, initiatives that assist communities to address the impacts of climate change.

The social baseline study indicated the generally high expectations held by local communities and officials on future community development activities as the KGP progresses, as well as some entrenched perceptions on negative impacts of mining that are closely associated with past coal mine development activities in the area. This suggests the need for a multi-year, strategic local cooperation plan:

- that reflects the LCA;
- links community development activities to impacts (positive and negative);
- builds capability within the Company and community to effectively and sustainability scale up community development projects[5] as the KGP progresses;
- manages community expectations and perceptions of community development projects, benefits, and entitlements so as to maintain and build trust between the Company and the community.

As noted in the *Erdene KGP Execution Plan (2019)*, the Company intends to negotiate and enter into a long-term LCAs with those stakeholders directly affected by the Project. The LCAs are intended to define the scope of potential benefits and opportunities of the mine, particularly with regard to employment, supply chain, and environmental protection, as well as the roles and responsibilities of the Company and the local government.

Mitigation Measures

The following measures are proposed:

[5] A more detailed description of the community development projects previously supported by Erdene is provided in *Chapter B10 Economy*, and not repeated here. The key projects include the Erdene scholarship programme; health and water-related support to the two *soums*, specifically water stewardship activities - access to water and restoration of wells.

- Building on the existing *Community Investment Policy*, Erdene will develop a *Local Cooperation Management Plan* to guide implementation of the LCAs, including the following objectives:
  - Seek opportunities to leverage funds and build partnerships with Government, international donors and other private companies working in the region;
  - Target community development activities based on impacts, and specifically for those community members who are potentially adversely affected by the Project.
  - Prioritise investment into human capital (rather than capital expenditure and infrastructure) for more sustainable outcomes. The Company's approach to community development will prioritise needs-based, participatory planning and implementation, which are critical for the success and sustainability of community-based development plans.
- Conduct community consultation to further define potential community development activities for support by the Company prior to finalisation of the LCAs. Thus obtaining feedback on how existing successful community development activities and programmes may be further scaled-up consistent with local needs and participation (e.g. scholarship programme, water stewardship activities).

1.5.2 Closure Phase Impacts

1.5.2.1 Decline in Direct, Indirect and Induced Employment at Closure of the KGP

The closure phase is expected to involve a decline in direct, indirect and induced employment, and potential contraction of the local economy. The impact on employment will be negative, direct and indirect. Job losses will occur along the supply chain as well as in induced employment because of the reduced demand for services. The geographic extent will be at the *soum*, *aimag* and to a limited degree national and international. The magnitude is medium, and sensitivity of the impact is high, leading to a pre-mitigation significance of Major. The duration will be long term and continuous, extending beyond the closure period. This impact will definitely occur, unless additional resources are proven to be economic and allow extension of the mine operations.

Mitigation Measures

The workforce will decline with closure of the mine. The mitigation measures will focus on implementing a proactive response to closure as follows:

- Prepare a *Closure Management Plan* to manage the demobilisation of workers from the KGP.
- Implement an "out-boarding" process as part of the *Closure Management Plan* for all employees subject to retrenchment, including notification periods, consultation provisions and severance packages compliant with the Labour Law of Mongolia and the requirements of the EBRD PR 2.
- Prioritise on-hiring of KGP employees on other Erdene projects in Mongolia, as may developed.

- Make certificates available to all workers, providing details of their employment and associated training.

Residual Impacts

The KGP will have a broad positive impact on employment and the economy during construction and operations, both in the Project AoI and more broadly in Mongolia. However, decommissioning and closure of the KGP is certain, with the magnitude of the impact anticipated to remain a medium. It is considered that the application of the above mitigation measures will reduce the sensitivity of affected people from major to medium sensitivity, thus leading to a residual impact of Moderate.

1.6 Summary of Residual Impacts and Mitigation Measures

Table 4 presents impacts on employment and economy enhancement / mitigation measures and assesses the significance of residual impacts. Erdene will conduct internal monitoring and reporting to track progress and outcomes of the individual mitigating / enhancement measures implemented to manage the impacts assessed in this Chapter.

Table 4 Summary of Impacts on Economy and Employment

ID	Impact	Project Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
E01	Direct, Indirect and Induced Employment Generation and Business Opportunities	Mongolian and expatriate workers	X	X	-	Develop and implement a *Human Resources (HR) Management Plan*, the provisions of which will apply to all personnel (including contractors), consistent with *Human Resources Management Policy.*	• *HR MP*	**Positive**
			X	X	-	Prioritise local and Bayankhongor *aimag* construction employees for operations phase roles and provide them with training during the construction phase to help them enhance the skills required for successful transition from construction to operation phase positions.	• *HR MP*	
			X	X	-	Develop and implement a training plan that takes into consideration the following aspects: • educational and skill levels of local labour pool; • ability of existing local teaching institutions to participate in and/or deliver training; and • differences between mining industry and other heavy industry sectors.	• *HR MP*	
			X	X		Organise training of employees to upgrade employees' skills and provide further practical experience as required, with training ranging from task specific on-the-job training to more formal vocational training, depending on the needs of the individual Erdene or contractor employee.	• *HR MP*	
			X	X	-	Conduct an inventory and pre-qualification survey, in addition to additional engagement with local communities and authorities, on local sourcing opportunities (meat, vegetables, dairy products) to identify potential suppliers	• *Contractor and Procurement MP*	

ID	Impact	Project Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
			X	X	-	Investigate, through consultation with local communities and authorities, the potential for a Supplier Development Programme that provides targeted support and assistance to develop local businesses' capacity.	• *Local Cooperation MP* • *Contractor and Procurement MP*	
E02	Community Expectations About Employment	All PAPs listed in Section 1.4.1.	X	X	-	The measures provided in E01 will apply to mitigate this impact, in addition to those listed below.	• *HR MP* • *Local Cooperation MP* • *Contractor and Procurement MP*	**Minor**
			X	X	-	Implement a preferential hiring policy, with preference given to local citizens if they meet the knowledge, skill and experience requirements of the position. The policy will prioritise employment applicants from Shinejinst and Bayan-Undur *soums*, thereafter applicants from Bayankhongor *aimag*, then beyond.	• *HR MP*	
			X	X		Establish eligibility for 'local hiring preference' through a specific timeframe of residency in the Project AoI and/or proof of diaspora status.	• *HR MP*	
			X	X	-	Conduct targeted recruitment of talented diaspora (of Shinejinst and Bayan-Undur *soum*) to attract skilled workers back to the Project area. Targeted recruitment will also consider previous seasonal employees and Erdene scholarship graduates for recruitment.	• *HR MP*	
			X	X	-	Advertise vacancies in locally appropriate and mutually agreed ways.	• *HR MP* • *Stakeholder and Communications MP*	

ID	Impact	Project Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
			X	X	-	Engage and coordinate with local training institutions to encourage applications from potentially suitable local job seekers.	• *HR MP* • *Stakeholder and Communications MP*	
			X	X	-	Clearly communicate employment estimates, timeframes and skills requirements to local communities on an ongoing basis through trained Community Relations personnel.	• *HR MP* • *Stakeholder and Communications MP*	
E03	Ability to source appropriately skilled workforce	All PAPs listed in Section 1.4.1.	X	X	-	The measures provided in E01 and E02 will apply to mitigate this impact, in addition to those listed below.	• *HR MP* • *Local Cooperation MP* • *Contractor and Procurement MP* • *Stakeholder and Communications MP*	**Minor**
			X	X	-	Use an international workforce for a term-limited period for compliance and training purposes, where a national personnel cannot be sourced.	• *HR MP*	
			X	X	-	Develop and implement a *Local Cooperation Management Plan* that includes initiatives on upskilling of local people to facilitate potential local recruits in meeting skills and experience requirements (e.g. internship, scholarship program for trades and professionals). Such initiatives will build on Erdene's previous community development initiatives, subject to additional engagement with local communities and authorities.	• *Local Cooperation MP*	

ID	Impact	Project Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						Promote employment and career development of women, including for managerial and technical / engineering positions.	• *HR MP*	
			X	X	-	Actively encourage women to apply for a diverse range of jobs. The KGP will aim for jobs other than in unskilled or semi-skilled roles (such as cleaning and catering) to also be available to and pursued by women candidates.	• *HR MP* • *Stakeholder and Communications MP*	
			X	X	-	Apply a strict policy of non-harassment to reduce workplace risks to women.	• *HR MP*	
			X	X	-	Work with local soum Government to identify opportunities to increase women's participation in the KGP. The Project will also explore opportunities for induced employment to support local enterprises that support employment for women, such as dairy products manufacturing and vegetable processing / pickling, which are largely conducted by women in the Project AoI.	• *HR MP* • *Contractor and Procurement MP* • *Local Cooperation MP* • *Stakeholder and Communications MP*	
E04	Disputes Concerning labour, accommodation, and working conditions	All workers	X	X	-	Erdene is committed to meeting national labour law and international requirements (specifically EBRD PR2) for protecting the rights and duties of employers and employees. The *HR Management Plan* commits Erdene to work in good faith with trade unions and any other employee group seeking formal representation.	• *HR MP*	**Minor**

ID	Impact	Project Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
			X	X	-	All Project-provided worker accommodation will comply with the *IFC / EBRD guidance note on workers' accommodation (IFC / EBRD 2009).*Key requirements on worker accommodation are as follows: • Living facilities are located to avoid flooding and other natural hazards. • Where possible, living facilities are located within a reasonable distance from the worksite. • Transport from the living facilities to worksite must be safe and free. • The living facilities are built with adequate materials, kept in good repair and kept clean and free from rubbish and other refuse.	• *HR MP*	
			X	X	-	Advise all workers of the site conditions, and specifically the remote location of the mine from any urban areas, prior to contracting.	• *HR MP*	
			X	X	-	Prohibit the withholding of workers' passports or identity cards and the employment of people under the age of 18 for hazardous work (with ages to be verified). All workers will be provided with awareness training on workers' rights and issues such as modern slavery as part of induction training. Disciplinary procedures will be clear and penalties for breaking the rules should be proportional and implemented through a procedure allowing workers to defend themselves and to challenge the decision taken.	• *HR MP*	

ID	Impact	Project Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
			X	X	-	Apply policy of no discrimination, by gender or any other personal attribute, in terms of hiring, promotion opportunities or pay (applying the principle for equal pay for equal work), as outlined in the *HR Management Policy*.	• *HR MP*	
			X	X	-	Implement an Employee Complaint Mechanism at the KGP, accessible to all personnel.	• *HR MP*	
			X	X	-	Require contractor compliance with the *HR Management Plan*. Contractors will be managed through the *Contractor and Procurement Management Plan*, which provides for ongoing monitoring of compliance by contractors on a regular basis.	• *HR MP* • *Contractor and Procurement MP*	
			X	X	-	Ensure employment contracts are in place, monitored and enforced, including of contractor employees for consistency and equity across the Project.	• *HR MP*	
E05	Local inflation	All PAPs listed in Section 1.4.1, particularly those on fixed incomes.	X	X	-	Conduct ongoing engagement with soum authorities and local communities, and particularly vulnerable groups, to monitor inflationary pressures / trends and, depending upon the results, collaborate to implement targeted and time-bound remedial measures.	• *Stakeholder and Communications MP*	**Minor**
			X	X	-	Pay salaries commensurate with comparable Projects (in line with national benchmarks and industry standards).	• *HR MP*	
E06	Increased revenue to state and local budgets	All PAPs listed in Section 1.4.1	X	X	-	Disclose payments to government through Erdene's financial reporting obligations.	• *Stakeholder and Communications MP*	**Positive**
			X	X	-	Conduct dedicated engagement with local government about public investment, particularly associated with establishment and operation of a Local Cooperation Agreement, which is a statutory	• *Stakeholder and Communications MP*	

ID	Impact	Project Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						obligation, and which the Company has a key role in the implementation thereof.		
			X	X	-	Conduct ongoing communications and engagement with local communities on the Project and its financial payments and contributions at state and local levels, to assist in fostering community level awareness of the KGP and its local economic contribution(s).	• *Stakeholder and Communications MP*	
E07	Community development initiatives	All PAPs listed in Section 1.4.1	X	X	-	In addition to the measures outlined above in E01, E02, E03, and E06, the below measures will be applied.	• *HR MP* • *Contractor and Procurement MP* • *Local Cooperation MP*	**Positive**
			X	X	-	Conduct community consultation to further define community development activities for support by the Company prior to finalisation of the LDF. This obtaining feedback on how existing successful community development activities and programmes may be further scaled-up consistent with local needs and participation (e.g. scholarship programme, water stewardship activities).	• *Local Cooperation MP*	
			X	X	-	Develop a Local Cooperation MP to guide implementation of the Local Cooperation Agreements, including the following objectives: • Seek opportunities to leverage funds and build partnerships with Government, international donors and other private companies working in the region; • Targeted community develop activities based on impacts, and specifically for those community	• *Local Cooperation MP*	

ID	Impact	Project Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						members who are adversely affected by the Project.; • Prioritise Local Cooperation Agreement investment into human capital (rather than capital expenditure and infrastructure) for more sustainable outcomes.		
E08	Decline in direct, indirect and induced employment at closure of the KGP	All PAPs listed in Section 1.4.1	-	-	X	Prepare a *Closure Management Plan* to manage the demobilisation of workers from the KGP.	*Closure MP*	**Moderate**
			-	-	X	Implement an "out-boarding" process as part of the *Closure Management Plan* for all employees subject to retrenchment, including notification periods, consultation provisions and severance packages compliant with the Labour Law of Mongolia and the requirements of the EBRD PR 2.	*Closure MP*	
			X	X	X	Prioritise on-hiring of KGP employees on other Erdene projects in Mongolia, as may developed.	*Closure MP*	
			X	X	X	Make certificates available to all workers, providing details of their employment and associated training.	*Closure MP*	

1.7 References

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SUSTAINABILITY
EAST ASIA LLC

Erdene Mongol LLC

C10 – Land Use

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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1. LAND USE

1.1 Introduction

This Chapter provides an assessment of potential land use and displacement impacts arising from the Khundii Gold Project (KGP or the Project) during construction, operations and closure phases. The Chapter also presents specific mitigation and management measures that will be implemented to avoid or minimise those impacts, and enhancement measures to maximise beneficial impacts.

1.2 Policy, Standards and Lender Requirements

Chapter *A2: Policy and Legal Framework* outlines the requirements that will be followed for the KGP.

1.3 Assessment Methodology

1.3.1 Scope of Assessment

1.3.1.1 Geographical Scope

The geographical scope of the assessment covers the KGP Area of Influence (AoI) as defined in *Chapter B13: Land Use*. The assessment covers direct and indirect impacts at a local level that may affect receptors in the following *baghs* and *soums* within Bayankhongor *aimag*:

- Shinejinst *soum* (Urtiin gol *bagh*) – contains the KGP mineral licence area (MLA) and the Site Access Road from Shinejinst *soum* centre to the KGP;
- Bayan-Undur *soum* (Idren *bagh*) – contains the KGP MLA.

1.3.1.2 Temporal Scope

The temporal scope covers the construction, and operation closure phases of the KGP.

1.3.1.3 Technical Scope

The scope of the socio-economic assessment for the KGP has been defined through a scoping process undertaken from June to September 2019, which identified potential affected people / communities and expected impacts . Based on this scoping exercise, impacts that may arise on land use due to the KGP have been assessed, including consideration of both physical and economic displacement, as defined by EBRD PR5 related to Land Acquisition and Involuntary Resettlement:

- physical displacement occurs if people living in the project area must move to another location, due to land acquisition or land occupancy or use by the project; and
- economic displacement occurs where land access or acquisition for a project causes a loss of or impedes access to assets, thereby affecting livelihoods.

The focus of this Chapter is on potential economic displacement as no physical displacement is expected.

1.3.2 Method of Assessment

The potential impacts were assessed and evaluated using the general methodology outlined in *Chapter A3: Methodology*. The application of this methodology has been informed by the following:

- ESIA team observations during fieldwork conducted August 2019;
- results of stakeholder consultations (see *Chapter A6: Stakeholder Engagement*);
- expert knowledge and judgement; and
- previous experience from ESIA work on similar projects or projects in similar social and environmental settings.

1.3.3 Significance Criteria

The significance of a potential impact is determined by a combination of the sensitivity of project affected people (PAP) and impact magnitude. The criteria used for allocating sensitivity and impact magnitude are provided in Table 1 and Table 2, respectively. The matrix for combining sensitivity and impact magnitude to allocate the level of significance to an impact is presented in *Chapter A3: Methodology*.

Table 1 Land Use Sensitivity Criteria

Level of Importance	Project Affected People
High	Already vulnerable PAP with very little capacity and means to adapt to a given change and maintain/improve quality of life.
Medium	PAP with limited capacity and means to adapt to a given change and maintain / improve quality of life.
Low	PAP with capacity and means to adapt to a given change and maintain/improve quality of life with little disruption.

Table 2 Magnitude of Land Use Impact Criteria

Impact Magnitude	Type of Impact
High	An impact that is likely to affect large numbers of people or and/or businesses (with number depending on the local context) irrespective of both time-scale and reversibility.
Medium	An impact that is likely to affect a moderate number of people and/or businesses (with number depending on the local context) and which may or may not be reversible.
Low	An impact that is likely to affect a small number of people (with number depending on the local context) and which is likely to be temporary (up to two years) and reversible.
Very Low	An impact that is unlikely to have a measurable or noticeable effect on the wellbeing of affected people so that the baseline conditions remain materially unaffected.
Beneficial	An advantageous or positive impact.

1.4 Potential Impacts

1.4.1.1 Herders and Other Affected People

The results of the baseline surveys conducted in the KGP AoI in August 2019 relating to the locations of herder camps and wells are shown in *Chapter B13: Land Use*. A summary of the herder households potentially impacted by land use and / or disturbance by the KGP and related infrastructure (the Site Access Road) is as follows.

- There is no expected physical displacement associated with the development of the KGP.

- Bayan Khundii MLA (Shinejinst *soum*, Urtiin gol *bagh*): There are 3 recorded winter camps[1] within 10 km of the Bayan Khundii MLA (all in Urtiin gol *bagh*[2], Shinejinst *soum*), with the closest being approximately 1.6 km away from the boundary of Bayan Khundii MLA.
- Altan Nar MLA (Bayan-Undur *soum*, Idren *bagh*): There are 4 recorded winter camps within 10 km of the Altan Nar MLA. Three of these are in Urtiin gol *bagh*, Shinejinst *soum*. The fourth[3] is located in Idren *bagh*.
- Site Access Road (Urtiin gol *bagh*, Shinejinst *soum*): There are 29 recorded winter camps within 2.5km of either side of the Site Access Road (with the closest located 0.01 km from the Site Access Road).
- As well as the specific locations recorded above, herders operate across broad areas within the AoI during all seasons and it can be expected that herders and herds could be present within the identified impact zones at some time. All herder households with winter or summer camps and wells and those accessing pasture[4] within the KGP Project AoI are exposed to potential direct and indirect impacts from the Project.

A 10 km zone around the KGP MLAs (Bayan Khundii and Altan Nar) was delineated as the potential impact zone based on consideration of the AoI identified in the land use, air quality, water resources, traffic and transport chapters.

A 5 km (2.5 km on either side of the Site Access Road) area was delineated as the impact zone for the Site Access Road based on consideration of the AoI identified in the land use, air quality, water resources, and traffic and transport chapters. A 2.5 km zone area on either side of the Site Access Road is relatively greater than the AoIs identified for dust impacts along the road, however it is regarded as consistent with the range of daily grazing movements of small stock, as well as the average distance listed by Household Survey respondents, to water sources (2.3 km).

1.4.2 Impact Sources – Construction and Operations Phase

The KGP construction phase will extend up to 12 months and require the permanent acquisition or 'allocation' of land for the purposes of constructing and operating the mine and associated infrastructure. Modest land take of approximately 150 ha[5] is required, with up to approximately 90

[1] There is no private ownership of grazing lands in Mongolia. The vast majority of land is state-owned and used for traditional nomadic herding. Limited private ownership of land is allocated for family needs (i.e. for a residence/dwelling) depending on location. Land use possession certificates are given to herders for winter camps, not for the associated pasture areas, by the *soum* government. Summer, spring and autumn pastures are not afforded the same protection and so are considered available for open access.
[2] One of the camps is physically located in Idren bagh, but is considered part of Urtiin gol bagh. Clarification with local authorities advised that the household's winter shelter is formally registered as part of Urtiin gol bagh, Shinejinst *soum* and that this discrepancy reflects an anomaly from the past.
[3] As noted in *Chapter B13 Land Use*, this winter camp is reportedly currently undergoing registration, consistent with the ability of herders to lodge applications for land use possession certificates in this area from 2018 when its classification status as Great Gobi Special Protected Area Peripheral Protection Zone was changed. This winter camp has reportedly been customarily used by the herder. Coordinates for the camp are yet to be ascertained at the time of writing.
[4] It is recognised that seasonal herders in the *bagh* could be potentially affected by a reduction in and / or disruption to / restriction in access to pasture land. This is a communal or shared impact that may increase competition for grazing, create tensions among herders, and potentially result in overgrazing, which may affect seasonal herders' livelihoods.
[5] This is an estimate of the Bayan Khundii MLA, and does not include Altan Nar as this will be subject to further definition once this aspect of the KGP development is pursued.

ha expected to be fenced. Erdene plans for the Bayan Khundii site to be developed first with the process plant and supporting infrastructure located there, and the Altan Nar site to be developed later (around 2026) as a satellite operation with minimal facilities. The Bayan Khundii deposit is located in Shinejinst *soum* (Urtiin gol *bagh*) and the Altan Nar deposit in Bayan-Undur *soum* (Idren *bagh*). The mine site and associated infrastructure will be secured by a stock-proof perimeter fence.

No temporary facilities are proposed to be constructed or utilised outside of the land allocated for the purposes of constructing and operating the mine. There is some limited land disturbance required for borrow material (anticipated to be less than 1 ha cumulatively, given the modest requirement).

The approximately 70 km dirt Site Access Road between the KGP site and Shinejinst *soum* centre (in Urtiin gol *bagh*) will require spot upgrading in parts to support construction activities. Project traffic during construction is estimated at an average of approximately 7.5 average vehicle movements per day (or a 13% increase to existing baseline traffic numbers). During operations, traffic volumes are reduced to approximately 4 vehicle movements per day (or an approximately 1% increase in baseline traffic numbers).

Groundwater is proposed to be provided from a borefield within the Khuren Tsav (KT) and Bosgyn Sair (BS) basins, which will provide the raw water supply for the Project, located approximately 1-3 km to the south of the Bayan Khundii MLA in Urtiin gol *bagh*, Shinejinst *soum*.

Land use impact sources predominantly originate in Urtiin gol *bagh*, Shinejinst *soum*, and to a lesser extent to Idren *bagh*, Bayan-Undur *soum*. Urtiin gol *bagh* contains the Bayan Khundii deposit, the development of which will include the majority of KGP infrastructure, including processing facilities, accommodation, and the Site Access Road. Idren *bagh* contains the Altan Nar open pits, waste landform and part of the haul road connecting Altan Nar to Bayan Khundii.

The impacts assessed in this Chapter include:

- Economic Displacement due to loss and / or restricted and / or disrupted access to pastures and land;
- Pasture impacts from nuisance issues to pasture users, specifically noise, dust, and vibration;
- Increase in competition for and conflict about grazing due to loss of and / or restricted access to pasture land;
- Regained access to pasture and land post-closure.

Related potential impacts on land use have been further assessed in impact assessment chapters as follows:

- deterioration of pasture land due to dust is assessed in *Chapter C2: Climate and Air Quality*;
- potential impact on herder wells is assessed in *Chapter C5: Water Resources*; and
- potential impact on herders and herds due to traffic is assessed in *Chapter C13: Transport*.

With respect to the development of the Altan Nar pits and the associated Link Road between the two MLAs, potential specific impacts are associated with mining at Altan Nar and the use of the

road by haul trucks carrying ore to the processing facilities at Bayan Khundii from the Altan Nar deposit. These may include impeded access to and disruption of seasonal camps or grazing land, deteriorated quality of pastureland due to deposition of dust and other pollutants generated in the course of mining and road transportation, as well as potentially reduced access to herder wells. Specific impacts on land use and livelihoods with respect to the development of the Altan Nar deposits will be subject to additional assessment at a later stage, should Erdene advance the deposit.

1.4.3 Efforts to Avoid or Minimise Displacement

All components of the KGP are in a sparsely populated rural area. Erdene has avoided, as far as practical, economic displacement due to loss of grazing land or disruption to herding practices throughout the Project development process.

Mine Site Areas: As described above, the mine site area, the fenced area proposed for construction and operations of the mine is the minimum based on the prediction of potential environmental and social impacts, thus ensuring public access to land and pasture is maintained as far as possible.

Site Access Road: The existing unpaved Site Access Road has been developed to minimise disruption to herders and herding practices. As noted above, the closest winter camp is approximately 0.01 km away from the Site Access Road. Upgrades to the road to support construction and operations phase traffic are anticipated to include spot repairs in some areas.

1.5 Assessment of Residual Impacts

1.5.1 Construction and Operations Impacts

Due to the similar nature of construction and operations impacts, these are discussed together.

1.5.1.1 Economic Displacement (Loss and / or Restricted and / or Disrupted Access to Pasture Land)

During construction and operations, the KGP site is expected to occupy approximately 150 ha, of which approximately 90 ha will be fenced to prevent public access and associated safety exposures, leading to a loss of access by herders who may have wanted to access seasonal pasture there. The KGP will also utilise and conduct spot upgrades to the Site Access Road, potentially disrupting and restricting herder (and their herds') access to a limited portion of seasonal pasture. Loss of, restricted, and / or disrupted access to pasture may lead to loss of herder livelihoods and incomes, as nomadic pastoralism is premised upon open grazing over vast pasture areas.

The approach to identifying economic displacement impacts has been through consultation with herders and local authorities at the *soum* and *bagh* level. This has included consultation with all herders frequenting the area during the social baseline fieldwork in August 2019 - including those with winter camps and therefore established user rights, and others who may only visit the area on occasion. Since pastureland is communal property (by law), every member of the herding community has equal access to it for grazing livestock. *Chapter B13 Land Use* describes that summer and winter pasture areas are not fixed and can change from year to year depending on forage conditions, livestock numbers, climatic conditions and the individual requirements of herder families. Most land in the AoI is state-owned and available for traditional herding, with no cultivated land within 20 km of proposed KGP infrastructure. Under Mongolia's Constitution (1992) and Law on Land (2002), land use possession certificates are given to herders for winter camp, not for the associated pasture areas, by the *soum* government.

As provided in *Chapter B13 Land Use*, pasture in the both Shinejinst and Bayan-Undur *soums* is sparse, and highly seasonally variable. Herders move, on average five times a year, with winter being the most sedentary season, often associated with a given winter camp (depending on pasture availability). In 2018 there were a 192 herders registered in Urtiin gol *bagh* and 97 in Idren bagh. The number of livestock in the two *soums*, like at the *aimag* level, tripled between 2010 and 2017, at the same time, there has not been an increase in land allocated for pasture. As established during the social baseline fieldwork, livestock production is proportionate to the quantity of livestock and its productivity and stock quality. The quantity of livestock is also proportionate to the volume of pasture available. The income of herders' households is additionally influenced by other factors such as the price of livestock products, distance from markets, and costs of transportation.

During the social baseline study fieldwork in August 2019 (summer season), no herders were found within 20 km of either the Bayan Khundii or Altan Nar MLAs, although herders were observed in the area during the 2016 baseline fieldwork, and Erdene has observed herders using pasture near the licence areas sporadically over the years that the Company has been conducting exploration since 2011 (Eco Trade 2017), (see Figure 1). Observations and discussion with these herders indicated that they graze livestock in this area based on the seasonal availability of pasture.

As noted above, there are 3 winter camps within 10 km of the Bayan Khundii MLA (all in Urtiin gol *bagh)*. With respect to the Altan Nar MLA, there are 4 winter camps within 10 km of the Altan Nar MLA. Three of these are in Urtiin gol *bagh*, and the fourth is in Idren *bagh* (see Figure 2) [6]. There are no permanent structures associated with any of these camps. Use of winter camps is dependent on the seasonal conditions, and possession of a winter camp is not indicative of use of that camp area every winter season.

The August 2019 fieldwork observed eight herder camps within 5 km of the Site Access Road (2.5 km on either side of the road) in Urtiin gol *bagh*. Observations and discussion with these herders also indicated that they graze and rear livestock in this area based on the seasonal availability of pasture. There are 29 recorded winter camps within 2.5 km of either side of the Site Access Road (with the closest located 0.1 km away). Again, there are no permanent structures associated with these camps (see Figure 2 for recorded winter camps).

The main Project components – the Bayan Khundii open pit development (including mining processing and associated infrastructure) and Site Access Road – are in Shinejinst soum, Urtiin gol bagh, and thus the primary impacts are likely to be experienced in Urtiin gol *bagh*. Given the high mobility of herders due to the variability of pasture in the area, all seasonal herders in Urtiin gol *bagh* could experience limited disruption to seasonal and sporadic pasture use and / or access and therefore potentially experience minor economic displacement based on the development of the Bayan Khundii deposit and the spot upgrading and use of the Site Access Road.

With regard to the Bayan Khundii Impact Zone, those herders that use their winter camps in the 10 km impact zone are considered to potentially experience a greater (though still limited) level of loss of access to and / or disruption and therefore potential impacts to pasture use surrounding their winter camp area, than other herders that may use communal grazing in the area seasonally. These herders may experience the loss of / disruption to pasture land access during construction and operations, with the impact being continuous over the life of the mine, and reversible in many

[6] The winter camp in Idren bagh is reportedly currently undergoing registration, consistent with the ability of herders to lodge applications for land use possession certificates for their winter camps in this area from 2018. Coordinates for the camp are yet to be ascertained at the time of writing (it is therefore not illustrated in Figure 1.

areas of the footprint that is subject to rehabilitation to a form consistent with pre-mining vegetation levels.

The Altan Nar MLA is located in Idren *bagh* and is only proposed to be developed in around 2026. Though both the Bayan Khundii and Altan Nar 10 km impact zones extend into Idren *bagh*, only one winter camp was recorded in the Altan Nar impact zone from Idren *bagh*. Further, there were no herders found to be using the area during the social baseline fieldwork, and the highly variable and sporadic seasonal use of pasture is well established. Idren *bagh* herders that use the areas within the impact zones seasonally could experience some limited economic displacement, with this impact occurring to a greater extent once the Altan Nar deposit is developed.

Herders in the 5km Site Access Road impact zone may experience intersection and minor disruption in their access to pastures and herd movements during the approximate 12 months of construction due to Project-related traffic on the Site Access Road. These impacts are temporary in nature. Project traffic during construction is estimated to be around 13% higher than the current baseline during construction. During operations, traffic volumes are reduced, and are anticipated to amount to an approximate 1% increase in traffic from the baseline, and thus disruption to pasture use and access is therefore less too, although these impacts are long-term (for the duration of operation of the mine).

Overall, this impact is considered to be of medium magnitude prior to the implementation of mitigation measures. As noted above, the high seasonal variability of pasture, high mobility of herders, small extent of pasture lost / disrupted, and low traffic volumes during both construction and operations means that economic displacement of herders is considered to be minor. There is, however, high sensitivity to potential livelihoods impacts by herders, and thus a pre-mitigation impact significance of Major is obtained.

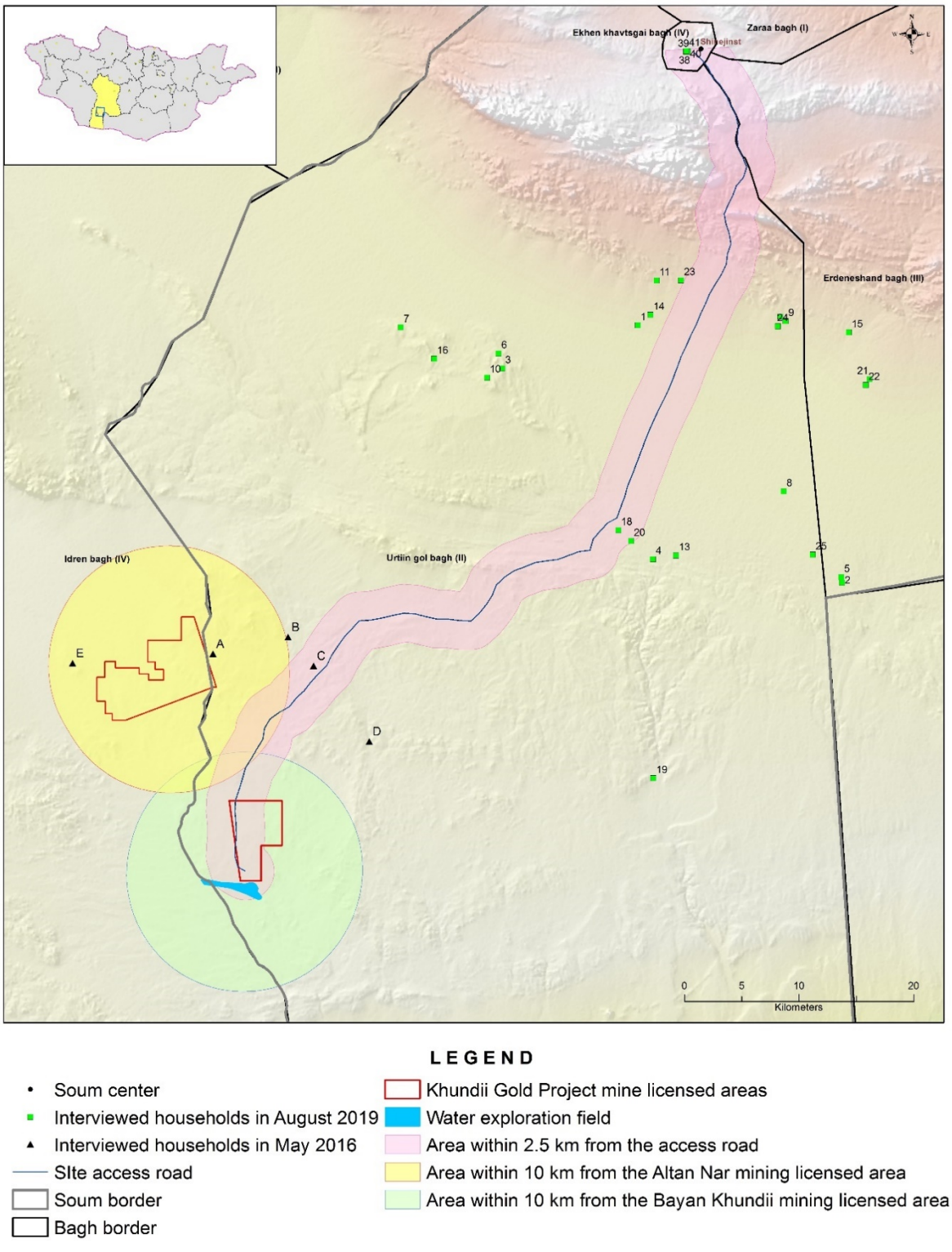

Figure 1 Recorded Herder Spring and Summer Camps

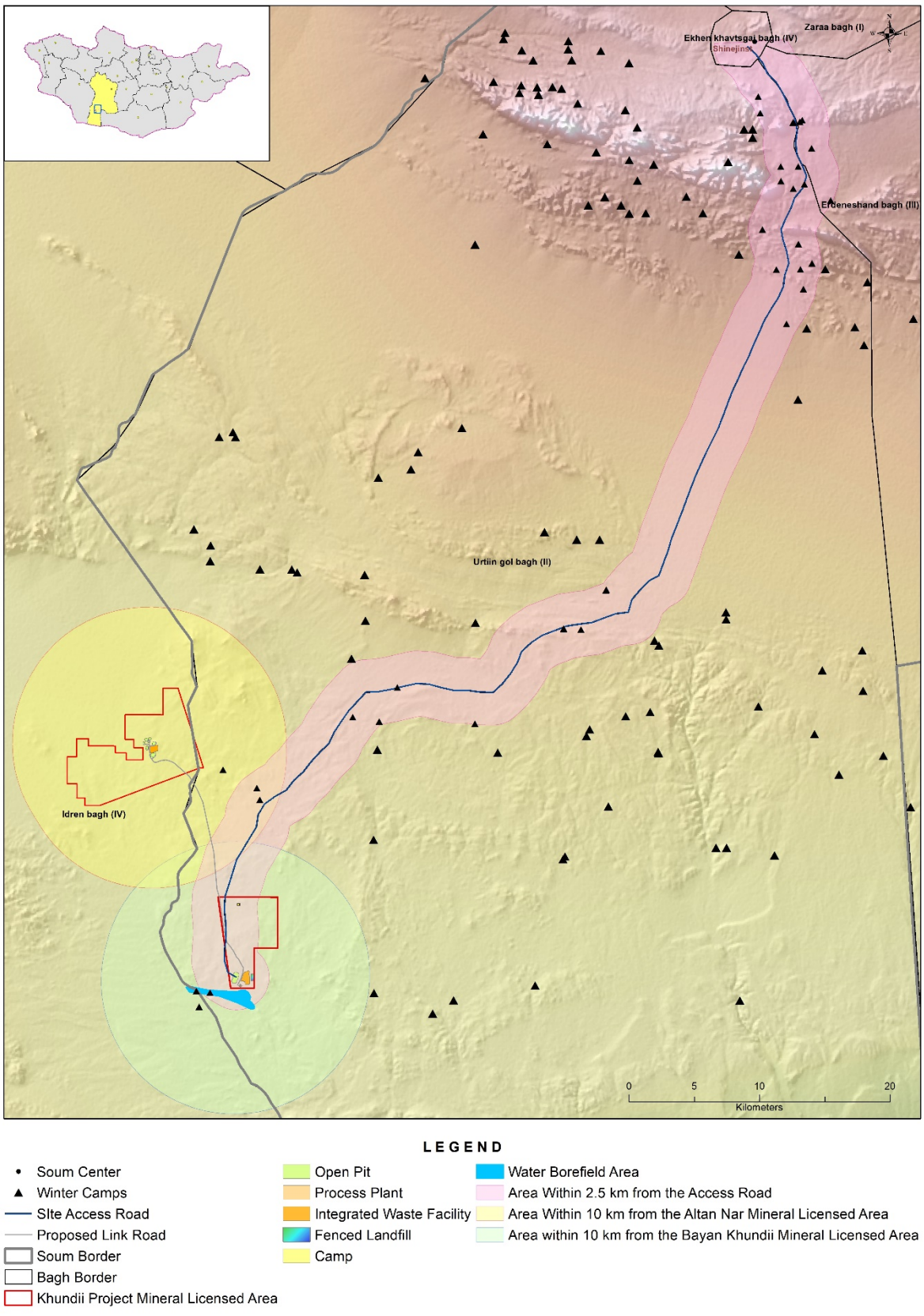

Figure 2 Herder Winter Camps

Mitigation Measures

The principles of land use and livelihoods enhancement and mitigation measures are to ensure during construction and operations that existing land-based livelihoods are continued with minimal disruption, and at closure, to re-establish pre-disturbance land uses (for example, re-establishment of pasture for livestock grazing, as appropriate), and to engage with relevant stakeholders to agree on this or alternative measures that facilitate beneficial use of land for sustainable livelihoods at all phases of the Project.

Prior to the description of mitigation measures to be employed, a brief note on economic displacement and livelihoods support measures is highlighted based on learnings and experience of economic displacement and compensation from other projects in Mongolia. These indicate that compensation and livelihoods support measures developed in response to economic displacement may risk creating a divisive situation within *bagh* communities, of "compensated" versus "non-compensated" households. This is a risk in small rural communities, and also based on the communal nature of pasture in Mongolia. Over time, this may lead to social tensions driven by divisiveness between households that receive support and those that do not. Thus, of importance to Erdene is designing broad-based livelihoods support measures in response to the limited economic displacement anticipated by the Project, and which recognises the communal nature of pasture.

Taking into consideration the above experience, the following mitigation measures are proposed to be implemented by Erdene:

- Engage with local authorities and herders, as appropriate, to further define and facilitate the implementation of a fit for purpose *Land Use and Livelihoods Management Framework*.
- <u>Herder Livelihood Support Programme:</u>

  Implement a Herder Livelihood Support Programme (HSLP) based on recognition of the communal nature of pasture land impacts, including loss of, reduction in, and / or disruption to pasture land access. The HLSP will be implemented in tandem with Erdene's broader community development activities through the *Local Cooperation Management Plan*, that will be directed at benefitting local community members in the Project area of influence. The HLSP will initially be targeted at those herders within Urtiin gol bagh with winter shelters in the specified impact zones and thereafter (as soon as practicable and scalable) potentially affected herders within Urtiin gol bagh more broadly, who may be eligible to participate. Scaling of the HSLP to Idren *bagh* will be conducted as the Altan Nar deposit is developed. Design and management of the HLSP will include further consultation with herders, *bagh* and *soum* administration, and other specialists, as relevant. The focus of the HSLP will be directed by this consultation to establish an understanding of any preferences as well as previous herder livelihoods programmes or projects in the area that have been successful. The following are identified as the types of themes that may be supported under the HSLP:

  - Pasture monitoring;
  - Seed collection and degraded pasture rehabilitation activities;
  - Herd animal health and awareness;

  - Cashmere quality improvement; and
  - Training and skills development.
- For those herders with winter camps in the impact zones, support measures will be provided based on eligibility. Measures are expected to cover up to 30-40 households. Where herders may experience a demonstrated seasonal reduction in pasture access / use, such eligible herder households may receive a specified amount of fodder for their animals (or similar support measure based on consultation and preferences).
- Provide advance notification and conduct consultation with potentially affected herders prior to any construction and operations works that may affect herd movements and access to pasture / water resources (through the *Stakeholder and Communications Management Plan)*. Consultation will focus on how impacts can be avoided or minimised.
- Should grazing be available within the MLA, and based on interest expressed by a herder(s), Erdene will facilitate access to this grazing land if it is safe to do so.
- Ensure that there is clear delineation of work areas prior to commencement of works.
- Implement the *Traffic Management Plan* (see *Chapter C13 Traffic and Transport*) and includes, among others:
  - Prohibit all off-road driving by any KGP-related vehicle unless in an emergency situation.
  - Implement road signage and traffic controls.
- Progressively rehabilitate all land areas subject to land disturbance for KGP purposes after the KGP has ceased works in these areas, returning it to pre-disturbance state. Rehabilitation works will be in accordance with KGP's *Land Disturbance Control and Rehabilitation Management Plan*.
- Maintain a *Grievance Procedure*.

Residual Impacts

After the application of mitigation measures the impact is assessed as being of low magnitude. It is considered that sensitivity to these potential impacts by herders may be reduced from high to medium through the implementation of the above mitigation measures. The post-mitigation impact significance rating is therefore Minor.

In addition, improved pastureland management, including positive changes to livestock raising and production, and thus rural livelihoods is anticipated to be a positive residual impact based on the implementation of the management measures outlined above.

1.5.1.2 Pasture Impacts from Nuisance Issues to Pasture Users (Noise, Dust, Vibration)

Specific impacts from deterioration of pasture land due to dust is assessed in *Chapter C2: Climate and Air Quality;* potential impact on herder wells is assessed in *Chapter C5: Water Resources*; and potential impact on herders and herds due to traffic is assessed in *Chapter C13: Traffic and Transport*. Cross-reference is made to these Chapters in this section, as applicable.

Mine construction and operations are likely to generate dust, noise and vibration from use of heavy equipment and movement of materials in the vicinity and particularly those downwind of the KGP deposits. As noted above, there are 3 recorded winter camps within 10 km of the Bayan Khundii impact zone (the closest of which is approximately 1.6 km away from the boundary of mining license area) and 4 winter camps in the Altan Nar impact zone. Further, seasonal use of pasture within 10 km of the site has been established as highly variable, based on pasture availability and quality at a particular time. Those herders with winter camps within the 10 km zone may experience low level nuisance impacts associated with dust, vibration and noise. Impacts are considered to be minor in nature, and they will be long-term (for the duration of construction and operations). Other seasonal land users are not able to be predicated with any certainty, with potentially impacted herders considered to be all herders from Urtiin gol *bagh* in the first instance, and potentially herders using the area from Idren *bagh (*once Altan Nar deposit comes into development). Given the communal nature of pasture land, it is not possible to establish which herders may be using specific pasture areas seasonally, thus all herders in Urtiin bagh are considered to potentially experience direct and indirect impacts, with the impact being sporadic in nature.

Nuisance impacts for roadside land users from the Project include increased dust generation from KGP traffic, traffic noise, and vibration. There will be an elevated level of traffic during the construction phase (traffic numbers described above and further discussed in *Chapter C13 Traffic and Transport*), and a reduction thereof during operations. It should be noted that traffic volumes are low, both during construction and operations. Nuisance impacts may be experienced by herders with winter shelters within the 2.5 km zone on either side of the road (5 km in total), and temporarily residing close to the road to the road (the closest winter camp is 500 m away). The highly variable seasonal pasture use and herder locations means that the nuisance impacts on seasonal pasture users are difficult to ascertain with certainty (which herders), with potentially impacted herders considered to be all herders from Urtiin gol *bagh*.

The social baseline fieldwork also established that herders concerns about negative impacts of mining were mainly related to fears about mine traffic (specifically haul trucks) leading to degraded pasture through dust creation (mainly associated with previous experience with coal mining development and coal haulage, which caused major perceived dust impacts), reduced land productivity; and impacts of mining on herder water resources. There is therefore a high existing sensitivity to the nuisance issues and potential impacts in relation to both construction and operation of the mine, and the use of the road. Pre-mitigation magnitude is considered to be medium as nuisance issues may affect a moderate number of people relative to the local context over the life of the mine. Nuisance impacts related to the Site Access Road are expected to be greater during construction and reduced during operations of the mine, due to the reduction in traffic. Impact significance is therefore Major pre-application of mitigations measures.

Mitigation Measures

In addition to those mitigation measures outlined above, the following mitigation measures will be applied:

- Conduct targeted periodic engagement and awareness creation with local communities on the KGP, impacts and impact management measures, Project schedule, upcoming activities to assist in fostering better understanding of the Project among communities (as opposed to coal mining).

- Implement the *Atmospheric Emissions Management and Monitoring Plan*, *Transport Management Plan*, and *Noise and Vibration Management Plan*.

Residual Impacts

Herder sensitivity is anticipated to remain high even with the implementation of the above measures. The magnitude is considered low after the application of mitigation measures. The overall residual impact significance is Moderate.

1.5.1.3 Increase in Competition for Grazing due to Loss of Pasture Land

Restrictions in access to specific grazing areas due to the construction and operation of the KGP may cause herders to move animals over slightly longer distances or to change their usual grazing patterns. If herders become less mobile, they may be tempted to overgraze some areas, leading to further degradation of pasture and creating potential for conflict between neighbouring herders.

During the fieldwork conducted in August 2019, herders indicated that disputes over pasture are infrequent, though when they do occur, disputes are reported to occur between herders camping nearby to one another. This potential for disputes based on increased competition for pasture may be exacerbated by the development and operation of the KGP.

Herder sensitivity is considered medium, and the magnitude of this impact is also considered to be medium due to the high seasonal variability of pasture, high mobility of herders, small extent of pasture lost / disrupted, and low traffic volumes. The pre-mitigation impact is therefore assessed as Moderate.

Mitigation Measures

The mitigation measure applied in Section 1.5.1.1 will be applied.

Residual Impacts

The herder sensitivity is medium, and the magnitude is low. The overall impact significance is therefore Minor, following the implementation of the mitigation measures presented above in Section 1.5.1.1.

1.5.2 Closure Impacts

1.5.2.1 Regained Access to Pasture and Land

The post-closure land use of the KGP site will be determined with input from Government agencies, and local community members, with a purpose of offsetting losses of employment and economic benefits to the maximum extent possible in the Project Area.

During closure the Project infrastructure will be dismantled, and the footprint rehabilitated. Ground disturbance will be limited to the existing footprint therefore it is considered that no closure impact is anticipated on any additional areas. The reclamation is scheduled to be conducted upon completion of mining operations and is expected to be undertaken within a specified period. Post-closure monitoring will also be undertaken. Impacts to land from closure activities are considered to be positive as the land will be rehabilitated to a secure, safe and stable landform. The spatial extent of impacts will be small (i.e. the area disturbed by the Project), of long-term duration as the land will be passed back to Government, and which may be available for use by herders. This is considered a mild positive impact as post-closure rehabilitation effects will be observable.

Mitigation Measures

Closure impact mitigation measures include:

- Develop and implement a *Closure Management Plan*.

Residual Impacts

Closure and rehabilitation is considered a beneficial impact in relation to land use.

1.6 Summary of Residual Impacts and Mitigation and Management Measures

Table 3 presents a list of the potential residual impacts and proposed mitigation measures

Table 3 Summary of Impacts on Land Use

ID	Impact	Land Users / Use Feature	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
LU01	Economic Displacement: (Loss and / or Restricted and / or Disrupted Access to Pasture Land)	Herders/ herders' camps	X	X	-	Engage with local authorities and herders, as appropriate, to further define and facilitate the implementation of a fit for purpose *Land Use and Livelihoods Management Framework*.	• Land Use and Livelihoods Management Framework	**Minor**
			X	X	-	Implement a Herder Livelihood Support Programme (HSLP) based on recognition of the communal nature of pasture land impacts, including loss of, reduction in, and / or disruption to pasture land access. The HLSP will be implemented in tandem with Erdene's broader community development activities through the *Local Cooperation Management Plan*, that will be directed at benefitting local community members in the Project area of influence. The HLSP will initially be targeted at those herders within Urtiin gol bagh with winter shelters in the specified impact zones and thereafter (as soon as practicable and scalable) potentially affected herders within Urtiin gol bagh more broadly, who may be eligible to participate. Scaling of the HSLP to Idren bagh will be conducted as the Altan Nar deposit is developed. Design and management of the HLSP will include further consultation with herders, bagh and soum administration, and other specialists, as relevant. The focus of the HSLP will be directed by this consultation to establish an understanding of any preferences as well as previous herder livelihoods programmes or projects in the area that have been successful. The	• Land Use and Livelihoods Management Framework	

ID	Impact	Land Users / Use Feature	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						following are identified as the types of themes that may be supported under the HSLP: • Pasture monitoring; • Seed collection and degraded pasture rehabilitation activities; • Herd animal health and awareness; • Cashmere quality improvement; and • Training and skills development.		
			X	X	-	For those herders with winter camps in the impact zones, support measures will be provided based on eligibility. Measures are expected to cover up to 30-40 households. Where herders may experience a demonstrated seasonal reduction in pasture access / use, such eligible herder households may receive a specified amount of fodder for their animals (or similar support measure based on consultation and preferences).	• Land Use and Livelihoods Management Framework	
			X	X	-	Provide advance notification and conduct consultation with potentially affected herders prior to any construction and operations works that may affect herd movements and access to pasture / water resources (through the *Stakeholder and Communications MP*). Consultation will focus on how impacts can be avoided or minimised.	• Stakeholder and Communications MP	
			X	X	-	Should grazing be available within the MLA, and based on interest expressed by a herder(s), Erdene will facilitate access to this grazing land if it is safe to do so.	• Land Use and Livelihoods	

ID	Impact	Land Users / Use Feature	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
							Management Framework	
			X	X	-	Maintain a *Grievance Procedure* to track and address any complaints from the local community in relation to land use.	• Stakeholder and Communications MP	
			X	X	-	Ensure that there is clear delineation of work areas prior to commencement of works.	• Land Disturbance Control and Rehabilitation MP	
			X	X		Prohibit all off-road driving by any KGP-related vehicle unless in an emergency situation.	• Transport MP	
			X	X		Implement road signage and traffic controls.	• Transport MP	
			X	X		All land areas subject to land disturbance for KGP purposes will be progressively rehabilitated after the KGP has ceased works in these areas, returning it to pre-disturbance state. Rehabilitation works will be in accordance with KGP's *Land Disturbance Control and Rehabilitation Management Plan.*	• Land Disturbance Control and Rehabilitation MP	
LU02	Pasture impacts from nuisance issues to pasture users from Site Access Road use and mine site construction and operations, specifically: noise, dust, and vibration.	Herders/ herders' camps	X	X	-	All measures provided above.	• Land Use and Livelihoods Management Framework • Stakeholder and Communications MP • Land Disturbance Control and Rehabilitation MP • Transport MP	**Moderate**

ID	Impact	Land Users / Use Feature	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
			X	X	-	Targeted periodic engagement and awareness creation with local communities on the KGP, impacts and impact management measures, Project schedule, upcoming activities to assist in fostering better understanding of the Project among communities (as opposed to coal mining).	• Stakeholder and Communications MP	
			X	X	-	Implementation of the *Atmospheric Emissions Management Plan*, *Transport Management Plan*, and *Noise and Vibration Management Plan.*	• Atmospheric Emissions MP • Noise and Vibration MP	
LU03	Increase in Competition for and Conflict About Grazing due to Loss of Pasture Land	Herders/ herders' camps	X	X		All measures provided above in LU01.	• Land Use and Livelihoods Management Framework • Stakeholder and Communications MP • Land Disturbance Control and Rehabilitation MP • Transport MP	**Minor**
LU04	Regained access to pasture land.	Herders / herders' camps	-	-	X	Development and implementation of a *Closure Management Plan*	• Closure MP	**Benefit**

1.7 References

European Bank for Reconstruction and Development. 2008. European Bank for Reconstruction and Development Environmental and Social Policy. Performance Requirement 8 Cultural Heritage.

Eco Trade LLC. 2017a. Altan Nar Environmental and Social Baseline Study.

Eco Trade LLC. 2017b.Bayan Khundii Environmental and Social Baseline Study.



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

Erdene Mongol LLC

Chapter C11 – Cultural Heritage

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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1. CULTURAL HERITAGE

1.1 Introduction

This Chapter provides an assessment of potential impacts on both tangible and intangible cultural heritage (hereafter referred to collectively as cultural heritage unless explicitly stated otherwise) arising from the Khundii Gold Project (KGP or the Project). This Chapter also presents specific mitigation measures that will be implemented to avoid or minimise negative impacts, and enhancement measures to maximise beneficial impacts.

1.2 Policy, Standards and Lender Requirements

Chapter A2: Policy and Legal Framework outlines the requirements that will be followed for the KGP.

1.3 Assessment Methodology

1.3.1 Scope of Assessment

1.3.1.1 Geographical Scope

This geographical scope of this assessment covers potential impacts on known and unknown tangible cultural heritage in the KGP's physical footprint - the KGP Site area, as well as the Site Access Road. Potential impacts on intangible heritage are considered at *soum* level, covering the areas of Shinejinst and Bayan-Undur *soum*s. The area of influence (AoI) is provided in *Chapter B14: Cultural Heritage*.

1.3.1.2 Temporal Scope

The temporal scope covers the KGP's construction, operation and closure phases.

1.3.1.3 Technical Scope

The scope of the socio-economic assessment for the KGP was defined through a scoping process undertaken from June to September 2019, which identified potentially affected people / communities and expected impacts. The potential impacts on cultural heritage due to the KGP have been assessed based on the scoping results.

Potential impacts associated with the construction and operations of the KGP were considered for cultural heritage values as defined by the Law on the Protection of Cultural Heritage 2016 and European Bank for Reconstruction and Development (EBRD) Performance Requirement 8 (PR8), namely:

- tangible heritage such as archaeological and paleontological sites and features, artefacts, structures and installations of cultural, historical or spiritual importance, as well as elements of the natural environment that are ascribed sacred or any other special status by local communities; and
- intangible elements of community social wealth, such as traditions, knowledge, customary practices, cultural norms and traditional ways of life that reflect a community's identity and its history and act as intergenerational links.

1.3.2 Method of Assessment

The potential impacts were assessed and evaluated using the general methodology outlined in *Chapter A3: Methodology*. The application of this methodology has been informed by the following:

- ESIA team observations during fieldwork conducted August 2019;
- results of stakeholder consultations (see *Chapter A6: Stakeholder Engagement*);
- expert knowledge and judgement; and
- previous experience from ESIA work on similar projects or projects in similar social and environmental settings.

1.3.3 Significance Criteria

1.3.3.1 Importance of Cultural Heritage Values

There are currently no specific standards or guidelines for evaluating the importance of cultural heritage features in Mongolia. The importance ascribed to cultural heritage tangible features found in the KGP's AoI has, therefore, been determined through the sensitivity criteria established in Table 1.

Table 1 Cultural Heritage Sensitivity Criteria

Sensitivity	Criteria
High	Intangible cultural heritage listed in national registers or associated with indigenous peoples or a single socio-cultural context or social movements or individuals of national or global significance. Tangible cultural heritage inscribed as a World Heritage Site. Nationally designated tangible cultural heritage feature.
Medium	Intangible cultural heritage listed in local registers or associated with specific livelihood strategies or social movements or individuals of local importance. Undesignated tangible cultural heritage that can be shown to be unique *sui generis* or unique for the period it represents or based on its role in linking several historical periods on the same site.
Low	Undesignated tangible cultural heritage feature considered to be 'replicable', where the particular eras and cultural values that the heritage feature symbolises are well represented by other sites and/or reflected in other structures elsewhere.

1.3.3.2 Magnitude of Potential Impact

A conservative approach based on professional judgement on the magnitude of potential impacts has been coupled with the principle that preservation of cultural heritage value is preferred, and that total physical loss of a heritage feature is the least preferred outcome. Potential impact duration, geographical extent of the cultural heritage value as well as the frequency and reversibility of any resulting impacts have also been considered. The criteria used to establish the magnitude of potential impacts are described in *Chapter A3: Methodology*.

Table 2 Magnitude of Cultural Heritage Impact Criteria

Magnitude of Impact	Type of Impact
High	Changes to most or all key cultural heritage items and/or values such that they are totally altered. Major changes to an area affecting intangible cultural heritage activities, associations, visual links and cultural appreciation.
Medium	Changes to most or all key heritage items and/or values such that they are clearly modified. Considerable changes to an area affecting intangible cultural heritage activities, associations, visual links and cultural appreciation.
Low	Minor changes to key cultural heritage items and/or values such that they are slightly altered or clearly modified. Slight changes to setting, or changes to setting that affect the character of the cultural heritage value.

	Minor changes to area that affect intangible cultural heritage activities, associations, visual links and cultural appreciation.
Very Low	Very minor or no changes to cultural heritage value or setting. Very minor or no changes to area that affect intangible cultural heritage activities, associations, visual links and cultural appreciation.

1.3.3.3 Significance of Impacts

Using an impact significance matrix that measures both the feature's sensitivity and the magnitude of a potential impact produces an assessment of the significance of the potential impact on each cultural heritage feature. The significance matrix is provided in *Chapter A3: Methodology*.

1.4 Potential Impacts

The following sections describe potential impacts on cultural heritage during the construction, operation and closure phases of the Project. Appropriate mitigation measures for each type of impact identified are also presented.

1.4.1 Impact Sources – Construction and Operations Phase

The construction and operations phases are expected to have similar impacts on cultural heritage, and are thus, discussed together. The following impacts have the potential to occur during the construction and operations phases of the KGP:

- Potential physical loss of or damage to undocumented, unanticipated objects or features that are encountered (including archaeological and palaeontological features and other features of cultural, historical and spiritual value) that are situated within the footprint of the KGP.
- Possible deliberate disturbance of an archaeological or palaeontological feature identified in proximity to the KGP and the site access road, resulting from inappropriate behaviour by the KGP's workforce, contractors or in-migrants into the area.
- Potential weakening of intangible values, such as traditional frameworks, practices and customs, which may decline as residents in Shinejinst and Bayan-Undur *soum* engage with the non-local construction and operations workforce at the KGP site.
- Closure of the mine may result in a return of the Project area to non-mining uses, and a decline in investment into local cultural heritage resources by the Project, as well as a decline of potential influence by non-native citizens on local practices.

1.5 Assessment of Residual Impacts

1.5.1 Construction and Operations Impacts

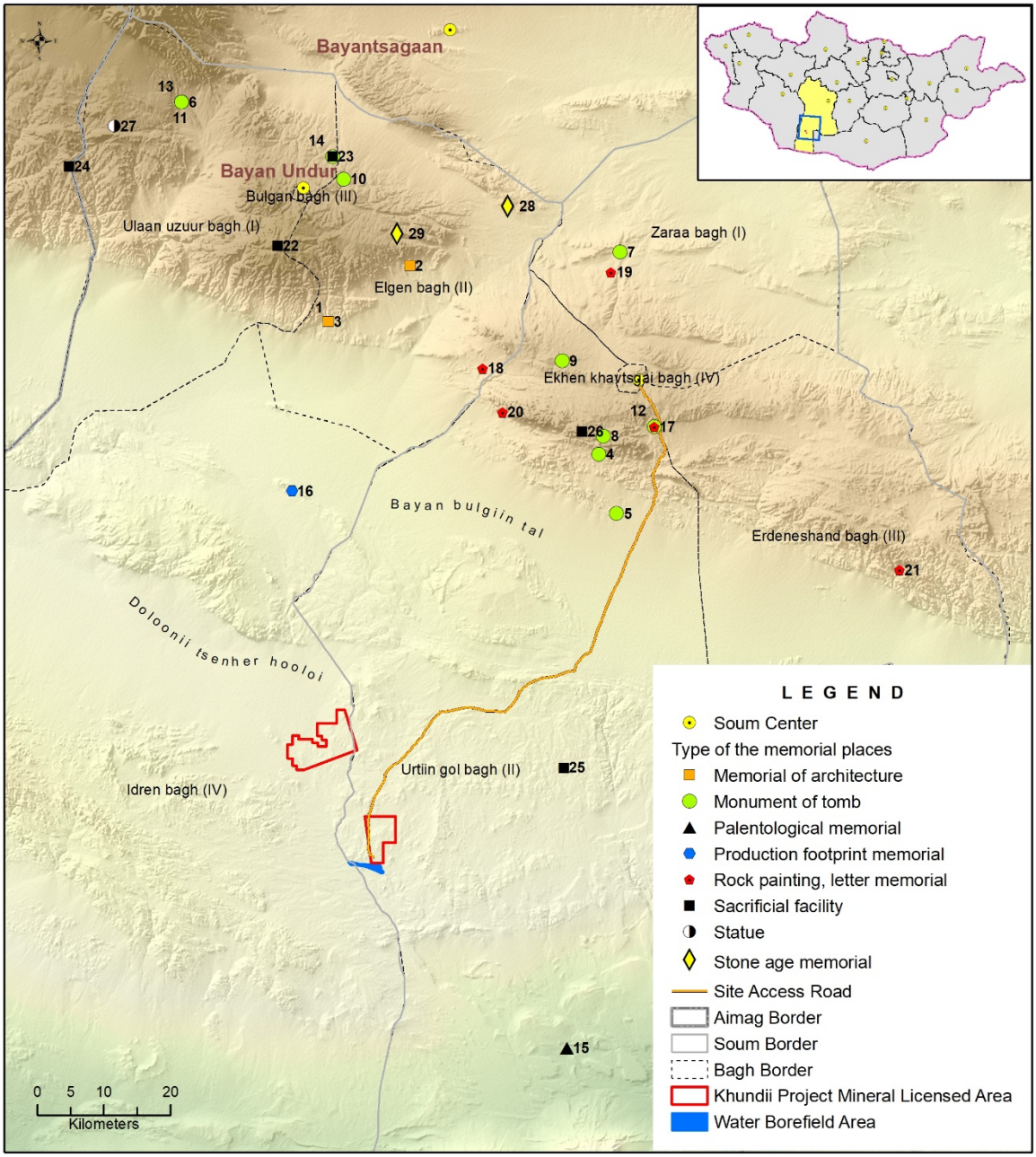
1.5.1.1 Damage to Tangible Cultural Heritage Features

Ground disturbance activities (e.g. site preparation, mining, blasting) for the KGP will be the main sources of possible physical disturbance to cultural heritage features, specifically the potential discovery of previously unknown cultural heritage features within the footprint of the KGP. These activities have the greatest potential to result in direct damage and/or loss of cultural paleontological and / or archaeological resources. Direct impacts thereupon, could have a permanent impact on such a resource.

As described in *Chapter B14: Cultural Heritage*, no tangible cultural heritage features liable to potential destruction or disturbance during construction or operations were identified. No artefacts related to ancient tombs and other human activities in the areas assessed - mountain mouth, escarpments, and tops high mountains - where ancient nomadic tombs might exist. In addition, no ancient tombs or other artefacts were found in the exploration work conducted in the ravines, depressions and their boundaries, and dry channels (see Figure 1[1]). The explanation for the lack of findings is that the land in this area is unsustainable for the long term inhabitancy of people and livestock, due to its lack of surface water for human and animal consumption. The palaeontological survey also did not identify any artefacts in the mine exploration licence area.

This occurrence of this impact is therefore considered unlikely, with potential impacts localised, infrequent and short term. Direct impacts, such as unanticipated discovery of previously unknown cultural resources during construction, could have a permanent impact on that resource. Pre-mitigation impact significance is considered to be Moderate, based on medium sensitivity and medium magnitude.

[1] Figure 1 provides a list of cultural heritage resources as listed on the Cultural Heritage Centre of Mongolia's database of traditional and sacred memorial sites (see also Chapter B14 Cultural Heritage). None of these sites are located in the KGP mineral licence area, and the Site Access Road also avoids these sites. Note that locational data was not provided for all resources, and hence the map shows only those for which this data was available).



Name of the memorial places

#	Name	#	Name	#	Name
1	Amar buyant temple	11	Shar bulag Monument	21	Monument of Indert rock
2	Gyaltganuur Monument	12	Khan Uul Monument	22	Bayan-Ovoo
3	Amar buyant temple	13	Shar bulag Monument	23	Khushuut Monument
4	Urd Jargalant Monument	14	Khushuut Monument	24	Monument of Ulaan chuluut khairkhan
5	Tomb of Khongor taish	15	Palentlogical Monument of Nogoon tsav	25	Monument of Suvragan Suhai
6	Shar bulag Monument	16	Monument of Chandmani mountain	26	Monument of Zalaa jinst mountain
7	Khashaat monument	17	Khan Uul Monument	27	Monument of Erdeniin huren
8	Zulegt monument	18	Bichigt Hanan monument	28	Khuuvur monument
9	Monument of Ikh Samant khairkhan	19	Monument of Tahilgat khairkhan	29	Khavtas valley monument
10	Monument of Delger murun	20	Darkhan bulag Monument		

Figure 1 Cultural Heritage Known Locations in the Vicinity of the Project

Mitigation Measures

The following mitigation measures will be implemented, as outlined in the *Transport Management Plan* and *Land Disturbance and Rehabilitation Management Plan*:

- Prepare and implement a *Chance Finds Procedure*. Chance finds will be preserved in situ or rescue excavations will be undertaken, as appropriate, following the established Government of Mongolia processes for such activities, building on Erdene's existing procedure.
- Provide training to all KGP personnel and contractors in the *Chance Finds Procedure* and the laws protecting cultural heritage. Specific training on identifying cultural heritage features and application of the procedure will be provided to all workers involved:
    - earth moving and the use of heavy equipment, including heavy transport vehicles;
    - drilling and blasting;
    - excavation and geological intervention;
    - environment protection; and
    - staff engaged in community relations activities.
- If any cultural heritage feature is encountered within the footprint of the KGP and/or nearby, contractors involved in the works will be equipped to protect the earth layer and to help undertake an assessment of the find in accordance with the *Chance Finds Procedure*.
- Apply the KGP *Land Disturbance Permit* as part of the *Land Disturbance and Rehabilitation Management Plan*. Planned disturbance will be assessed as part of the Project's permit review process.
- Employ strict measures to control the conduct of KGP personnel, including the contractor workforce, through the *Code of Conduct*.
- Obtain applicable land acquisition and disturbance permits, as required by statutory procedures, in advance of any excavation works planned beyond the KGP's footprint (refer to *Chapter A2: Legal Framework*).

For all areas where ground-disturbing activities will take place, the principal mitigation measure to prevent the loss of tangible cultural heritage will be implementation of the KGP *Chance Finds Procedure*. The procedure will be designed to ensure the safety, integrity and proper handling of any previously undocumented objects of cultural or historical significance that may be encountered. The *Chance Finds Procedure* will apply to anyone involved in ground-disturbing activities (i.e. employees, contractors and sub-contractors carrying out all types of earthworks). Obligations both for the contractor and their sub-contractors relating to the procedures for the handling of chance finds will be included in contracts.

Residual Impact

Given the implementation of mitigation measures listed, the impact will be of low magnitude and medium sensitivity. The overall residual impact significance is Minor.

1.5.2 Deliberate Disturbance of Cultural Heritage Features

The presence of the Project may result in in-migration to Shinejinst and Bayan-Undur *soum*s, including members of the construction and operations workforce and incoming economic migrants pursuing employment and business opportunities associated with the overall development of the KGP Project (see *Chapter C8 Population and Demographics*). The Project may also increase the number of visitors to cultural heritage sites of interest in the *soum*s. This has the potential to result in unintended damage to heritage sites or inadvertent breaches of existing norms associated with those sites. This, in turn, may be detrimental to community sentiments and translate into conflicts between local residents and in-migrants and visitors. It is noted that the potential for in-migrants is considered to be low during both the construction and operations phase, given the remote location of the KGP from the *soum* and *aimag* centres, among others. Workforce numbers will be slightly reduced and stabilise during KGP operations. The reduction in workforce during the operations phase may somewhat minimise potential pressure on cultural heritage resources.

Prior to the application of mitigation measures, this impact is considered to occur infrequently, although impacts may be irreversible, ranging from short-term to permanent, and are likely to be relevant at the local to regional level. Impact magnitude is therefore medium, and sensitivity is also medium, resulting in an significance rating of Moderate.

Mitigation Measures

Control over illegal third-party excavations at the heritage sites located outside of the KGP and the enforcement of regulatory and penal measures will be beyond Erdene's direct jurisdiction. In addition to the mitigation measures noted in Section 1.5.1, the following mitigation measure will be applied:

- Cooperate with relevant governmental bodies and competent institutions to assist in identifying illegal activities through reporting of any unlawful underground survey and excavation activities detected near the KGP. Participatory monitoring in support of the protection of local cultural heritage resources / sites by local herders with the support of Erdene may be considered. This will be further investigated and discussed with local communities, including the possibility of combining cultural heritage participatory monitoring with other participatory programmes (e.g. monitoring of water resources).
- Prohibit all KGP personnel and contractors from initiating or participating in any type of illegal exploration or excavation activities that involve searching for, transfer of and/or trade in archaeological and palaeontological objects and any other items that have cultural or historical value. Depending on the severity of each individual violation case, the penalty will range from temporary suspension from the workforce to dismissal. In aggravated cases, such as trafficking in archaeological or palaeontological antiquities, any KGP worker or contractor found to be involved in such illegal activity will be subject to immediate dismissal and transfer to the relevant law enforcement bodies for possible criminal and civil legal action, as appropriate.
- Provide accommodation for the workforce at the KGP to limit accessibility by employees and contractors to heritage resources.
- Instruct all KGP personnel to follow designated approved routes and avoid sites of archaeological and cultural interest. Personnel involved in transportation,

including relevant contractor and subcontractor-contractor personnel, will undergo mandatory training in traffic management.

- Implement a *Code of Conduct* and induction program that includes provisions on cultural heritage, including norms of acceptable behaviour based on the principle of mutual respect for cultural diversity.
- Periodically, and as appropriate, provide personnel with the opportunity to visit sites of local cultural significance, as part of ongoing cultural heritage respect and awareness creation.

Residual Impact

Given the implementation of all mitigation measures listed above, the impact is expected to be of low magnitude and with medium sensitivity. The overall residual impact significance is Minor. The potential to identify activities by third-parties and inform relevant government agencies is Beneficial.

1.5.3 Impacts to Intangible Cultural Heritage

Through the mobilisation and deployment of the construction and operations workforce, the intermingling and interface between local and non-resident populations can lead to a weakened interest in, and reduced appreciation of religious and spiritual traditions, ceremonies and use of sacred places, norms, ethics and prohibitions, as was outlined in *Chapter B14 Cultural Heritage*. This is due to the shifting preferences towards modern sensibilities. Pre-mitigation, this impact is considered to be of medium sensitivity, and medium magnitude, with considerable potential changes to the local area affecting intangible cultural heritage activities, associations, visual links and cultural appreciation. Significance is considered to be Moderate, pre-mitigation.

Conversely, interaction between people of different backgrounds and geographies may also create opportunities for fostering cultural diversity and mutual enrichment. Erdene recognises and appreciates the intangible cultural heritage and associated practices that are present in Bayankhongor *aimag*, and particularly Shinejinst and Bayan-Undur *soum*s and has worked with the *soum* governments and local community communities since it began exploration activities in the area to support and strengthen local cultural events and conserve and reinforce local traditions and culture. The social baseline found that the majority of people interviewed think their intangible cultural heritage is important and want to preserve these practices, and continue to pass these traditions to future generations.

Mitigation Measures

The following mitigation and enhancement measures are proposed, in addition to the measures outlined in *Chapter C8 Population and Demography*:

- Include ongoing consultation and disclosure activities with local communities about in-migration, recruitment and accommodation management measures in the *Stakeholder and Communications Management Plan* (and *Grievance Procedure*). The *Stakeholder and Communications Management Plan* will have a particular focus on those practicing herding traditions, and the Project's impacts and the mitigation measures to minimise any effects on traditional herding practices, combined with an ongoing and responsive Livelihood Support Programme through *the Land Use and Livelihoods Management Plan* (see also *C10: Land Use*).

- Continue work with the *soum* governments and the local community to support and strengthen local cultural events and conserve and reinforce local traditions and culture through the development and implementation of the *Local Cooperation Management Plan*. Potential measures include:
  - Provide support to local institutions to be able to meet the information and educational needs of communities with respect to cultural heritage in response to evidence of the lack of local expertise in cultural heritage.
  - Establish an oral history program based in *soum* cultural centres to enhance oral traditions in the AoI (e.g. "Chuluun tsargil" instrument playing; Takhil tile game in Shinejinst; and in Bayan-Undur Amarbuyant worship ceremonies, among others); and also, prepare exhibits and public programs that inform local residents about intangible and tangible cultural heritage.
  - Continue Erdene's existing participation in and support for local cultural heritage celebrations, such as Naadam and Tsagaan Tsar.
- Should it be determined that intangible cultural heritage is being impacted, or community members express a concern that it is being adversely affected; mitigation measures may be employed to minimise these effects.
- Implement a Code of Conduct and induction program that includes provisions on cultural heritage, including norms of acceptable behaviour based on the principle of mutual respect for cultural diversity.

Residual Impact

Given the implementation of mitigation measures listed above, the impact will be of low magnitude and low sensitivity. The residual impact significance is Negligible. As noted, there may also be Positive impacts experienced.

1.5.4 Closure

Closure of the mine will result in a return of the Project area to non-mining uses, and a decline in investment into local cultural heritage resources by the Project, as well as a decline of potential influence by non-native citizens on local practices.

As discussed in *Chapter A5: Project Description*, a comprehensive KGP *Closure Management Plan* must be prepared prior to planned closure. Potential impacts from the closure and decommissioning of the KGP will be identified and further described at this stage and assessed in accordance with the KGP Closure Plan, which will be produced in compliance with Good International Practice[2]. Closure impacts are not anticipated to be significant.

1.6 Summary of Residual Impacts and Mitigation and Management Measures

Table 3 presents a summary of the potential residual impacts and proposed mitigation measures for the KGP.

[2] As defined in the EBRD Environmental and Social Policy (2014), good international practice refers to the exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally or regionally. The outcome of such exercise should be that the project employs the most appropriate technologies in the project-specific circumstances.

Table 3 Summary of Impacts on Cultural Heritage

ID	Impact	CH Feature	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
CH01	Physical loss of or damage to undocumented, unanticipated cultural heritage objects or features that are encountered within the footprint of the KGP.	Undocumented archaeological or palaeontological objects or features encountered within the footprint of the KGP.	X	X	-	Prepare and implement a *Chance Finds Procedure*. Chance finds will be preserved in situ or rescue excavations will be undertaken, as appropriate, following the established Government of Mongolia processes for such activities, building on Erdene's existing procedure.	• *Land Disturbance Control and Rehabilitation MP* • *Chance Finds Procedure*	**Minor**
			X	X	-	Provide training to all KGP personnel and contractors in the *Chance Finds Procedure* and the laws protecting cultural heritage. Specific training on identifying cultural heritage features and application of the procedure will be provided to all workers involved: • earth moving and the use of heavy equipment, including heavy transport vehicles; • drilling and blasting; • excavation and geological intervention; • environment protection; and • staff engaged in community relations activities.	• *Land Disturbance Control and Rehabilitation MP* • *Chance Finds Procedure*	
			X	X	-	Obligations (both for the contractor and their sub-contractors) relating to the procedures for the handling of chance finds will be included in contracts.	• *Land Disturbance Control and Rehabilitation MP*	

ID	Impact	CH Feature	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
			X	X	-	If any cultural heritage feature is encountered within the footprint of the KGP and/or nearby, contractors involved in the works will be equipped to protect the earth layer and to help undertake an assessment of the find in accordance with the *Chance Finds Procedure*.	• *Land Disturbance Control and Rehabilitation MP* • *Chance Finds Procedure*	
			X	X	-	Apply the KGP *Land Disturbance Permit* as part of the *Land Disturbance and Rehabilitation Management Plan*. Planned disturbance will be assessed as part of the Project's permit review process.	• *Land Disturbance Control and Rehabilitation MP*	
			X	X	-	Employ strict measures to control the conduct of KGP personnel, including the contractor workforce, through the *Code of Conduct*.	• *Human Resources MP*	
			X	X	-	Obtain applicable land acquisition and disturbance permits, as required by statutory procedures, in advance of any excavation works planned beyond the KGP's footprint (refer to *Chapter A2: Legal Framework*).	• *Land Disturbance Control and Rehabilitation MP*	
CH02	Deliberate Disturbance of Cultural Sites	Identified sites in Shinejinst and Bayan-Undur *soum*s and undocumented archaeological or palaeontological objects or features	X	X	-	Application of measures in *Chapter C8 Population and Demographics*	-	**Minor**
			X	X	-	Cooperate with relevant governmental bodies and competent institutions to assist in identifying illegal activities through reporting of any unlawful underground survey and excavation activities detected near the KGP. Participatory monitoring in support of the protection of local cultural heritage resources / sites by local herders with the support of Erdene may be considered. This will be further investigated and discussed with local communities, including the possibility of combining cultural heritage participatory monitoring with other participatory	• *Stakeholder and Communications MP*	

ID	Impact	CH Feature	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						programmes (e.g. monitoring of water resources).		
			X	X	-	Prohibit all KGP personnel and contractors from initiating or participating in any type of illegal exploration or excavation activities that involve searching for, transfer of and/or trade in archaeological and palaeontological objects and any other items that have cultural or historical value.	• *Human Resources MP*	
			X	X	-	Provide accommodation for the workforce at the KGP to limit accessibility by employees and contractors to heritage resources.	• *Human Resources MP*	
			X	X	-	Instruct all KGP personnel to follow designated approved routes and avoid sites of archaeological and cultural interest. Personnel involved in transportation, including relevant contractor and subcontractor-contractor personnel, will undergo mandatory training in traffic management.	• *Transport MP*	
			X	X	-	Implement a *Code of Conduct* and induction program that includes provisions on cultural heritage, including norms of acceptable behaviour based on the principle of mutual respect for cultural diversity.	• *Human Resources MP*	
			X	X	-	Periodically, and as appropriate, provide personnel with the opportunity to visit sites of local cultural significance, as part of ongoing cultural heritage respect and awareness creation.	• *Human Resources Management Plan*	

ID	Impact	CH Feature	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
CH03	Potential weakening of intangible values, such as traditional frameworks, practices and customs.	Intangible cultural heritage features of local communities	X	X	-	Include ongoing consultation and disclosure activities with local communities about in-migration, recruitment and accommodation management measures in the *Stakeholder and Communications Management Plan* (and Grievance Procedure). The *Stakeholder and Communications Management Plan* will have a particular focus on those practicing herding traditions, and the Project's impacts and the mitigation measures to minimise any effects on traditional herding practices, combined with an ongoing and responsive Livelihood Support Programme through the *Land Use and Livelihoods Management Plan*	• *Stakeholder and Communications MP* • *Grievance Mechanism* • *Land Use and Livelihoods MP*	**Minor**
			X	X	-	Continue work with the soum governments and the local community to support and strengthen local cultural events and conserve and reinforce local traditions and culture through the development and implementation of the *Local Cooperation Management Plan*. Potential measures include: • Provide support to local institutions to be able to meet the information and educational needs of communities with respect to cultural heritage in response to evidence of the lack of local expertise in cultural heritage. • Establish an oral history program based in soum cultural centres to enhance oral traditions in the AoI (e.g. "Chuluun tsargil" instrument playing; Takhil tile game in Shinejinst; and in Bayan-Undur Amarbuyant worship ceremonies, among others); and	• *Local Cooperation MP*	

ID	Impact	CH Feature	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						also, prepare exhibits and public programs that inform local residents about intangible and tangible cultural heritage. • Continue Erdene's existing participation in and support for local cultural heritage celebrations, such as Naadam and Tsagaan Tsar.		
			X	X	-	Should it be determined that intangible cultural heritage is being impacted, or community members express a concern that it is being adversely affected; mitigation measures may be employed to minimise these effects.	• *Stakeholder and Communications MP* • *Grievance Mechanism*	
			X	X	-	Implement a *Code of Conduct* and induction program that includes provisions on cultural heritage, including norms of acceptable behaviour based on the principle of mutual respect for cultural diversity.	• *Human Resources MP*	
CH04	Closure impacts, including decline in investment into local cultural heritage features Erdene, as well as a decline of potential influence by non-native citizens on local practices	Tangible and intangible cultural heritage features of local communities.	-	-	X	Development of *Closure Management Plan*.	• *Closure MP*	**Minor**

1.7 References

European Bank for Reconstruction and Development. 2008. European Bank for Reconstruction and Development Environmental and Social Policy. Performance Requirement 8 Cultural Heritage.

Eco Trade LLC. 2017a. Altan Nar Environmental and Social Baseline Study

Eco Trade LLC. 2017b.Bayan Khundii Environmental and Social Baseline Study



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

Erdene Mongol LLC

C12 – Occupational and Community Health, Safety and Security

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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1. OCCUPATION AND COMMUNITY HEALTH, SAFETY AND SECURITY

1.1 Introduction

This Chapter provides an assessment of potential impacts on occupational and community health, safety and security arising from the Khundii Gold Project (KGP or the Project) during construction, operation and closure phases. This Chapter also presents specific mitigation measures that will be implemented to avoid or minimise negative impacts, and enhancement measures to maximise beneficial impacts.

1.2 Policy, Standards and Lender Requirements

Chapter A2: Policy and Legal Framework outline the requirements that will be followed for the KGP.

1.3 Assessment Methodology

1.3.1 Scope of Assessment

1.3.1.1 Geographic Scope

The geographical scope of the assessment covers the KPG Area of Influence (AoI) as defined in *Chapter B15: Community Health, Safety and Security*. The assessment, therefore, focuses on impacts on people and communities of Shinejinst and Bayan-Undur *soums* specifically, and more broadly in Bayankhongor *aimag*, where the KGP, including the mine site, and Site Access Road are located.

1.3.1.2 Temporal Scope

The temporal scope covers the construction, operation and closure phases.

1.3.1.3 Technical Scope

The scope of the socio-economic assessment for the KGP has been defined through a scoping process undertaken from June to September 2019, which identified potentially affected people / communities and expected impacts. The potential impacts on community and occupational health, safety and security due to the KGP have been assessed based on the scoping results.

1.3.1.4 Method of Assessment

The potential impacts were assessed and evaluated using the general methodology outlined in *Chapter A3: Methodology*. The application of this methodology has been informed by the following:

- ESIA team observations during fieldwork conducted August 2019;
- results of stakeholder consultations (see *Chapter A6: Stakeholder Engagement*);
- expert knowledge and judgement; and
- previous experience from ESIA work on similar projects or projects in similar social and environmental settings.

1.3.2 Significance Criteria

The significance of a potential impact is determined by a combination of sensitivity of Project-affected people (PAP) and impact magnitude. The criteria used for allocating sensitivity and

impact magnitude are provided in Table 1 and Table 2 respectively. The matrix for combining sensitivity and impact magnitude to allocate the level of significance to an impact is presented in *Chapter A3: Methodology*.

Table 1 Health, Safety and Security Sensitivity Criteria

Level of Importance	Project-Affected People
High	Project-Affected People (PAP) with poor understanding of the risks posed by a project and how to avoid/minimise them. PAP such as the young, very old or disabled with high sensitivity to changes in environmental health determinants, such as air quality and noise levels. PAP such as the poorest, and/or marginalised groups with high sensitivity to changes in social health determinants because they have restricted access to medical care, complaint procedures or community representatives able to act in their interests. PAP sharing resources constantly with the project such as users of roads and tracks. PAP who normally engage in high risk behaviours which make them more sensitive to changes in risk.
Medium	PAP likely to experience temporary inconvenience as a result of changes in environmental or social determinants of health. They may share resources occasionally with the Project, such as two peak uses of roads each day. They have some, but not complete, understanding of the risks posed by a project. Have some knowledge about project risks and scoping strategies available.
Low	PAP with effective coping strategies who feel little or no challenge to their wellbeing as a result of project activities. They may share resources with the project occasionally and broadly understand the risks associated with the Project.

Table 2 Magnitude of Health, Safety and Security Impact Criteria

Impact Magnitude	Type of Impact
High	An impact that is expected to cause an increase in mortality greater than 1% and/or 10% additional morbidity (illness/injury) (based on specified baseline situation) irrespective of both time-scale and reversibility.
Medium	An impact that is expected to cause an increase in mortality up to 1% and/or more than 1% additional morbidity (illness/injury). Morbidity (illness/injury) increase may or may not be reversible and, when reversible, may result in an inability to work for a period of at least 1 month.
Low	An impact that is expected to cause an increase in acute and/or chronic morbidity (illness/injury) of less than 1% which is likely to be temporary (up to 1 year) and reversible and may result in an inability to work for a period of at least 2 weeks.
Very Low	An impact that is unlikely to have a measurable or noticeable effect on the wellbeing of people so that the baseline conditions will be materially unaffected.
Beneficial	An advantageous or positive impact.

1.4 Potential Impacts

1.4.1 Project Affected People

All workers are considered as affected in relation to occupational health, safety and security.

All community members within the AoI may experience community health, safety and security impacts, including herders and local residents of Shinejinst and Bayan-Undur *soums*. Particularly sensitive 'at risk' PAPs include people with disabilities and those suffering from chronic disease, women, and specifically those who may be more susceptible to Gender-Based Violence and

Harassment (GBVH) such as those who are of a lower socio-economic status or are involved in sex work.

1.4.2 Impact Sources

The key impact sources in relation to occupational and community health, safety and security are linked to the remote nature of the site and associated potential occupational health and safety impacts including emergency events. Further, the development of a new mine site, with new equipment, infrastructure, and a newly assembled workforce has the potential to result in workplace accidents and injuries, which may be compounded by the potential challenges of controlling a mining contractor workforce.

Worker interactions with local communities may contribute to an increase in communicable diseases, and pressure on already stressed local health services. Social fracture and a reduction in wellbeing may also occur, induced by Project activities in the area, including alcoholism, prostitution and/or crime.

The KGP construction phase will involve a small construction workforce of up to 506 people (including contractors) for an estimated construction period of up to 12 months. During the operations phase, the Project is expected to employ approximately 337 personnel on site. For the purposes of this ESIA, an additional 25 % allowance has been included for a projected maximum total on-site workforce of approximately 420 people to allow for a conservative assessment of potential impacts. Not all of the workforce will be on site at the same time, with fewer workers on site on any given shift (maximum of 190 on site at a time). Workers will be flown to Bayankhongor aimag centre, and then transported to the site via buses. Local workers, from Shinejinst and Bayan-Undur soums, will also be transported to site by bus and will be housed at the mine site accommodation, returning to their home base upon completion of their roster via bus.

During construction and operations the approach to worker accommodation will be to house all workers on the KGP at the purpose built accommodation camp located at Bayan Khundii (approximately 4 km away). It is anticipated that a single security provider will be contracted to provide 24/7 security at the KGP site, and that security guards will be unarmed. An illegal artisanal and small-scale mining (ASM) incursion at the KGP may compromise the security of the site and result in Project delays, and also endanger the health and safety of the miners and / or local community members.

To support the Project's emergency response capabilities, Erdene permitted a compacted earth track airstrip located in a dry lakebed at the Altan Nar mine licence area suitable for a small aircraft to land. This doubles as a helipad, in the event that a helicopter is required.

Power is provided on the site by generators, and potable water will be provided from a reverse osmosis water treatment plant, with water supplied from a borefield located south of the mine licence area (see further *Chapter A5 Project Description*).

1.4.2.1 Potential Impacts

The potential impacts assessed in this Chapter are as follows:

- unplanned emergency events impacting workers, emergency responders, Government agencies and communities in the Project AoI;
- worker access to health and emergency services;
- workplace accidents and / or injuries due to work commencement on a new mine site;

- contractor workforce not adhering to contractual requirements;
- increased pressure on local health services;
- increased incidence of communicable disease;
- social fracture and reduction in wellbeing and / or personal safety;
- unauthorised community access to KGP facilities and infrastructure;
- suspension of Project, greater regulatory requirements, and / or increased activism due to perceived or actual environmental and social impacts;
- illegal artisanal and small-scale mining incursion at the KGP.

The following potential impacts have been assessed in companion impact assessment chapters, as follows:

- exposure to elevated dust levels, for example, at locations involving traffic flows and / or groundworks is assessed in *Chapter C2: Climate and Air Quality*;
- disturbance due to an increase in noise levels is assessed in *Chapter C3: Noise and Vibration*;
- changes to water resources are assessed in *Chapter C5: Water Resources*;
- potential for increased accidents / collisions associated with mine-related traffic are assessed in *Chapter C13: Transport*;
- hazardous materials transport and potential for spills and accidents involving these materials are assessed in *Chapter C13 Transport*.

1.5 Assessment of Residual Impacts

This section provides a detailed description of impacts, including the residual construction, operation and closure impacts of the KGP. It also sets out the mitigation measures integral to the Project that aim to reduce the magnitude of the potential impacts.

1.5.1 Construction and Operations Phase

1.5.1.1 Unplanned Emergency Events Impacting Workers and Local Communities

Unplanned emergency events have the potential, when these are significant unmitigated events, to cause impacts to the health and safety of both workers and local communities. These include environmental, social and/or safety impacts resulting from:

- Major fire / explosions / other industrial or construction accident (including fatalities);
- Pit wall failure;
- Flooding at mine;
- Seismic event;
- Infectious disease outbreak;
- Loss of power, heat or water to site;
- Extreme weather / natural disasters;

- Political crisis / illegal detention / terrorist attack; and
- Other unplanned emergency event.

Such unplanned emergency events are not likely, although have potential direct, major negative impacts, that may be irreversible, and affect the local, regional, and potentially national and international level, in the short to medium term.

Mitigation Measures

To mitigate the risk of severe injury or death from emergency events, the following measures will be implemented:

- Develop and implement a *Crisis and Emergency Response Management Plan* specific to the KGP context, including to respond to Project-related incidents that may affect communities, containing information on possible affected communities as well as communication and notification strategies and procedures.
- Ensure a hazard and risk identification process is in place and updated annually. Risk identification process informed by hazards and risks identified at a functional level including Safety, Environment and Communities risks. Risk analysis includes Ulaanbaatar, Bayankhongor City Centre, mine site, associated facilities, transport routes and other off-site infrastructure. Erdene risk assessment procedures are used to inform hazard and risk identification Process.
- Disclose the *Crisis and Emergency Management Plan* and undertake engagement with local emergency response organisations and communities on emergency response issues and awareness.
- Crisis and emergency response teams will be appropriately trained to deal with anticipated potential emergency situations, including environmental emergencies.
- Establish mutual support agreements with local and national police and emergency services, as appropriate and feasible.
- Manage the procurement, transport, storage, use and disposal of reagents and chemicals consistent with good international practice, including the management of cyanide consistent with the principles outlined in the International Cyanide Management Code (ICMC) for the manufacture, transport and use of cyanide (see further mitigation measures outlined in *Hazardous Materials Management Plan*).
- Maintain sufficient inventory and ensure contingency measures are in place to provide heating, water, and power to maintain worker health and safety in the event of an emergency situation.
- Evacuate the site in the event that maintenance of health and safety of workers is unable to be achieved.

Residual Impacts

Due to the measures that will be applied, it is unlikely that such unplanned events will occur. It is considered that the magnitude of the impacts can be reduced to medium, as can the receptor sensitivity. This delivers a residual impact significance of Moderate.

1.5.1.2 Worker Access to Health and Emergency Services

The KGP is a very remote mine site, 980 km from Ulaanbaatar and 300 km from Bayankhongor *aimag* centre. There is also a lack of local medical facilities and capability available to assist in the event of an emergency. The *soum* hospitals do not conduct surgical operations, and emergency response services are rudimentary. Thus the ability to provide effective, reliable and timely medical evacuation ("Medivac") services for workers is critical, as any delays or challenges in provision thereof may result in loss of life or serious injury.

In the event of accidents or health emergencies in the workplace, direct and indirect employees of Erdene will have access to site medical services, or health services provision in the soums, aimag centre or Ulaanbaatar in the event that medical issues cannot be treated on site. Site medical services will include the availability of qualified health professionals on site at all times, including a doctor, nurse and paramedic. The Project has an established contract with a service provider for Medivacs and therefore the ability to conduct a Medivac in the event of an emergency as there is an airstrip available, and permitted for small aircraft. In the event that a plane cannot be used due to weather conditions, for example, then Medivac by helicopter is the agreed alternative.

While it is unlikely that such an event would occur, it would have potential direct, irreversible impacts in the short to medium term at the local level.

Mitigation Measures

Ensuring that employees are "fit" to perform the essential functions of their jobs is important in mitigating this impact. Erdene will implement a medical monitoring programme through the *Occupational Health, Safety and Security Management Plan*, which includes pro-active elements that are predictive and preventive in nature, and outline the responsibilities of contractors.

The measures specified in Section 1.5.1.1 will also be applied, with additional measures including:

- Regular engagement with and monitoring of Medivac service provider to ensure response capability is maintained.
- Develop and implement the *Occupational Health, Safety, and Security Management Plan*.

Residual Impacts

The remoteness of the KGP site and the impacts thereof on provision of timely Medivac services is considered as having a residual impact of Moderate, even with the application of the above measures. The sensitivity may be reduced to medium, as can the magnitude.

1.5.1.3 Workplace Accidents and / Or Injuries Due to Work Commencement on a New Mine Site

The greatest number of accidents in the life of a mine tend to be when personnel are new to roles. Relevant research from The Department of Mines and Petroleum in Western Australia investigated "Fatal accidents in the Western Australian mining industry 2000-2012" . Key factors influencing fatalities were:

- The duration of the deceased in the role: almost one-third of fatalities occurred in the person's first year in a role, with 48% of fatalities being workers who had been in their role for two years or less.

- Duration at the mine site: regardless of experience elsewhere or years in an occupation, workers at the site for less than one year accounted for 49% of fatalities.
- Supervisor's duration in the role: 68% of fatalities occurred during the supervisor's first three years in the role.
- Compliance with procedures: many accidents are repeat events where both the hazard and the precaution or controls that will prevent injuries are known (73% of fatalities). However, there was either no procedure in place or the procedures or rules were not complied with in 89% of fatalities.

Lessons learned from this international experience can be readily applied to the KGP, as the possible impact to worker health and safety (whether lost time injuries – LTIs – or fatalities) is due to commencement of work at a new site, with new operators, new equipment, and new technology.

As noted in *Chapter B15 Community Health Safety and Security*, the occupational health and safety inspection frequency in Mongolia by agencies is low – inspections are rarely on safety, and only sometimes on occupational health – so Erdene is recommended to initiate and act on this responsibility to ensure worker health and safety.

The potential impacts are highest in the first 12 months of construction and operations, with potential to impact at the *aimag* level, in a direct, major negative manner. There is a high sensitivity to this impact, resulting in a pre-mitigation impact rating of Major.

Mitigation Measures

Erdene should be conscious of new arrivals, whether experienced or not, and the need for time to familiarise themselves with the day and night working environments, new colleagues, supervisors and work processes. Trends in fatalities indicate the importance of effective induction, training and supervision of new workers in the first months of employment or contract. Mitigation measures proposed, include the application of the Erdene preliminary *Occupational Health, Safety and Security (HSS) Policy and Program* provided in the *Project Execution Plan* and which will be further developed in the *Occupational Health, Safety and Security Management Plan*, as follows:

- Contractor management requirement of a minimum level of occupational health and safety to be met, consistent with Erdene's health and safety policy, standards and procedures, and the provisions of the OHSAS 18001 / ISO 45001, through the contract duration, with monitoring and penalties in response to any breaches.
- Implement a prequalification / screening processes prior to contracting.
- Where necessary, use written procedures, standardised practices, work rules and training initiatives to promote an atmosphere supportive of "Safe Work Practices" including:
    - Hazard identification and risk assessment conducted at all areas to identify those work processes, practices, and facility hazards which could cause accidents and injuries; and Safe Work Practices which address the root causes of potential accidents, injuries and illness shall be established for all major activities at the KGP.

- Provide induction, training and supervision in the first months of employment, for both staff and contractors, including:
    - New Employee orientation; job-specific training; ongoing training; management and supervisory training; safety for engineers training; contractor training; hazard communication training; hazard identification training; and where applicable, safety topics and awareness should be incorporated in all training programs.
- Implement the *Erdene Incident / Accident Investigation Program* which provides a system that consistently instructs supervisors, managers, and safety representatives on the process involved in reporting, investigating and analysing accidents / incidents.
- Conduct contract performance monitoring including of inductions, daily safety toolbox meetings, regular contractor management meetings on safety.
- Review facilities, equipment and the site safety program on a scheduled basis, using uniform methods, procedures and forms. The components of the inspection and audit program will include:
    - Daily inspections / walk about; addressing of regulatory compliance requirements; management cooperation and participation; recommendations; follow-up; record retention;
- Crisis and Emergency response plan in place, with ongoing training.

Residual Impacts

The application of the above listed measures is considered to effectively reduce the magnitude and sensitivity of the impact, resulting in a residual impact of Minor.

1.5.1.4 Contractor Workforce Not Adhering to Contractual Requirements

As noted above, Erdene will have a significant contracted labour force on the KGP, including in the provision of mobile maintenance (mining fleet; mining production; and camp, among other potential areas).

Experience on other mining projects in Mongolia (and internationally) indicates that often the most significant occupational health and safety issues are associated with contractors and that contractors follow their contractual requirements well where strong guidance is in place. This includes implementation of penalties where contracts are breached.

The potential for contractors to operate outside of Erdene control may impact the health and safety of all workers on site, as well as community members. This may result in irreversible direct negative impacts, including loss of life, over the duration of the mine construction and operations. There is also high sensitivity by Erdene and KGP workers, as well as community members that may be exposed to contractors. The pre-mitigation impact significance is considered to be Major.

Mitigation Measures

The above mitigation measures outlined in Section 1.5.1.3 are considered sufficient to address the potential impacts of the contactor workforce not adhering to contractual requirements.

Residual Impacts

The application of the above listed measures is considered to effectively reduce the magnitude and sensitivity of the impact, resulting in a residual impact of Minor.

1.5.1.5 Increased Pressure on Local Health Services

It is not likely that the workforce will create additional demand on health services in the Project AoI, specifically the local *soum* hospitals or the hospital located in Bayankhongor *aimag* centre, as the Project will primarily provide medical assistance and services to workers to facilitate ongoing health maintenance and education, including vaccinations against typical infectious diseases prevalent in the area such as tuberculosis (through pre-approved medical service providers); provision of fresh and healthy food for employees at camp during their shifts; and education in healthy eating and good sanitation practices, among others.

Provision of work-related health services to staff is likely to have no net impact on public health services in the Project AoI, as the local workforce for non-work related health issues will still seek some local services. However, as with professional and vocational education, both workforce health services provision and capacity building in good health practices are considered a potential benefit that will extend beyond the life of the Project, and have the potential for secondary positive impacts into worker's households.

Stress on health services may also be created through speculative or opportunistic in-migration to the local area. Healthcare is a necessity for in-migrants of all ages so speculative in-migrants with dependents will increase the burden on health services. While the potential for in-migration is low (as discussed in *Chapter C8 Population and Demographics*), a small increase in population may place additional stress on already challenged healthcare services and infrastructure locally. Poor availability of healthcare personnel is a current issue throughout the Project AoI, and baseline survey respondents cite problems including high staff turnover and poor hospital infrastructure and capacity as problems. Project-induced in-migration has the potential to create low-moderate, negative impacts on at-capacity health services within the Project AoI over the life of the Project (and potentially beyond the life of the Project).

Mitigation Measures

In addition to measures outlined in *Chapter C8 Population and Demographics*, the following mitigation measures that will be impacted include:

- Ensure health screening of employees and contractors is conducted before contracting workers and on a periodic basis throughout their employment / contract.
- Provide employees and contractors with adequate health care for work-related issues and injuries that is independent of the soum health care system.
- Provide regular health awareness training to workers (for example through toolbox talks).
- Mitigate the potential pressure on health services resulting from in-migration through liaising with local health professionals to identify ways that the Project can provide sustainable investments in health services and capabilities.

Residual Impacts

It is anticipated that with the implementation of the above mentioned measures, the significance of this impact can be reduced from a Moderate, to a residual rating of Minor (Medium sensitivity and Low Magnitude).

1.5.1.6 Increased Incidence of Communicable Disease

Of the infectious disease recorded in Bayankhongor *aimag* approximately 70% were sexually transmitted infections (STIs) in 2018. The *aimag* also noted a concern about increasing levels of Tuberculosis. The ability of local health facilities to effectively manage an increase in communicable disease(s) within the community is also currently low. The presence of the construction and operations workforce (likely predominantly male), coupled with a potential (albeit small) population of in-migrants to the Project AoI, may increase the risk of transmission of communicable diseases, including STIs and potentially other diseases such as tuberculosis. Close living conditions at camp and poor field sanitation can also increase the risk of communicable diseases, as well as food and water-borne diseases.

The remoteness of the KGP site (and accommodation camp) from the nearest *soum* centre (Shinejinst *soums* centre is approximately 70 km away) is an inherent mitigation factor to this impact as it limits potential interactions between the workforce and communities. The workforce itself is also relatively small in number, with a maximum of around 190 workers on site during a shift. The more mobile workforce, such as truck drivers and those that interact with community members directly as part of their jobs are likely to pose the greatest risk. This may be an indirect negative impact, which could be regional (*aimag* level) and long term.

Behavioural risk factors such as elevated rates of alcohol use due to increased disposable incomes locally, and a potential increase in the number of sex workers attracted by the presence of a likely predominantly male workforce, may further increase the incidence of high risk sexual behaviours. Groups most at risk are those with existing high-risk behaviours (i.e. sex workers, and those using alcohol). Hence, the further spread of already high rates of STIs is a probable indirect negative impact that would be regional and over the long term, occurring during both construction and operational phases.

Mitigation Measures

In addition to the measures specified in Section 1.5.1.5, and to mitigate the potential introduction and spread of communicable diseases related with construction and operations, the following mitigation measures will be implemented:

- Implement a *Code of Conduct* that is applicable to all KGP workers. All Erdene personnel and Contractors will be given basic community health, safety and security awareness training and induction in the *Code of Conduct*. This will include awareness of STIs and other communicable disease prevention. Provide this training on an ongoing basis.
- Identify opportunities to support local public health campaigns that focus on prevention of communicable diseases and STIs.
- Strict enforcement of a policy of no prostitution, and immediate dismissal of any workers found to be using prostitutes.
- Review and identify lessons learned from grievances received that relate to perceived changes in communicable diseases. Update the *Community Health,*

Safety and Security Management Plan, as required, to reduce the risk of introduction or spread of communicable diseases.

Residual Impacts

An increase in the occurrence of communicable diseases attributable to the KGP is unlikely, given the remoteness of the site and low probably of unplanned population influx. Following the application of mitigation actions, the impact magnitude is low and the sensitivity of affected people in this area is medium, resulting in an impact significance of Minor.

1.5.1.7 Social Fracture and Reduction in Wellbeing and / or Personal Safety

The Project workforce, and the potential arrival of Project-related in-migrants in Shinejinst and Bayan-Undur *soums* creates the potential impact of social fracture and reduction in wellbeing and / or personal safety due to:

- The presence of security (e.g. at gates) and the potential for conflict engendered by their presence;
- Actual or perceived treatment by or benefits from the Project to one community or stakeholder group over another; this may include in-migrants in search of economic opportunities;
- Increased crime.
- Increase in GBVH;
- Increased alcohol-related illnesses and incidents;
- Pressure on police and other public services; and
- Prostitution.

There have been no security incidents at the KGP exploration sites between security / Project personnel and the community since Erdene commenced exploration activities. Interactions with the potential to cause risks to human safety have included eviction of opportunistic artisanal miners at the exploration site alongside local authorities and police (see additional discussion below). The remoteness of the site ensures that community interaction with security is limited, with potential interactions mainly with herders in the area, or with people that make a specific trip to the site. As noted above, security at the site will be provided through security personnel, and a perimeter fence (including patrols thereof). The consequences of conflict with local residents is direct, possible through the life of the mine, and is therefore long-term and localised, affecting people coming in direct contact with security at the site.

Jealousies from securing / not securing training or employment with the mine compared to in-migrants or other *soum* / *bagh* citizens and perceived or actual wage differences within or between Erdene employees and contractors may arise. This may lead to social fracture issues. As noted in *B8 Demography*, attitudes of *soum* residents are generally positive towards in-migrants and there is recognition of the benefits that in-migration can bring to the local community. It is noted that migration, both into and out of the two *soums* (and the *aimag*) is negligible. In addition, migration to the area by economic opportunity seekers is also anticipated to be very limited. In-migrants may, over time, contribute to social fracture issues, as described above.

Social fracture / antisocial behaviour (e.g. sexual assault, alcohol use, petty crime) as a result of, for example, a lack of employment or from increased disposable income in the Project AoI may also occur. As noted in the *Chapter B15 Community Health, Safety and Security*, some of the key

community health, safety and security issues currently experienced in the Project AoI are in relation to the use of alcohol and associated crime and anti-social behaviours. This is also noted to be a particular existing concern for local authorities, specifically regarding the youth population. There may also be potential for exploitative sexual behaviours to emerge, based on increased disposable incomes (and corresponding alcohol use), including gender-based violence, trafficking, and prostitution. While reported instances of these, and other crimes, are very low currently, they may place additional pressure on the police and local public services in the area, as well as contribute to a reduction in community wellbeing and safety.

As noted *in B15 Community Health, Safety and Security*, GBVH is a current issue in the area, with both KIIs and FGDs noting instances of GGBVH. One KII noted GBVH tends to be under-reported or not reported at all, and further indicated that cases of domestic violence occur 1 to 3 times a month on average in the soum (Bayan-Undur). GBVH may also be exacerbated by Project employment and associated economic benefits, that may facilitate higher level of disposable incomes and associated alcohol consumption. Chapter B15, further notes that most crime (including GBVH), in the Project AoI is associated with alcohol consumption.

Chapter *B9 Social Structures* found in FGDs that there is very little trust in local authorities and staff. Rather, trust is placed in relatives, and particularly those with higher education levels and who reside in the *soum* centre (and who are viewed as better informed on socio-economic issues and politics). Further, the Household Survey found general low levels of trust in all levels of government, the police, courts and Non-Governmental Organisations (NGOs), among others. This has implications for social fracture-related impacts, including local level ability to detect and manage them. Company engagement efforts will need to prioritise working together with a broad range of local institution and stakeholders to recognise community perspectives and issues, and respond proactively, as appropriate.

Social fracture and reduction in wellbeing and / or personal safety are possible through the life of the mine (particularly during construction and operations, and less so during closure), and are therefore long-term and localised potential impacts. Receptor sensitivity is considered to be medium, with the pre-mitigation impact magnitude assessed as medium, leading to an impact significance of Moderate pre-mitigation.

Mitigation Measures

Social fracture and reduction in wellbeing and / or personal safety will be minimised on the basis that the mitigation measures included in *Chapter C8: Population and Demographics* are applied, in addition to the provisions specified in Sections 1.5.1.5 and 1.5.1.6 above, supplemented by the following proposed additional measures.

- Use the *Stakeholder and Communications Management Plan* to communicate with local communities about the Project workforce and the steps taken to mitigate any impacts to the community, and ensure awareness of the *Grievance Procedure* to report complaints.
- Conduct ongoing consultation with a variety of stakeholder (political, health authorities, women groups, children's groups) throughout the Project lifecycle to provide ongoing information on Project activities, to specifically address GBVH related issues, and to obtain feedback on GBVH issues.
- Implement actions to discourage alcohol abuse, including but not limited to:
    - Implementing a "Dry" site (no alcohol consumption on site);

  - Providing leisure facilities provided on site; and
  - Conducting alcohol and controlled substance testing, as appropriate.
- Provide induction training for all Project workers that includes awareness building about gender sensitivity and GBVH, trafficking and prostitution and ways of identifying risks and reporting related observations or incidents.
- Include specific provisions in the worker Code of Conduct on gender and GBVH.
- Provide specific training for Community Liaison Officers (CLOs) to ensure they have required skills to effectively and sensitively address GBVH related issues in the course of their jobs.
- Adherence by Erdene (and their security contractors) to the provisions enshrined in the *Voluntary Principles on Security and Human Rights*, including:
  - Provide security, human rights and use of force training, consistent with the provisions of the *Voluntary Principles on Security and Human Rights*, to employees and contractors engaged in security duties, and support security providers to offer training in security and human rights to their personnel.
  - As far as permitted under local legislation, conduct careful screening and background checks of security personnel and service providers prior to hiring.
  - Conduct regular audits of security service providers to ensure compliance with local legislation.
  - Develop and implement procedures on control of the use of force by security personnel, which will be only when strictly necessary and will always be proportional to lawful objectives.
  - Report and investigate any credible allegations of human rights abuses or excessive use of force or power by security personnel.
  - Conduct regular consultations with local people, making security procedures publicly available, and properly recording and promptly addressing any complaints related to security personnel.

Residual Impacts

With the implementation of mitigation actions listed above, the impact magnitude is low, and the sensitivity of at-risk PAPs is medium. Post-mitigation impacts are assessed as Minor.

1.5.1.8 Community Access to KGP Facilities and Infrastructure

Mine sites are inherently dangerous places, and so threats to public safety exist particularly where members of the community could come onto the site without authorisation or appropriate induction, safety equipment or site knowledge. Furthermore, activities such as blasting could cause serious accidents or fatalities. This potential impact applies to human health and safety of members of the community or any employee or contractor not currently working, from access to mining facilities at the KGP. It also applies to livestock health and safety, noting the seasonal use of pasture land in the area. As noted above, the remote location of the site and low population in the area reduce the site's accessibility and potential for the occurrence of this impact. Additionally, the mine site (including deposit, processing facilities and infrastructure) as well as

accommodation camp will be protected by a stock proof perimeter fence (including patrols thereof).

This potential impact would be a direct major negative impact due to a threat to human and livestock life, long term (for the life of the Project) and applies to the direct Project area (site-level extent). The sensitivity of receptors is considered to be medium, and the pre-mitigation impact magnitude is considered to be medium, resulting in an impact significance of Moderate.

Mitigation Measures

To mitigate the potential threat to human health and life from gaining unauthorised access to any part of the Project site, during construction, operations and (to a lesser but no less dangerous degree) closure, the following mitigation measures will be implemented.

- Exclude the public from active mining areas to minimise impacts of blasting.
- Use security personnel to ensure no unauthorised public access.
- Provide signage at all entrance / exist points and periodically on boundaries / fenced areas.
- Secure / make safe all plant and machinery at the end of each working day.
- Provide regular updates to herders, vulnerable groups and other residents about potential Project hazards and changes to Project activities that may have community safety impacts.
- Develop and implement a *Crisis and Emergency Response Management Plan* specific to the KGP context, including to respond to Project-related incidents that may affect communities, containing information on possible affected communities as well as communication and notification strategies and procedures.
- Implement an outreach program to periodically bring visitors for site visits in a controlled and safe manner.

Residual Impacts

Due to the measures that will be applied to protect PAP from access to the mine site and associated facilities and infrastructure, the magnitude is low, and sensitivity is medium given the serious consequences that can arise from an incident. The overall impact significance is Minor.

1.5.1.9 Suspension of Project, Greater Regulatory Requirements, and / or Increased Community / NGO Activism Due to Perceived or Actual Environmental and Social Impacts

Perceived or actual environmental and social impacts by the KGP may result in the suspension of the Project, greater regulatory requirements, and / or disruption from increased community / NGO activism (e.g. protests, blockage of access to site).

There are a number of NGOs active at a national level with a history of anti-mining sentiment, and that may potentially foster such sentiments locally in the event that negative environmental and social impacts occur or are perceived to occur. *Chapter B10 Economy* found that there are some entrenched existing negative perceptions of mining within the local community, largely driven by historical experience with local coal mining exploration and development, and the associated environmental impacts (particularly dust).

As noted in *Chapter B9 Social Structures*, the Company has over time developed a generally high level of legitimacy, credibility and trust (or together, social licence to operate) among local communities and with local governments institutions. Many respondents in the Focus Group Discussions commented that Erdene is aware and responsive to community concerns and communicates effectively. Both Shinejinst and Bayan-Undur *soum* administrations reported having a good understanding of how to communicate problems to Erdene if needed. This finding was corroborated in Fraser et al.'s study (2019) in which it was found that Erdene personnel have earned trust with key stakeholders through proactive early engagement, and a focus on ensuring community development decisions and discussions are conducted in group settings involving affected communities (rather than one-one-one talks), among others.

The discussion in Section 1.5.1.7, notes the existence of low levels of trust by herders in local authorities and staff, as well as the general low levels of community trust in all levels of government, the police, courts and NGOs. In the event of increased local level dissatisfaction / activism, awareness and understanding of these issues may be uneven within and between local communities, authorities and institutions. This highlights, again, the importance of the Company working together with a broad range of local institutions and stakeholders to recognise community perspectives and issues, and respond proactively, as appropriate.

While this impact is unlikely to occur, it could have a long-term impact on the Project and its viability and profitability and there is a high sensitivity on behalf of the Company, which is considered the receptor in this instance. The pre-mitigation magnitude is considered to be high, leading to an impact significance of Major.

Mitigation Measures

Building Erdene's social licence to operate as the KGP moves into construction and then onto operations is critical in mitigating potential impacts. A key component in building Erdene's social licence to operate is ensuring consistent, regular engagement with local communities, authorities and institutions through the *Stakeholder and Communications Management Plan*, and the ongoing implementation and accessibility of the Company's *Grievance Procedure*. Engagement will focus on ensuring that stakeholders are provided relevant information that is responsive to community interests about the Project, in a timely manner that is both accessible and understandable to local communities. This includes specific engagement on positive and negative environmental and social impacts, and how the Company manages these (including for example, jobs, community development activities, dust and traffic management, among others).

Furthermore, the provisions outlined in *Chapter C9 Economy and Employment* relating to the implementation of the *Local Cooperation Management Plan*, including the Local Cooperation Agreements in place with local communities, authorities and institutions, are key to maximising the positive impacts of the Project and ensuring that benefits of the Project are experienced at a broad community level.

In addition, the mitigation measures outlined in Section 1.5.1.7 are applicable, particularly in relation to security personnel and potential community interaction.

Residual Impacts

Given the application of the above suite of measures, it is considered that magnitude is reduced to low, while sensitivity remains high. The residual impact significance is therefore Moderate.

1.5.1.10 Artisanal and Small-scale Mining Incursion at the KGP

As noted in *Chapter B10 Economy*, Shinejinst and Bayan-Undur *soums* have experienced artisanal and small-scale mining (ASM) activities historically. There is at least one small scale mining cooperative operating in Shinejinst under a "reclamation" agreement at two areas, the one approximately 40 km, and the other approximately 20 km from the Bayan Khundii Mining Licence Area. Orphaned unreclaimed diggings can be found in both *soums*. Neither *soum* has hosted an industrial (or commercial) mine operated according to Mongolian (or international) standards. Consequently, practical knowledge of the potential benefits and risks of mining is limited amongst the population. ASM was discussed during the FGDs in August 2019, with participants generally indicating that very few households conduct ASM, and that ASM is confined to individuals who mine to sustain or supplement their livelihoods, and not as a permanent occupation in these *soums*. Households are noted to be ambivalent about small scale mining – recognising that benefits can accrue, but that these flow to relatively few. It was further noted by Shinejinst *soum* that artisanal mining is not widespread in the *soum*, though there are a few people or cooperatives (unregistered / unapproved) that mine gold illegally and that these cases are considered a breach of law. Practices whereby ASM companies or cooperative from outside the *soums* try to illegally access ground for small-scale mining and employ local households to collect the gold were also noted during FGDs.

In 2015, shortly after the public announcement of the results of Erdene's first drilling campaign, small-scale miners visited the property and illegally excavated a small area in open ground directly west of the Company's license tenement. In cooperation with local Government authorities, police shut down the activities within a few months. Removal of the miners was achieved peaceably and since then, there have been no meaningful attempts at ASM near the KGP. Erdene have security on site armed with non-lethal weapons, and it is noted that there have been no confrontations with potential artisanal and small-scale miners and Company security personnel, and that there has been very little activity or interest in the KGP site in recent years (as confirmed through the KGP visitor log).

The Company has previously periodically invited interested people to visit the site, and this has provided an opportunity for awareness creation within local communities that the gold at the KGP is not amenable to traditional ASM methods of mining, nor is the size of the potential KGP mine consistent with ASM regulations. The remoteness of the KGP site from ASM processing facilities in the *aimag* is another inherent deterrent to potential miners.

Throughout all phases of the Project, a potential impact is that opportunistic artisanal and small-scale miners become active at the KGP site, with associated impacts in relation to community health, safety and security and which may also compromise Project scheduling. This includes potential security issues associated with interaction / conflict between potential miners with KGP security staff, health and safety issues associated with unsafe mining practices such as tunnels to extract ore, use of hazardous materials such as cyanide and mercury for gold extraction, and environmental degradation of water sources / soil. The potential impact of artisanal mining activity is direct high-moderate negative, of long-term duration and small spatial extent. The impact is considered to be of Major significance, including high magnitude ranking, and high sensitivity for receptors that include potential artisanal and small-scale miners in the community and Company personnel that may interact with potential miners.

Mitigation Measures

The mitigation measures proposed, include those defined in Section 1.5.1.7 and 1.5.1.8, in addition to:

- Conduct targeted ongoing stakeholder engagement with local and *aimag* level police, *soum* and *bagh* administrations, and communities:
  - To understand prevalence / emergence of ASM activities in Shinejinst and Bayan-Undur, including the drivers thereof (poverty, vulnerability, criminality).
  - About the nature / type of gold associated with the KGP deposit, which make it unsuitable for ASM processing and access methods;
  - About the measures in place to protect unauthorised access (including perimeter fencing and security personnel);
  - To discourage incursions of ASM at the KGP, including potential negative legal consequences of being complicit in illegal mining, as well as the associated health and safety risks of such activities.
- Liaise with local authorities and police to establish mutual response agreement in the event that an ASM incursion occurs, including awareness of the Company's commitment to the principles enshrined in the Voluntary Principles on Security and Human Rights in relation to the use of force, and expectations in this regard should assistance from local authorities be required.

Residual Impacts

The implementation of the above mitigation measures will reduce the sensitivity and magnitude of the impact from high to medium. The post-mitigation measure significance is therefore Moderate.

1.5.2 Closure Impacts

During closure of the KGP it is considered that the above discussed impacts with the potential to occur during construction and operations will be reduced / eliminated due to the absence of a Project workforce, and lack of mining activities. Where impacts described above, have an element associated with closure, this is noted above, namely Section 1.5.1.8 Community Access to KGP Facilities and Infrastructure and 1.5.1.10 ASM Incursion at the KGP. There are no specific closure impacts on occupational and community health safety and security that are anticipated to occur.

A comprehensive KGP Closure Plan will be prepared prior to planned closure. Potential impacts from the closure and decommissioning of the KGP will be further defined and assessed in accordance with this Closure Plan.

1.6 Summary of Community Health, Safety and Security Impacts

Table 3 Summary of Impacts on Occupational and Community Health, Safety and Security

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
HSS 01	Unplanned Emergency Events	Project workers, herders, local residents of Shinejinst and Bayan-Undur *soums*	X	X	-	Develop and implement a *Crisis and Emergency Response Management Plan* specific to the KGP context, including to respond to Project-related incidents that may affect communities, containing information on possible affected communities as well as communication and notification strategies and procedures.	• *Crisis and Emergency Response MP*	**Moderate**
			X	X	-	Ensure a hazard and risk identification process is in place and updated annually. Risk identification process informed by hazards and risks identified at a functional level including Safety, Environment and Communities risks. Risk analysis includes Ulaanbaatar, Bayankhongor City Centre, mine site, associated facilities, transport routes and other off-site infrastructure. Erdene risk assessment procedures are used to inform hazard and risk identification Process.	• *Crisis and Emergency Response MP* • *Occupational Health, Safety and Security MP*	
			X	X	-	Crisis and emergency response teams will be appropriately trained to deal with anticipated potential emergency situations, including environmental emergencies.	• *Crisis and Emergency Response MP*	
			X	X	-	Establish mutual support agreements with local and national police and emergency services, as appropriate and feasible.	• *Crisis and Emergency Response MP*	

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
			X	X	-	Disclose the *Crisis and Emergency Management Plan* and undertake engagement with local emergency response organisations and communities on emergency response issues and awareness.	• *Crisis and Emergency Response MP* • *Stakeholder and Communications MP*	
			X	X	-	Manage the procurement, transport, storage, use and disposal of reagents and chemicals consistent with good international practice, including the management of cyanide consistent with the principles outlined in the International Cyanide Management Code (ICMC) for the manufacture, transport and use of cyanide (see further mitigation measures outlined in *Hazardous Materials Management Plan*).	• *Hazardous Materials and Non-Mineral Waste MP*	
			X	X	-	Maintain sufficient inventory and ensure contingency measures are in place to provide heating, water, and power to maintain worker health and safety in the event of an emergency situation.	• *Crisis and Emergency Response MP*	
			X	X		Evacuate the site in the event that maintenance of health and safety of workers is unable to be achieved.	• *Crisis and Emergency Response MP*	
HSS 02	Worker Access to Health and Emergency Services	Project workers	X	X	-	The measures specified in Section 1.5.1.1 will be applied.	• *Crisis and Emergency Response MP* • *Stakeholder and Communications MP* • *Hazardous Materials and Non-Mineral Waste MP*	**Moderate**

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
			X	X	-	Develop and implement the *Occupational Health, Safety and Security Management Plan.*	• *Occupational Health, Safety and Security MP*	
			X	X	-	Implement a Medical monitoring program, which includes pro-active elements that are predictive and preventive in nature, and outlines the responsibilities of contractors.	• *Occupational Health, Safety and Security MP*	
			X	X	-	Provide workers with access to site medical services, or health services provision in Ulaanbaatar or elsewhere in the event that medical issues cannot be treated on site, including the ability to conduct a "Medivac" in the event of an emergency.	• *Crisis and Emergency Response MP*	
			X	X	-	Conduct regular engagement with and monitoring of Medivac service provider to ensure response capability is maintained.	• *Crisis and Emergency Response MP*	
HSS 03	Workplace Accidents and / Or Injuries Due to Work Commencement on a New Mine Site	Project workers	X	X	-	The measures specified in Section 1.5.1.1 will be applied.	• *Crisis and Emergency Response MP* • *Stakeholder and Communications MP* • *Hazardous Materials and Non-Mineral Waste MP*	**Minor**
			X	X	-	Contractor management requirement of a minimum level of occupational health and safety to be met, consistent with Erdene's health and safety policy, standards and procedures, and the provisions of the OHSAS 18001 / ISO 45001, through the contract duration,	• *Contractor and Procurement MP* • *Occupational Health, Safety and Security MP*	

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						with action / penalties in response to any breaches.		
			X	X	-	Implement a prequalification / screening processes prior to contracting.	• *Contractor and Procurement MP*	
			X	X	-	Provide induction, training and supervision for both staff and contractors, including: • New Employee Orientation; • Job-specific Training; • Refresher / Update / Annualised Training; • Management and Supervisory Training; • Safety for Engineers Training; Contractor Training; • Hazard Communication Training; • Hazard Identification Training; and • Where applicable, safety topics and awareness should be incorporated in all training programs.	• *Occupational Health, Safety and Security MP*	
			X	X	-	Implement the Erdene Incident / Accident Investigation Program which provides a system that consistently instructs supervisors, managers, and safety representatives on the process involved in reporting, investigating and analysing accidents / incidents.	• *Crisis and Emergency Response MP* • *Occupational Health, Safety and Security MP*	

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
			X	X	-	Conduct contract performance monitoring including of inductions, daily safety toolbox meetings, monthly contractor management meetings on safety.	• *Occupational Health, Safety and Security MP* • *Contractor and Procurement MP*	
			X	X	-	Review facilities, equipment and the site safety program on a scheduled basis, using uniform methods, procedures and forms. The components of the inspection and audit program will include: • Daily inspections / walk about; Addressing of local, district, regional and state compliance requirements; Management cooperation and participation; Recommendations; Follow-up; Record Retention;	• *Occupational Health, Safety and Security MP*	
HSS 04	Contractor Workforce Not Adhering to Contractual Requirements	Project workers	X	X	-	The mitigation measures outlined in HSS03 will be applied.	• *Contractor and Procurement MP* • *Occupational Health, Safety and Security MP*	**Minor**
HSS 05	Increased Pressure on Local Health Services	Project workers, local residents of Shinejinst and Bayan-Undur *soums*	X	X	-	Ensure health screening of employees and contractors is conducted before contracting workers and on a periodic basis throughout their employment / contract.	• *Occupational Health, Safety and Security MP*	**Minor**
						Provide employees and contractors with adequate health care for work-related issues and injuries that is independent of the *soum* health care system.	• *Occupational Health, Safety and Security MP*	
			X	X	-	Provide regular health awareness training to workers (for example through toolbox talks).	• *Occupational Health, Safety and Security MP*	

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
			X	X	-	Mitigate the potential pressure on health services resulting from in-migration through liaising with local health professionals to identify ways that the Project can provide sustainable investments in health services and capabilities.	• *Community Health Safety and Security MP* • *Local Cooperation MP*	
HSS 06	Increased Incidence of Communicable Disease	Project workers, herders, local residents of Shinejinst and Bayan-Undur *soums*	X	X	-	Implement a *Code of Conduct* that is applicable to all KGP workers. All Erdene personnel and Contractors will be given basic community health, safety and security awareness training and induction in the *Code of Conduct*. This will include awareness of STIs and other communicable disease prevention. Provide this training on an ongoing basis.	• *Occupational Health, Safety and Security MP*	**Minor**
			X	X	-	Identify opportunities to support local public health campaigns that focus on prevention of communicable diseases and STIs.	• *Community Health, Safety and Security MP* • *Local Cooperation MP*	
			X	X	-	Strict enforcement of a policy of no prostitution, and immediate dismissal of any workers found to be using prostitutes.	• *Occupational Health, Safety and Security MP*	
			X	X	-	Review and identify lessons learned from grievances received that relate to perceived changes in communicable diseases. Update the *Community Health, Safety and Security Management Plan,* as required, to	• *Grievance Procedure* • *Community Health, Safety and Security MP*	

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						reduce the risk of introduction or spread of communicable diseases.		
HSS 07	Social Fracture and Reduction in Wellbeing and / or Personal Safety	Project workers, herders, local residents of Shinejinst and Bayan-Undur *soums*	X	X	-	Provisions specified in HSS05 and HSS06 apply.	• *Occupational Health, Safety and Security MP* • *Community Health, Safety and Security MP* • *Local Cooperation MP*	
			X	X	-	Use the *Stakeholder and Communications Management Plan* to communicate with local communities about the Project workforce and the steps taken to mitigate any impacts to the community, and ensure awareness of the Grievance Procedure to report complaints.	• *Stakeholder and Communications MP*	**Minor**
			X	X	-	Conduct ongoing consultation with a variety of stakeholder (political, health authorities, women groups, children's groups) throughout the Project lifecycle to provide ongoing information on Project activities, to specifically address GBVH related issues, and to obtain feedback on GBVH issues.	• *Stakeholder and Communications MP*	
			X	X	-	Implement actions to discourage alcohol abuse, including but not limited to: • Implementing a "Dry" site (no alcohol consumption on site); • Providing leisure facilities on site; and • Conducting alcohol and controlled substance testing, as appropriate.	• *Occupational Health and Safety MP*	

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
			X	X	-	Provide induction training for all Project workers that includes awareness building about gender sensitivity and GBVH, trafficking and prostitution and ways of identifying risks and reporting related observations or incidents, as well as awareness on gender sensitivity.	• *Community Health, Safety and Security MP*	
			X	X		Include specific provisions in the worker Code of Conduct on gender and GBVH.	• *Community Health, Safety and Security MP*	
			X	X	-	Provide specific training for Community Liaison Officers to ensure they have required skills to effectively and sensitively address GBVH related issues in the course of their jobs.	• *Community Health, Safety and Security MP*	
			X	X	-	Adherence by Erdene (and their security contractors) to the provisions enshrined in the Voluntary Principles on Security and Human Rights, including: • Provide Security, Human Rights and Use of Force training, consistent with the provisions of the Voluntary Principles on Security and Human Rights, to employees and contractors engaged in security duties, and support security providers to offer training in security and human rights to their personnel.	• *Occupational Health, Safety and Security MP* • *Stakeholder and Communications MP* • *Community Health, Safety and Security MP*	

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						• As far as permitted under local legislation, conduct careful screening and background checks of security personnel and service providers prior to hiring. • Conduct regular audits of security service providers to ensure compliance with local legislation. • Develop and implement procedures on control of the use of force by security personnel, which will be only when strictly necessary and will always be proportional to lawful objectives. • Report and investigate any credible allegations of human rights abuses or excessive use of force or power by security personnel. • Conduct regular consultations with local people, including making security procedures publicly available, and properly recording and promptly addressing any complaints related to security personnel.		
HSS 08	Community Access to KGP Facilities and Infrastructure	Herders, local residents of Shinejinst and Bayan-Undur *soums*				The provisions specified in HSS01 and HSS07 are applicable, in addition to the following.	• *Occupational Health, Safety and Security MP* • *Community Health, Safety and Security MP* • *Local Cooperation MP*	

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
							• *Crisis and Emergency Response MP* • *Stakeholder and Communications MP*	
			X	X	-	• Exclude the public from active mining areas to minimise impacts of blasting.	• *Community Health, Safety and Security MP*	
			X	X	-	• Use security personnel to ensure no unauthorised public access.	• *Community Health, Safety and Security MP*	
			X	X	X	• Provide signage at all entrance / exist points and periodically on boundaries / fenced areas.	• *Community Health, Safety and Security MP*	
			X	X	-	• Secure / make safe all plant and machinery at the end of each working day.	• *Community Health, Safety and Security MP*	
			X	X	-	• Provide regular updates to herders, vulnerable groups and other residents about potential Project hazards and changes to Project activities that may have community safety impacts.	• *Community Health, Safety and Security MP*	
			X	X	-	• Implement an outreach program to periodically bring visitors for site visits in a controlled and safe manner.	• *Community Health, Safety and Security MP*	

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
HSS 09	Suspension of Project, Greater Regulatory Requirements, and / or Increased Community / NGO Activism Due to Perceived or Actual Environmental and Social Impacts	Herders, local residents and authorities of Shinejinst and Bayan-Undur *soums*, Bayankhongor *aimag*, and national level				Conduct consistent, regular engagement with local communities, authorities and institutions at the local, *aimag*, and national level as appropriate through the *Stakeholder and Communications Management Plan*, and the ongoing implementation and accessibility of the Company's *Grievance Procedure*, including: • Ensure stakeholders are provided relevant information that is responsive to community interests about the Project, in a timely manner that is both accessible and understandable to local communities. This includes specific engagement on positive and negative environmental and social impacts, and how the Company manages these (including for example, jobs, community development activities, dust and traffic management, among others).	• *Stakeholder and Communications MP (incl. Grievance Procedure)*	**Moderate**
						See also, provisions outlined in *Chapter C9 Economy and Employment* relating to the implementation of the *Local Cooperation Management Plan* to maximise the positive impacts of the Project and ensure that benefits of the Project are experienced at a broad community level.	• *Local Cooperation MP*	

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						Mitigation measures outlined in HSS07 are applicable, particularly in relation to security personnel and potential community interaction.	• *Community Health, Safety and Security MP*	
HSS 10	Artisanal and Small-scale Mining Incursion at the KGP	Project workers, herders, local residents of Shinejinst and Bayan-Undur *soums*, and Bayankhongor *aimag*	X	X	-	The mitigation measures proposed, include those defined in HSS07 and HSS08, in addition to the following.	• *Occupational Health, Safety and Security MP* • *Community Health, Safety and Security MP* • *Local Cooperation MP* • *Stakeholder and Communications MP* • *Crisis and Emergency Response MP*	
			X	X	X	Targeted ongoing stakeholder engagement with local and *aimag* level police, *soum* and *bagh* administrations, and communities: • To understand prevalence / emergence of ASM activities in Shinejinst and Bayan-Undur, including the drivers thereof (poverty, vulnerability, criminality). • About the nature / type of gold associated with the KGP deposit, which make it unsuitable for ASM processing and access methods; • About the measures in place to protect unauthorised access (including perimeter fencing and security personnel);	• *Stakeholder and Communications MP* • *Community Health, Safety and Security MP*	

ID	Impact	Potentially Affected People	Phase			Enhancement/Management/Mitigation Measure	Management Plan Allocation	Residual Significance
			Con	Ops	Clo			
						• To discourage incursions of ASM at the KGP, including potential negative legal consequences of being complicit in illegal mining, as well as the associated health and safety risks of such activities.		
			X	X	-	Liaise with local authorities and police to establish mutual response agreement in the event that an ASM incursion occurs, including awareness of the Company's commitment to the principles enshrined in the *Voluntary Principles on Security and Human Rights* in relation to the use of force, and expectations in this regard should assistance from local authorities be required.	• *Community Health, Safety and Security MP*	

1.7 References

Department of Mines and Petroleum, 2014, Fatal accidents in the Western Australian mining industry 2000-12: what lessons can we learn? – report: Investigation Services and Resources Safety Division, Department of Mines and Petroleum, Western Australia, 17 pp.



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

C13: Traffic and Transport

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Acronyms and Abbreviations

AoI	Area of Influence
EBRD	European Bank for Reconstruction and Development
ESIA	Environmental and Social Impact Assessment
EU	European Union
IFC	International Finance Corporation
KGP	Khundii Gold Project

1. TRAFFIC AND TRANSPORT

1.1 Introduction

The Kundii Gold Project (KGP; the Project) is a proposed gold mining project under development by Erdene. The site is in *Bayankhongor Aimag*, in southwestern Mongolia. The combined development consists of two deposits, the Bayan Khundii and Altan Nar deposits, 16km apart.

The Project is located approximately 1000 km southwest of Ulaanbaatar and 350 km south of the Aimag capital, Bayankhongor City, 85 km south west of the center of Shinejinst soum and 140 km from the border of the Inner Mongolia province of China.

Refer to Figures 1 and 2 below.



Source: Erdene Mongol 2019

Figure 1 Location of Khundii Gold Project

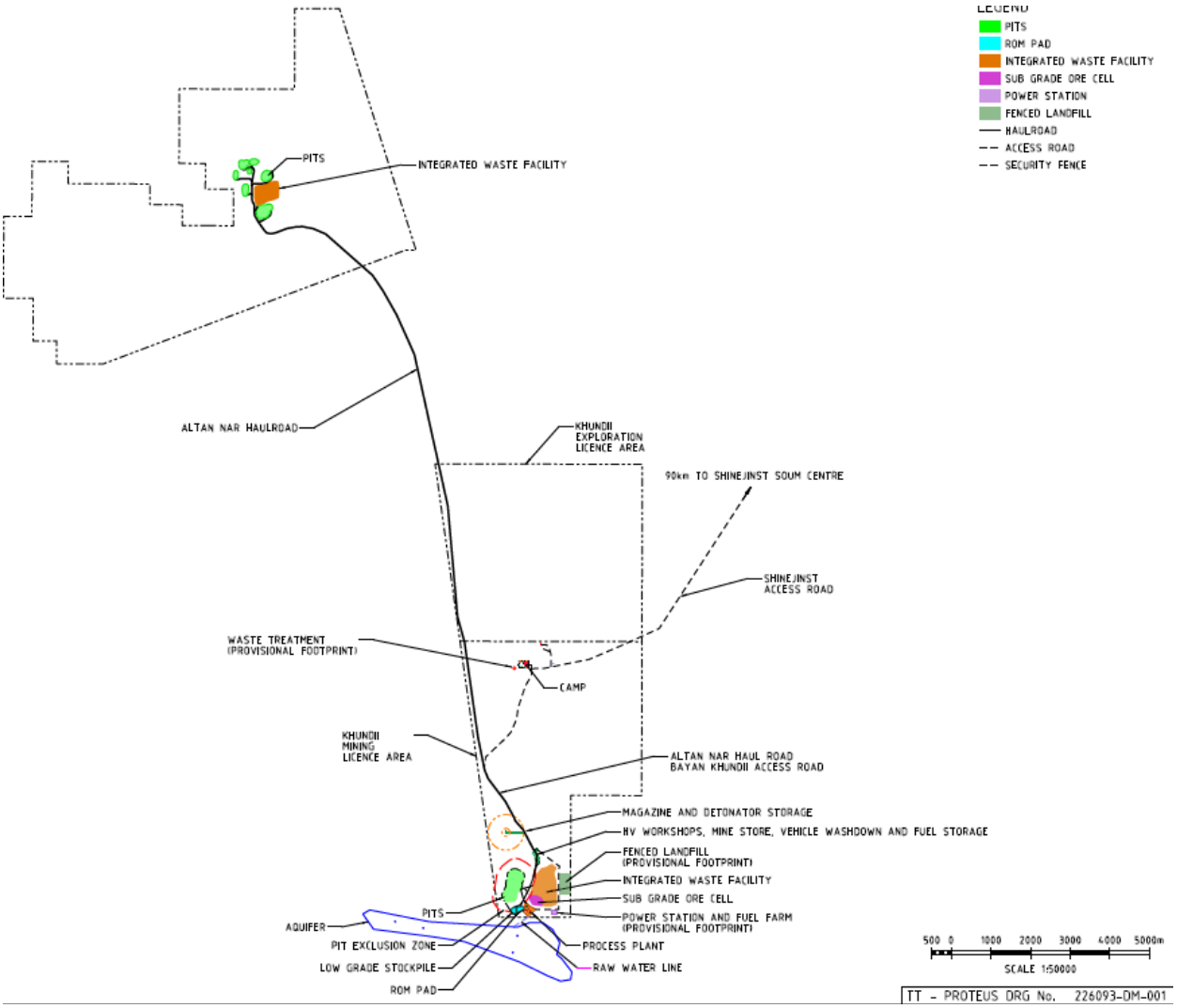

Figure 2 Map of Bayan Khundii and Altan Nar Mining Operation

1.2 Scope of Assessment

The spatial scope of this transport impact assessment includes:

- Bayan Khundii Site
- Altan Nar Site
- Proposed haul road between the Altan Nar open pits and Bayan Khundii plant
- Route from Ulaanbataar to Bayan Khundii via Shinejinst
- The route from the Chinese border at Shivee Khuren to Bayan Khundii via Gurvan Tes.

The assessment also covers:

- The construction, operation and decommissioning phases of the Project.
- Potential direct and indirect impacts that could result from the construction and operational transport for the Project.

2. METHODOLOGY

2.1 General Approach

In considering the impact assessment of traffic and transport factors, the general approach outlined in *Chapter A3: Methodology* has been adopted. The significance of impacts and effects has been determined by establishing the magnitude of the impact combined with the sensitivity of the receptor. The magnitude of an impact is a measure of the scale of a change from baseline conditions for a given receptor.

Given the available data, the magnitude of the potential impact for transport has been based on quantitative evaluations of the magnitude of change of vehicle movements when compared to the existing baseline. The magnitude of change (rated as beneficial, very low, low, medium and high) is defined in Table 1.

Table 1 Magnitude of Transport Impact Criteria

Magnitude of Impact	Type of Impact (Change in Baseline Vehicle Movements)
High	> +20%
Medium	+ 11 to +20%
Low	+3 to +10%
Very Low	0 to +2%
Beneficial	Reduction in baseline vehicle movements or improvements in the capacity/condition of the road network.

Where there is a lack of data and the calculation of the percentage change to the baseline conditions is not possible, assessments have been conducted on a qualitative basis using the following considerations:

- road type (e.g., highway or local road) and likely use (e.g., for mine-related transport or commuting); and
- likelihood of worst-case scenario and assumptions of actual vehicle movements.

The magnitude of impacts to herders and wildlife at risk of collisions with vehicles has considered whether increased traffic volumes will occur on an existing road, resulting in a very low to low magnitude of impact, or on a newly constructed Project road, resulting in a low to medium magnitude of impact.

2.2 Transport Receptors

Receptor sensitivity varies according to the type, condition, and ability of the receptor to adapt to the change in conditions. Changes in transport can affect the existing transport network users in terms of the capacity of road transport. Changes in transport can also affect health arising from prevailing road conditions and the behaviour of road users. This could be in the form of stress resulting from congestion, poor air quality as a result of increased traffic or a reduction of road safety.

Receptors such as domestic road users are at risk of motor vehicle incidents (MVIs) and therefore are sensitive to changes in traffic. Evidence from the engagement program indicates that motor cycles are the most prevalent transport vehicle for domestic users and safety protection such as helmets is uncommon.

Receptors such as commercial road users are less sensitive as they are more able to manage the impact of increased traffic. Specifically, for potential impacts on transport receptors, the receptor sensitivity is described in Table 2 below.

Table 2 Transport Receptor Sensitivity

Level of Receptor Sensitivity	Type of Receptor
High	Wildlife susceptible to collisions with traffic
	Permanent residents (Domestic traffic)
	Herders at risk of collisions with traffic
Medium	Commercial road users
	Construction/operation workforce
	Public road users

2.3 Magnitude of Impact

2.3.1 Existing Traffic Counts

To provide an understanding of the existing road transport network, the collection of baseline traffic data was undertaken. The parameters for this data collection are as follows:

- Traffic counts on the roads between Bayankhongor aimag centre and Shinejinst soum.
- A traffic logger was placed between 12 June and 05 August 2019 (an 8-week period) counting traffic in both directions.

Key outcomes from the data collected are:

- The road between Bayankhongor aimag centre and Shinejinst soum accommodates low volumes of traffic.
- Over the 8-week data collection period, the busiest day saw 103 vehicles use the road over the 24-hour period; an average of about 4 vehicles per hour over the 24-hour period.
- The lowest traffic volume recorded per day was 29 vehicles, indicating significant variation in traffic using the road from day to day.
- The average daily count for the 8-week period was 55 vehicles per day which is about 2 vehicles per hour.

The baseline data produced a wide range of traffic numbers. The lowest daily count was 29 whereas the highest was 103. The highest daily counts coincided with certain summer-time festival events. Anecdotal evidence suggests traffic movements in the area are dynamic, with various events (start of the school year, winter preparation, camel festival, New Year, Lunar New Year, cashmere sales, or end of school year) generating variable traffic numbers. Using an average of 55 vehicle movements per day is conservative.

2.3.2 Location of Herders Camps

Another factor in the assessment of the magnitude of impact from increased traffic from the KGP is the potential effects on herders. The magnitude of this impact is likely to be insignificant given the remoteness and sparse density of the herder camps around the KGP sites. Figure 3 below shows the location of locally recorded camps in relation to the KGP site, as of August 2019.

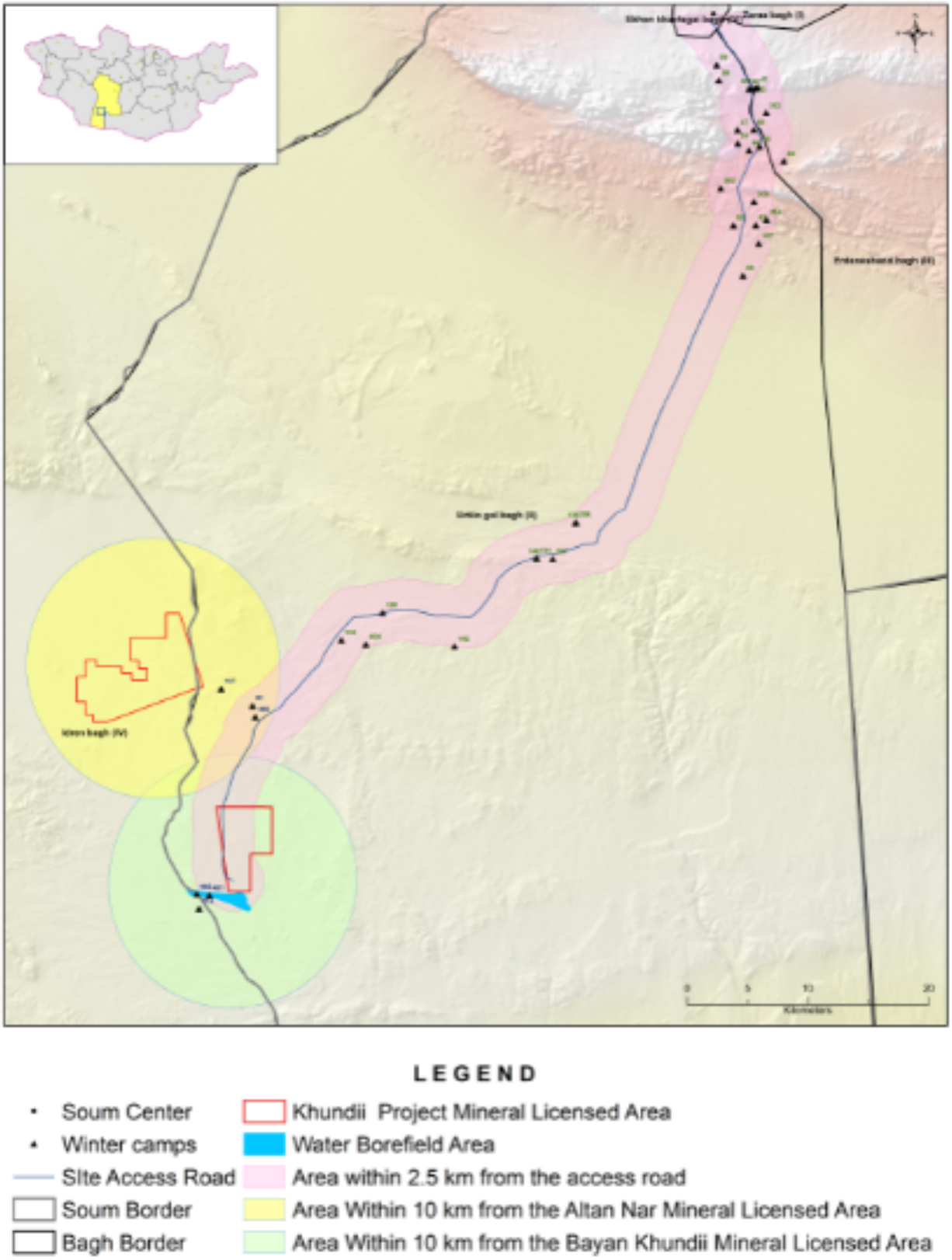

Figure 3 Location of Herder Winter Camps, 2019

2.3.3 Traffic Routes

2.3.3.1 Introduction

There are two identified routes into the KGP area; one from the north east and one from the south east. These routes are shown in some detail on Figures 4 to 7 and are described below.

2.3.3.2 Ulaanbaatar- Bayankhongor- Shinejinst- Bayan Khundii Camp.

The distance of this route is 1045km (one way). The route passes through numerous soums and remote countryside. Erdene commissioned a study of this route (Monrud LLC, 2019) which highlights the remote and under developed nature of most of the roads to be utilised. It also provides an indication of the portions of the route that may require upgrading prior to the construction of the KGP. The baseline traffic count data referred to in 2.3.1 above comes from this route at a point just north of Shinejinst.

Figures 4, 5, 6 and 7 show the route from Bayankhongor to the Bayankhundii camp in more detail. In summary the total route comprises:

- A sealed highway to Mongolian standards from Ulaanbaatar to Bayankhongor.
- An unsealed but formed road from Bayankhongor to Shinejinst; a public road providing a variety of access functions.
- Unsealed tracks from Shinejinst to Bayankhundii camp; the KGP will be the major user of this part of the route.

The area traversed by the route is a remote desert environment, sparsely settled with subsistence herders and smaller soums (up to 3000 persons) with little safety/traffic management in place. The use of motorbikes is prevalent with drivers typically having limited personal safety equipment. The roads are generally of a poor standard. Existing traffic movement numbers are low and the project imposes modest traffic onto the regional/district network.

2.3.3.3 Shivee Khuren Border to Bayankhundi camp.

The length of this route is 540 km (one way). This route from the Chinese border utilises the Shivee Khuren border station and uses existing unsealed roads that go through the western portion of the Gobi Gurvansaikhan National Park. The park, at nearly 27,000 km^2, is the largest national park in Mongolia, stretching 380 km from east to west and 80 km from north to south. The park lies about 100 km north of the Shivee Khuren border station.

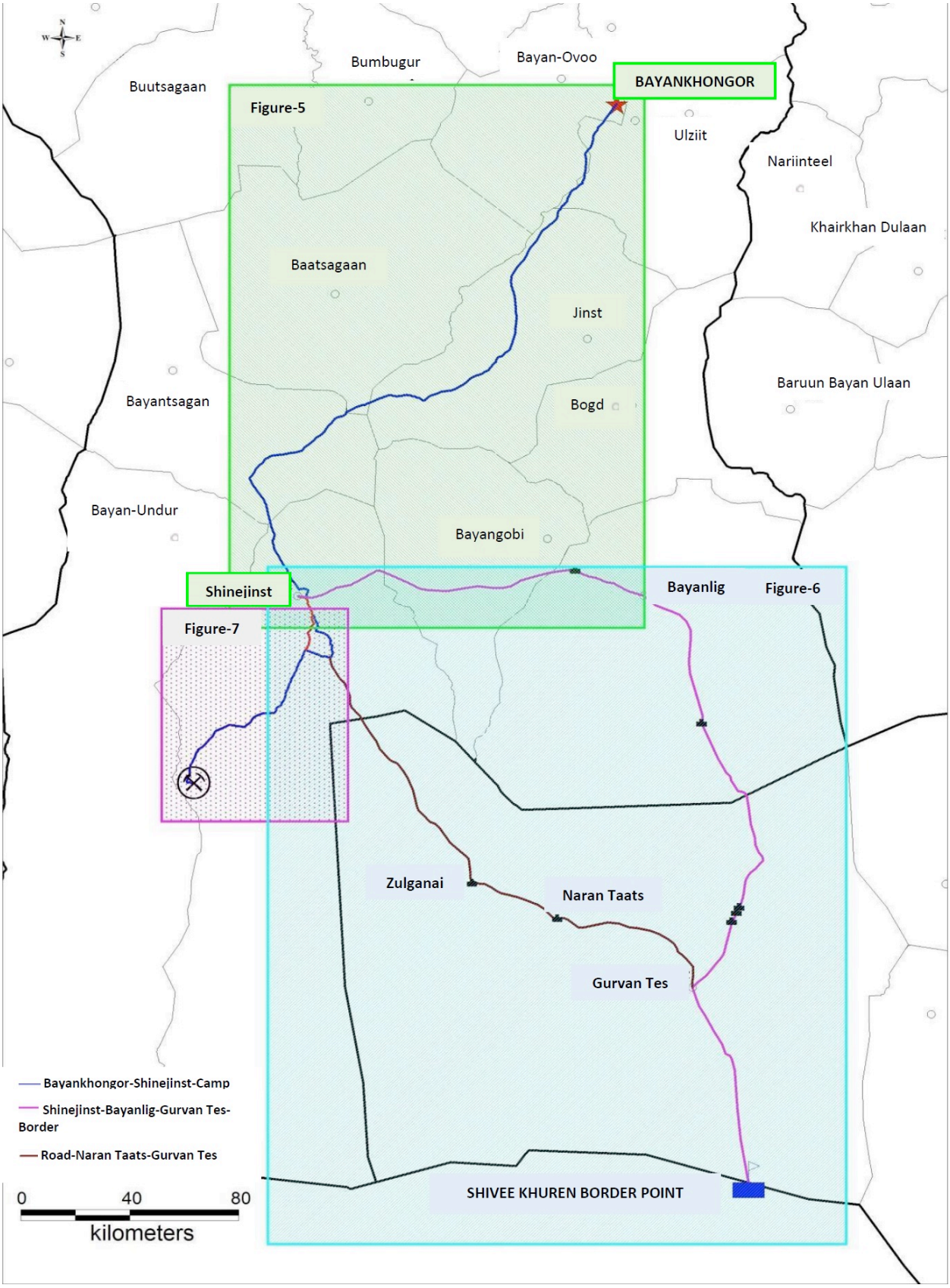

Figure 4 Transport Route Legend

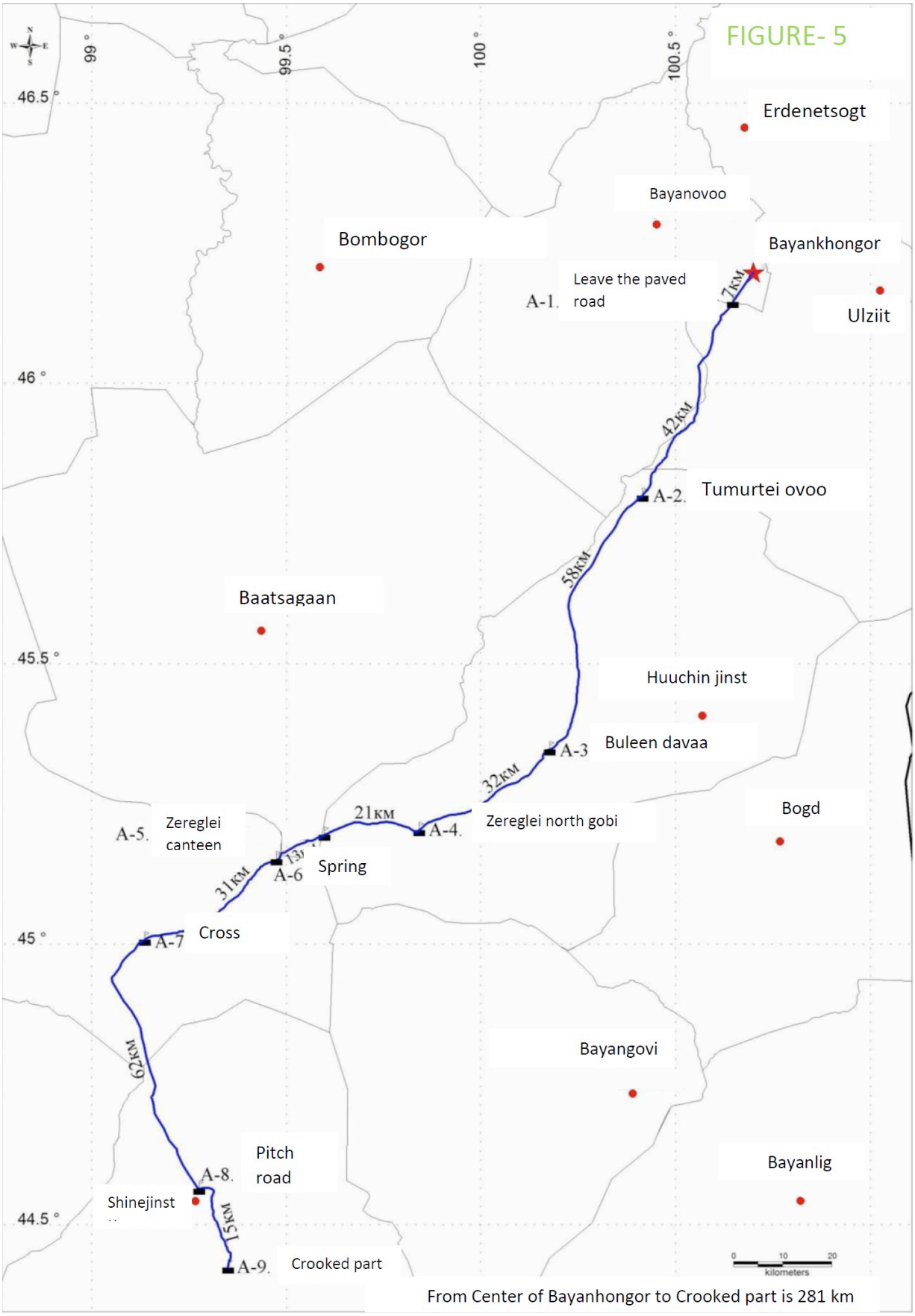

Figure 5 Transport Route Bayankhongor to Shinejinst

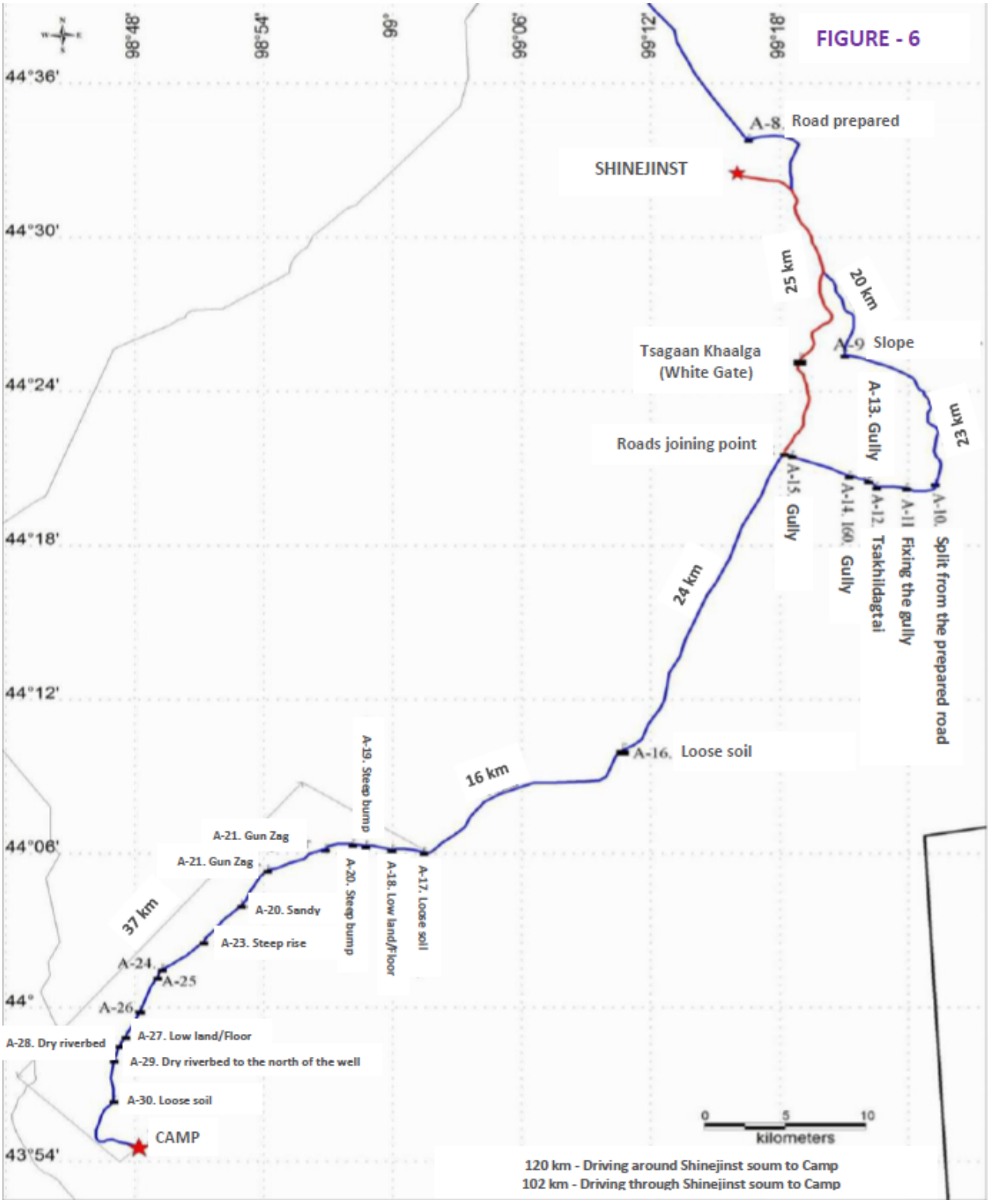

Figure 6 Transport Route Shinejinst to Camp

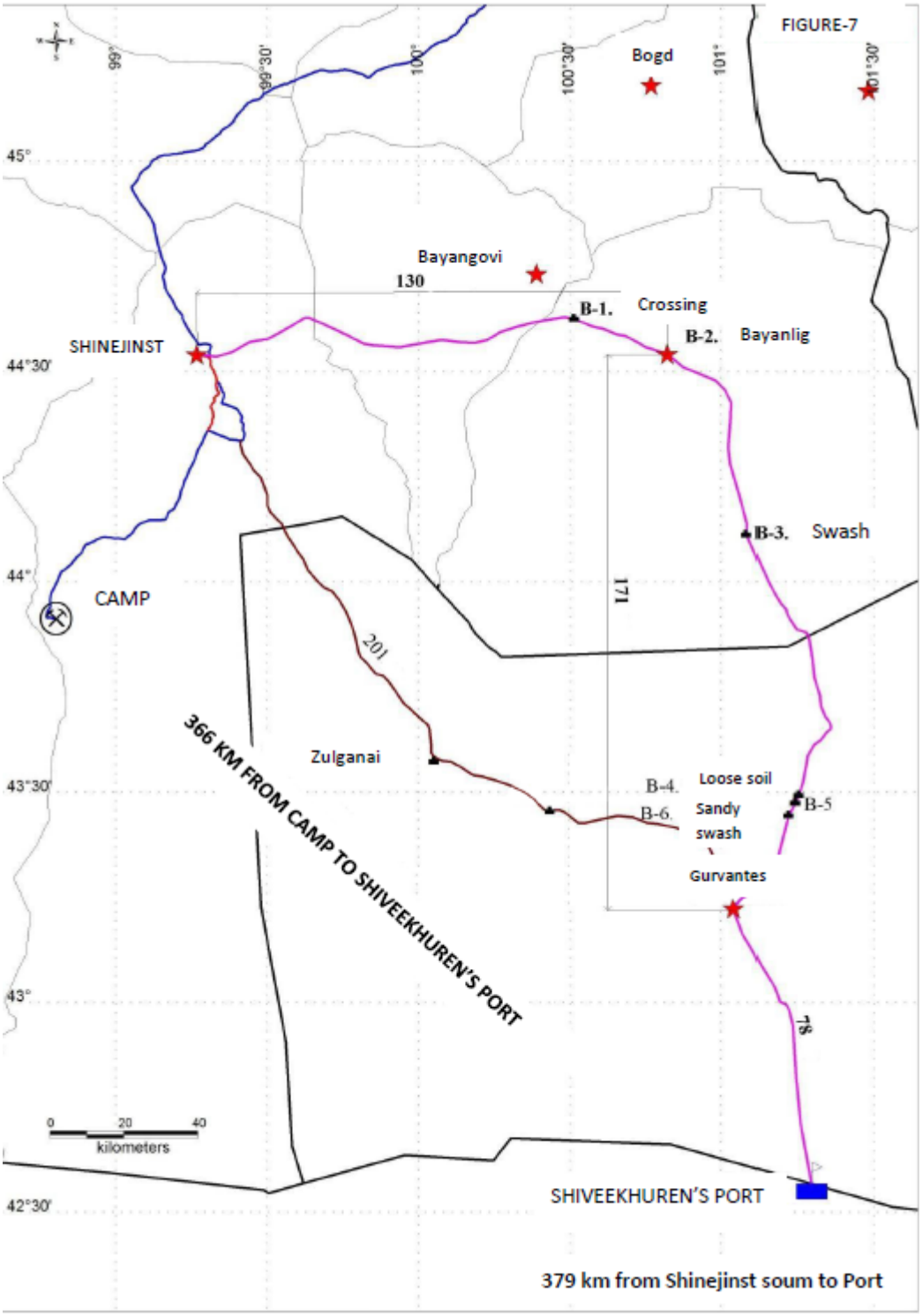

Figure 7 Transport Route Shiveekhuren to Shinejinst to Camp

3. IMPACT ASSESSMENT

3.1 Camp, Mine and Plant Construction

Construction of the camp, mine and plant are expected to require up to 12 months. The forecast traffic movements for the construction period are set out in Table 3 below.

Table 3 Camp, Plant and Mine Construction Traffic Movements

Construction Item	Vehicle	Total volume	Total trips
Concrete	100 tonne truck	5134 m^3	122 trips
Fuel	100 tonne truck	6,707,500 litres	161 trips
Freight	various	Includes 400 trips from the south east (border).	625 trips
Workforce	42 seat bus		100 trips
Building Materials	100 tonne truck	11,699m^2 @ 50m^2 per truck	234 trips
TOTAL			**1354 trips (2708 movements)**
			7.5 average movements per day

During the 12-month construction period, these additional traffic movements will result in a 13% increase to the existing baseline traffic numbers. This results in a medium magnitude of impact on the Ulaanbaatar- Bayankhundi route using the quantitative assessment methodology set out in section 2.1 and Table 1. It produces a **minor adverse** overall impact significance.

On the Shivee Khuren border to Bayankhundi camp route the additional 400 trips (800 movements) over the 12-month construction period represents about two movements per day and results in a very low impact. This is based on a qualitative assessment of the impact as outlined in 2.1.

The use of this route during construction represents a very low magnitude of increase in traffic on highly sensitive receptors, being the National Park, and therefore a **minor adverse** impact significance overall.

3.2 Operational Phase

The operational phase traffic is documented in Table 4 below.

Table 4 Operational Traffic Movements

Operational Item	Vehicle	Notes	Total Trips p.a.
Freight	various	Various freight items	176 trips
Personnel	42 seat bus	Transport workers to and from camp	172 trips
Fuel	100 tonne truck	Diesel fuel deliveries (13,450,000 litres per annum)	324 trips
Chemicals	100 tonne truck	3,763.4 tonnes p.a.	38 trips
TOTAL			**710 trips (1420 movements)**

TOTAL			**2 trips per day (4 movements)**

These trips are most likely to use the road from Ulaanbaatar and Shinejinst. The operational traffic impacts are likely to be very low given the small number of forecast trips and the existing small numbers of existing transport users. The increase in trip numbers is in the order of one percent.

3.3 Wildlife and Livestock

The herding of livestock is a predominant land use activity in the area surrounding the KGP site. There are potential impacts on this land use particularly during the construction period when traffic movements are higher than in the operational phase. Figure 3 shows the location of the winter herder camps around the access road from Shinejinst. While the sensitivity of this receptor is high, the additional traffic is low. The key management action for this impact is an education program for the herders and given this mitigation, the residual impact is **minor adverse**.

The impact on wildlife will be mostly felt on the route from the Chinese border to the KGP site through the National Park. Again, the sensitivity of this receptor is high, but the additional traffic is low. The key management action for this impact is an education program for the drivers and given this mitigation, the residual impact is **minor adverse**.

3.4 Damage to Existing Road Network

The existing road network provides important transport infrastructure for the local herders and residents in this remote landscape. Deterioration of the existing road through over use by Project related traffic should be avoided, where possible. With a mitigation strategy being the ongoing monitoring of the road surface by project personnel the residual impact is **negligible.**

3.5 Dust and Noise

There is potential impact from the generation of dust and noise created by additional traffic. Along both routes this increase is modest and with the management and monitoring proposed in the Traffic Management Plan the residual impact is **negligible.**

4. IMPACT MANAGEMENT

4.1 Traffic Management Plan

A key supplementary document to be prepared to manage all traffic impacts from the KGP Project is the Traffic Management Plan. This document will be a self-contained and detailed management document setting out traffic issues, management actions, responsibilities, measurement and compliance procedures.

4.2 Summary of Key Management Actions

The key management actions that form the basis of the Traffic Management Plan are:

- Consultation on traffic awareness with community and herder groups affected by the KGP and related traffic generation. Local stakeholders are potentially unfamiliar with the transport needs of construction and operation of a gold mine. Engagement should be undertaken to improve this knowledge.
- Consultation with police, border and emergency services agencies who will be dealing with the traffic management on an administrative basis.
- Ensure measures in place to mitigate transport through community centres include speed restrictions and bypass routes where appropriate. Drivers should follow pre-determined routes that have been subject to risk assessments.
- Maintaining or improving road sections, where feasible.
- Stipulations that all driving by mine and service personnel is to occur during day-time hours where possible to improve safety.
- Scheduling of vehicle movements to maximise efficiency of vehicle movements and reduce the number where possible.
- Restrictions on the transport operators servicing the construction and operational phases of the mine in relation to maximum driving hours per day and week.
- Strict adherence to speed limits, traffic regulations and pre-agreed traffic routing.
- Driver training standards to be prescribed and monitored.
- Provision of adequate signage.
-
- Use of vehicle escorts, as required, especially for convoys of oversized or overweight Heavy Goods Vehicles.

Table 5 below sets out the application of these actions to the various phases of the KGP project.

Table 5 Summary of Transport Impacts and Management

ID	Impact	Receptor	Phase			Enhancement/Management/Mitigation Measure	Management Plan	Residual Significance
			Con	Ops	Dec			
T01	Increased construction and operations transport on the main logistics routes - disturbance and increased risk to other users, livestock and wild animals	Users of road (including construction and operation workforce) herders, and migratory and herd animals	X	X	-	• Consultation on traffic awareness with community and herder groups affected by the KGP and related traffic. • Consultation with local herders and community groups, police, border and emergency services. • Stipulations that all driving is to occur during day-time hours where possible. • Scheduling of vehicle movements outside of peak times. • Restrictions on the maximum driving hours per day and week. • Strict adherence to speed limits, traffic regulations and pre-agreed traffic routing. • Driver training and standards. • Provision of adequate signage. • Use of vehicle escorts as required (especially for convoys of oversized or overweight Heavy Goods Vehicles)	Transport Management Plan	**Minor Adverse**

ID	Impact	Receptor	Phase			Enhancement/Management/Mitigation Measure	Management Plan	Residual Significance
			Con	Ops	Dec			
T02	Increased construction transport on route from Ulaanbaatar to KGP Site via highway to Shinjinst - disturbance and increased risk to road users	Users of road (including construction and operation workforce)	X	-	-	• Consultation on traffic awareness with community groups affected by the KGP and related traffic. • Stipulations that all driving is to occur during day-time hours where possible. • Restrictions on the maximum driving hours per day and week. • Strict adherence to speed limits, traffic regulations and pre-agreed traffic routing. • Driver training and standards. • Consultation with police, border and emergency services. • Efforts to maximise efficiency of vehicle movements and reduce the number where possible.	Transport Management Plan	**Negligible**

ID	Impact	Receptor	Phase			Enhancement/Management/Mitigation Measure	Management Plan	Residual Significance
			Con	Ops	Dec			
T03	Increased construction and operation transport on road network - disturbance and increased risk to road users	Users of road (including construction and operation workforce)	X	X	-	• Consultation on traffic awareness with community groups affected by the KGP Project and related traffic. • Stipulations that all driving is to occur during day-time hours where possible. • Restrictions on the maximum driving hours per day and week. • Strict adherence to speed limits, traffic regulations and pre-agreed traffic routing, including use of larger regional roads and agreed routes where possible. • Driver training and standards. • Consultation with local herders and community groups, police, border military and emergency services. • Efforts to maximise efficiency of vehicle movements and reduce the number where possible.	Transport Management Plan	**Minor Adverse**

ID	Impact	Receptor	Phase			Enhancement/Management/Mitigation Measure	Management Plan	Residual Significance
			Con	Ops	Dec			
T04	Construction of internal roads within the KGP Site	Local herders, KGP employees	X	-	-	• Maintenance of existing section of road through KGP Site during construction of bypass road. • Noise and dust monitoring. • Consultation with police and emergency services.	Transport Management Plan	**Negligible**

ID	Impact	Receptor	Phase			Enhancement/Management/Mitigation Measure	Management Plan	Residual Significance
			Con	Ops	Dec			
T05	Vehicle movements along the maintenance roads - disturbance and increased risk to other land users, livestock and wild animals	Users of road, herders, and migratory and herd animals	X			• Consultation with local herders and community groups, police and emergency services. • Consultation on traffic awareness with community and herder groups affected by the KGP Project and related traffic. • Speed reductions around dwellings. • Stipulations that all driving is to occur during day-time hours where possible. • Restrictions on the maximum driving hours per day and week. • Strict adherence to speed limits, traffic regulations and pre-agreed traffic routing. • Driver training and standards. • Efforts to maximise efficiency of vehicle movements and reduce the number where possible.	Transport Management Plan	**Minor Adverse**

ID	Impact	Receptor	Phase			Enhancement/Management/Mitigation Measure	Management Plan	Residual Significance
			Con	Ops	Dec			
T06	Operations transport on the KGP Site Access Road - disturbance and increased risk to other users of the road at the intersection points.	Users of road.		X		• Daytime, if possible, delivery windows to KGP Site. • Strict adherence to speed limits. • Strict adherence to limits on driving hours. • Driver education and training courses.	Transport Management Plan	**Minor Adverse**
T07	Operation vehicle movements along the non-power infrastructure maintenance roads - disturbance and increased risk to other land users, livestock and wild animals	Users of road, herders, and migratory and herd animals		X		• Consultation on traffic awareness with community and herder groups affected by the KGP and related traffic. • Stipulations that all driving is to occur during day-time hours where possible. • Restrictions on the maximum driving hours per day and week. • Strict adherence to speed limits, traffic regulations and pre-agreed traffic routing. • Driver training and standards. • Efforts to maximise efficiency of vehicle movements and reduce the number where possible.	Transport Management Plan	**Negligible**

ID	Impact	Receptor	Phase			Enhancement/Management/Mitigation Measure	Management Plan	Residual Significance
			Con	Ops	Dec			
T08	Operations transport on site roads between AN and BK - increased risk to workforce	Employees of KGP Project		X		• Strict adherence to the use of pre-designated routes. • Provision of adequate signage. • Strict adherence to speed limits. • Driver education and training courses. • Strict adherence to spill response measures in the event of a spillage from a vehicle.	Transport Management Plan	**Minor Adverse**
T09	Increased traffic during decommissioning	Users of roads, employees of KGP and *soum* residents			X	• Adherence to KGP Closure Plan.	Closure Plan	**Negligible**

(b) Con - construction.
(c) Ops – operations.
(d) Dec – decommissioning.

5. CONCLUSIONS

The study area is a remote desert environment, sparsely settled with subsistence herding as the predominant agricultural land use. The *aimag* is also defined by smaller *soums* (about 3000 persons) with little safety/traffic management where the use of motorbikes is prevalent with drivers having typically minimal PPE.

The poor standard of existing roads is a key issue in the *aimag*. Erosion and a general degraded landscape are evident as are the poor soils with little structure.

There are low existing vehicle and traffic movement numbers and the project imposes modest traffic onto the regional/district network.

The result is the additional traffic generated by the Project provides a minor adverse residual impact on the current road network.

The key impact mitigation action is the preparation of an issue specific Traffic Management Plan (TMP) to document a range of strategies, responsibilities, monitoring and outcomes required.

6. REFERENCES

RPMGlobal, 2019. NI 43-101 Technical Report for the Preliminary Economic Assessment of the Khundii Gold Project. Erdene Resources Development Corp. 4 February 2019.

Monrud LLC (July 2019) – A study of road utilisation during the Bayan Khundii camp operation.



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

C14: Cumulative Impacts

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number: 9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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14. CUMULATIVE IMPACTS

14.1 Introduction

The assessment of cumulative impacts is an integral part of the Environmental and Social Impact Assessment (ESIA) process. Cumulative Impact Assessment (CIA) that is required to ensure that multiple effects on social and environmental receptors arising from the Khundii Gold Project, as well as any potential combined impacts from other projects/activities, have been addressed.

Environmental and social impacts arising from existing, planned and foreseeable developments within the KGP Area of Influence (AoI) might individually be insignificant, but when combined with the KGP could amount to a significant cumulative impact. These are also known as "in-combination" impacts. The KGP AoI includes the KGP Mineral Licence Areas, the water supply bore field, and the public access road between Bayan Khundii MLA and Shinejinst soum centre. The KGP AoIs for indirect effects have been defined in impact assessment Chapters C2 to C13.

14.2 European Bank for Reconstruction and Development Requirements

The European Bank for Reconstruction and Development Performance Requirement 1 (EBRD PR1) *Assessment and Management of Environmental and Social Impacts and Issues* requires the ESIA process to consider the cumulative impacts of the project in combination with impacts from other relevant past, present and reasonably foreseeable developments as well as unplanned but predictable activities enabled by the project that may occur later or at a different location.

The Cumulative Impact Assessment has drawn upon primary data collected specifically for the KGP and a secondary data review through public sources of information. Outside of the KGP AoI, at the wider regional level, greater reliance has been placed on secondary data sourced from publicly available sources.

14.3 Assessment Methodology

The ESIA addresses cumulative impacts. These are defined as "those that result from the incremental impact of the project when added to other existing, planned and reasonably predictable future projects and developments" (IFC 2013).

As such, two types of cumulative impact are considered:

- Type 1 – Combined effects of different types of impact, for example noise and dust and visual impacts resulting from the construction of the KGP facilities. These are also known as "impact interactions"; and
- Type 2 – Impacts from other planned developments together with the KGP which individually might be insignificant, but when considered together could amount to a significant cumulative impact. These are also known as "in-combination" impacts.

Cumulative impacts have generally been assessed using professional judgement as the majority of cumulative impacts are hard to quantify. It is recognised that there is an inherent uncertainty in the range of potential cumulative impacts that may arise, although this ESIA seeks to identify the main impacts in a qualitative manner in order to provide for robust analysis.

14.3.1 Scoping: Valued Environmental and Social Components, Temporal and Spatial Boundaries

14.3.1.1 Valued Environmental and Social Components Identification

Valued Environmental and Social Components (VESCs) are those prevailing environmental and social attributes within areas that are potentially impacted by the KGP (during the construction and operation phases). VESCs have been identified through the ESIA process, including through relevant stakeholder engagement (as detailed in Chapter A6: Stakeholder Engagement) and through reviews and assessments undertaken by relevant specialists as part of the ESIA process.

The Cumulative Impact Assessment is limited to proposed developments and activities that have the potential to have a significant impact on sensitive human, heritage and environmental values and/or raise concerns from Affected Communities. In addition, the VESCs on which the KGP itself is assessed to have a material adverse impact will be considered as part of the CIA. For the purposes of this CIA, residual impacts categorised as either Negligible or Minor Adverse impact significance in this ESIA are not assessed. Hence, potential impacts are scoped in or out of this CIA taking account of the following considerations:

- the residual significance of an impact, as determined in Chapters C2 to C13 (on the basis that impacts categorised as of Negligible or Minor Adverse impact significance would make only a minor contribution to any cumulative impact);
- consideration of the spatial extent of the VESCs in Bayankhongor aimag, including how the spatial extent of the VESC may overlap with both the KGP's AoI and the area of influence of other (non-KGP) developments identified through the scoping process; and
- consideration of the relative temporal boundaries of the different developments (e.g. whether developments or stressors occur simultaneously or consecutively) and the duration of such impacts.

Table 1 Scoping Criteria for Inclusion of Valued Environmental and Social Components

Residual Impact				
Negligible Adverse	**Minor Adverse**	**Moderate Adverse**	**Major Adverse**	**Positive**
Out of scope of CIA (on the basis that the Khundii Gold Project's contribution to any cumulative impact would be insignificant)	Out of scope of CIA (on the basis that the Khundii Gold Project's contribution to any cumulative impact would be insignificant)	In Scope	In Scope	In Scope

The topics presented in Table 2 have been assessed in Chapters C2 to C13 of this ESIA. Based on the CIA scoping criteria provided in Table 1, the list of topics has been screened to identify those environmental and social aspects that have been assessed to have either a Moderate or Major Adverse or Positive residual impact significance (see Table 3).

Table 2 Summary of Resources/Receptors Considered within this Environmental and Social Impact Assessment

Dimension	Resource/Attribute
Physical	Climate and Air Quality
	Noise and Vibration
	Topography, Landscape, Geology and Soils (including Visual)
	Water Resources
	Waste
Terrestrial Ecology	Biodiversity Conservation
Human	Population and Demographics
	Economy and Employment
	Land Use
	Cultural Heritage
	Occupational and Community Health, Safety and Security
	Traffic and Transport

14.3.1.2 Temporal and Spatial Boundaries

The CIA temporal boundary covers the construction and operation phases of the Khundii Gold Project. In this Chapter, “short term” and “medium term” are defined as 0-5 years, and 5-12 years, respectively.

The spatial boundaries of the CIA have been defined by reference to the KGP characteristics (see *Chapter A5: Project Description*) and the assessment areas applied to the defined VESCs within the various impact assessment chapters (*Chapters C2 to C13*). A flexible approach has been maintained, with the geographical boundaries of the CIA varying depending on the characteristics of the potentially impacted VESC. As such, the geographic boundaries vary from the very limited space occupied by a small VESC (e.g. a discrete feature of cultural heritage value) to a relatively large geographic region or habitat within which a particular VESC can be found (e.g. habitat occupied by migratory large ungulates). The spatial extent of relevant VESCs is detailed in the relevant impact assessment chapters within this ESIA.

14.3.1.3 Valued Environmental and Social Components

A summary of the VESC residual impacts defined for the KGP construction and operation phases is presented in Table 3, and only includes in-scope VESCs (impacts with a residual impact significance of Moderate or Major Adverse or Positive categorisation) that may be cumulatively impacted by the KGP.

Table 3 Summary of Khundii Gold Project Major, Moderate or Positive Residual Significant Impacts for Further Consideration in the Cumulative Impact Assessment

Aspect/ ESIA Chapter	VESC(s)	Impact	Phase		
			Construction	Operation	Closure
Climate and Air Quality (*Chapter C2*)	Identified winter camps	Emission impacts from mining sources – **Moderate adverse**	X	X	-
Water Resources (*Chapter C5*)	KT and BS Basin aquifer	Water Use Impacts – **Moderate Adverse**	-	X	X
	Herder wells/bores within the Project AoI	Water Use Impacts – **Moderate Adverse**	-	X	X
Employment and Livelihoods *(Chapter C9)*	Mongolian and expatriate workers	Direct, indirect and induced employment generation and business opportunities - **Positive**	X	X	-
	Employees and contractor workers (Mongolian and international), local soum residents, local bagh herders, local soum businesses and entrepreneurs, people with low levels of education, women, people with a limited non-agricultural (including herding) skills base, people without easy access to information on job opportunities. In addition, disabled and chronically sick people, families and people dependent on fixed welfare payments, and elderly people dependant on State pensions.	Increased revenue to state and local budgets - **Positive**	X	X	-
	Employees and contractor workers (Mongolian and international), local soum residents, local bagh herders, local soum businesses and entrepreneurs, people with low levels of education, women, people with a limited non-agricultural (including herding) skills base, people without easy access to information on job opportunities. In addition, disabled and chronically sick people, families and people dependent on fixed welfare	Community development initiatives - **Positive**	X	X	-

Aspect/ ESIA Chapter	VESC(s)	Impact	Phase		
			Construction	Operation	Closure
	payments, and elderly people dependant on State pensions.				
	Employees and contractor workers (Mongolian and international), local soum residents, local bagh herders, local soum businesses and entrepreneurs, people with low levels of education, women, people with a limited non-agricultural (including herding) skills base, people without easy access to information on job opportunities. In addition, disabled and chronically sick people, families and people dependent on fixed welfare payments, and elderly people dependant on State pensions.	Decline in direct, indirect and induced employment at closure of the KGP – **Moderate adverse**	-	-	X
Land Use (*Chapter C10)*	Herders/ herders' camps	Pasture impacts from nuisance issues to pasture users from Site Access Road use and mine site construction and operations during construction and operations phase, specifically: noise, dust, and vibration – **Moderate adverse**	X	X	-
	Herders/ herders' camps	Regained access to pasture and land - **Positive**	-	-	X
Occupational and Community Health, Safety and Security *(Chapter C12)*	Project workers, herders, local residents of Shinejinst and Bayan-Undur soums	Unplanned emergency events – **Moderate adverse**	X	X	-
	Project workers	Worker access to Health and Emergency services – **Moderate adverse**	X	X	-
	Herders, local residents and authorities of Shinejinst and Bayan-Undur soums, Bayankhongor aimag, and national level	Suspension of Project, greater regulatory requirements, and/or increased Community/NGO activism due to perceived or actual Environmental and Social Impacts – **Moderate adverse**	X	X	-
	Project workers, herders, local residents of Shinejinst and Bayan-Undur soums, and Bayankhongor aimag	Artisanal and Small-scale Mining Incursion at the KGP – **Moderate adverse**	X	X	-

14.3.2 Scoping: Other Activities and Environmental Drivers

14.3.2.1 Introduction

This scoping phase identified the historical, existing and planned (or reasonably defined) third-party developments with the potential to exacerbate impacts on the KGP-affected VESCs identified in the first scoping phase, resulting in 'in-combination' impacts. Information about third-party developments was obtained during the KGP stakeholder engagement and consultation process (*Chapter A6: Stakeholder Engagement*) and secondary sources, such as a data review of public sources of information, mapping and graphical sources. Figure 1 shows the KGP Mineral Licence Area in relation to the surrounding area, which contains extensive protected area and no known planned future developments.

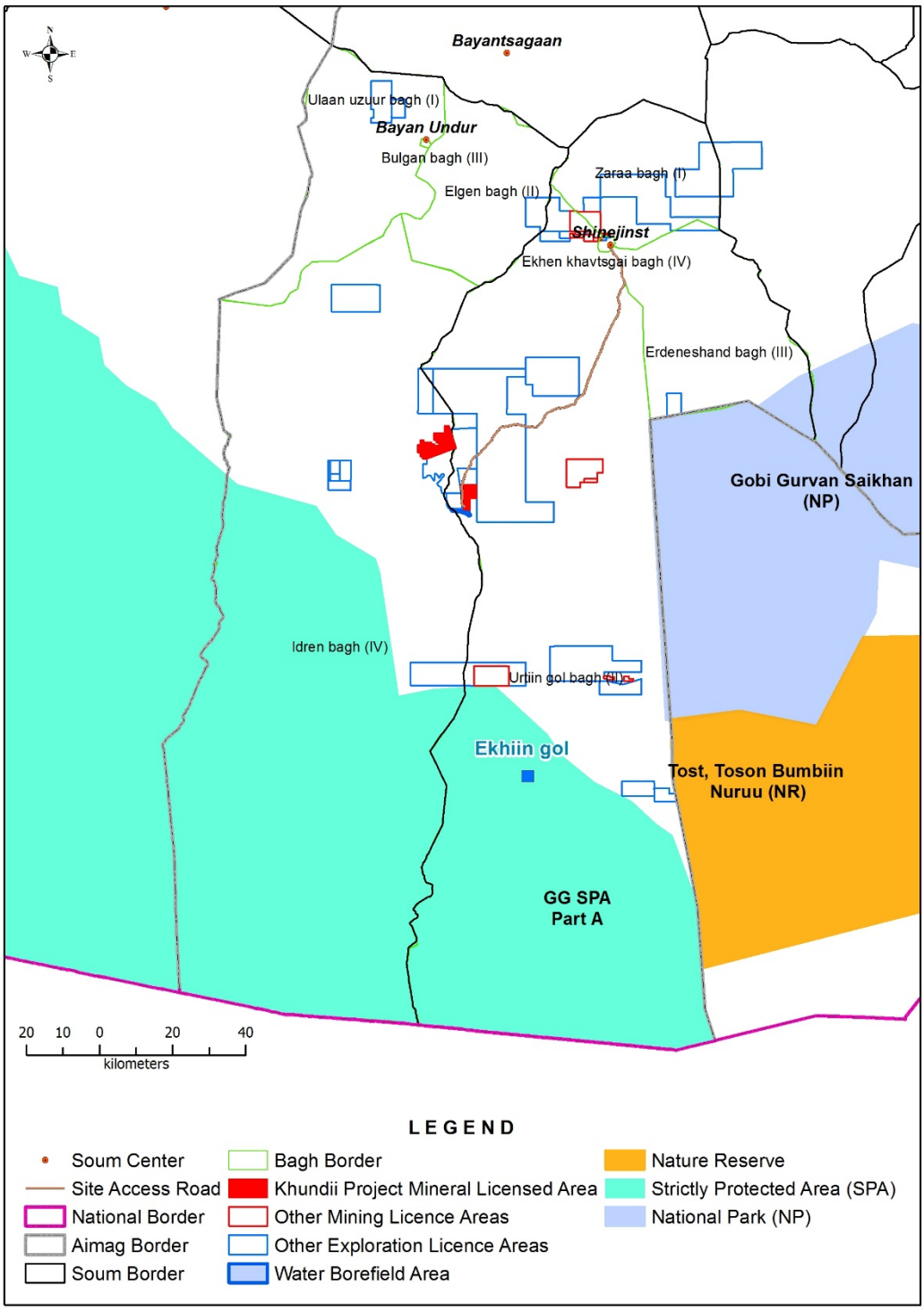

Figure 1 Location of KGP Project and surrounding licence areas

14.3.2.2 Developments

The following existing and planned/reasonably defined developments have been identified in the KGP AoI that may interact with the KGP, resulting in cumulative impact on the VESCs identified in Table 3:

- Existing developments related to the Khundii Gold Project AoI:
  - At present, there are no active mining operations in the KGP operating soums of Shinejinst and Bayan-Undur.

- Planned/reasonably defined developments (as of January 2020):
  - Gobi Coal & Energy Ltd was developing “Shinejinst” and “Zeegt” projects in Shinejinst soum in 2010-12, but both are currently in care and maintenance due to downturn in coal prices.
  - Shinejinst soum has 10 exploration licenses held by three license holders, and 10 mining licenses held by five companies.
  - Bayan-Undur soum has 8 exploration licenses held by seven companies, and 5 mining licenses held by two companies.
  - Despite the number of valid exploration and mining licenses, **none** are yet known to have active mining operations planned in the near future.
  - At present, none of the conceptual railway development or road network development projects have been advanced to a funding or construction decision for the KGP area.

There are limitations and a high degree of uncertainty in the current knowledge of third-party developments and drivers that may lead to additional influence on the VESCs at different stages of the KGP’s lifetime. As such, the CIA is qualitative in nature.

14.4 Cumulative Impact Assessment Significance Assessment

This section discusses how third-party developments may interact with the KGP and may result in cumulative impacts.

14.4.1 Air Quality

Mining and ore processing operations (drilling, blasting, loading, hauling, crushing, etc) are likely to contribute PM emissions to the airshed. Diesel generators and vehicles are likely to contribute NO2, SO2, CO and PM emissions to the airshed.

The main sources of greenhouse gas emissions for the Project relate to the burning of fuel in mobile and stationary combustion engines. Due to the Project’s isolated location, energy will be generated on site. It is estimated that the Project will generate approximately 61,559 tonnes of CO2 equivalent per annum at its maximum throughput. No other project activities have been identified impacting air quality at a significant level, so no Type 1 cumulative impacts are expected.

Air quality impacts from construction and operation of the Project at the nearest winter herder camps are classed as Moderate. As the Project is expected to last 12 years, and unlikely for development of additional mines to occur in that timeframe, there are no expected Type 2 cumulative impacts related to air quality.

14.4.2 Water Resources

The VESCs that have potential for cumulative impacts include the KT and BS bore fields, herder wells and groundwater dependent ecology within the water resources AoI.

Groundwater use during construction will require relatively small volumes of water, but this will increase during operations as groundwater abstraction will supply water for the Project. Several mitigation measures will be implemented to respond to any changes to water availability due to bore field abstraction, within a period of less than 6 months. Groundwater used by herders is considered a highly sensitive receptor, and therefore must be considered for potential cumulative impacts. No other Project activities are expected to impact water resources, therefore no Type 1 cumulative impacts are expected.

The potential for cumulative impacts would be very limited as there are no planned developments likely to use the same water supply. If one or two additional mines were to start development in the region in the near future, it would be unlikely to create additional impacts on herder water supplies in the KGP area of influence, considering the small scale of mining developments and lack of any single large water resource. Therefore, no Type 2 cumulative impacts are anticipated.

14.4.3 Biodiversity and Ecosystem Services

For the KGP project, several mitigation measures have been recommended for implementation to avoid potential impacts to protected areas, and to address stakeholder concerns. Based on the mitigation measures proposed for Priority Biodiversity Features and Critical Habitat, no sensitive biodiversity receptors are expected to experience "significant residual adverse impacts" during construction and operation of the KGP. Sensitive plants, marbled polecat and goitered gazelle species may experience minor adverse impacts due to their overlapping habitat with the KGP footprint, but residual effects are not expected to cause hardship, degradation, or impair the function and value of these species. For plants, implementation of rehabilitation procedures is expected to result in no net loss of biodiversity over the long-term.

One area of potential concern for stakeholders will be increased traffic during construction through protected or sensitive areas. Construction is expected to increase daily traffic by 4-5 trucks for a period of approximately six months, and no other projects are expected to start construction or operation in the near future. As noted in *Chapter C13*, traffic numbers will be further reduced during operations. Traffic-related impacts during construction and operations of the KGP are assessed as being of minor adverse impact significance overall with the implementation of mitigation measures proposed. As there are no foreseeable third-party developments that may utilise the same traffic routes, the potential for any cumulative impacts in relation to increases in traffic resulting in adverse biodiversity outcomes is considered to be unlikely. No Type 1 or Type 2 cumulative impacts are anticipated for biodiversity and ecosystem services.

14.4.4 Employment and Livelihoods

The economic investment of the KGP is anticipated to play a significant role in the Project area. As noted above, the KGP is currently the only mining project proposed to be developed in the near term in either Shinejinst or Bayan-Undur soums, with no other projects likely to be developed within these soums in the medium-term. There are also no other significant industries (other than herding) in the two soums that may provide a source of employment and investment. Furthermore, while the Project may induce some speculative in-migrants looking for economic opportunities, the overall trend is for static migration levels in the two soums, with the remoteness of the soums, lack of supportive infrastructure and services, and poor economic diversity and opportunities playing a major role in discouraging migrants to the area.

Therefore, the potential for Type 2 cumulative impacts, both positive and negative, on employment and livelihoods from third party developments is unlikely to occur in the short or medium terms.

14.4.5 Community Health, Safety and Security

The VESCs that may be impacted through cumulative impacts are road users and herders, predominantly residents of Shinejinst and Bayan-Undur soums.

During Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) conducted in August 2019 participants raised concerns about road safety. There is a perception within local communities that mining development will lead to a large increase in road traffic, combined with

poor roads and unsafe driving practices whereby drivers do not use designated roads, leading to traffic accidents, and also impacting local pasture quality and causing health issues due to dust. These concerns are linked to historical experience of coal exploration in the soums (although there are no current planned coal mining developments in the soums). Perceptions are also based on experiences of communities in other areas, such as neighbouring South Gobi province where large scale mining development and operations have resulted in major increases in traffic, and particularly trucks, to the Chinese Border.

In addition, consideration was made of the potential for cumulative impacts to occur in relation to the KGP contributing to an increase in traffic levels to the Shivee-Khuren border and playing a part in escalating prostitution at the border, and associated community health, safety and security impacts. There are a number of projects in the greater South Gobi region, and others under consideration, including the upgrading of the rail and road facilities at the border, which may be a causal factor in the development of such an industry at the border. This may be similar to what has occurred at the Gashuun Sukhait border point used by major mining projects in South Gobi province (Oyu Tolgoi, Tavan Tolgoi), among others, where the high levels of traffic have facilitated the emergence of a significant prostitution industry and associated community health, safety and security impacts.

As noted in the *Chapter C13*, the existing traffic movement numbers are low, and the Project imposes modest traffic onto the regional/district network both during construction and operations There is an anticipated 13% increase in traffic on the Ulaanbaatar-Bayan Khundii route, and only around two traffic movements per day during construction on the Shivee-Khuren border to Bayan Khundii camp route. Traffic numbers are further reduced during operations. Traffic-related impacts during construction and operations of the KGP are assessed as being of minor adverse impact significance overall with the implementation of mitigation measures proposed. As there are no foreseeable third-party developments that may utilise the same traffic routes, the potential for any cumulative impacts in relation to increases in traffic resulting in adverse community health and safety outcomes is considered to be unlikely. Based on the above discussions no Type 1 or Type 2 cumulative impacts are anticipated for community health, safety and security.

14.5 Summary

At the scoping stage of this ESIA, potential environmental cumulative impacts such as fragmentation of habitat or increased demand for scarce groundwater resources were considered as potential outcomes due to the interaction of the KGP with other mining developments in the future. Potential social cumulative impacts, such as local population influx, increased road transport risks and associated community health and safety impacts, due to the interaction of the KGP with other mining developments in the future were also considered. However, at this stage, available information suggests no known potential resource development projects in the region in the near to mid-term.

Following the assessment above by resource and receptor, and based on current knowledge about the Project and surrounding region, no Type 1 or Type 2 cumulative impacts are anticipated for the KGP. Given the remote location of the Project, relatively short life of mine, mitigation measures to be put in place, and low probability of nearby resource development projects in the region in the near to mid-term, the potential for cumulative impacts of any type is low.

14.6 References

European Bank for Reconstruction and Development (EBRD). 2014. Assessment and Management of Environmental and Social Impacts and Issues.

International Finance Corporation (IFC). 2013. Good Practice Handbook Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets.



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment:
D00: Environmental and Social Management Plan Framework

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Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Management Framework Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project) Environmental and Social Management Plan (ESMP). The ESMP is an integral part of the KGP's Health, Safety, Environmental and Communities (HSEC) Management System.

The HSEC Management System is a set of processes and practices to consistently implement the KGP's business objectives and goals. The HSEC Management System is a dynamic and continuous process supported by the company management and involves engagement between the management, workers and stakeholders, including communities directly affected by Erdene's activities.

This Framework Plan and the other management plans for specific environmental and social risks form the KGP ESMP. This Framework Plan describes how Erdene will manage environmental and social impacts of the KGP.

The KGP HSEC Management system and this Framework Plans are underpinned by the following key documents:

- Erdene Resource Development Corp. and Erdene Mongol LLC's Health, Safety, Environmental and Community Policies;
- Erdene Resource Development Corp. and Erdene Mongol LLC's Code of Business Conduct and Ethics;
- Committee of Sponsoring Organizations of the Treadway Commission (COSO) Enterprise Risk Management Framework;
- International Standard Organisation (ISO) 14001 (Environment);
- Occupational Health and Safety Assessment Series (OHSAS) 18001;
- Mongolian regulatory requirements;
- Lender requirements, including Performance Requirements of the European Bank for Reconstruction and Development (EBRD); and
- Good international industry practice.

1.1 Objectives

The ESMP is the main mechanism for Erdene to manage environmental and social impacts of the KGP. The ESMP reflects the identification and assessment of environmental and social risks and potential impacts detailed in the accompanying KGP Environmental and Social Impact Assessment (ESIA). The ESMP also describes how the mitigation and management measures to minimise the residual environmental and social impacts and risks have been incorporated into the KGP HSEC Management System.

The main objectives of this Framework Plan are to:

- introduce the KGP ESMP context and specific environmental and social management plans;
- document and direct KGP personnel and other stakeholders on how project environmental and social risks are managed to conform with applicable KGP standards and specifications

- enable Erdene to systematically assess and control KGP environmental and social risks through implementation of specific control measures; and
- introduce the mechanisms to review and refresh the ESMP for continuous improvement.

1.2 Scope

The ESMP covers all phases of the KGP in relation to:

- overview of the processes to identify, avoid, mitigate and manage environmental and social risks
- roles and responsibilities of Erdene, contractors and sub-contractors; and
- monitoring of environmental and social performance for continuous improvement.

The specific Management Plans that have been developed for implementation for the KGP ESMP are as follows:

Table 1 Khundii Gold Project Environmental and Social Management Plans

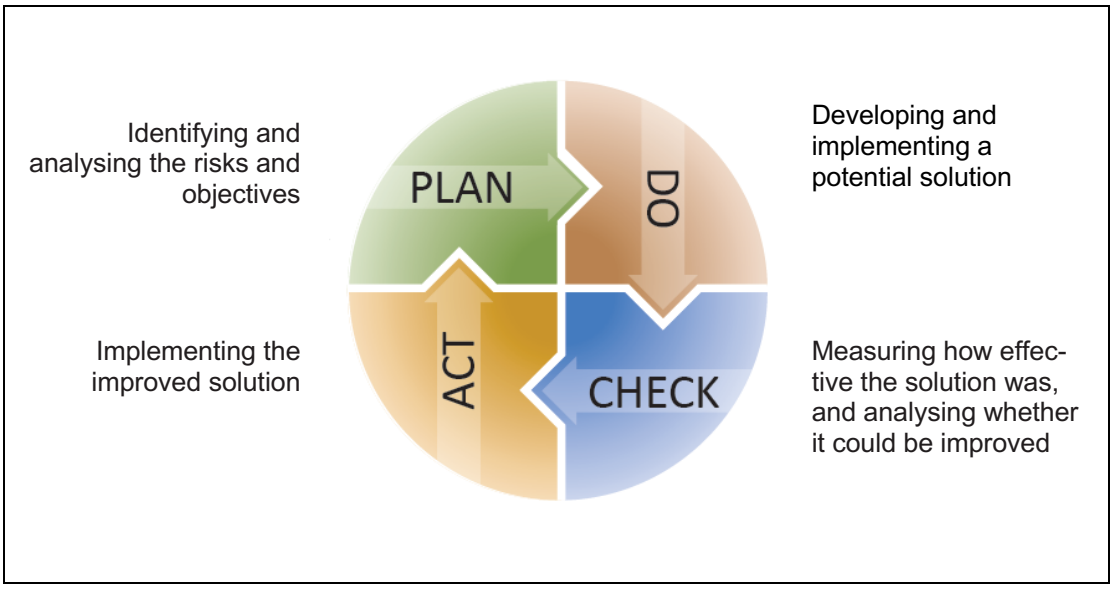
Management Plan Name	
D1	Air Quality Management Plan
D2	Noise and Vibration Management Plan
D3	Water Resources Management Plan
D4	Biodiversity Management Plan
D5	Waste Management Plan
D6	Hazardous Materials Management Plan
D7	Community Health, Safety and Security Management Plan
D8	Contractor and Procurement Management Plan
D9	Crisis and Emergency Response Management Plan
D10	Human Resource Management Plan
D11	Land Use and Livelihoods Management Framework
D12	Occupational Health, Safety and Security Management Plan
D13	Stakeholder and Communications Management Plan
D14	Local Cooperation Management Plan
D15	Transport Management Plan
D16	Land Disturbance Control and Rehabilitation Management Plan
D17	Closure Management Plan

In addition, contractors may also prepare their own documents to demonstrate compliance with the KGP HSEC Management System and ESMP.

As part of the HSEC Management System and ESMP, Erdene will develop specific supporting procedures and implementation plans. These additional implementation documents will provide additional detail on the tasks and activities to be undertaken to implement mitigation and management controls during all phases by Project personnel.

2. ENVIRONEMENTAL AND SOCIAL MANAGEMENT

The commonly used systematic approach for ESMP with continuous improvement is the Plan-Do-Check-Act cycle (PDCA) (Figure 1).



Source: IFC 2015

Figure 1 Plan-Do-Check Act Process for Management Systems

The KGP used the PDCA cycle model for its ESMP to maintain the system's appropriateness and effectiveness. Components of the KGP ESMP, in relation to the PDCA process, are summarised in the sections below.

2.1.1 Policy and Legal Framework

Relevant policy and standards are defined in each Management Plan and draw from the following sources:

- applicable legislative requirements including the Mongolian Statutory Detailed Environmental Impact Assessment (DEIA) requirements;
- applicable Lender standards; and
- applicable Erdene policies, procedures and standards.

2.1.1.1 Mongolian Regulatory Requirements

Requirements of the applicable Mongolian regulations and standards have been incorporated in the discipline specific Environmental and Social Management Plans, which collectively form the KGP ESMP.

A DEIA has been prepared for the KGP. The DEIA includes a statutory environmental management and monitoring plan setting out the measures necessary to ensure compliance with Mongolian regulatory requirements for all phases of the KGP.

2.1.1.2 Lender Standards

Performance Requirements of the European Bank for Reconstruction and Development (EBRD) are the foundational lender requirements to which the KGP is committed. Erdene has prepared a full ESIA which meets the EBRD Environmental and Social Policy (2019) requirements. The ESIA has identified and assessed potential environmental and social impacts of the KGP on the biophysical and human environments and set out measures to avoid, minimise, mitigate and manage potential significant adverse impacts to acceptable levels.

The KGP ESIA shares similar impact assessment and mitigation approaches with the statutory DEIA. Rigid impact assessment requirements that cover not only the environment, but also the social impacts of projects and detailed requirements for managing the identified potential impacts, and disclosures characterises the ESIA requirements. The KGP ESIA will be a publicly-disclosed document that demonstrates how Erdene will meet applicable legislation as well as Lender standards.

2.1.1.3 Applicable Erdene Policies and Standards

Erdene has developed and implemented a Health, Safety, Security, Environment and Community (HSEC) Policy (Erdene 2018) aligned to internationally recognised health, safety and environmental standards. The HSEC policy is applicable to all KGP activities (including all construction activities) and all personnel working for the Project.

2.2 Hazard Identification and Risk Management

The identification, assessment and timely remediation of environmental and social hazards are integral to the KGP.

The KGP ESIA identified foreseeable potential environmental and social hazards and impacts associated with the KGP construction, operation and closure activities, according to the Performance Requirement 1 of the EBRD Environmental and Social Policy. Mitigation measures for the identified hazards in the KGP ESIA feed into this ESMP Framework, the Management Plans and Implementation documents.

Before any new activity is undertaken or resumed at the KGP site, managers, employees and contractors are expected to identify and assess significant and potential environmental and social hazards associated with such activity. The hazards identified will be risk assessed, dependent on the context, nature and scale of the risks, and appropriate control measures will be developed and implemented. KGP's environmental and social monitoring plans will be regularly updated for new risk control measures, as necessary.

The risk assessment will use standard risk matrix (refer to *ESIA A3: Methodology chapter*) for risk significance, and all identified risks will be collated in a centralised risk register.

Risk assessment at KGP is an iterative process and involves employees, HSEC representatives and contractors, considering environmental and social impacts in an integrated manner.

2.3 Organisation Accountabilities and Responsibilities

Erdene is committed to implementing requirements of the ESMP and HSEC Management System. Financial, technical and physical resources will be made available by senior management on an on-going basis to meet the KGP Project ESMP requirements, ensure employees and contractors meet their accountabilities and report relevant information to the government authorities, financial lenders and other stakeholders.

Erdene will have dedicated HSEC resources to support the KGP ESMP implementation. Where specific HSEC expertise is not available within the HSEC Team, KGP will utilise external service providers.

Role descriptions define the position, including key HSEC responsibilities. Personnel may have both general and specific HSEC responsibilities depending on their roles. Specific HSEC responsibilities are documented in role descriptions, with general HSEC responsibilities being communicated to staff and contractors via the processes below:

- KGP HSEC Management System and other employment policies;

- inductions and training; and
- pre-start work group meetings.

Key roles and responsibilities for implementation of the KGP ESMP are outlined in Table 2 below.

Table 2 Key Roles and Responsibilities

Role	Responsibilities
Board of Directors	Oversight of the ESMP implementation
Executive (CEO and CFO)	Approve the budget for the execution of the ESMP and oversight for its implementation
Senior Management / VPs / Department Heads	Approve the ESMP Overall responsibility for the scope and implementation of the ESMP Ensure appropriate resourcing levels to implement the requirements of the ESMP
HSEC Managers /Leads	Ensure that the requirements of the ESMP are met in workplaces under their management control Ensure staff and contractors under their supervision are trained and competent to implement all requirements of the ESMP Provide support and on-the-ground assistance to operations (including contractors) for the implementation and maintenance of the KGP ESMP requirements. Responsible for reviewing and approving and overall implementation of corrective actions
HSEC Team	Advise and support staff and contractors consistently with the requirements of the ESMP Ensure the KGP ESMP is operating and continuously improving
All Employees /Contractors	Adhere to the requirements of the KGP ESMP and Procedures Participate in training, risk workshops, meetings and inspections as appropriate. Report ESMP incidents, accidents and improvement opportunities

Erdene will have over-arching responsibility for the ESMP during the lifetime of the KGP.

2.4 Training Competency and Awareness

All necessary training is provided as part of induction training (to provide general awareness) and job-specific training as necessary.

The provision of training to KGP workers will ensure that they can manage the ESMP aspects of their roles. Introductory training is provided to all staff and contractors through inductions appropriate for the phase, location and nature of work.

Minimum environmental and social training requirements and specific training requirements are set out in each respective Management Plan. Specialised training is provided to those completing tasks with significant environmental and social risks identified in the ESMP. Specialised training may also be provided by external service providers for specific subject areas, with these requirements being outlined in a training needs analysis. Erdene will conduct training needs assessments for employees working on high environmental and social risk areas, and all training records will be maintained.

2.5 HSEC and ESMP Document Control

The KGP HSEC Management System documentation system consists of the HSEC Policy, Management Plans, Implementation Documents (e.g. Supporting Procedures), registers, forms and checklists. All documents are controlled and accessible to the applicable workforce.

2.6 Communication and Consultation

As per communication and consultation requirements, the following HSEC forums will take place for the KGP:

- involvement from a cross-section of employees in the development and review of HSEC Management System documentation including the ESMP;
- internal and external stakeholder consultation in the event of changes that impact workplace HSEC Management System;
- representation in management meetings;
- one-on-one communication during HSEC interactions;
- receiving, documenting and responding to relevant communication from external interested and affected parties on HSEC issues;
- reporting of incidents to the relevant authorities as required by Mongolian legislation;
- pre-shift and other scheduled team meetings;
- scheduled performance appraisals between employees and direct line supervisors;
- operational feedback meetings;
- selected publications; and
- use of work area information centres.

Erdene will utilise the following communications means for external communications on HSEC and ESMP matter:

- community consultation programme;
- regulatory communications; and
- responses to complaints received through its Grievance mechanism.

All records for external communications will be documented and maintained.

2.7 Operation Controls

Environmental and social hazard and impact areas will be identified in ESMP risk registers and controlled through the management controls identified in the individual management plans.

HSEC Managers and Leads are accountable for ensuring that controls are developed for the identified environmental and social risks in their respective areas. HSEC Leaders are also responsible for implementing and effectively communicating the content of the relevant standards and procedures in their respective areas.

Employees and contractors are responsible for conducting work in accordance with the applicable controls. Management controls are applicable to all activities where risk control measures are required. These activities and/or processes are as follows:

- conducting risk assessments within their work areas;
- establishing and maintaining supplementary procedures to cover situations where their absence could lead to deviations from KGP policies and objectives;

- communicating risks to employees and contractors and to ensure that they are trained;
- conducting HSEC and ESMP interactions to ensure appropriate controls are in place; and
- re-assessing the process and documentation and updating learning material where necessary.

The following may trigger revision of current procedures, the establishment of new procedures or other risk control mechanisms:

- any new process or new equipment preceded by a risk assessment;
- change in the design of the workplace, process, installations, machinery, operating procedures and work organisation;
- a near miss or incident;
- observations that identified a deviation, problem or more efficient work method;
- inspections and/or audits including critical risk management new legislation and/or corporate requirements; and
- meetings, appraisals, revision of documentation, and others.

2.7.1 Management Plans

Details of the mitigation and management measures to be implemented during all phases of the KGP are provided in the ESIA and in individual Management Plans of the ESMP (Refer to Table 1).

Controls measures identified for the potential risks/impacts from the KGP activities are described within the individual Management Plans. Erdene will develop the necessary implementation documents providing detailed guidelines and procedures to meet the Management Plan requirements. The Management Plans and the implementation documents will be updated on a regular basis.

2.7.2 Management of Change

The Management of Change (MoC) Procedure (to be developed) sets out a process to ensure that effective controls are in place for managing the environmental and social risks associated with change. The key elements for assessing and managing the risks associated with an identified change include:

- defined areas of high potential risk with respect to change, regardless of whether the change may be planned or unplanned, sudden or gradual;
- employees and contractors training and competency to identify what constitutes a change and how to initiate the MoC process; and
- risk assessment of proposed changes conducted;
- appropriate information on the change communicated to internal and external stakeholders.

2.7.3 Management of Change Scope

Change does not occur when variations to plant, equipment, processes and people are within designed or agreed boundaries or tolerances. This includes normal repairs or other activities to

restore the original functionality; this is known as replacement in kind. No formal MoC approval is required for these types of activities; however, the replacement must be reviewed with the immediate supervisor.

The MoC process applies to the activities or items listed below which may undergo change:

- design, re-design and construction of plant and equipment;
- introduction of new or alterations to plant and equipment;
- materials used, their composition and properties, including new chemicals and organisms;
- chemicals added to the process or equipment;
- drawings and engineered processes;
- introduction of new or changes to existing operating or maintenance SWPs;
- health, safety or environment equipment, procedures, policies or standards;
- electronic process controller's configurations which are outside the current established limits;
- organisation structures and job responsibilities;
- personnel changes, training or competency requirements;
- project management hand over to operations;
- regulatory or statutory limits, licences, permits or agreements;
- land use zoning or land use management plans; and
- alteration of environmental and social impacts, management and monitoring measures set forth in the KGP ESIA.

The above list is not inclusive of all MoC scope changes and HSEC managers and Leads will monitor for any changes that may require formal MoC assessment processes. Relevant details will be provided in the MoC Procedure.

Following the identification of a change, the MoC process shall be initiated.

2.7.3.1 Assessment of Proposed Change

All change requests will be subjected to a formal review and authorisation (change authorisation review) using the MoC process. Prior to pre-implementation activities commencing, concept approval shall be granted or rejected for the proposed change via the MoC process. Approval authority levels are set out in the MoC Procedure. A risk assessment of the proposed change shall be conducted and attached to the change record in the MoC process for impact Category 1 and 2 changes (Table 3).

A risk assessment is a constraining action that must be completed before a change can be implemented. The relevant HSEC Leader(s) will identify the appropriate level of risk assessment to be conducted for Impact Category 1 or Impact Category 2 changes.

2.7.3.2 Communication and Notification of Change

The KGP will report any relevant proposed changes to the Project to the EBRD and/or other lenders in accordance with the terms and conditions agreed in the Financing Agreements.

Post implementation, authorised changes shall be communicated to all stakeholders affected by the change and include the following:

- benefits of the change;
- consequences of the change; and
- risks associated with the change and risk controls.

Where a material change to the Project standards or Management Plans is required, external stakeholders, including Project Lenders, will be notified, as set out below in Table 3.

Table 3 Management of Change Categories and Requirements

Impact Category	Impact Description	Action Required
Category 1	Changes which are reasonably likely to result in: (i) a significant departure from the Project Description (see ESIA *Chapter A5: Project Description* and/or the Project Standards; (ii) new significant environmental and/or social impact(s) not identified in the ESIA; (iii) significant environmental and/or social impact(s) identified in the ESIA in respect of which the mitigation measures in the Management Plans (and Implementing Documents) are not or are not reasonably likely to be effective; or (iv) material amendment(s) or supplement(s) to the environmental and social management plans (and Implementing Documents). To avoid doubt, an alteration or deletion of any positive undertaking or specific prohibition which comprises an avoidance or mitigation action required to manage impacts identified in the ESIA will be considered material.	The Company will notify the Lender Group of all proposed Category 1 Changes ("Notice of Change") in accordance with the procedure that has been agreed between the Project Lenders and the Company. The Notice of Change will include such details are required by that procedure, and the implementation of such Change will be subject to that procedure.
Category 2	Changes which have the potential to or are reasonably likely to result in: (i) a departure from the Project Description (see ESIA *Chapter A5: Project Description*) and/or the Project Standards; (ii) new moderate environmental and/or social impact(s) not identified in the ESIA; or (iii) significant environmental and/or social impact(s) identified in the ESIA but in respect of which no material amendment(s) or supplement(s) to the Management Plans are required.	The Company will notify the Lender Group of all proposed Category 2 Changes in accordance with the procedure that has been agreed between the Project Lenders and the Company. The Notice of Change will include such details are required by that procedure, and the implementation of such Change will be subject to that procedure.
Category 3	Changes which do not fall within either Category 2 or Category 1.	Notification of the Change(s) to the Lender Group through annual Project Reporting.

2.7.3.3 Emergency Change

A change satisfying the criteria as an emergency change is initiated by preparing an emergency change request using the MoC process.

Emergency change requests are reviewed and approved by the Workplace Supervisor to ensure that:

- copies of the emergency change request are provided to the appropriate support and technical personnel;
- communication is provided to all affected personnel;
- training is conducted at the start of each shift and repeated throughout the duration of the emergency change until all affected shifts have received the communication; and
- training is documented and recorded.

Prior to implementing an emergency change, site HSEC personnel must be notified to ensure that emergency controls are adequate to prevent adverse health, safety and environmental impacts.

Emergency changes must be implemented in accordance with all critical control procedures (e.g., work permits, SWPs and KGP HSEC Management System procedures) and must be preceded by the completion of a Pre-task Hazard Assessment.

Emergency changes have a 24-hour duration but may be extended after 24 hours with approval from the relevant HSEC Leader. Where an extension is granted a normal non-emergency change request shall be initiated by the next normal workday. Note that the emergency change request cannot be closed until the non-emergency change request had been authorised.

A post-implementation review will be conducted by the Workplace Supervisor for all emergency changes to confirm that all applicable aspects of the MoC process have been applied to the emergency change and to determine how the normal MoC process can be applied if a similar change occurs.

2.8 Emergency Preparedness

Emergency preparedness and response management processes for the KGP are documented under *D9: Crisis and Emergency Response Management Plan*. Crisis and Emergency Response Management Procedures (CERMP) will be developed to meet the Management Plan requirements, with responsibilities and processes being clearly defined for each potential emergency situation.

The response processes to emergency situations are tested periodically, as well as following real emergency situations to evaluate the effectiveness of the response processes. The CERMP will specifically address the following requirements:

- reporting and functional relationships between the operation, business and corporate management teams;
- procedure for activating the team;
- roles and responsibilities of all people in the teams;
- response by visitors, contractors and employees;
- equipment available (internal and external) for emergency response; and
- procedures to be followed for the effective operation of the emergency team.

2.9 Measuring and Monitoring

ESMP impact measuring and monitoring requirements are defined in each Management Plan. Instructions for how to conduct measurement and monitoring are set out in Implementation Documents (e.g. topic specific monitoring plans).

Erdene will undertake monitoring of the management and mitigation activities for which it is responsible in addition to the checking and review of contractors' monitoring documentation. Environmental and social monitoring (sampling and analysis) as defined in the Management Plans and supporting monitoring plans will also be undertaken by the Project.

Occupational health, safety and environmental aspects are monitored in accordance with legal requirements and at a frequency determined by the level of HSEC risk associated with the aspect being monitored.

Where operating criteria is exceeded (e.g. legal exposure, emissions or standards) these exceedances are recorded, reported and investigated. Recommended actions from the analysis of the monitoring results are documented, assigned accountability and tracked until completion.

The medical surveillance programme includes employees and contractors and is consistent with local regulatory requirements; operational health risks and linked to Erdene's objectives and targets. The programme is based on workplace monitoring and assessment. Where a possible health risk is identified, workers are required to undergo medical surveillance.

In addition to the Project based monitoring and measuring, KGP is also subject to several external agencies that will conduct audits periodically. The results of these audits are used as part of the continuous improvement process built into the ESMP. Examples of the auditing agencies are included, but are not limited to, the list below:

- Government Agency for Specialized Inspection (GASI);
- Ministry of Environment and Tourism and its agencies;
- Independent Environmental and Social Consultants (IESCs) as required by the Company and/or Lenders; and
- Independent auditors that conduct environmental audits as per GoM legislative requirements.

2.10 Non-Conformance, Incident and Action Management

2.10.1 Incident Recording and Investigation

The procedures developed to address non-conformance, incident and action management outline the requirements to report, review and address incidents and non-conformances and implement corrective and preventive actions. Management at all levels is responsible for ensuring all incidents and non-conformances in their respective areas are reported and investigated. They are also responsible for ensuring root cause identification and corrective or preventive actions are taken.

All employees are responsible for taking immediate reasonable action necessary to prevent a potential incident. Personnel are responsible for reporting incidents and non-conformances to their supervisor immediately. All employees are empowered to stop work if they experience or observe unsafe working conditions or at-risk behaviour.

2.10.2 Non-Conformance Corrective Action and Reporting

Non-conformance is classified according to the potential significance of the non-conformance. Significance, corrective actions and reporting are set out in Table 4 below.

Table 4 Classification of Non-Conformance, Corrective Action and Reporting (Lender Group Requirements)

Classification	Description	Action Required

Class IV	A critical non-conformance, materially inconsistent with the Project Standards or Management Plans, resulting in or reasonably likely to result in irreversible impacts to sensitive receptors or important resources or significant damage or irreversible harm or damage to an ecologically or socially sensitive resource or has the potential for an extreme health and safety incident.	Immediate corrective action or site-specific attention required to correct or to stop the on-going non-conformance and mitigate any effects that have occurred, including temporary work suspension where necessary.
Class III	A material non-conformance materially inconsistent with the Project Standards or Management Plans, that has not resulted in clearly identified impacts to sensitive receptors or important resources or material damage or irreversible harm or damage to an ecologically or socially sensitive resource or have the potential for an extreme health and safety incident, but it is reasonably likely to have such effects.	Corrective action or site-specific attention required to correct or to stop the on-going non-conformance and/or to prevent the occurrence of environmental and social impacts. If potential impacts occur, the Class IV notification and reporting process will apply If potential impacts do not occur, the Class II notification and reporting process will apply.
Class II	A material non-conformance with the Project Standards or Management Plans, but not reasonably likely to result in impacts to sensitive receptors or important resources or material damage or irreversible harm or damage to an ecologically or socially sensitive resource or have the potential for an extreme health and safety incident.	Corrective or preventative action to be taken if required to comply with Project Standards or Management Plans.
Class I	An incident not materially inconsistent with the Project Standards or Management Plans and not reasonably likely to present a threat to the environment, community or worker health and safety.	Class I non-conformances (and any actions taken to address them) will be reported in the Project's Annual Monitoring Report.

2.10.3 Lender Notifications and Reporting

Erdene will report on non-conformances to the EBRD in accordance with procedures agreed with the Lender. If a non-conformance is not closed out within the time frame notified, Erdene will develop and implement a revised corrective action plan to resolve the non-conformance.

Reporting requirements are defined in each Management Plan as applicable.

2.10.4 Statutory Notifications and Reporting

Erdene will report to Mongolian regulatory bodies as required and as defined in DEIAs, permits and licence documentation.

2.11 Data and Records Management

Records are identified and maintained to demonstrate the effective operation of the KGP HSEC Management System. They are traceable to the activity, product, service or requirement they represent. Records support and substantiate audits, inspections, reviews, training, quality control and test activities to provide evidence of conformance and compliance to specification and contractual requirements, legal as well as internal requirements.

All HSEC records are stored and maintained to ensure that they are legible, readily retrievable, and to prevent damage or loss. These records are available for evaluation and form the proof of conformance to applicable requirements.

2.12 Performance Assessment and Auditing

The KGP HSEC Management System includes performance assessment and auditing of all elements of the management system at the following levels:

- Performance Assessments are intended to measure the KGP's HSEC performance against agreed indicators, metrics and targets. Performance assessment focuses on the extent to which objectives are being met, effectiveness of controls and proactive measures (such as the number of audits, inspections and verifications) and reactive measures (such as recordable incidents, corrective actions etc). Where targets are not being achieved this is a trigger for corrective or preventative actions. Key performance indicators are reviewed at least annually.
- HSEC Inspections are undertaken regularly by leaders and contractors to:
  - verify whether personnel in different work areas are trained, equipped and where necessary certified to comply with HSEC procedures;
  - reinforce behaviour consistent with standards and correct inconsistent behaviour; and
  - identify and correct non-conformances.
- Daily workplace inspections are carried out by workplace leaders and monthly subject-matter expert/assigned person inspections are undertaken by the HSEC Team.

Note that not all management plans fall under the KGP HSEC Management System for monitoring, auditing and reporting, and these will be undertaken as outlined in the respective sections of each management plan.

2.13 Management Review

To meet the review phase of the KGP ESMP Erdene will organise:

- Senior Management Meetings to be held to review ESMP performance, progress against strategic objectives at senior level;
- Regular HSEC and ESMP Meetings to be held with leaders with the Erdene HSEC Department to ensure that key aspects are discussed including: progress against the improvement plan, audit findings and results, timely management of actions, incidents and external complaints, key HSE and environmental statistics and training; and
- ESMP Review carried out by HSEC Leader(s) to ensure the continued suitability, adequacy and effectiveness of the system. Actions are identified and recorded to improve the ESMP and results are shared across the company via management meetings and Toolbox meetings.

3. LIST OF ABBREVIATIONS AND ACRONYMS

COSO	Committee of Sponsoring Organizations of the Treadway Commission
DEIA	Detailed Environmental Impact Assessment
EBRD	European Bank for Reconstruction and Development
EPC	Engineering, Procurement and Construction
Erdene	Erdene Mongol LLC
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HSEC	Health, Safety, Environmental and Communities
IESC	Independent Environmental and Social Consultants
KGP	Khundii Gold Project
KPI	Key Performance Indicator
MoC	Management of Change
PDCA	Plan-Do-Check-Act
PR	Performance Requirements
SWP	Standard Work Practices



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D1: Air Quality Management Plan

May 2020

Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Air Quality Management Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP)

1.1 Objectives

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define topic-specific training requirements; and
- set out references for supporting materials and information.

1.2 Scope

This Management Plan covers all Erdene activities, including contractor activities, during the construction, operation and closure phases of the KGP. This document outlines Erdene's commitment and approach to mitigating air quality risks that may arise as a direct or indirect result of the KGP.

1.3 Emissions Sources

Emissions sources have been identified by the proponents. The impacts of these emissions have been assessed and are documented in the ESIA. In summary, the pollutants of concern for the mining operation and associated operations have been identified as:

- Particulate matter (PM)[1];
- Nitrogen dioxide (NO_2);
- Sulphur dioxide (SO_2); and
- Carbon monoxide (CO).

[1] typically assessed and measured as PM_{10} and $PM_{2.5}$, that is, particulate matter of less than 10 micrometers and 2.5 micrometers of aerodynamic diameter

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined below.

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan. • Set the vision for implementation of this Management Plan
Senior Management / VPs / Department Heads	• Approve this Management Plan • Overall responsibility for the scope and implementation of this Management Plan • Ensure appropriate resourcing levels to implement the requirements of this Management Plan • Support execution of this Management Plan • Management of implementation activities • Interpretation of monitoring results • Corrective actions
HSEC Manager	• Responsible for the overall implementation of this Management Plan • Responsible for ensuring this Plan is available to all employees and Contractors • Responsible for ensuring that contractors develop air quality management plans/actions and inspection procedures, consistent with the requirements outlined in this plan, prior to the commencement of work • Responsible for ensuring that relevant activities are undertaken in compliance with this Management Plan and related procedures • Responsible for ensuring that Erdene employees are fully trained in air quality management practices • Responsible for reviewing and approving and overall implementation of corrective actions as a result of non-conformances relating to air quality management
HSEC Team	• Develops air quality monitoring plan and schedule • Undertakes periodic audits and inspections of the air quality levels at workplaces with high risks • Reports air quality complaints to the HSEC Team Manager and implements corrective actions

Workplace Supervisors	• Plan work activities involving dust and emissions generating equipment and machinery according to the requirements of this plan • Conduct routine work area and work plan inspections to ensure this Management Plan requirements are in place and followed • Ensure that any breaches of the requirements of this Management Plan are reported, and corrective actions are taken
Procurement Team	• Ensure air quality generating equipment purchase is sourced from reputable manufacturers • Where possible, ensure that environmental performance of equipment, particularly air quality, is considered in procurement decision making
Contractors	• Ensure that management plans are developed to align with this plan and approved prior to commencement of work • Adhere to the requirements of this Management Plan
All Employees	• Adhere to the requirements of this Management Plan

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are:

Table 2 Key Interfaces

Team / Unit	Key Interface(s)
Executive and Senior Management	• Sets strategy and provides corporate direction to operational personnel
HSEC Team	• Implements corporate strategy and impact management commitments • Consults with stakeholders including herder groups and residents • Managing and processing community grievances from air quality impacts • Feedback of community responses to executives and senior management
Operations	• Operating procedures targeted to minimise air quality impacts
Engineering and Maintenance	• Responsible for ensuring continual maintenance of plant and equipment to comply with noise and vibration requirements

3. PROJECT STANDARDS

Applicable Standards must be complied with for all Project activities (the "Project Standards"). Project Standards comprise:

- applicable Mongolian laws and standards;
- applicable international and lender standards and guidelines; and
- applicable Erdene policies and procedures.

3.1 Applicable Mongolian Law and National Standards

Applicable Mongolian legal and national standards are listed below, detailed descriptions of which may be found in *Chapter A2 Policy and Legal Framework*:

- Law on Air (In force on 5th June 1995; amended 12th January 2018); and
- Law on Air Pollution Fee (In force on 24th June 2010; amended 12th January 2018).
- MNS 4585:2016 Air quality. general requirements;
- MNS 5885:2008 Accepted concentration of air polluting substances. Technical general requirements;
- MNS 3113:1981 Atmosphere. Common requirement for Determination method of polluted air matter.

3.2 Applicable International Standards and Guidelines

3.2.1 European Bank for Reconstruction and Development

Funding for the KGP project may be provided under the European Bank for Re-construction and Development (EBRD) framework. EBRD involvement dictates that the project has been developed to meet the EBRD's Environmental and Social Policy (2014) and the EBRD Performance Requirements (PR). Erdene will comply with the requirements of *EBRD Performance Requirement 1 Assessment and Management of Environmental and Social Impacts and Issues* (PR1) when implementing its policies. PR1 identifies the importance of developing management plans for residual impacts created by projects under the EBRD funding framework. PR1 states that:

- Taking into account the findings of the environmental and social assessment process and the outcomes of stakeholder engagement, the client will develop and implement a programme of actions to address the identified project's environmental and social risks and impacts and other performance improvement measures to meet the PRs. Depending on the project, the programme may consist of a combination of documented operational policies, management systems, procedures, plans, practices and capital investments, collectively known as environmental and social management plans (ESMP).

PR1 also notes the following:

- The client will establish, maintain, and strengthen, as necessary, an organizational structure that defines roles, responsibilities, and authority to implement the ESMS for ensuring on-going compliance with relevant national laws and regulatory requirements and the PRs.

- It is the client's responsibility to ensure that contractors working on project sites meet the ESMS requirements by adopting and implementing an appropriate contractor management system.
- The client will ensure that adequate systems, resources and personnel are in place to carry out monitoring. The client will review the results of monitoring and initiate corrective actions as necessary.
- The client will provide regular reports to EBRD on the environmental and social performance of the project, including compliance with the PRs and implementation of the ESMS, ESMP and stakeholder engagement plan where appropriate.

The EBRD's PR 3, *Resource Efficiency and Pollution Prevention Requirements,* includes the need to achieve relevant ambient air quality standards, with the European Union (EU) limits to be achieved unless there are more stringent local requirements. The ambient air quality standards to be used in this ESIA includes EU Directives 2008/50/EU which are outlined in *Chapter C2*.

Consideration should be given to occupational health and safety. In Europe, there are two types of occupational exposure limits for chemical agents:

- EU community exposure limits; and
- National exposure limits.

The occupational health and safety guidelines relevant to this Project are outlined in *Chapter C2*.

3.3 Applicable Erdene Standards

Erdene, as a corporate entity, has a *Policies and Procedures Manual* (2018) that guides its activities and provides standards by which mineral development projects will be undertaken. The Manual states that Erdene seeks to manage the potential environmental impacts of its business operations starting from early exploration stage in the following key areas:

- Landscape integrity and resource use.
- Waste and hazardous materials handling and disposal.
- Water quality and availability.
- Traditional environmental practices.
- Air quality.
- Biodiversity and ecosystem services.
- Others, as appropriate to a specific minerals project.

The Manual also notes the importance of Performance Monitoring in relation to the environmental management of its project activities to define the methods of assessing and evaluating the company's performance and risk management as per the policies and procedures manual.

The Manual commits Erdene to develop a plan for Environmental Management, outlining proposed activities, performance targets and required resources, for each calendar year. The following performance indicators are noted in the Manual to help the company measure the performance of its environmental management.

- Environmental management systems designed and implemented per project.
- Completion of appropriate rehabilitation of all disturbances, such as those related to field camps, drill pads, temporary roads, and others per project.
- Completion of annual material and carbon footprint reports.
- Number of environmental stewardship investments per project.
- Early research and experimentation for biological reclamation.
- The company executive will appoint a senior management representative to oversee and facilitate monitoring and reporting against the indicators given above through monthly internal reports as well as public disclosures on at least an annual basis.
- On a case-by-case basis, Erdene may also accommodate legitimate third-party, non-governmental monitoring of the environmental impacts of its operations in order to improve performance.

Key sections of the company's Policies and Procedures Manual, including the Erdene Code of Business Conduct and Ethics, are available to the public and may be found at the company's website (https://erdene.com/en/corporate/governance/). Selected operations management policies will be further developed and, where appropriate and required by the Project Lenders, disclosed prior to the construction or operations phases.

4. MITIGATION MEASURES AND MANAGEMENT CONTROLS

4.1 Overview of Management Controls

Based upon the identified impacts and opportunities presented in the ESIA, the following control measures will be put in place during the construction, operations, and closure phases of the KGP.

Particulate matter generated by mining operations at the site will be controlled and managed in accordance with the control measures outlined in the Air Quality Management Plan (AQMP).

The table below presents the key management controls that Erdene will implement.

Table 3 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability			
				Pre-construction	Construction	Operation	Closure
AQ01	Emission impacts from mining sources – at any identified herder camps	a) Dust suppression on stockpiles, haul roads and wind erosion sources b) Use of extraction (e.g. baghouse or cyclone) for material sources such as crushing plant. c) Sprays on conveyors and plant equipment, with a focus on crushing and grinding equipment. d) Implementation of manufacturer recommended engine maintenance and repair programs for all plant and vehicles. e) Replacement of fuel filters, air filters and oil filters in accordance with manufacturers recommendations for diesel generators. f) Use of low sulphur fuels, where available. g) Enclose plant equipment where feasible. h) Implement blasting controls where mine blasting is likely to result in dust emissions that exceed Project standards	• Annual audit • One monitoring exercise in the winter period • Monthly operational report (as related to the identified and potential sources of emissions)	-	-	X	X
AQ02	Emission impacts from the boiler and diesel generators located near the Project Accommodation camp	a) Implementation of the recommended separation distance between camp and source(s). b) Use of low sulphur fuels, where available. c) Replacement of fuel filters, air filters and oil filters in accordance with manufacturers recommendations for diesel generators.	• Commissioning report • Annual audit • Monthly operational report	-	X	X	X

AQ03	Dust management during construction	a) Dust suppression on haul roads and wind erosion sources c) Enclosing potentially dust generating construction equipment where possible.	• Construction Environmental Management Plan (CEMP) to be prepared and implemented by construction contractor.	-	X	-	-
AQ04	Dust management during operation	) Dust suppression on stockpiles, haul roads and wind erosion sources b) Use of extraction (e.g. baghouse or cyclone) for material sources such as crushing plant. c) Sprays on conveyors and plant equipment, with a focus on crushing and grinding equipment. d) Implementation of manufacturer recommended engine maintenance and repair programs for all plant and vehicles. e) Replacement of fuel filters, air filters and oil filters in accordance with manufacturers recommendations for diesel generators. f) Use of low sulphur fuels, where available. g) Enclose plant equipment where feasible. h) Implement blasting controls where mine blasting is likely to result in dust emissions that exceed Project standards	• Operational Environmental Management Plan (OEMP) to be prepared and implemented by ERD and operations implementation.	-	-	X	-

5. MONITORING

5.1 Overview of Monitoring Requirements

The monitoring measures that are to be implemented to assess compliance with Project Standards and to verify baseline conditions are described in this section. In the event that monitoring identifies non-conformance with Project Standards, these will be investigated, and appropriate corrective actions identified.

As outlined in the impact assessment, the Bayankhongor Aimag region is one of the most sparsely populated areas globally. The nearest towns (*soum* centres) to the KGP site are Shinejinst and Bayan Undur, located 70 km northeast and 80 km to the north, respectively. While nomadic pastoral activity does occur in the region, it is expected that there will only be limited and sporadic grazing in the AoI to the mine.

Short term air quality monitoring has been completed at the Project site in 2016 and 2019 as a component of baseline environmental surveys. The baseline ambient air quality monitoring to date has been sporadic and short-term with limited value in providing a quantitative baseline for comparison with post development monitoring. The Project is committed to undertake additional continuous of airborne particulate, PM2.5 and PM10, and for SO_2 and NOx during the pre-development Project stage to verify the baseline air quality conditions and to allow a quantitative assessment of impacts.

The nearest receptor to mine activity is the worker accommodation camp. However, it is not expected that mining activities will impact significantly at the worker accommodation due to the distances and topography between the mine and the camp. Localised impacts from heating and power generation at the campsite will be mitigated through the implementation of recommended separation distances between sources and the camp.

5.2 Monitoring Framework

Air quality monitoring for the Project will have the following objectives:

- Verify baseline ambient air quality to the extent possible prior to Project development.
- Use monitoring data to review and improve the Air Quality Management Plan, as necessary.
- Assess adequacy of dust and other emission controls in ensuring that Project activities do not contribute to ambient air quality that exceeds relevant air quality standards applicable for nearby sensitive receptors and workers.

Air quality monitoring locations will be selected applying national criteria, including *MNS 3113:1981 Atmosphere, Common Requirement for Determination Method of Polluted Air Matter*, and relevant international standards, including the *EU Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC)*. Monitoring locations for ambient air quality will consider the location of any sensitive receptors, including worker accommodation or herder shelters, so that monitoring data will be sufficiently representative of air quality at sensitive receptors. Monitoring locations will avoid being located near emissions sources including power generation, heating facilities and roads.

Erdene will install a weather station at the mine site with the capability to continuously monitor ambient air quality. The monitoring unit will be established and operating at least 3 months prior to the commencement of construction and will allow continuous real time monitoring of PM_{10} and $PM_{2.5}$ and monthly continuous sampling of NO_x and SO_2. The location of the weather station and air quality monitoring station will be selected in consideration of:

- Mongolian National Standards and EU Directives (as listed above);
- access to electrical power;
- within a secure area, and;
- representative of the Project AoI.

The air quality monitoring framework for the Project is outlined in Table 4 and includes the monitoring required measure performance against project KPIs identified in Table 5 and will focus on ensuring compliance with the Project standards using the key performance indicators established in Section 5.3.

Table 4 Air Quality Monitoring Framework

Monitoring Required	Project Phase	Parameters/Frequency	Location
Baseline Verification	At least 3 months prior to commencement of construction	Continuous real time: PM_{10}, $PM_{2.5}$, Continuous sampling with monthly analysis: SO_2, NO_2	At weather station location within Project site boundary.
Construction Environmental Management Plan Monitoring	Construction	PM_{10} , $PM_{2.5}$ monitoring for minimum 12 hour periods at least monthly	To be determined in contractor CEMP approved by Erdene
Gaseous emissions from stationary sources	Construction and commissioning	Ambient sampling of SO_2 and NOx over a minimum one-month period within Project Area	Locations to be determined but should include the worker accommodation camp and locations near the southern boundary of the Project Area.
Monitoring at nearby herder camps - receptors	Construction and operations	When herders are located within the AoI: undertake 12 hour monitoring of PM10 and PM2.5 at least once during each seasonal use and in response to dust complaints.	Locations to be nearby to and representative of receptor location.
Incident reporting	Construction and operations	Monthly record of air quality events that result in high visible dust emissions, worker complaints or external grievances. Records should include incident investigations and responses.	N/A

5.3 Key Performance Indicators

The table below summarises the KPIs and associated key management controls that can be used to assess the progress and effectiveness of proposed mitigation strategies.

Table 5 - Key Performance Indicators

Unique ID	KPI	Target
AQ-KPI - 1	Achieving the relevant ambient air quality standards for this Project at sensitive receptor locations	As per Table 1 in *Chapter C2*
AQ-KPI - 2	Achieving the occupational health and safety guidelines relevant to this Project anywhere within the facility boundary.	As per Table 2 in *Chapter C2*

5.4 Exceedance Procedure

Should an ambient air quality monitoring exceedance be identified the following actions will be taken:

- An investigation will be undertaken to establish the root cause. This will include checking weather conditions at the time of the exceedance, operations and other possible impacts will be considered in the investigation;
- Subject to the findings of the investigation actions will be taken to minimise any reoccurrence of the exceedance where possible;
- The identified cause of the impact and the selected response will be formally documented in an incident response report and electronically recorded in an incident management system; and
- All exceedances will be reported in an annual environmental audit report.

5.5 Review and Revision of this Plan

This Management Plan will be reviewed at a minimum of every six months during construction. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required (as identified through the *Management of Change Procedure* contained within the KGP ESMS Framework), this Management Plan may also be updated on an “as required” basis.

6. TRAINING

All necessary training is provided as part of induction training (to provide general awareness) and job specific training as necessary.

6.1 Induction Training

All employees of Erdene and Contractors working at the Project will be provided with general induction, site specific induction and a broad range of health, safety and environmental awareness training, including the Erdene *Code of Conduct*.

All persons will be tested to ensure that they have understood their inductions and made to re-sit if necessary. Inductions will be available in Mongolian and in English. Erdene will maintain a register of all inducted persons, including any restrictions.

6.2 Job-Specific Training

Persons working in specific areas or on specific jobs may be required to attend additional area or job specific inductions or briefings, which will address air quality management requirements.

7. AUDIT AND REPORTING

7.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with the requirements of the Erdene HSEC Management System (including the ESIA and the KGP Project ESMP).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan also may be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

7.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

8. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of management plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the ESMP and the Management Plans form the KGP ESMP. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system as described.

This Management Plan has overlaps and cross-linkages to several other Management Plans, as follows:

Table 6 Context and Overlaps with Other Management System Documentation

Management Plan Title	**Overlap / Cross Linkage**
Water Resources Management Plan	Contains actions to manage erosion and stabilise drainage channels
Waste Management Plan	Contains actions to manage the IWF and any air quality risks created with the IWF concept
Community Health, Safety and Security Management Plan	Contains procedures to minimise dust generation as a health issue
Occupational Health, Safety and Security Management Plan	OH&S issues in relation to air quality are dealt with in the OHSSMP.
Stakeholder and Communications Management Plan	Contains stakeholder engagement framework which sets out where grievances related to air quality complaints can be processed.
Land Disturbance and Rehabilitation Management Plan	Contains provisions relating to land disturbance and erosion management during construction

9. LIST OF ABBREVIATION, ACRONYMS AND UNITS OF MEASURE USED

AoI	Area of Influence
AQMP	Air Quality Management Plan
CEMP	Construction Environmental Management Plan
EBRD	European Bank for Reconstruction and Development
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
EU	European Union
KGP	Khundii Gold Project
KM	Kilometres
KPI	Key Performance Indicators
MNS	Mongolian National Standards
PM_{10}	Particulate Matter of size less than 10 microns
$PM_{2.5}$	Particulate Matter of size less than 2.5 microns
PR 1	Performance Requirement 1
STEL	Short-Term Exposure Limit
TWA	Time Weighted Average

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan

TMP	D15: Transport Management Plan
LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D2: Noise and Vibration Management Plan

May 2020

Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Noise and Vibration Management Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project).

1.1 Objectives

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define topic-specific training requirements; and
- set out references for supporting materials and information.

1.2 Scope

This Management Plan covers all KGP activities, including contractor activities during construction, operations and closure phases of the KGP. This document outlines Erdene's commitment and approach to managing noise and vibration risks.

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined below (Table 1).

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan.
Senior Management / VPs / Department Heads	• Approve this Management Plan • Overall responsibility for the scope and implementation of this Management Plan • Ensure appropriate resourcing levels to implement the requirements of this Management Plan • Support execution of this Management Plan • Management of implementation activities • Interpretation of monitoring results • Corrective actions
HSEC Manager	• Responsible for the overall implementation of this Management Plan • Responsible for ensuring this Plan is available to all employees and Contractors • Responsible for ensuring that contractors develop noise and vibration management plan and inspection procedures, consistent with the requirements outlined in this plan, prior to the commencement of work • Responsible for ensuring that relevant activities are undertaken in compliance with this Management Plan and related Procedures • Responsible for ensuring that Erdene employees are fully trained in noise and vibration management practices • Responsible for reviewing and approving and overall implementation of corrective actions as a result of non-conformances relating to noise and vibration management
HSEC Team	• Develops Noise and Vibration monitoring plan and schedule • Undertakes periodic audits and inspections of the noise and vibration levels at workplaces with high noise and vibration risks • Reports noise and vibration complaints to the HSEC Team Manager and implements corrective actions
Workplace Supervisors	• Plan work activities involving heavy equipment and machinery according to the requirements of this plan • Conduct routine work area and work plan inspections to ensure this Management Plan requirements are in place and followed • Ensure that any breaches of this Management Plan requirements are reported, and corrective actions are taken
Procurement Team	• Ensure noise and vibration generating equipment purchase is sourced from reputable manufacturers • Ensure, as possible, environmental performance, including noise and vibration, of equipment are considered for procurement decision making
Contractors	• Ensure that noise and vibration management plans are developed to align with this plan and approved prior to commencement of work • Adhere to the requirements of this Management Plan
All Employees	• Adhere to the requirements of this Management Plan

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are introduced in Table 2.

Table 2 Key Interfaces

Team / Unit	Key Interface(s)
HSEC Team	Liaising with local residents especially in relation to consultation and managing community grievances resulting from potential noise impacts.
Procurement	Responsible for sourcing equipment and vehicles with noise and vibration reduction features and Contracting
Operations team	Operating equipment and vehicles
Engineering and Maintenance, including Mobile Maintenance-Mining Fleet, teams,	Responsible for ensuring continual maintenance of plant and equipment to comply with noise and vibration requirements

3. PROJECT STANDARDS

Applicable standards shall be complied with for all Project activities (the "Project Standards"). Project Standards comprise:

- applicable Mongolian legislation and national standards;
- applicable international standards and guidelines; and
- applicable Erdene policies and procedure.

3.1 Applicable Mongolian Law and National Standards

Applicable Mongolian legal and national standards are listed below, detailed descriptions of which may be found in *Chapter A2 Policy and Legal Framework*. Mongolian Laws applicable to noise and vibrations are as follows:

- Law on Environmental Impact Assessment (2012); and
- Law on Air (2012)

Mongolian Government Regulations and Procedures:

- Regulation on General Safety Rules for Blasting, Appendix #2 of the Government Resolution #313, dated August 7th, 2019.

The Mongolian National Standards (MNS) issued by the Mongolian Agency for Standardization and Metrology in relation to noise and vibration include the following:

- MNS 5002:2000 Occupational Safety and Health. Noise. Requirements for General Safety;
- MNS 5003:2000 General Requirements for the Measurement of Noise
- MNS 4585:2016 Mongolian National Air Quality Standards (permissible noise level); and
- MNS 0017-5-1-21:1992 Noise of Motor Vehicles. Level of Noise and Measurements Methods.

Noise and vibration management requirements identified in the statutory Detailed Environmental Impact Assessment (DEIA) for Bayan Khundii have been incorporated in this Management Plan (Table 2).

3.2 Applicable International Standards and Guidelines

The following good international industry practice guidance and legislation have been taken into account:

- EBRD Performance Requirements (PR) (2014) (PR1: Assessment and Management of Environmental and Social Impacts and Issues; PR3: Resource Efficiency and Pollution Prevention and Control); and
- IFC Environmental, Health, and Safety General Guidelines (April 2007).

There are no quantitative vibration thresholds set by Mongolian regulatory or Lender requirements. Therefore, vibration levels recommended by the Technical Basis for Guidelines to Minimise Annoyances due to Blasting Overpressure and Ground Vibration (Australian and New Zealand Environmental Council, 1990), and EU Directive 2002/44/EC of the European Parliament and of the Council of 25 June 2002 on the Minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration) are recommended to KGP as good industry practise for vibration thresholds to be applied appropriately to the Project.

3.3 Applicable Erdene Standards

The primary Erdene policies and standards that apply to noise and vibration management are provided in the *Erdene 2018 Policy and Procedures Manual*, which includes the Health, Safety and Security Policy. The Policy identifies the rationale and guiding principles for the health, safety and security of the Company employees.

Key sections of the company's Policies and Procedures Manual, including the Erdene Code of Business Conduct and Ethics, are available to the public and may be found at the company's website (https://erdene.com/en/corporate/governance/). Selected operations management policies will be further developed and, where appropriate and required by the Project Lenders, disclosed prior to the construction or operations phases.

3.4 Khundii Gold Project Standards

Project standards that KGP is planned to adhere to are shown in **Error! Reference source not found.**.

Table 3 Recommended Noise and Vibration Standards for Khundii Gold Project

Impact	Receptor	Recommended Project Standards	Comments
Noise	Industrial/commercial (day and night-time)	85 dB(A) (8 hour average) 140 dB(C) (Peak/Instantaneous noise level)	Project Standard for all industrial noise levels at KGP based on IFC Environmental, Health, and Safety (EHS) Guidelines: Noise (2007)
	Residential (day-time)	55 dB(A) (16 hour average)	Noise level during 06:00-18:00 hours for workers camp and herders camp areas, based on IFC Environmental, Health, and Safety (EHS) Guidelines: Noise (2007).
	Residential (night-time)	45 dB(A) (8 hour average)	Noise level during 18:00-06:00 for workers camp and herders camp areas, based on IFC Environmental, Health, and Safety (EHS) Guidelines: Noise (2007)
Airblast Overpressure	Noise sensitive sites	115 dB with allowed exceedance on upto 5% of the total number of blasts for 12 months. No exceedance over 120 dB.	Recommended blasting time 9:00am-5:00pm, as feasible, based on *Technical Basis for Guidelines to Minimise Annoyances due to Blasting Overpressure and Ground Vibration* (ANZEC 1990)
Blast Ground Vibration	Vibration sensitive areas	5 mm/sec (peak particle velocity) on allowed upto 5% of the total number of blasts for 12 months. No exceedance over 10 mm/sec.	
Hand-arm vibration	Workers	0.5 m/s^2 for 8 hours	Based on EU Directive 2002/44/EC of the European Parliament and of the Council (2002)
Whole Body Vibration		1.15 m/s^2 for 8 hours	

4. MITIGATION MEASURES AND MANAGEMENT CONTROLS

4.1 Overview of Management Controls

This Management Plan intends to minimise and manage potential noise and vibration impacts of the Project on sensitive receptors, especially community members and Project workers. Noise and vibration management controls use impact mitigation hierarchy principles.

Based upon the identified impacts and opportunities presented in the ESIA, the following control measures will be put in place during the construction, operations, and closure phases of the KGP.

The key management controls to mitigate and manage the Project noise and vibration impacts are provided in Table 4.

Table 4 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of verification	Applicable Phase			
				Pre-construction	Construction	Operation	Closure
NV01	Noise and vibration prevention measures	• Select equipment with noise and vibration abatement technology, where possible; • Restrict unnecessary engine idling of equipment and vehicles; • Place warning signs for all high level of noise and vibration emitting equipment and work areas	• Inclusion of noise and vibration standard requirements in the procurement process for relevant equipment and machinery • Routine workplace inspection/audit report	X	X	X	X
NV02	Onsite use of noise and vibration generating equipment and machinery	• Schedule earth moving and construction activities to minimise the number of heavy construction and earth moving equipment that need to work simultaneously; • Regular maintenance of construction equipment to the manufacturer's specifications; • Provide workers with suitable PPE that reduces the noise level to the Project standard; • Only authorised employees to work in the high noise level generating work areas; • Erect, where required and feasible, noise shields around high noise generating equipment; • Apply a dampening base to larger stationary equipment or areas with high vibration, where feasible;	• Construction work plan • All high noise and vibration generating equipment maintenance records • PPE provision records • Routine workplace inspection/audit report	-	X	X	X
NV03	Blasting noise and vibration reduction	• Schedule blasting in advance • Notify community members and workers of the blasting schedule	• Notification records of blasting schedule	-	-	X	-

NV04	Local stakeholder engagement	• Proactively engage and notify, as part of the stakeholder engagement plan, potential temporary herders who may come and stay close to the mine site about potential high level noise from the mining activities	• Engagement records	X	X	X	-
NV05	Toolbox talks and training	• All personnel using high noise and vibration generating equipment shall be subject to routine training and tool box talks on the equipment use	• Training records	X	X	X	X
NV06	Monitoring	• Determine site noise and vibration monitoring points at sensitive receptor locations in Table 6 for long term monitoring, as required	• Monitoring locations selected	X	X	X	
NV07	Monitoring	• Monitor work places with high level of noise and vibration sources periodically and adjust, as suited, working hours of site workers to minimise exposure to noise and any vibration levels exceeding the Project standard. • Use a grievance procedure to record and respond to any complaints in relation to noise and vibration levels and conduct follow up actions.	• Regular workplace inspection/audit report • Grievance procedure records	X	X	X	X

4.2 Design Controls

Recommended design controls for prevention and/or minimisation of the impacts related to noise and vibrations are defined as follows:

- Select equipment and machinery with standard noise abatement technology;
- Allow adequate setback distance between the workers camp and camp diesel generators;
- Use of sound absorbing construction materials, as required and feasible;
- Use of noise shields for high level of noise generating equipment, as required and feasible;
- Construct enclosures for ore processing plant equipment and diesel generators;
- Place warning signs for high noise and vibration generating areas; and
- Dampening base for larger vibrating equipment or areas, as required and feasible.

5. MONITORING

5.1 Overview of Monitoring Requirements

The Monitoring measures that are to be implemented during the construction and operation phase to assess compliance with Project Standards are described in this section.
In the event that monitoring identifies non-conformance(s) with Project Standards, appropriate corrective actions will be identified based on an investigation.

5.2 Monitoring Framework

Noise and vibration monitoring for the Project will have the following objectives:

- Verify pre-development ambient noise baseline used for impact assessment to the extent possible prior to Project development.
- Use monitoring data to review and improve the Noise Management Plans, as necessary.
- Assess effectiveness of controls and verify compliance with occupational noise criteria at those locations where workers are exposed to elevated noise levels.
- Assess effectiveness of controls and verify compliance with ambient noise criteria at any nearby sensitive receptors.

Noise monitoring locations will be selected in compliance with national criteria, including *MNS 5002:2000 Occupational Safety and Health. Noise. Requirements for General Safety*, and relevant international standards, including *EU Directive 2002/44/EC of the European Parliament and of the Council of 25 June 2002 on the Minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents*. Monitoring locations will consider the location of sensitive receptors and/or workers and be located so as to provide a representative sample of noise received at these locations. Noise monitoring locations will be selected to reduce the influence of non-Project related noise emissions including roads.

5.3 Key Performance Indicators

Erdene will evaluate noise and vibration management performance within the Project site boundary on a continual basis, including selective and fit-for-purpose monitoring beyond the project site boundary, as appropriate. Key Performance Indicators (KPI) to assess noise and vibration management are presented in Table 5.

Table 5 Key Performance Indicators

Unique ID	KPI	Target	Measure
NV-KPI-01	Number of case where Noise and Vibration levels exceeded the Project standards	Target: Zero Minimise and continued improvement in number of reported noise and vibration related incidents	Number of reported noise and vibration related incidents arising from the Project activities per year
NV-KPI-02	Number of noise-related Workers and Community Complaints	Target: Zero Minimise and continued improvement in number of reported noise and vibration related incidents	Number of reported noise and vibration related complaints from the Project activities per year

5.4 Key Monitoring Activities

Key monitoring requirements for assessing the effectiveness of noise and vibration impact management controls at KGP are provided in Table 6. If the monitoring results identify noise and vibration level exceedances over the Project standards investigations will be undertaken and corrective actions for improvement will be identified.

Table 6 Monitoring Measures – Noise and Vibration

Unique ID	Topic/ Aspects	Methods	Periodicity	Location
NV-MON-01	Day and night-time noise levels	Calibrated noise monitoring equipment	Monthly	• Workers' accommodation camp • Herders camp areas in case herders come and use the camps temporarily
NV-MON-02	Workplace with high noise and vibration levels	Calibrated noise and vibration levels monitoring equipment	Monthly	Ore processing plant work areas with high noise and vibration generation
NV-MON-03	High noise and vibration generating mobile equipment use	Calibrated noise and vibration levels monitoring equipment	Monthly during construction; Quarterly during Operations	Monitoring to be undertaken at the manufacturers recommended distance from or at the equipment

5.5 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required (as identified through the *Management of Change Procedure* contained within the KGP ESMP Framework), this Management Plan may also be updated on an "as required" basis.

6. TRAINING

All necessary training is provided as part of induction training (to provide general awareness) and job specific training as necessary.

6.1 Induction Training

All employees of Erdene and Contractors working at the Project will be provided with general induction, site specific induction and a broad range of health, safety and environmental awareness training, including the Erdene Code of Conduct.

All persons will be tested to ensure that they have understood their inductions and made to re-sit if necessary. Inductions will be available in Mongolian and in English. Erdene will maintain a register of all inducted persons, including any restrictions.

General aspects of noise and vibration management applicable to all workers will also be covered.

6.2 Job Specific Training

Any job specific training needs with regard to noise and vibration management will be evaluated based on the noise and vibration monitoring outcomes.

Persons working in specific areas or on specific jobs may be required to attend additional area or job specific inductions or briefings, which will address specific noise and vibration management requirements.

7. AUDIT AND REPORTING

7.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with requirements of the Erdene HSEC Management System (including the ESIA and ESMP).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan may also be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

7.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

8. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of Management Plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the Framework and Management Plans form the KGP ESMPs. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system.

This Management Plan has overlaps and cross-linkages to several other Management Plans (Table 7).

Table 7 Context and Overlaps with Other Management System Documentation

Management Plan Title	Overlap / Cross Linkage
Occupational Health, Safety and Security Management Plan	OHSS risks form the KGP
Transport Management Plan	Vehicle noise management
Stakeholder Engagement Plan	Engagement with local community and any complaints regarding noise
Community Health, Safety and Security Management Plan Management Plan	Noise levels and potential disturbance to potential sensitive receptors
Biodiversity Management Plan	Noise levels and disturbance to wildlife in the Project area
Contractor and Procurement Management Plan	Contractor compliance with the Project requirements

9. LIST OF ABBREVIATION AND ACRONYMS, AND UNITS OF MEASURE USED

DEIA	Detailed Environmental Impact Assessment
EBRD	European Bank for Reconstruction and Development
Erdene	Erdene Mongol LLC
ESIA	Environmental and Social Impact Assessment
HSEC	Health, Safety, Environment and Community
KGP	Khundii Gold Project
KPI	Key Performance Indicator
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
PR	Performance Requirements

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan
TMP	D15: Transport Management Plan
LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D3: Water Resource Management Plan

May 2020

Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Water Resources Management Plan* (WRMP*)* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project).

1.1 Objectives

The primary objective of the WRMP is to protect the sustainability of water resources and manage and prevent any adverse impacts to water users within the Project AoI.

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- roles and responsibilities of key stakeholders;
- the applicable project standards relevant to this WRMP;
- project commitments, procedures and guidance relevant to this WRMP;
- Provide a summary of additional investigations to be undertaken pre-construction;
- monitoring and reporting procedures, including Key Performance Indicators (KPI);
- topic-specific training requirements; and
- references for supporting materials and information.

1.2 Scope

The WRMP covers all KGP and Contractor activities relating to water resources during the entire life cycle of the KGP, from construction through mine operations and eventual closure. This Management Plan covers all water used by the KGP, from the point of abstraction through to its loss from the system and emphasises the need to maximise the recycling and re-use of water in order to minimise the daily volume abstracted from the Khuren Tsav (KT) and Bosgyn Sair (BS) borefield and the Camp Well aquifer. It also covers the protection and monitoring of the water resources in the area, which are essential for the sustainability of the local communities and wildlife. This includes the ephemeral flows in the local streams and the shallow aquifers used by communities.

Refer to Figure 1 for the KGP Site overview.

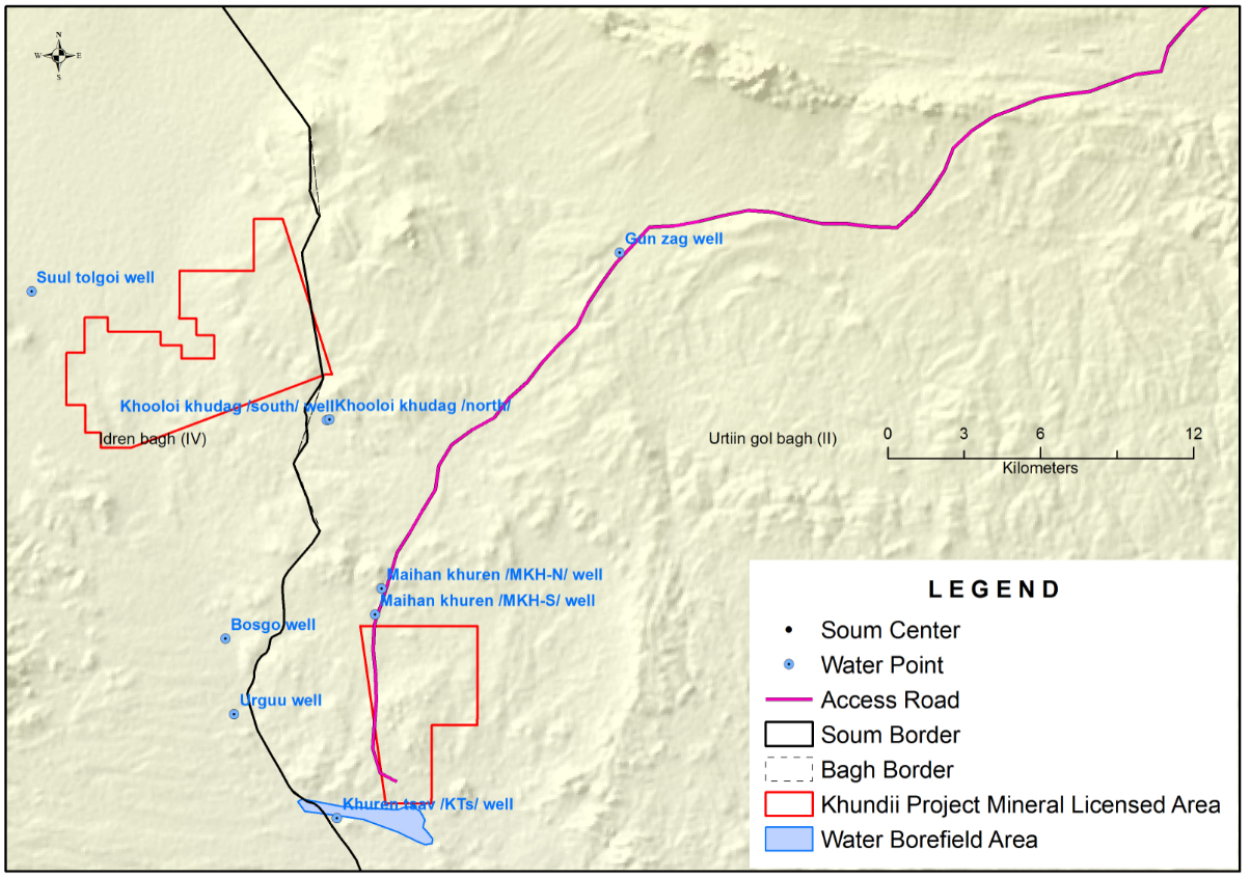

Figure 1: Khundii Project Mineral Licensed Areas and water wells

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined in Table 1 below.

Table 1 - Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan. • Set the vision for implementation of this Management Plan
Senior Management/ VPs/ HSEC Leader(s)	• Overall accountability for this Management Plan is scope and implementation • Ensure appropriate resourcing levels to implement the requirements of this Management Plan • Support execution of this Management Plan • Management of implementation activities
HSEC Team Manager	• Responsible for the implementation of this Management Plan • Responsible for ensuring this Plan is available to all employees and Contractors • Responsible for ensuring that contractors develop their own water resources management plan and inspection procedures, consistent with the requirements outlined in this plan, prior to the commencement of work • Responsible for ensuring that relevant activities are undertaken in compliance with this Management Plan and related Procedures • Responsible for ensuring that Erdene employees are fully trained in water resource management practices • Responsible for reviewing and approving and overall implementation of corrective actions as a result of non-conformances relating to water resource management • Ensure all the permits for water resource management are in place
HSEC Team	• Develops Water Resources Monitoring Plan and schedule • Undertakes periodic audits and inspections of the water resource facilities (I.e. borefield infrastructure), workplace areas and contractor workplaces against the requirements of this Management Plan • Reports all environmental non-conformances and incidents to the HSEC Team Manager and implements corrective actions • Ensures that all water resources data are properly recorded and reported

Role	Responsibilities
	• Tracks compliance to this Management Plan and communicate findings to key stakeholders
Workplace Supervisors	• Conduct routine work area inspections to ensure relevant activities are in accordance with this Management Plan and related Procedures • Report all hazards, near misses, non-conformances and incidents • Prevent practices that might lead to incidents • Ensure that all water resources data are properly recorded and reported
Contractors	• Ensure that supporting water resource management plans (I.e. water monitoring plan) are developed to align with this plan and approved prior to commencement of work • Ensure that relevant activities are undertaken in accordance with this Management Plan and related Procedures • Ensure that all personnel are fully trained in water resource management practices • Ensure incidents are reported to Erdene HSEC Team Lead/Manager and incident investigations are undertaken
All Employees	• Adhere to the requirements of this Management Plan • Prevent practices that might lead to environmental or safety incidents • Report all hazards, near misses, non-conformances and incidents

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan are set out in Table 2 below:

Table 2 - **Key Interfaces in the Implementation of the Plan**

Role	Responsibilities
Executive and Senior Management	• Sets strategy and provides corporate direction to operational personnel
HSEC Team	• Implements corporate strategy and impact management commitments • Consults with stakeholders including herder groups and residents • Managing and processing community grievances from water resources impacts • Feedback of community responses to executives and senior management
Operations:	• Operating procedures targeted to minimise water resources impacts
Engineering and Maintenance	• Responsible for ensuring continual maintenance of plant and equipment to comply with noise and vibration requirements

3. PROJECT STANDARDS

Applicable Standards shall be complied with for all Project activities (the "Project Standards"). Project Standards comprise:

- applicable Mongolian laws and standards;
- applicable international and lender standards and guidelines; and
- applicable Erdene policies and procedures.

3.1 Applicable Mongolian Law and National Standards

Applicable Mongolian legal and national standards are listed below, detailed descriptions of which may be found in *Chapter A2 Policy and Legal Framework*.

Mongolian Laws and national standards concerning water resources are as follows:

- Law of Mongolia on Water (2012);
- Law of Mongolia on Natural Resources Use Fees (2000);
- Law of Mongolia on Environmental Protection (1995);
- Law on Mongolia on Environmental Impact Assessment (1998); and
- Law of Mongolia on Special Protected Areas (1994).

The Mongolian National Standards (MNS) issued by the Mongolian Agency for Standardization and Metrology in relation to water resources include the following:

- MNS 4586:1998 Water Environmental Quality;
- MNS (ISO) 5667-1:2002 Water Quality: General Requirements and Guidelines for Water Sampling;
- MNS 4943:2015 Water Quality Wastewater Effluent Standard;
- MNS 0899:1992 Requirements and Rules for Choosing a Water Supply Source and Hygienic Requirements;
- MNS 3342:1982 General Requirements for Protection of Groundwater from Pollution/Contamination;
- MNS 4047:1988 Environmental Protection Hydrosphere – Surface Water Quality Monitoring Procedure; and
- MNS 4288:1995 General Requirements for Selecting a Site for Wastewater Treatment Plants and Treatment Technologies and Effectiveness.

3.2 Applicable International Standards and Guidelines

Funding for the KGP project may be provided under the European Bank for Re-construction and Development (EBRD) framework. EBRD involvement dictates that the project has been developed to meet the EBRD's Environmental and Social Policy (2014) and the EBRD Performance Requirements (PR).

The following good international industry practice guidance and legislation have been considered:

- *EBRD Performance Requirements (PR), 2014 (particularly PR1: Assessment and Management of Environmental and Social Impacts and Issues, PR3: Resource Efficiency and Pollution Prevention and Control, and PR10: Information Disclosure and Stakeholder Engagement);*
- *IFC Environmental, Health, and Safety (EHS) General Guidelines, 2007;*
- *IFC EHS Guidelines for Water and Sanitation, 2007;*
- *IFC Performance Standards (PS), 2012 (particularly PS1: Assessment and Management of Environmental and Social Risks and Impacts and PS3: Resource Efficiency and Pollution Prevention);*
- *World Health Organisation, Guidelines for Drinking-water Quality, Revision 3, 2004;*
- *Codex Alimentarius Commission, General Standard for Bottled / Packaged Drinking Waters (Other than Natural Mineral Waters), CODEX Stan 227-2001; and*
- *EU Council Directive 98/83/EC of 3rd November 1998 on drinking water quality.*

Erdene will comply with the requirements of *EBRD Performance Requirement 1 Assessment and Management of Environmental and Social Impacts and Issues* (PR1) when implementing its policies. EBRD Performance Requirement 1 (PR1) identifies the importance of developing management plans for residual impacts created by projects under the EBRD funding framework. PR1 states that:

- Taking into account the findings of the environmental and social assessment process and the outcomes of stakeholder engagement, the client will develop and implement a programme of actions to address the identified project's environmental and social risks and impacts and other performance improvement measures to meet the PRs. Depending on the project, the programme may consist of a combination of documented operational policies, management systems, procedures, plans, practices and capital investments, collectively known as environmental and social management plans (ESMP).

PR1 also notes the following:

- The client will establish, maintain, and strengthen, as necessary, an organizational structure that defines roles, responsibilities, and authority to implement the ESMS for ensuring on-going compliance with relevant national laws and regulatory requirements and the PRs.
- It is the client's responsibility to ensure that contractors working on project sites meet the ESMS requirements by adopting and implementing an appropriate contractor management system.
- The client will ensure that adequate systems, resources and personnel are in place to carry out monitoring. The client will review the results of monitoring and initiate corrective actions as necessary.
- The client will provide regular reports to EBRD on the environmental and social performance of the project, including compliance with the PRs and implementation of the ESMS, ESMP, ESAP and stakeholder engagement plan where appropriate.

3.3 Applicable Erdene Standards

Erdene, as a corporate entity, *has a Policies and Procedures Manual* (2018) that guides its activities and provides standards by which its projects will be undertaken. The Manual states that Erdene seeks to manage the potential environmental impacts of its business operations starting from early exploration stage in the following key areas:

- Landscape integrity and resource use.
- Waste and hazardous materials handling and disposal.
- Water quality and availability.
- Traditional environmental practices.
- Air quality.
- Biodiversity and ecosystem services.
- Others, as appropriate to a specific minerals project.

The Manual also notes the importance of Performance Monitoring in relation to the environmental management of its project activities to define the methods of assessing and evaluating the company's performance and risk management, as per the policies and procedures manual.

The Manual commits Erdene to develop a plan for Environmental Management, outlining proposed activities, performance targets and required resources, for each calendar year. The following performance indicators are noted in the Manual to help the company measure the performance of its environmental management.

- Environmental management systems designed and implemented per project.
- Completion of appropriate rehabilitation of all disturbances, such as related to field camps, drill pads, temporary roads, and others per project.
- Completion of annual material and carbon footprint reports.
- Number of environmental stewardship investments per project.
- Early research and experimentation for biological reclamation.
- The company executive will appoint a senior management representative to oversee and facilitate monitoring and reporting against the indicators given above through monthly internal reports as well as public disclosures on at least an annual basis.
- On a case-by-case basis, Erdene may also accommodate legitimate third-party, non-governmental monitoring of the environmental impacts of its operations in order to improve performance.

4. MITIGATION MEASURES AND MANAGEMENT CONTROLS

4.1 Overview of Management Controls

Based upon the identified impacts and opportunities presented in the ESIA, the following control measures will be put in place during the construction, operations, and closure phases of the KGP.

A list of the identified potential water resource impacts, their control descriptions and means of verifications for those control measures are documented in Table 3 below.

4.2 Implementation

Water resources management measures will be implemented by means of an operational Water Monitoring Plan (WMP) and associated supporting procedures that reflect the requirements of the key management controls as described in Table 3.

Through the WMP, Erdene will pursue an integrated approach to gathering and interpretation of the information on surface and groundwater, flood events, and erosion. The WMP will present a series of separated specific sets of procedures, such as for monitoring surface water (including floods, etc.) and groundwater levels. It will also present details on data QA/QC and evaluation and how the BK Project will assess the significance of any changes to the baseline data and, where appropriate, identify the need for additional actions and mitigations.

The WMP will present an approach to establish specific action criteria for water resources across the project AoI and subsequent management actions. The WMP will present the additional baseline data possible to be obtained prior to construction and proposed groundwater abstraction works from the KT and BS borefields. Further analysis of these data will be undertaken to facilitate the establishment of specific and appropriate quantitative action criteria relating to groundwater elevation and quality and protection of sensitive receptors, including herder water users and groundwater dependant ecology within a groundwater abstraction Radius of Influence (RoI). Upon completion of these further assessments, this WRMP and the WMP may be updated to include specific water resources action criteria and appropriate management actions as necessary, to be implemented during project operations.

Response actions to be implemented should thresholds be met/exceeded may include alteration of the groundwater abstraction regime through changes in the pumping rates from individual water supply bores or provision of assistance or infrastructure to ensure access to water for herders within a groundwater abstraction RoI is maintained to the same extent to which access had been available prior to the operation of the KT and BS borefields. Proposed mitigation actions will ensure that any reduced access to water will be managed and/or replaced within a timeframe that will ensure no adverse impacts to sensitive receptors. The implementation of the monitoring programs will allow for the early detection of potential reduced herder access to groundwater due to drawdown.

Implementation of these measures also aims to enable understanding of any impacts to herder wells, so that necessary assessment and mitigation can be undertaken. The Grievance Redress Mechanism developed for the Project includes a specific procedure to address effectively any claims related to water availability to herders or impacts on herders' wells.

Table 3 presents the key management controls for adherence by all KGP Employees and Contractors.

4.3 Alerts and Actions

Details of the alerts and actions to be taken where impacts are identified are presented within the section and sub-sections and will be further detailed in the WMP upon collation of additional baseline data.

Impacts are defined based on notional triggers such as a sustained drop in water levels greater than the seasonal norm and/or sufficient to present the user with issues for supply; or a statistically significant variation in water quality when compared to long term trends. This WRMP presents an overview of the alerts and actions that will be presented in further detail as part of an operational WMP in the following sub-sections 4.3.1 and 4.3.2.

4.3.1 Groundwater Level

A sustained groundwater level change (either rising or falling) observed in monitoring bores will alert further assessment. The trend should occur over at least three measurement periods. Assessment will also be triggered where a complaint is received regarding changes to groundwater levels. Groundwater monitoring networks will allow for a pre-emptive assessment of groundwater impacts to sensitive receptors.

Should an assessment of groundwater elevation data indicate that impacts are attributable or partially attributable to groundwater abstraction works, then appropriate mitigation actions or replacement of supply measures would be triggered.

The groundwater level assessment will comprise the following key steps:

- review data for the monitoring well and ensure correct and accurate;
- compile rainfall and relevant operational (i.e. borefield abstraction or herder usage) data and compare to monitoring bore water levels;
- review groundwater levels in nearby monitoring bores that target the same hydrogeological unit;
- assess statistical significance of variation where possible through comparison to baseline and long-term trends;
- assess findings against conceptual understanding and, where appropriate, groundwater flow model (i.e. was a reduction in water level expected);
- conclude reasons for water level change – where uncertain develop work plan to collect more data to resolve uncertainty;
- where water level changes due to leakage from a storage facility then conduct an engineering assessment of the facility to identify if remedial action can be taken or is required;
- identify sensitive receptors (water users, groundwater dependent vegetation etc) and assess magnitude of any impact; and
- review of assessment and confirm if mitigation/remedial action is required and, where required, select mitigation/remedial action method (such as support to develop deeper wells) and implement.

Monitoring data, with a focus on shallow groundwater, will be assessed against available climate information including precipitation data, to distinguish impacts associated with natural variability from any groundwater abstraction impacts.

Groundwater abstraction impact action criteria will include defined groundwater drawdown thresholds at receptors. Response actions to be implemented should thresholds be met/exceeded may include alteration of the groundwater abstraction regime through changes in the pumping rates from individual water supply bores or provision of assistance or infrastructure to ensure access to water for herders within the NK Basin is maintained to the same extent to which access is available prior to groundwater abstraction.

These measures will be implemented such that any disruption of water supply to herders due to abstraction will not exceed a 6-month period and will be replaced in a timely manner to ensure that water availability is maintained equal to or greater than availability under baseline conditions. The actions taken to address reduced herder access to water may include modification of existing well infrastructure or provision of alternative infrastructure. The mitigation actions to be implemented in the event that threshold water level triggers are exceeded will be subject to extensive engagement with affected water users prior to commencement of borefield operation. This process, including response triggers and actions will be specified in the appropriate management plans.

Should monitoring trigger points be exceeded for groundwater levels and water quality, management control options to be considered will include:

- adjusting groundwater abstraction rates from appropriate bores to reduce or eliminate observed impacts;
- installation of additional production bores at alternate locations; and
- provision of water to replace any loss of access, as appropriate, where controls mentioned above will not mitigate impacts.

4.3.2 Groundwater Quality

A sustained change in water quality observed in monitoring bores will action further assessment. The trend should occur over at least three measurement periods except where the measurement exceeds an appropriate quality standard relevant to the local water quality, where re-testing is required to confirm the reading. Assessment will also be triggered where a complaint is received regarding groundwater quality.

The groundwater quality assessment will comprise the following key steps:

- review field and laboratory data and quality standards to ensure data is correct;
- compile rainfall and operational (i.e. abstraction) data and compare to water quality;
- assess statistical significance of variation where possible through comparison to baseline and long-term trends;
- review water quality in nearby monitoring bores that target the same hydrogeological unit and additionally features that could be the source of such anomalies;
- assess findings against conceptual understanding (i.e. was a change in water quality anticipated);
- conclude reasons for water quality variance – where uncertain develop a work plan to collect more data to resolve uncertainty;

- identify sensitive receptors (water users, groundwater dependent vegetation etc) and assess magnitude of any impact; and
- review of assessment and confirm if mitigation is required and, where required, select mitigation method and implement.

Table 3 - Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability			
				Pre-construction	Construction	Operation	Closure
WR01	Water use and resource efficiency	• Monitoring of water use • Water conservation measures will be applied through treatment and re-use of wastewater.	Water use records Inspection records	-	X	X	-
WR02	Groundwater surface water quality protection	The following controls shall be used to minimise the occurrence of leaks and spills of hazardous materials to soil and water: • All hazardous wastes for which there is not an engineered and approved treatment or disposal method available will be properly stored on site until a treatment and/or disposal route becomes available; • Vehicles and machines used during construction and operation of the KGP will be subjected to regular mechanical inspections to minimise the occurrence of leaks and spills of fuels, oils and hydraulic fluids; • Fuel, oil and chemical storage tanks will include impervious secondary containment to prevent direct spills or releases to the soil; and • Soil contamination from spills or leaks will be remediated through removal of contaminants, neutralisation or remediation.	Compliance with operational procedures Compliance with vehicle maintenance schedules Mechanical inspections	-	X	X	X

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability			
				Pre-construction	Construction	Operation	Closure
WR03	Surface water management	During construction and maintenance activities, potential impacts associated with disturbances to the natural surface water regime will be avoided where possible or minimised by employing the following measures: • Road and pipeline crossings will be constructed in a manner that maintain downstream surface or subsurface water movement; • roads will be constructed with drainage design to accommodate any stormwater runoff and maintain local hydrology; • areas of natural drainage will be protected from disturbance using barriers and other land disturbance controls; • Short term disturbance of drainage systems associated with construction, including trenching, temporary roads and other earthworks will be restored and stabilised on completion of works; • erosion and sediment controls will be applied during construction to prevent increased sediment transport following rainfall; • drainage construction and engineering controls to prevent uncontrolled stormwater runoff will be included during construction. • installation of trench breakers in pipeline excavations that intersect ephemeral drainage channels, as required and feasible.		X	X	X	X

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability			
				Pre-construction	Construction	Operation	Closure
WR04	Water criteria	• Develop and implement criteria on water abstraction, dewatering, and effluent water-quality, based on government regulations. • Routine assessment of the criteria will take into consideration baseline and operational water level and quality data obtained post commencement of groundwater abstraction. • During revisions of this WRMP every 2 years, the criteria will be assessed against site-specific data to ensure they remain appropriate for management of impacts to water resources within the KGP Project AoI.	Water Use Permits Water reporting to Ministry of Environment, Green Development and Tourism Effluent Standards Water Reserve Approvals Environment & water mandatory training for TTS employees including contractors Criteria Assessment records WRMP review documentation	X	X	X	-
WR05	Wastewater treatment	• Grey and black water treatment will be achieved using a packaged plant. Grey water will be treated and recycled where possible to reduce raw water makeup requirements.	Camp records	X	X	X	-
WR06	Water use impacts	• Implement routine monitoring of groundwater elevations within the KGP AoI to establish	Camp records	X	X	-	-

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability			
				Pre-construction	Construction	Operation	Closure
		additional baseline data. • Assess monitoring data, with a focus on shallow groundwater, against available climate information including precipitation data, to distinguish impacts associated with natural variability from any groundwater abstraction impacts. • Review groundwater abstraction impact action criteria to include defined groundwater drawdown thresholds at receptors. • Response actions will be specified in the appropriate monitoring plans and in the instance that monitoring trigger points be exceeded for groundwater levels and/or water quality, management control options to be considered include: • adjusting groundwater abstraction rates from appropriate bores to reduce or eliminate observed impacts; • installation of additional production bores at alternate locations; and • provision of water to replace any loss of access, as appropriate, where controls do not mitigate impacts satisfactorily.	Water Resources Monitoring Plan				
WR07		Implement the KGP grievance process	Water Resources Monitoring Plan	-	X	X	-

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability			
				Pre-construction	Construction	Operation	Closure
			Community Complaints and Feedback Management Procedure				
WR08	Toolbox training	All Employees and Contractors working on the KGP Project, in water resource-related activities, shall be subject to routine toolbox training. This will include details on the importance of water resource conservation and management.	Training/toolbox talks/ records checked to ensure complete	X	X	X	-
WR09	Specialist task training	Specialist training shall be provided to key personnel involved in environmental water monitoring and sampling.	Training records	X	X	X	-
WR10	Sampling protocols training	All Project personnel undertaking monitoring and/or water sampling will be trained in the sampling protocols and QA/QC project plan.	Training records	X	X	X	-

4.4 Design Controls

Design controls relating to the prevention or minimisation of impacts on water resources are as follows:

- constructing roads with gutters side drains to accommodate any stormwater runoff and maintain local hydrology, including those associated with site operations and any improvements required to the off-site access road.
- including drainage construction and engineering controls to prevent uncontrolled stormwater runoff and diverting clean stormwater to the surrounding area.
- burying pipelines below the ground freezing to minimise water loss and leaks and providing insulated air release valves and isolation valves.
- Investigate the feasibility of installing additional leak detection systems on the main supply pipeline to detect and further minimise potential water loss.
- Periodic inspections of water pipeline to assess integrity of pipeline and potential for leaks.
- constructing fords or culverts where Project construction facilities/infrastructure (e.g., Project roads) cross ephemeral surface water channels or playa areas. Where culverts are used, these locations will be individually assessed, designed, and installed to ensure adequate flow of flood waters and to avoid significant erosion upstream or downstream of the culvert. Culverts will be designed to accommodate 1 in 10-year flood events, except in headwater locations, where they will be designed to accommodate 1 in 100-year flood events.
- storage sites for hazardous construction materials, fuel, oil and chemicals will be constructed to be impermeable.
- constructing the surface water drainage system at the KGP Site as follows:
    - both surface runoff and indirect discharge from potentially contaminating Site areas will be treated and used to avoid potential impacts on the water quality of adjacent streams, soils and groundwater.
    - runoff from fire control systems in areas with no risk of oil contamination will be removed by drains and treated for reuse.
    - oil interceptors will be used to ensure that oil and fuel is not discharged to receiving water bodies, such as shallow aquifers and ephemeral surface water drainage channels.
    - rainfall runoff collected from undisturbed areas will be diverted to prevent contamination.

4.5 Water Recycling and Management

KGP's commitment to water recycling and management is demonstrated via the active conservation of water for all the operation phase activities. The KGP Project design includes surface water management measures which will mitigate impacts associated with potential contaminant migration. Stormwater and drainage systems will be designed to capture runoff from potentially contaminating activities and processes while diverting uncontaminated stormwater to the downstream natural drainage systems.

5. MONITORING

The operation phase WMP will present detailed requirements regarding the water resources monitoring program. This Section provides a summary of additional; pre-construction works required to further assess Project impacts to water resources and inform the establishment of the operational phase WMP.

5.1 Proposed additional (pre-construction) groundwater investigations

5.1.1 KT-BS wellfield including camps

5.1.1.1 Proposed initial works

Four new groundwater monitoring wells are proposed to be installed prior to any production pumping to enhance the groundwater monitoring network and further understand aquifer extent and hydrogeological regime within the borefield.

Both production and monitoring wells should be commissioned prior to any long-term use. This entails the redevelopment of the well by airlifting or pumping, or a combination of both. The process removes any debris or fines that may have accumulated, increase the effective porosity and permeability improving flow between the bore casing and surrounding aquifer, and to create a graded zone of sediment around the screen stabilizing the formation preventing further movement of debris/fines.

Each production well will be fitted with a submersible pump, such as a Grundfos 45S30-7 model (Tetra Tech 2019b) or equivalent. Pump dimensions are ~1m length and ~100mm in diameter at a depth of ~60mbgl, and the capacity to pump between 2 to 4 L/s assuming the hydraulic head is close to ground level (Tetra Tech, 2019b).

Headworks will be installed at the production and monitoring wells to protect the well from natural elements such a freezing, possible flooding, vehicle movement, include air valves with access for ongoing monitoring. The production well infrastructure, including the pump, riser main and pipework, will be temporary fixtures so they can be readily moved to a new well location, if required.

Stress testing (pumping), followed by analyses of drawdown using diagnostic plots, will be undertaken to further understand the aquifer and the spatial interaction of fracture hosted aquifer systems. Longer term 30-day aquifer pumping test during the construction phase will be undertaken and supported by a monitoring network within a 200m radius of the pumping bore. The better yielding boreholes identified within the additional aquifer testing program should be used for water supply, with the surrounding open exploration holes used as monitoring bores.

5.1.1.2 Pre-construction

Currently there has been an approximate 1:3 bore success rate (~3 pilot holes for every successful bore) To improve this ratio, more detailed structural analysis will be undertaken prior to construction to understand the structural setting and identify water bearing structures. Erdene have already made significant progress regarding this methodology (refer Okhi-Us, 2019 and 2017) but given the primary aquifers are structurally controlled, it will be an ongoing requirement. A detailed structural mapping assessment will be carried out prior to locating any new wells.

5.1.1.3 During operations

Ongoing replacement of wells may be required during operations. The requirement will be assessed year on year.

5.1.1.4 Production well design

New production wells should follow the design as detailed in Figure 2 in the Water Supply Evaluation of Tetra Tech (2019b) and have been included in Appendix X of this management plan. This design involves the installation of larger diameter permanent (usually steel) casing in the upper part of the borehole, with small diameter liner installed to the base of the borehole where slotted pipe is at the depths of water bearing lithologies.

All new wells and boreholes should be developed on completion of drilling, to repair any damage done to the formation during the drilling operation so that the natural hydraulic properties are restored, and that groundwater will flow freely from the surrounding aquifer into the borehole. Well development and commissioning can be done using airlifting or pumping, or a combination of both.

5.2 Groundwater monitoring

5.2.1 Standing water levels

All production wells and monitoring boreholes will be installed with long term pressure transducers to digitally record standing groundwater levels, temperature and electric conductivity (EC) in combination with either a i) DataGrabber – a physical retrieval of data from the down hole LeveLogger using direct cables and a USB; ii) LeveLogger App - a bluetooth wireless connection from smart phone to the Levelogger, or iii) LevelSender a telemetry system connecting LevelLoggers to anywhere using the cellular network (if a network is available).

Ongoing regular recordings of these parameters provides invaluable insight into the behaviour of the aquifers, particularly interaction between discreet aquifers and changes in water quality.

5.2.2 Geochemistry

The geochemistry suite for testing will follow government guidelines and permitting requirements. The analytical suite for pre-construction works could be reduced to basic parameters for any non-potable water wells, and at the least include temperature, pH, EC, HCO_3, Na, Cl, SO_4, Mg and Ca.

5.2.3 Monitoring borehole design

The construction of the groundwater monitoring boreholes will follow similar design to the existing monitoring boreholes. Final placement should be based on the same structural lineaments as the production wells, such as perpendicular and parallel to the strike of primary structures, to achieve connectivity (Tetra Tech, 2019c).

The depth of the monitoring well will depend on the proximity to the production well such that 75m depth for monitoring wells within 10m of the production well and 50m depth for monitoring wells at 100m distance from the production well. Length of slotted or open zones including the type, shape and size of filter pack material, should be consistent with existing installations and developed.

5.3 Areas for future wellfield development

It is anticipated that additional wellfields and bores will be necessary to ensure longevity of the water supply. A comprehensive knowledge of the fracture distribution and weathered zones is traditionally the most important horizons for groundwater resource development. Detailed structural mapping combined with geophysical methods such as resistivity mapping, will be undertaken prior to the development of any potential wellfield to enhance the groundwater strike rate during any future drilling programs.

Four prospective wellfields have been recently identified through a combination of local knowledge and international experience. It is understood an area directly north of the western portion of the KT-BS wellfield, around the alteration zone of the Ulaan license area, is a viable prospect for additional water resources (~5km from the plant site). Additionally, the area west of the driller's camp on the Khundii license has potential to host additional water (~5km from the plant site, to the north)."

The third and fourth prospective areas are lithologies containing high Mn. This can indicate Mn precipitation on joints/fractures which are often associated with groundwater flow implying porosity and higher yields. Using an inverse distance model for Mn based on assays from the resource drill holes, some high points can be inferred at depth (near base of pit) in the north and western sides of the proposed pit.

5.4 Overview of Monitoring Requirements

The processes to identify impacts to identified receptors, including herders and their access to water, are presented within this WRMP and the WMP. The processes include recording groundwater abstraction volumes from KT and BS borefields and assessing extracted volumes against design controls and monitoring groundwater levels at designated locations to assess impacts against project thresholds.

The monitoring measures that are to be implemented during the operations phase to assess compliance with Project Standards are described in this section.

In the event that monitoring identifies non-conformance with Project Standards, these will be investigated, and appropriate corrective actions identified.

5.5 Key Performance Indicators

The table below summarises the KPIs and associated key management controls that can be used to assess the progress and effectiveness of proposed mitigation strategies.

Table 4 - Key Performance Indicators

Unique ID	KPI	Target	Measure
WRMP-KPI-01	Number of recorded water-related non-conformances with this Plan.	Minimise and continued improvement in number of reported water-related non-conformances.	Number of reported water-related non-conformances per year.
WRMP-KPI-02	Number of water-related complaints from local communities as recorded as per the Community Complaints and Feedback Management Procedure	Minimise and continued improvement in number of water-related community complaints.	Number of reported water related community complaints per year
WRMP-KPI-03	Number of reported and confirmed instances of impacts to surface water resources	Target: zero	Incidents of surface water impacts from environmental incidents including spills Number of confirmed impacts to herder wells, springs and/or groundwater dependent receptors

5.6 Key Monitoring Activities

Key monitoring activities will focus on assessing the quantity and quality of the surface water and groundwater in the KGP's AoI. Specific monitoring provisions will be presented in the more detailed WMP.

Among these, provision will be made for supporting a community-based monitoring programme in relation to water resources. Erdene recognises that the management of water resources in this region is of great importance to local herders and residents, whose livelihoods depend on it. The potential for a community-based monitoring programmes of water resource (and other aspects such as pasture, and wildlife) is proposed to be included within the Local Cooperation Management Plan (LCMP). Key to community-based monitoring is the capacity and skills development associated with such programmes. As such the nature, scope, potential participants, and skills development aspects, among others, associated with such a programme will be further investigated as part of consultation activities proposed to be held with local communities under the LCMP. Should community-based monitoring of water resources be supported by local communities, then the programme and results thereof, will be directly linked to, and inform, this Water Resources Management Plan.

5.6.1 Alerts and Actions

The WMP will include alerts and actions for groundwater elevation, groundwater quality, sediment and surface water quality and erosion and sedimentation across the water resources AoI. Details regarding triggers for further assessment and potential management or mitigation actions necessary will also be presented within the WMP. In addition, as noted above a key action trigger will include community complaint about water impacts. Mitigation and management actions presented within the WMP include specific detail regarding the process by which the issue (i.e. trigger point exceedance) can be resolved.

5.7 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required (as identified through the *Management of Change Procedure* contained within the KGP ESMS Framework), this Management Plan may also be updated on an "as required" basis.

6. AUDIT AND REPORTING

6.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with the requirements of the Erdene HSEC Management System (including the ESIA and the KGP Project ESMP).

All incidents and non-conformances identified during these inspections will be reported as per the requirements of the KGP HSEC MS as described in the KGP ESMP Framework.

Conformance with this Management Plan also may be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

6.2 Record Keeping

Erdene will require all contractors to undertake audits and will monitor the efficacy of mitigation and monitoring through the audit reporting program.

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

7. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of Management Plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the Framework and Management Plans form the KGP ESMPs. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system.

This Management Plan has overlaps and cross-linkages to several other Management Plans, as follows:

Table 5 Context and Overlaps with Other Management System Documentation

Management Plan Title	Overlap / Cross Linkage
Biodiversity Management Plan	Management and monitoring requirements of flora species
Air Quality Management Plan	Management of dust issues
Hazardous Materials Management Plan	Managing accidental release of hazardous materials into the environment
Waste Management Plan	Managing waste collection, handling and disposal
Contractor and Procurement Management Plan	Contractor compliance with Project requirements
Stakeholder and Communications Management Plan	Particularly in relation to engagement with local community and water resources related complaints
Crisis and Emergency Response Plan	Community preparedness in case of emergency situations

The following procedures will support implementation of this Management Plan at KGP providing detailed information:

- *Water Monitoring Plan*
- *Land Distrurbance Permit Procedure;*
- *Land Rehabilitaion Procedure; and*
- *Topsoil handling and Storage Procedure*.

Necessity of developing additional procedures to support effective implementation of this Management Plan will be evaluated based on the monitoring results.

8. LIST OF ABBREVIATIONS, ACRONYMS AND UNITS OF MEASUREMENT

AoI	Area of Influence
EBRD	European Bank for Reconstruction and Development
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
KGP	Khundii Gold Project
KPI	Key Performance Indicators
RoI	Radius of Influence
TMP	Transport Management Plan
WMP	Water Monitoring Plan
WRMP	Water Resources Management Plan
WWTP	Wastewater Treatment Plant

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan
TMP	D15: Transport Management Plan
LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D4: Biodiversity Management Plan

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Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the Biodiversity Management Plan for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project).

1.1 Objectives

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define topic-specific training requirements; and
- set out references for supporting materials and information.

2. SCOPE

This Management Plan covers all KGP activities, including contractor activities during construction, operations and closure phases of the KGP. This document outlines Erdene's commitment and approach to managing biodiversity impact risks.

3. ROLES AND RESPONSIBILITIES

3.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlines below (Table 1).

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan.
Senior Management / VPs / Department Heads	• Approve this Management Plan • Overall responsibility for the scope and implementation of this Management Plan • Ensure appropriate resourcing levels to implement the requirements of this Management Plan • Support execution of this Management Plan • Management of implementation activities • Interpretation of monitoring results • Corrective actions • Provide leadership on biodiversity management issues
HSEC Manager	• Responsible for ensuring this Plan is available to all employees and Contractors • Responsible for ensuring that relevant activities are undertaken in compliance with this Management Plan and related Procedures • Responsible for ensuring that Erdene and contractors' employees are fully trained in biodiversity management practices

	• Responsible for reviewing and approving and overall implementation of corrective actions as a result of non-conformances relating to biodiversity management
HSEC Team	• Develops Biodiversity monitoring plan and schedule • Implements the biodiversity management controls • Develops necessary biodiversity management induction training for all employees and contractors • Provides training and guidance to Erdene and contractors' employees on the requirements of this management plan • Tracks compliance to this management plan and reporting
Workplace Supervisors	• Plan and implement all work activities according to the requirements of this plan • Ensure that any breaches of this Management Plan requirements are reported, and corrective actions are to be taken
All employees and Contractors	• Comply with requirements of this Management Plan

3.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) with other departments are introduced in Table 2.

Table 2 Key Management Interfaces

Team / Unit	Key Interface(s)
HSEC Team	Liaising with local residents especially in relation to consulting and managing community grievances resulting from biodiversity issues
Engineering and Maintenance Team	Ensuring all land clearing activities to comply with biodiversity requirements
Transport and Mining Fleet Team	Planning all transport activities to comply with requirements of this plan

4. PROJECT STANDARDS

Applicable standards shall be complied with for all Project activities (the "Project Standards") and the Project Standards comprise:

- applicable Mongolian legislations and national standards;
- applicable international standards and guidelines; and
- applicable Erdene policies and procedure.

4.1 Applicable Mongolian Law and National Standards

Mongolian Laws applicable to biodiversity are as follows:

- Law on Environmental Protection (1995);
- Law on Soil Protection and Prevention from Desertification (2012);
- Law on Special Protected Areas (1994);
- Law on Special Protected Area Buffer Zones (1997);
- Law on Environmental Impact Assessment (2012);
- Law on Fauna (2000); and
- Law on Natural Plants (2012).

Mongolian National Standards (MNS) applicable to biodiversity conservation include:

- MNS 0017-5-1-19:1992 General Requirements for Rehabilitation of Disturbed Lands;
- MNS 4915:2000 Technical Requirements for the Reclamation and Re-Vegetation of Disturbed Lands from Geological Exploration Works;
- MNS 4915:2000 Technical Requirements for Determination of the Fertile Soil Layer Standard While Performing Earth Work;
- MNS 4920: 2000 Environment. Slope of Destroyed Land. Technical Requirements;
- MNS 5914:2008 Environment. Land Reclamation. Terms and Definitions;
- MNS 5915:2008 Environment. Classification of Land Destroyed Due to Mining Activities;
- MNS 5916:2008 Environment. Requirements for Fertile Soil Removing and its Temporary Storage during the Earth Excavation; and
- MNS5918:2008 Environment. Re-Vegetation of Disturbed Land. Technical Requirements.

See *Chapter A2: Policy and Legal Frameworks* for additional information on National regulations.

4.2 Applicable International Standards and Guidelines

The following good international industry practice guidance and legislation have been taken into account:

- EBRD Performance Requirements (PR) (2014) (particularly PR6: - Biodiversity Conservation and Sustainable Management of Living Natural Resources); and
- IFC Environmental, Health, and Safety General Guidelines (April 2007).

4.3 Applicable Company Standards

The primary Erdene policies and standards that apply to biodiversity management are provided in the Erdene (2018) Policy and Procedures Manual, which includes the Biodiversity and Ecosystem Services Policy. The Policy identifies the company's commitments to biodiversity and ecosystems services management, including necessary biodiversity offset for impacts that cannot be rehabilitated.

5. MITIGATION MEASURES AND MANAGEMENT CONTROLS

5.1 Overview of Management Controls

This Management Plan intends to minimise and manage potential biodiversity impacts of the Project on priority biodiversity and critical habitat features. The key management controls to mitigate and manage the Project biodiversity impacts are provided in Table 3.

5.2 Voluntarily Biodiversity Conservation Actions

The Project biodiversity impact assessment *(C6: Biodiversity Conservation)* did not identify significant adverse residual impacts to critical habitat species from the KGP activities after the recommended impact mitigation actions are implemented. Therefore, no biodiversity offset programme is recommended for KGP at this time.

The Critical Habitat Assessment (CHA) for the KGP identified Critical Habitats for six mammals (*Camelus bactrianus, Equus hemionus, Uncia uncia, Ovis ammon, Ursus arctos gobiensis, Gazella subgututurosa*) and one reptile (*Cyrtopodion elongatus*) species within the conservatively defined critical habitat study areas for KGP.

Considering the importance of the regional protected areas for conservation of the critical habitat triggering species, Erdene is voluntarily committed to the following conservation actions with the aim of supporting the critical habitat triggering species existing habitats in the region or their survival during the times of environmental hardship:

- Supporting scientific research studies with regard to the Critical Habitat Triggering species;
- Providing food to critical habitat mammal species during harsh winter or drought;
- Maintaining water points for wildlife in the protected areas, where feasible;
- Providing capacity building training programmes to community members with regard to biodiversity conservation and pasture management;
- Supporting additional income generating projects with conservation objectives under the Local Government Cooperation Agreement within the Protected areas buffer zones;
- Supporting initiatives to increase the Protected areas management capacity;
- Cooperating with stakeholders to facilitate biodiversity conservation initiatives; and
- Sharing the Project's biodiversity monitoring results with other interested parties for legitimate research purposes.

Actions undertaken for the above activities will be reported annually to KGP's external and internal stakeholders.

Table 3 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of verification	Applicable Phase		
				Construction	Operation	Closure
BD01	Priority plant species loss from land disturbance	• Implement Land Disturbance Permit[1] (LDP) procedure to prevent unauthorised land disturbance	• LDP Records	X	X	X
BD02		• Conduct pre-construction survey for all land disturbance areas and avoid areas containing priority plant species where possible	• Records of pre-construction surveys	X	X	
BD03		• Implement Priority Plant Protection Procedure prior to any land clearing	• Records of Priority Plant Protection Procedure implementation	X	X	
BD04		• Progressively rehabilitate disturbed lands, except the open pits, where feasible	• Rehabilitation records	X	X	X
BD05		• Develop and enforce a no off-road driving policy	• Traffic monitoring records	X	X	X
BD06		• Implement road maintenance and improvement work to avoid creating multiple lines of earth road or road widening by Project traffic	• Road maintenance records	X	X	
BD07	Uncontrolled dust emissions from vehicle movements and earthworks during the construction and operation of the Project on vegetation in the mine site area	• Watering of onsite roads for dust suppression and/or any other appropriate dust suppression measures	• Dust control records (e.g. Road watering records, etc.)	X	X	X
BD08	Accidental leaks or spillages that impact soils and flora	• Provide environmental awareness training to all employees and contractors	• Training records	X	X	X
BD09		• Construct spill containing bunding for hazardous materials storage areas	• Bunding in potential spill areas	X	X	

BD10	Unauthorised gathering of rare or beneficial species by Project workers	• Provide environmental awareness training to all employees and contractors	• Training records	X	X	
BD11		• Implement no hunting and gathering policy	• Inspection records from No Hunting and Gathering Policy	X	X	
BD12	Potential loss of marbled polecat *(Vormela peregusna)* habitat	• Conduct pre-construction survey for marbled polecat den presence in direct construction footprint areas	• Pre-construction survey records	X	X	X
BD13		• Engage with specialists to safely capture and release of marbled polecats if this species active dens are found within the direct footprint areas	• Wildlife capture and release records	X	X	
BD14	Indirect habitat loss via avoidance by wildlife, particularly by large migratory ungulate species	• All Project related traffic are restricted to daytime travel, whenever possible	• Traffic monitoring records	X	X	X
BD15		• Determine suitable onsite and offsite speed limits and enforce		X	X	
BD16		• All construction traffic to be organised in convoys		X	X	
BD17	Increased mortality from traffic collision with wildlife	• All Project related traffic are restricted to daytime travel, whenever possible	• Traffic monitoring records	X	X	
BD18		• Vehicle speeds are restricted through driver education and enforcement		X	X	X
BD19		• Develop and provide biodiversity awareness training to all Project employees and induction for visitors	• Training and induction records	X	X	X
BD20		• Traffic and wildlife collisions are monitored, and warning signs are erected in road sections with potential wildlife crossings/collisions	• Wildlife collision and mortality records	X	X	
BD21	Potential leisure hunting of *Gazella subgututurosa, Capra sibirica, Ovis ammon* by Project personnel	• Provide environmental awareness training to all Project employees and induction for visitors	• Training and induction records	X	X	X
BD22		• Develop and enforce No hunting and gathering policy	• Implementation of the policy	X	X	X

BD23		• Undertake periodic inspection of all Project vehicles for wildlife products	• Inspection records from No Hunting and Gathering Policy	X	X	X
BD24	Increased mortality of sensitive fauna species by scavenger species attracted to the Project area.	• Provide environmental awareness training to all Project employees and induction for visitors	• Training and induction records	X	X	X
BD25		• No domestic pets (dogs or cats) to be kept onsite to prevent predation	• Monitoring of and removal of domestics pets from mine site	X	X	X
BD26		• No food waste left accessible to predatory species	• Periodic inspection records	X	X	X
BD27	Direct habitat loss through destruction of bird nests especially for *Chlamydotis undulata and Podoses hendersoni*	• Provide environmental awareness training to all employees on sensitive bird species and their identification	• Training records	X	X	
BD28		• Undertake pre-construction surveys especially in areas with Mongolian almond and saxaul species to avoid nest destruction	• Records of pre-construction surveys	X	X	
BD29		• Dissuade nesting activity in the construction areas with large bushes or trees such as Mongolian almond and saxaul where Mongolian ground jay and houbara bustard may breeds prior to nesting season by using fit-for-purpose bird dispersal methods	• Records of pre-construction surveys and actions taken	X		
BD30	Collision and Electrocution from powerlines (*Falco cherrug, Chlamydotis undulata)*	• Use avian friendly design for the site power towers and lines to prevent electrocution especially for saker falcon, as required and feasible	• Design used	X	X	
BD31		• Monitor bird mortality monitoring along the power lines and take necessary additional mitigation actions to eliminate the identified threats if necessary	• Wildlife collision and mortality records and actions taken	X	X	
BD32	Increased mortality of bird chicks by scavenger species attracted to the Project area.	• Limit, as possible, the accessibility of food waste left to predatory birds, such as raven, that may prey on other bird species eggs and nestlings	• Periodic inspection records	X	X	X
BD33		• Provide environmental awareness training to all employees on sensitive reptile species and their identification	• Training records	X	X	

BD34	Loss of reptile habitat from mining construction activities (*Cyrtopodion elongatus)*	• Undertake pre-disturbance ground survey for areas to be disturbed and remove reptile species of concern	• Records of pre-construction surveys • Wildlife capture and release records	X	X	
BD35	Increased mortality of sensitive reptile species by scavenger species attracted to the Project area. (*Coluber spinali, Eremias multiocellata*)	• Limit the food waste left accessible to scavenging species that prey the reptile species	• Periodic inspection records	X	X	X
BD36	Reptile species mortality from vehicular accidents	• Erect warning road signs to mark areas with high density of reptiles to avoid accidental vehicular mortality	• Wildlife collision and mortality records	X	X	X

[1] The LDP will include the following biodiversity protection commitments:
- No undisturbed land or previously rehabilitated lands to be disturbed without prior approval;
- Biodiversity species survey to be carried out by competent personnel prior to any land disturbance;
- Determine and impose land disturbance conditions to protect priority biodiversity species identified by the survey;
- Impact mitigation hierarchies to be determined and followed to protect priority biodiversity species; and
- Implementation of land disturbance conditions and rehabilitation requirements to be inspected regularly.

5.3 Design Controls

Recommended design controls for prevention and/or minimisation of the impacts related to biodiversity are defined as follows:

- Maintenance of roads to avoid unnecessary land disturbance;
- Use avian friendly design for the site power towers and lines to prevent electrocution especially for saker falcon, where required and feasible;
- Bunding in potential spill areas;
- Contain food waste appropriately; and
- Place warning signs about wildlife in potential traffic collision areas.

6. MONITORING

6.1 Overview of Monitoring Requirements

The Monitoring measures that are to be implemented during the construction and operation phase to assess compliance with Project Standards are described in this section. In the event that monitoring identifies non-conformance(s) with Project Standards, appropriate corrective actions will be identified based on an investigation.

6.2 Key Performance Indicators

Erdene will evaluate biodiversity management performance within and beyond the Project site boundary on a continual basis. Key Performance Indicators (KPI) to assess its biodiversity management are presented in Table 4.

Table 4 Key Performance Indicators

Unique ID	KPI	Target	Measure
BD-KPI-01	Percentage of Project employees completed environmental awareness training upon commencement of employment at KGP	Target: 100%	Training records
BD-KPI-02	Number of cases where land disturbance activities undertaken with LDP	Target: 100%	Reports of actual and approved total land disturbance activties
BD-KPI-03	Pre-construction biodiversity survey for all land disturbance activities	Target: 100%	Reports of and LDP
BD-KPI-04	Percentage of rehabilitated areas that has been signed-off by regulators (open pits excluded)	Target: 100%	Annual land rehabilitation plans and Rehabilitation inspections reports/Acts
BD-KPI-05	Number of wildlife collision/mortality from Project traffic	Target: Zero	Wildlife collision and mortality records
BD-KPI-06	Number of preventable deaths of priority bird species from collision and electrocution from power lines or other	Target: Zero	Bird mortality records

	causes directly attributable to the Project		
BD-KPI-07	Number of breaches of the No illegal hunting and gathering policy	Target: Zero	Periodic inspection records

6.3 Key Monitoring Activities

Key monitoring requirements for assessing the effectiveness of biodiversity management controls at KGP are provided in Table 5. If the monitoring results identify exceedances over the Project biodiversity KPI investigations will be undertaken and corrective actions will be identified for improvement.

Table 5 Monitoring Measures – Biodiversity

ID	Topic/ Aspects	Methods	Periodicity	Location
BD-MON-01	Pre-construction survey for all land disturbance areas	As described in the LDP (to be developed)	Prior to land disturbance	All areas to be disturbed
BD-MON-02	Wildlife injury and mortality from vehicle collision	Reports on all wildlife collision and injury incidents involving Project vehicles	Continuous	All Project AoI
BD-MON-03	Bird collision and electrocution	Monthly inspections of the power lines Bird collision or electrocution reports	Monthly	Along the Project power lines
BD-MON-04	Illegal hunting and gathering	Inspection of Project vehicles	Monthly on unspecified dates and upon receiving claims	Site entry/exit point Spot checks within the Project site
BD-MON-05	Priority mammals species monitoring	As described in Priority Fauna Monitoring Procedure (to be developed)	Seasonally	Within Project AoI (TBA upon commencing the Project)
BD-MON-06	Flora monitoring	As described in Plant Monitoring Procedure (to be developed)	Yearly	TBA (locations within and outside of the mine AoI)
BD-MON-07	Wildlife injury and mortality	Wildlife injury and mortality related information reported by workforce and community members	Continuous	Vicinity of all KGP onsite infrastructure areas and access road

7. TRAINING

7.1 Induction Training

All persons (employees and contractors) working on the KGP will be required to sit a comprehensive Project induction, addressing key Occupational Health and Safety (OHS), environmental, community and other requirements, before starting work. The induction

will cover the Erdene policy, legal obligations, employer and employee duty of care, Personal Protective Equipment (PPE), fitness for work, emergency and evacuation procedures, hazard and incident reporting, site road rules, safety signs, mine radio protocols and emergency calls, among others. General aspects of biodiversity management applicable to all workers will also be covered.

Persons working in specific areas or on specific jobs may be required to attend additional area or job specific inductions or briefings, which will address specific biodiversity management requirements.

All persons will be tested to ensure that they have understood their inductions and made to re-sit if necessary.

Inductions will be available in Mongolian and in English. Erdene will maintain a register of all inducted persons, including any restrictions.

8. AUDIT AND REPORTING

8.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with requirements of the Erdene HSEC Management System (including the OHS and the KGP Project ESMP).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan also may be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

8.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

9. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of Management Plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the Framework and Management Plans form the KGP ESMPs. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system.

This Management Plan has overlaps and is interrelated to several other Management Plans, as shown in Table 6.

Table 6 Context and Overlaps with Other Management Plans

Management Plan Title	Overlap / Cross Linkage
Land Disturbance Control and Rehabilitation Management Plan	Land disturbance and rehabilitation requirements
Transport Management Plan	Traffic planning and safety;
Stakeholder Engagement Plan	Engagement with local community and biodiversity related complaints
Waste Management Plan	Disposing and managing waste that may attract wildlife

Air Quality Management Plan	Managing dust issues
Contractor and Procurement Management Plan	Contractor compliance with the Project requirements

The following procedures will support implementation of this Management Plan at KGP providing detailed information:

- *Bird Mortality Monitoring Procedure*
- *Vehicles Inspection Procedure*
- *Land Disturbance Permit Procedure*
- *Fauna Monitoring Procedure*
- *Priority Plant Protection Procedure*
- *Plant Monitoring Procedure*

The necessity of developing additional procedures to support effective implementation of this Management Plan will be evaluated based on the monitoring results.

10. LIST OF ABBREVIATION AND ACRONYMS

CHA	Critical Habitat Assessment
EBRD	European Bank for Reconstruction and Development
Erdene	Erdene Mongol LLC
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HSEC	Health, Safety, Environment and Community
KGP	Khundii Gold Project
KPI	Key Performance Indicator
LDP	Land Disturbance Permit
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan
TMP	D15: Transport Management Plan
LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D5: Waste Management Plan

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Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Waste Management Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project) covering both mineral, non-mineral waste, and ore processing plant tailings management.

1.1 Objectives

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators (KPIs);
- define topic-specific training requirements; and
- set out references for supporting materials and information.

1.2 Scope

This Management Plan covers all KGP activities, including contractor activities during construction, operations and closure phases of the KGP. This document outlines Erdene's commitment and approach to mitigating risks that may arise as a direct or indirect result of the of the management of solid and liquid waste, hazardous and non-hazardous waste, mineral waste, and tailings from ore processing plant.

1.2.1 Non-Hazardous Waste Definition

The definition of non-hazardous waste is as follows:

Solid and liquid wastes that do not pose a threat to human health and/or the environment in the medium to longer term, typically waste associated office wastes, putrescible wastes, camp waste, scrap steel and inert construction waste and mineral waste.

1.2.2 Hazardous Waste Definition

The definition of hazardous waste is as follows:

Solid and liquid wastes that pose a threat to human health and/or the environment in the medium to longer term. They can cause harm to people through inhalation, ingestion or skin contact. Effects can be irritant, corrosive, allergenic or toxic, ranging from acute to chronic. They can cause harm to the environment through toxic effects due to absorption, bioaccumulation and/or coating.

1.2.3 Mineral Waste

The definition of mineral waste is as follows:

Mineral waste is the un-mineralized material excavated from the open pits at BK and AN, the spent ash from HOBs, and potentially the sub-grade material that is stockpiled but never becomes economic to process and is therefore remediated to final landform.

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined below.

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve budget for the execution of the Management Plan
Senior Management / VPs / HSEC Leader(s)	• Overall responsibility for this Management Plan, scope and implementation • Ensure appropriate resourcing levels to implement the requirements of this Management Plan • Support execution of this Management Plan • Management of implementation activities
HSEC Team Manager	• Responsible for the implementation of this Management Plan • Responsible for ensuring this Plan is available to all employees and Contractors • Responsible for ensuring that contractors develop their own waste management plan and inspection procedures, consistent with the requirements outlined in this plan, prior to the commencement of work • Responsible for ensuring that relevant activities are undertaken in compliance with this Management Plan and related Procedures • Responsible for ensuring that that Erdene employees are fully trained in waste management practices • Responsible for reviewing and approving and overall implementation of corrective actions as a result of non-conformances relating to waste management • Ensure all the applicable regulatory permits for waste management are in place
HSEC Team	• Develops waste inventory, collates and analyses waste inventory data for all waste streams • Develops Waste Monitoring Plan and schedule • Undertakes periodic audits and inspections of the waste management facility, workplace waste areas and contractor workplaces against the requirements of this Management Plan • Reports all environmental non-conformances and incidents regarding waste to the HSEC Team Manager and implements corrective actions • Ensure that all hazardous waste data is properly recorded and reported • Tracking of compliance to this Management Plan and communication of findings to key stakeholders
Workplace Supervisors	• Conduct routine work area inspections to ensure relevant activities are in accordance with this Management Plan and related Procedures • Report all hazards, non-conformances and incidents • Prevent practices that might lead to incidents • Ensure that all hazardous material and waste data is properly recorded and reported • Ensure Material Safety Data Sheets (MSDS)s are available at hazardous material locations in Mongolian and English

Procurement Team	• Ensure sustainable procurement of goods/materials etc. from reputable suppliers to minimise waste brought to the Project area • Obtain relevant MSDSs for materials purchased and brought to the Project area • Communicate smart procurement process to contractors to reduce waste brought to site
Contractors	• Ensure that waste management plans are developed to align with this plan and approved prior to commencement of work • Ensure that relevant activities are undertaken in accordance with this Management Plan and related Procedures • Ensure that all personnel are fully trained in waste management practices, particularly when working with hazardous materials • Ensure incidents are reported to Erdene HSEC Team Lead/Manager and incident investigations are undertaken • Properly store hazardous materials and provide MSDSs at the storage location • Ensure compliance with this plan
All Employees	• Adhere to the requirements of this Management Plan • Prevent practices that might lead to environmental or safety incidents • Report all hazards, non-conformances and incidents

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are:

Table 2 Key Interfaces

Team / Unit	Key Interface(s)
HSEC and procurement teams	Environmental issues, the safety of off-site activities and security issues
Operations and Mining Team	Mineral waste facility construction; process plant tailings handling and disposal
Infrastructure, Utilities and Accommodation Team	Infrastructure and services. Waste management facility and associated infrastructure
Transport and Logistics Team	Transportation of waste within the AoI to the waste management facility
Construction contractors	Adherence and implementation to requirements

3. PROJECT STANDARDS

Applicable Standards shall be complied with for all Project activities (the "Project Standards"). Project Standards comprise:

- applicable Mongolian laws and standards;
- applicable international and lender standards and guidelines; and
- applicable Erdene policies and procedures.

3.1 Applicable Mongolian Law and National Standards

Applicable Mongolian legal and national standards are listed below, detailed descriptions of which may be found in *Chapter A2 Policy and Legal Framework.*

Mongolian Laws applicable to waste management are as follows:

- Mongolian Law on Environmental Protection (1995);
- Mongolian Law on Waste (2017);
- Mongolian Law on Hazardous and Toxic Chemicals (2011);
- Law of Mongolia on Sanitation, 1998 (amended 2016);
- Law of Mongolia on Subsoil (1988);
- Law on Land (2002);
- Law on Air (2012); and
- Law on Environmental Impact Assessment (2012).

Mongolian National Standards (MNS) issued by the Mongolian Agency for Standardization and Metrology associated with waste management are:

- MNS 4943:2015 Water quality and waste water;
- MNS 5344:2011 Transportation of domestic waste;
- MNS6734:2018 Treated water re-use;
- MNS BS 8525:2015 Grey water system, General requirements; and
- MNS 3342:1982 General requirements for protection of groundwater from pollution/contamination.

Other applicable Mongolian Government Regulations and Procedures include:

- Government Resolution #135 of 2002 which addresses the procedures of the classification, collection, packaging, transportation, treatment, storage, and disposal of Hazardous Waste
- Joint Order #A-320/305 of Minister of Nature, Environment and Tourism and Minister of Health of 2011 which address the procedures for the disposable of medical wastes
- Minister's Order # 404 of 2006 of Ministry of Nature, Environment and Tourism which addresses the procedures for the operation of waste disposal sites
- Annex to Order # 127 of 2003 Minister of Nature and Environment of Mongolia. Guideline on hazardous waste storage and disposal records.

3.2 Applicable International Standards and Guidelines

The international standards which Erdene will implement are those set by the European Bank for Reconstruction and Development (EBRD). Erdene will comply with the requirements of the following EBRD Performance Requirements (2014) when implementing the Project:

- PR1: Assessment and Management of Environmental and Social Risks and Impacts
- PR3: Resource Efficiency and Pollution Prevention and Control; and
- PR4: Health, Safety and Security; and
- Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries and amending Directive 2004/35/EC.

3.3 Applicable Erdene Standards

The primary Erdene policies and standards that apply to waste management are provided in the Erdene 2018 *Policy and Procedures Manual*, which includes the Waste and Hazardous Materials Handling and Disposal Policy. The Purpose of this policy is to identify the company's approach to handling and disposal of solid waste and hazardous materials.

4. MITIGATION MEASURES AND MANAGEMENT CONTROLS

4.1 Overview

The purpose of this Management Plan is to ensure the effective management of solid and liquid hazardous and non-hazardous mineral and non-mineral wastes during all phases of the KGP in accordance with Project, Mongolian and International Standards. This is to be achieved through the implementation of the waste hierarchy and ensuring the safe handling, treatment and disposal of generated wastes. The implementation of the waste hierarchy includes:

- waste reduction and avoidance at source;
- waste segregation at point of generation;
- waste recycling; and
- waste storage, treatment, and disposal to Project standards.

Waste reduction and avoidance will primarily be achieved through detailed project planning and procurement. Smart procurement may help minimise unnecessary waste production. Through a smart procurement process, the KGP will endeavour to conduct business with best available suppliers. KGP will endeavour to reduce waste to landfill by applying purchasing principles aligned with the waste management hierarchy. These principles will include:

- Basing procurement decisions on the principles of 'value for money over life cycle of products' as opposed to 'the lowest cost only' and will give preference to and purchase energy efficient and environmentally sustainable performing products, materials and services that are cost competitive;
- Ensuring suppliers minimise packaging (particularly plastics) and requesting that product packaging be recyclable (where feasible);
- Considering the life-cycle of any product purchased and ensuring it has a long-life and can be reused or recycled at the end of its life, where feasible;
- Avoiding waste by not purchasing items that are not needed, or are obsolete, not sustainably produced, or are not of a quality which will last;
- Procuring food items based on calculations per staffing numbers at a reasonable cost per person;
- Reusing items/products/materials instead of disposing to landfill. This will include reusing items, such as office supplies, stationary, furniture, machinery and paper within the workplace, or finding an alternative opportunity for reuse, such as local community reuse;
- Returning, where feasible, any excess construction materials, used chemical containers etc. to the supplier or implement recycling initiatives with the local community; and
- Considering bulk purchasing to reduce the amount of waste packaging on Site.

Waste recycling will be achieved via engagement with the local community and the use of accessible and appropriately licenced recycling contractors.

Waste treatment and disposal will occur at the dedicated, engineered on-site landfill for domestic and non-hazardous waste. The quantity of hazardous materials brought to the Project area and used will be minimised to reduce hazardous waste generation. Where hazardous materials cannot

be re-used, these materials will be stored in a prepared area of the waste management centre until transfer to an in-country licensed disposal facility.

Wastewater produced within the AoI will be treated via a wastewater treatment plants (WWTP) at the workers accommodation camp and mine site.

Wastewater treated to meet the Project standards will be either used for dust suppression or discharged to the local environment. Any bio-solids produced from the WWTP will be disposed of to landfill.

For mine waste management, an integrated approach involving co-mingling of waste rock and filtered tailings has been designed. Key features of this integrated approach are:

- Waste rock and filtered tailings co-mingled in a single Integrated Waste Facility (IWF);
- A designed and engineered landform with reduced permeability; and
- High stability and less erosion through layered construction.

Damp tailings in the form of solid substance from the tailings thickener are to be deposited between the waste rock particles in a homogenous manner creating a single IWF.

All waste disposal/containment facilities shall be constructed in line with the Project standards including the EBRD requirements.

4.2 Key Management Controls

This Management Plan has been developed at a framework level to guide the development of construction and operational phase Management Plans, Procedures, and Guidelines, among others, which will present specific detail for the aspects of the day-to-day management activities for waste management at the KGP.

The key management controls are outlined in Table 3.

Table 3 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability			
				Pre-construction	Construction	Operation	Closure
WM-KMC-01	Waste reduction and minimisation	• Implement smart procurement processes and engage with best available suppliers • Implement waste hierarchy • Implement recycling initiatives with local community, where feasible	• Waste inventories • Workplace inspections • Waste management facility inspections	X	X	X	X
WM-KMC-02	Hazardous waste reduction	• Implement sustainable procurement processes to reduce amount of hazardous material brought to project area • Assess options to reuse hazardous material	• Chemical and hazardous materials registers	X	X	X	X
WM-KMC-03	Waste classification	• All waste will be classified according to national standards and Project standards	• Workplace inspections • Internal audits	X	X	X	X
WM-KMC-04	Waste inventories	• Waste inventories will be developed, maintained and managed to accurately record all waste generated on site, and waste sent offsite for treatment/disposal (volumes per month/year and cumulative total)	• Internal audit • Inspection • Internal environmental reports	X	X	X	X
WM-KMC-05	Waste segregation	• Wastes to be segregated to allow appropriate handling, treatment and disposal	• Workplace inspection • Audit	X	X	X	X
WM-KMC-06	Non-hazardous waste disposal	• Disposal of non-hazardous waste disposal will occur at the engineered and	• Workplace inspection • Internal Audit	X	X	X	X

		approved waste management centre landfill only					
WM-KMC-07	Hazardous material storage	• All hazardous waste will be stored at the waste management facility until transfer to a licenced facility or appropriate re-use or treatment process undertaken • Storage of liquid hazardous materials (including waste oil and solvents) in dedicated bunded areas with 110% capacity secondary containment • MSDSs provided and accompanied to all hazardous materials • Spill kits and PPE to be readily available onsite	• Waste inventories • Visual inspection • Internal audits • Validation of storage design	X	X	X	X
WM-KMC-08	Medical waste	• Medical waste to be collected at source and transferred as hazardous waste to local hospital for incineration	• Workplace inspection • Waste inventories • Internal audits • Waste transfer chain of custodies	X	X	X	X
WM-KMC-09	Waste water treatment and disposal	• Waste water generated within the AoI will be treated via the WWTP to meet national standards (MNS 4943:2011). and either discharged to the environment or used for dust suppression • Routine sampling and analytical testing of effluent to be conducted to confirm it meets national standards (MNS 4943:2011). Sampling to be conducted in accordance with national standard (MNS 5667- 10:2001) • Routine inspection of WWTP to ensure it is being operated and managed to meet project and national requirements	• Inspections of WWTP • Internal audit • Laboratory analytical reports • Internal environmental reports	-	X	X	X
WM-KMC-10	Workplace inspections/inspection of waste management facility	• Undertake routine workplace inspections and audits, including contractors' workplaces to ensure waste management practices are being adhered to	• Inspection/audit reports	X	X	X	X

		• Undertake inspections and audits of the waste management facility to ensure waste management practices are being adhered to and potential risks of contamination to soil, water etc. are being managed					
WM-KMC-11	Inspection of offsite waste treatment/disposal facilities	• As per EBRD PR3, conduct due diligence of offsite waste treatment/disposal facilities prior to use and during use to ensure waste is received, handled, treated and disposed of appropriately	• Audit/inspection reports	X	X	X	X
WM-KMC-12	Toolbox talks & training	• All personnel undertaking waste management activities shall be subject to routine training and tool box training. This will include details on the importance of adequate waste management including safe storage and handling requirements; and waste classification and segregation	• Training and toolbox talk materials and records	X	X	X	-
WM-KMC-13	Waste haulage and transfer within the AoI to waste management centre	• Waste haulage drivers to be provided appropriate training • Hauling of waste will be undertaken in a manner that prevents inadvertent release of hazardous waste on route	• Visual inspection • Internal audits	X	X	X	-
WM-KMC-14	Mine Waste Management	• Appropriate design of the Integrated Waste Facility (IWF) • Regular sampling of the IWF materials • Dust management on the IWF	• Design verification • Regular inspections of the IWF • Laboratory analytical reports • Implementation of the Dust Management Plan	-		X	X

4.3 Design Controls

4.3.1 Non-Mineral Waste

Design controls relating to the prevention or minimisation of impacts related to non-mineral waste are as follows:

- construction of a WWTP which incorporates:
  - Treated effluent reused for dust suppression/discharged to environment
  - Disposal of biosolids to landfill
- development of an on-site landfill for construction and domestic waste which incorporates:
  - environmental monitoring wells
  - secure perimeter fencing
- designated recycling areas for wood, metals, plastics and other recyclable materials; and.
- designated bunded storage area for hazardous wastes.

4.3.2 Mineral Waste

Design controls for the prevention or minimisation of impacts from mineral waste are discussed below:

- Waste rock and filtered tailings will be co-mingled in a single Integrated Waste Facility (IWF). This approach reduces the land disturbance footprint as compared to a segregated waste rock dump and tailings storage facility;
- The IWF will be a designed and engineered landform with reduced permeability. It will have high stability and less erosion through layered construction;
- The design approach for the IWF incorporates damp tailings in the form of solid substance from the tailings thickener to be deposited between the waste rock particles in a homogenous manner . This has the benefit of reducing dust risk.

Further elements of the design controls around the IWF are to:

- ensure adequately lining with an impermeable layer;
- construct an appropriate run-off capture system;
- ensure fit-for-purpose monitoring of soils and surface water near the IWF;
- ensure tailings are sufficiently detoxified;
- optimise water recovery; and
- ensure waste rock feed is managed so that materials are suitable for IWF construction, including “clean” rock for closure capping of the facility.

5. MONITORING

5.1 Overview of Monitoring Requirements

For the purpose of the KGP, monitoring is defined as environmental media monitoring only (e.g. air quality, dust, noise, water quality, flora/fauna counts etc.) and includes details on location, frequency, sampling methods and parameters where available. Non-environmental media monitoring (e.g. inspection activities conducted by a site/HSEC manager or similar role, or any social/workforce monitoring such as inspections of worker accommodation conditions) are considered to be mitigation and management measures.

Therefore, there are no measures for waste that meet the KGP monitoring definition.

The management measures including checks, inspections and audits as defined in Table 3 will be implemented during the specified of the KGP to assess compliance with legal requirements and Project Standards.

In the event that a non-conformance with Project Standards is identified, this will be investigated, and appropriate corrective actions taken.

5.2 Key Performance Indicators

Erdene will evaluate waste management performance throughout all phases of the Project. The Key Performance Indicators (KPIs) used to assess waste management are outlined in Table 4.

Table 4 Key Performance Indicators

Unique ID	KPI	Target	Measure
WM-KPI-01	Number of reported non-compliances with the mitigation controls identified in this Management Plan.	Target: Zero Minimise and continued improvement in number of reported non-compliances	Auditing
WM-KPI-02	Number of reported incidents of hazardous material releases leading to actual or potential harm to humans or the environment.	Target: Zero Minimise and continued improvement in reducing the number of reported incidents	Auditing
WM-KPI-03	Number of reported waste-related incidents	Minimise and continued improvement in number of reported non-compliances with this Plan.	Number of reported waste-related incidents per year
WM-KPI-04	Volume of waste generated and sent to the Waste Management Centre or disposal.	Minimise total volume of waste generated and continued improvement.	Monthly volume of non-mineral waste per person
WM-KPI-05	Percentage of waste materials recycled	Minimise disposal to landfill and continued improvement.	Percentage recovery of recyclable materials (e.g. plastic)
WM-KPI-06	Number of waste related community complaints	Minimise and continued improvement in number of waste related community complaints. Target = zero	Number of reported waste related community complaints per year
WM-KPI-07	Number of exceedances to soil/water contamination and dust generation monitoring standards on the IWF	No exceedances	Number of exceedances

5.3 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required (as identified through the *Management of Change Procedure* contained within the KGP ESMP Framework), this Management Plan may also be updated on an "as required" basis.

6. TRAINING

All necessary training is provided as part of induction training (to provide general awareness) and job specific training as necessary.

6.1 Induction Training

All employees of Erdene and Contractors working at the Project will be provided with general induction, site specific induction and a broad range of health, safety and environmental awareness training, including the Erdene Code of Conduct.

All persons will be tested to ensure that they have understood their inductions and made to re-sit if necessary. Inductions will be available in Mongolian and in English. Erdene will maintain a register of all inducted persons, including any restrictions.

General aspects of waste management applicable to all workers will also be covered.

6.2 Job Specific Training

Persons working in specific areas or on specific jobs may be required to attend additional area or job specific inductions or briefings, which will address specific waste management requirements.

All personnel with hazardous material and non-mineral waste management responsibilities shall be subject to routine toolbox training. This will include details on the importance of appropriate hazardous material and non-mineral waste management practices including safe storage and handling requirements.

6.3 Other Training Requirements

Additional, specialist training shall be provided to key personnel involved in activities which involve the use, storage or haulage of hazardous materials and non-mineral waste.

Landfill Operators will be trained in waste classification in order to ensure that they have a detailed understanding of which wastes can be recycled, reused, or are permitted to be landfilled. When appropriate, competencies in emergency response scenarios must be obtained.

7. AUDIT AND REPORTING

7.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with requirements of the Erdene HSEC Management System (including the ESIA and the KGP Project ESMP).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan also may be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

7.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

8. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of Management Plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the Framework and Management Plans form the KGP ESMPs. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system as described.

This Management Plan has overlaps and cross-linkages to several other Management Plans, as follows:

Table 5 Context and Overlaps with Other Management System Documentation

Management Plan Title	Overlap / Cross Linkage
Air Quality Management Plan	Potential air quality issues from the waste management facilities
Water Resources Management Plan	Waste water treatment and managing potential water resources contamination issues
Crisis and Emergency Response Plan	Managing accidental situations where hazardous waste is released into the environment

Other procedures may be developed, as required, to support this management plan in addition to the above Management Plans.

9. LIST OF ABBREVIATION, ACRONYMS AND UNITS OF MEASURE USED

AoI	Area of Influence
EBRD	European Bank for Reconstruction and Development
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HSEC	Health, Safety, Environment & Community
KGP	Khundii Gold Project
KPI	Key Performance Indicator
MLA	Mine Licence Area
MNS	Mongolian National Standard
MP	Management Plan
MSDS	Material Safety Data Sheets
OHS	Occupational Health & Safety
PR	Performance Requirement
WMC	Waste Management Centre
WMP	Waste Management Plan
WWTP	Wastewater Treatment Plant

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan
TMP	D15: Transport Management Plan
LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D6: Hazardous Materials Management Plan

April 2020

Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Hazardous Materials Management Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project).

1.1 Objectives

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define topic-specific training requirements; and
- set out references for supporting materials and information.

1.2 Scope

This Management Plan covers all KGP activities, including contractor activities during construction, operations and closure phases of the KGP. This document outlines Erdene's commitment and approach to handling and managing hazardous materials for the KGP operations.

Hazardous materials are defined, for this Management Plan, as 'any item or agent (biological, chemical, radiological, and/or physical), which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors'[1].

The terms "hazardous materials" or "hazardous substances" are interchangeably used for this MP.

[1] Institute of Hazardous Materials Management (https://www.ihmm.org/about-ihmm/what-are-hazardous-materials). Accessed 15 January 2020.

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined below (Table 1).

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan.
Senior Management / VPs/ Department Heads	• Approve this Management Plan • Overall responsibility for the scope and implementation of this Management Plan • Ensure appropriate resourcing levels to implement the requirements of this Management Plan • Support execution of this Management Plan • Management of implementation activities • Interpretation of monitoring results • Corrective actions
HSEC Manager	• Responsible for the overall implementation of this Management Plan • Develop a system for monitoring the types and quantity of Hazardous Materials onsite • Responsible for ensuring that relevant activities are undertaken in compliance with this Management Plan and related Procedures • Responsible for ensuring that Erdene and contractors' employees are fully trained in hazardous materials management • Obtain all necessary regulatory permits associated with handling of hazardous materials • Ensure all hazardous materials are properly stored onsite • Obtain Material Safety Data Sheets (MSDS) from suppliers and store at the storage location • Responsible for reviewing and approving contractor's hazardous materials management plans consistent with the requirements of this Management Plan • Overall implementation of corrective actions as a result of non-conformances relating to hazardous materials management • Ensure hazardous materials register is maintained • Assess and develop, in cooperation with workplace supervisors, hazardous materials safe work procedures for applicable hazardous substances
HSEC Team	• Responsible for ensuring this Plan is available to all employees and Contractors • Provide training and guidance to Erdene and contractors' employees on the requirements of this management plan • Provide technical support to KGP employees and Contractors to ensure compliance with this Management Plan and related procedures • Prepare Hazardous Materials Management performance report, as required • Report all environmental non-conformances and incidents regarding Hazardous Materials and follow-up to correct any non-conformances • Ensure that hazardous materials management issues at KGP are adequately included in the relevant training materials • Keep and update hazardous materials register

	• Track compliance to this management plan and reporting
Workplace Supervisors	• Assess and develop, in cooperation with HSEC Manager, safe work procedures for handling of hazardous materials • Plan and implement all work activities according to the requirements of this plan • Ensure that any breaches of this Management Plan requirements are reported, and corrective actions are to be taken
Contractors	• Develop own Hazardous Materials Management Plan consistent with the requirement of this MP
Contractors	• Comply with requirements of this Management Plan

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are shown in Table 2.

Table 2 Key Interfaces

Team / Unit	Key Interface(s)
HSEC Team	Liaising with local residents especially in relation to consulting and managing community grievances resulting from hazardous materials management issues
Transport and Mining Fleet Team	Transporting hazardous materials to comply with requirements of this plan
Procurement	Purchasing hazardous materials and obtaining MSDS for all applicable materials under the HSEC managers' direction
Engineering Team	Designing and constructing hazardous materials handling and storage facilities according to the applicable safety requirements

3. PROJECT STANDARDS

Applicable standards shall be complied with for all Project activities (the "Project Standards") and the Project Standards comprise:

- applicable Mongolian legislation and national standards;
- applicable international standards and guidelines;
- requirements of the statutory Detailed Environmental Impact Assessment (DEIA); and
- applicable Erdene policies and procedure.

3.1 Applicable Mongolian Law and National Standards

Applicable Mongolian legal and national standards are listed below, detailed descriptions of which may be found in *Chapter A2 Policy and Legal Framework*. Mongolian Laws applicable to Hazardous Materials an Waste are as follows:

- Law on Environmental Protection (1995);
- Law on Toxic and Hazardous Chemicals (2006);
- Law on Occupational Health and Safety (2008);

- Law on Environmental Impact Assessment (2012);
- Law on Water Pollution (2012); and
- Law on Natural Plants (2012).

Mongolian National Standards (MNS) applicable to Hazardous Materials are:

- MNS 2029:2011 Occupational Safety and Health. Label and Marking of Toxic and Hazardous Chemicals; and
- MNS 6458:2014 Occupational Safety and Health. Storage of Toxic and Hazardous Chemicals.

3.2 Applicable International Standards and Guidelines

The following good international industry practice guidance and legislation have been taken into account:

- EBRD Performance Requirements (PR) (2014) (particularly PR3: Resource Efficiency and Pollution Prevention and Control); and
- IFC Environmental, Health, and Safety General Guidelines (April 2007).

3.3 Applicable Erdene Standards

The primary Erdene policies and standards that apply to hazardous materials management are provided in the *Erdene 2018 Policy and Procedures Manual*, which includes the Waste and Hazardous Materials Handling and Disposal Policy. The Policy identifies the company's approach and commitments to handling and disposal of solid waste and hazardous materials.

4. MITIGATION MEASURES AND MANAGEMENT CONTROLS

4.1 Overview of Management Controls

This Management Plan intends to minimise and manage potential risks from the use of hazardous materials to people and the environment during KGP activities. Based upon the identified impacts and opportunities presented in the ESIA, the following control measures will be put in place during the construction, operations, and closure phases of the KGP

The key management controls to to be implemented by Erdene are provided in Table 3.

4.2 Design Controls

Recommended design controls for prevention and/or minimisation of the impacts related to Hazardous Materials are defined as follows:

- Construction of all liquid hazardous materials, including fuel, loading and unloading spots in bunded areas to prevent accidental spillages; and
- Construction of storage areas for hazardous materials with impermeable base flooring.

Table 3 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of verification	Applicable Phase		
				Construction	Operation	Closure
HZ01	Procurement of Hazardous Materials	• Ensure MSDS are obtained and reviewed for transport and storage requirements prior to hazardous materials purchase	• Hazardous Materials Management Procedure • Inspection reports	X	X	-
HZ02		• MSDS of hazardous materials are obtained and made available in both Mongolian and English languages to all work areas where the materials are stored and used	• Hazardous Materials Management Procedure • Hazardous Materials Inventory	X	X	X
HZ03		• Obtain all required regulatory permits for applicable hazardous substances import	• Risk Register • Permit documentation • Internal inspection reports	X	X	-
HZ04	Transport of Hazardous Materials	• Use competent, or licenced if required, transport providers for transport of all hazardous materials, including any potentially hazardous waste, shipping from the site to processing facilities	• Hazardous Materials Management Procedure • Inspection reports • Contractor agreements	X	X	X
HZ05		• Obtain appropriate permits for transport of applicable substances with high risk, such as cyanide	• Permit documentation • Hazardous Materials Management Procedure • Inspection reports	X	X	X
HZ06		• Provision of First Aid Kits and Emergency Response Plan for all hazardous waste transport	• Emergency Response Plan • Inspection records	X	X	X
HZ07	Storage of and use of Hazardous Materials	• Hazardous materials are stored according to the manufacturer's instructions, such as storage amount, mixing with other materials and environmental requirements	• Training records • Inspection records	X	X	X

HZ08		• Develop and maintain onsite hazardous materials inventory	• Hazardous materials inventory and its update • Inspection records	X	X	X
HZ09		• All hazardous wastes are properly segregated and labelled in the onsite temporary waste storage areas	• Waste Management Plan • Inspection records	X	X	X
HZ10		• Store all liquid chemicals in a secondary containment with at least 110% of the capacity	• Storage design and commissioning report • Inspection reports	X	X	X
HZ11		• Provide suitable spill kits and other necessary emergency response equipment to all work areas where hazardous materials are stored and used	• Inspection records	X	X	X
HZ12		• Ensure appropriate First aid Kits and PPEs provided to all work areas and employees who are potentially exposed to hazardous substances	• Inspection records • PPE inventory	X	X	X
HZ13		• Develop and implement Safe work procedures for high risk hazardous materials, such as cyanide	• Safe Work Procedure • Inspection records	X	X	X
HZ14	Training and Awareness of Hazardous Materials	• Conduct safety talks and toolbox meetings at regular basis	• Meeting records	X	X	X
HZ15		• Conduct emergency simulations regularly to ensure emergency preparedness	• Emergency simulation plan and records	X	X	X

5. MONITORING

5.1 Overview of Monitoring Requirements

The Monitoring measures that are to be implemented during the construction and operation phase to assess compliance with Project Standards are described in this section.

In the event that monitoring identifies non-conformance(s) with Project Standards, appropriate corrective actions will be identified based on an investigation.

5.2 Key Performance Indicators

Erdene will evaluate the hazardous materials management performance on a continual basis. The table below summarises the KPIs and associated key management controls that can be used to assess the progress and effectiveness of proposed mitigation strategies.

Table 4 Key Performance Indicators

Unique ID	KPI	Target	Monitoring Measure
HZ-KPI-01	Number of cases where Project employees including contractors are exposed to hazardous materials and received medical treatment or hospitalisation	Target: Zero	First aid records Medical emergency records
HZ-KPI-02	Number of cases where hazardous materials accidentally discharged into the environment	Target: Zero	Emergency response records Internal inspection reports
HZ-KPI-03	Hazardous materials inventory is developed and maintained	Target: All hazardous materials to be included	Procurement records and Hazardous materials inventory
HZ-KPI-04	MSDSs of all hazardous materials are provided in Mongolian and English languages	Target: 100%	Procurement records and MSDSs at workplaces with hazardous materials use
HZ-KPI-05	Provision of hazardous materials handling training to all employees who are responsible for transport, handling, use, and/or disposal of the hazardous materials	Target: 100%	Training records
HZ-KPI-06	Number of non-compliance against the requirements of this Management Plan	Target: Zero	Inspection reports
HZ-KPI-07	Installation of secondary containment for all storage areas for liquid hazardous materials	Target: 100%	Inspection of secondary containment facilities
HZ-KPI-08	Provision of appropriate First Aid Kits and PPEs for all work	Target: 100%	Inspection reports

	areas with hazardous materials and employees work with hazardous materials		
HZ-KPI-09	Obtaining of all statutory permits and approvals for handling and using of hazardous materials	Target: 100%	List of permits obtained vs risk register of hazardous materials

5.3 Key Monitoring Activities

There are no measures for hazardous materials management that require regular monitoring[2] for the KGP. The management measures including checks and inspections as defined in Table 3 will be implemented to assess compliance with legal requirements and Project Standards.

In the event that a non-conformance with Project Standards is identified, this will be investigated, and appropriate corrective actions taken.

5.4 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required (as identified through the *Management of Change Procedure* contained within the KGP ESMP Framework), this Management Plan may also be updated on an "as required" basis.

[2] For the purpose of the KGP, monitoring is defined as environmental media monitoring only (e.g. air quality, dust, noise, water quality, flora/fauna counts etc.) and includes details on location, frequency, sampling methods and parameters where available. Non-environmental media monitoring (e.g. inspection activities conducted by a site/HSEC manager or similar role, or any social/workforce monitoring such as inspections of worker accommodation conditions) are considered to be mitigation and management measures.

6. TRAINING

All necessary training is provided as part of the induction training (to provide general awareness) and job specific training as necessary

6.1 Induction Training

All employees of Erdene and Contractors working at the Project will be provided with general induction, site specific induction and a broad range of health, safety and environmental awareness training, including the Erdene *Code of Conduct*.

All persons will be tested to ensure that they have understood their inductions and made to re-sit if necessary. Inductions will be available in Mongolian and in English. Erdene will maintain a register of all inducted persons, including any restrictions.

General aspects of hazardous materials management applicable to all workers will also be covered.

6.2 Job-Specific Training

Persons working in specific areas or on specific jobs such as warehouse and waste management facility may be required to attend additional area or job specific inductions or briefings, which will address specific requirements for hazardous materials management.

7. AUDIT AND REPORTING

7.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with requirements of the Erdene HSEC Management System (including the OHS and the KGP Project ESMP).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan also may be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

7.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

8. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of Management Plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the Framework and Management Plans form the KGP ESMPs. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system.

This Management Plan has overlaps and cross-linkages to several other Management Plans (Table 5).

Table 5 Context and Overlaps with Other Management System Documentation

Management Plan Title	Overlap / Cross Linkage
Transport Management Plan	Hazardous materials transport
Community Health, Safety and Security Management Plan	Potential impacts to the community from hazardous materials
Water Resources Management Plan	Monitoring of potential water resources contamination
Crisis and Emergency Response Management Plan	Hazardous materials emergency response and preparedness situation
Stakeholder Communications Management Plan	Engagement with local community and potential hazardous materials related complaints
Waste Management Plan	Disposal and management of waste and potential contamination
Contractor and Procurement Management Plan	Contractor compliance with the Project requirements

The following procedures will support implementation of this Management Plan at KGP providing detailed information:

- *Hazardous Materials Management Procedure; and*
- *Spill Response Procedure.*

The necessity of developing additional procedures to support effective implementation of this Management Plan will be evaluated based on the monitoring results.

9. LIST OF ABBREVIATION AND ACRONYMS, AND UNITS OF MEASURE USED

DEIA	Detailed Environmental Impact Assessment
EBRD	European Bank for Reconstruction and Development
Erdene	Erdene Mongol LLC
ESMP	Environmental and Social Management Plan
HSEC	Health, Safety, Environment and Community
KGP	Khundii Gold Project
KPI	Key Performance Indicator
MSDS	Material Safety Data Sheet
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D7: Community Health, Safety and Security Management Plan

April 2020

Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Community Health, Safety and Security Management Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project).

1.1 Objectives

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define topic-specific training requirements; and
- set out references for supporting materials and information.

1.2 Scope

This Management Plan covers all Erdene activities, including contractor activities, during construction, operations and closure phases of the KGP. This document outlines Erdene's commitment and approach to mitigating community health safety and security risks that may arise as a direct or indirect result of the KGP.

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined below (Table 1).

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan.
Senior Management / VPs	• Approve this Management Plan • Overall responsibility for the scope and implementation of this Management Plan • Ensure appropriate resourcing levels to implement the requirements of this Management Plan • Support execution of this Management Plan • Management of implementation activities • Interpretation of monitoring results • Corrective actions
Compliance and Stakeholder Relations Department Head	• Overall responsibility for the scope and implementation of this Management Plan. • Development, monitoring and revision of this Management Plan.
HSEC Team	• Conduct timely implementation of this Management Plan, including coordination with implementing organisations and other stakeholders. • Tracking of compliance with this Management Plan and communication of findings to key stakeholders.
All Employees and Contractors	• Adherence with this Management Plan and implementation of requirements. • Report any community complaints or CHSS incidents.

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are:

Table 2 Key Interfaces

Team / Unit	Key Interface(s)
HSEC and security teams	Environmental issues, the safety of off-site activities and security issues, and in relation to communication with local communities concerning community health, safety and security issues.
Infrastructure, Utilities and Accommodation Team	Infrastructure and services.
Administration Management Team	Worker management.

3. PROJECT STANDARDS

Applicable Standards shall be complied with for all Project activities (the "Project Standards"). Project Standards comprise:

- applicable Mongolian laws and standards;
- applicable international and lender standards and guidelines; and
- applicable Erdene policies and procedures.

3.1 Applicable Mongolian Laws and Standards

Applicable Mongolian legal and national standards are listed below, detailed descriptions of which may be found in *Chapter A2 Policy and Legal Framework*.

Mongolian community, health, safety and security laws applicable to the KGP are as follows:

- Law of Mongolia on Health (In force on 5th May 2011; amended 18th January 2019);
- The Law on Hazardous and Toxic Chemicals (In force on 25th May 2006; amended 12th May 2017);
- Law on Waste (In force 1st July 2004; amended on 12th May 2017);
- Law of Mongolia on Water (In force on 5th June 1995; amended 2nd May 2019)
- Law on Air (In force on 5th June 1995; amended 12th January 2018); and
- Law on Environmental Impact Assessment (In force 23rd June 2012).

3.2 Applicable International Standards and Guidelines

3.2.1 European Bank for Reconstruction and Development

The international standards which Erdene plans to implement are those set by the European Bank for Reconstruction and Development (EBRD). EBRD *Performance Requirement 2 Labour and Working Conditions* sets out security personnel requirements. EBRD *Performance Requirement 4 Health and Safety* sets out requirements with regard to community health, safety and security. Key requirements are as follows:

- Identification and assessment of project-related risks and adverse impacts to the health and safety of potentially affected communities and development of protection, prevention and mitigation measures proportionate to the impacts and risks, and appropriate to the stage, size and nature of the project. Cooperation with the relevant authorities and other stakeholders, as appropriate, on mitigation measures and plans. These measures will be consistent with the mitigation hierarchy approach and good industry practice (GIP).
- Measures to avoid or mitigate community health and safety impacts of the project may be the responsibility of the relevant public authorities. Under these circumstances, the project will clarify its role and its responsibility to notify and cooperate with the relevant authorities.

3.2.2 The Voluntary Principles on Security and Human Rights

The *Voluntary Principles on Security and Human Rights* (VPs) were introduced in 2000 to provide guidance to extractives companies on maintaining the security of their operations in a manner

that respects human rights and fundamental freedoms[1]. The Voluntary Principles fall into three main categories:

- risk assessment;
- relations with public security; and
- relations with private security.

Risk assessment entails the ability to assess the risks present in a company's operating environment in relation to the security of personnel, local communities and assets as well as protection of human rights.

In interactions between companies and public security, companies have an interest in ensuring that actions taken by governments, particularly those of public security providers, are consistent with the protection and promotion of human rights. Where private security providers are engaged in protecting a company's personnel or assets, the risk of private security contractors exceeding their authority will be minimised, and respect for and protection of human rights have to be promoted.

Erdene will align its activities to the Voluntary Principles.

3.2.3 Guiding Principles on Business and Human Rights

The aim of the *Guiding Principles on Business and Human Rights: Implementing the United Nations "Protect, Respect and Remedy" Framework (Human Rights Council, UN 2011),* is to guide governments, corporations, and other relevant stakeholders in ensuring that business operations around the world do not negatively impact and abuse human rights. The Principles are made up of three pillars: protect, respect and remedy: the State duty to protect human rights, the corporate responsibility to respect human rights and the right of victims to access an effective remedy. The corporate responsibility to Respect requires a company to:

- Avoid causing or contributing to any adverse human rights impact through its own activities, and address any impact when it does occur;
- Seek to mitigate or prevent any impact that is directly linked to its operations, products and services through its business relationships.

Erdene will align its activities with the UN Guiding Principles.

3.3 Applicable Erdene Standards

The primary Erdene policies and standards that apply to community health, safety and security are provided in the *Erdene 2018 Policy and Procedures Manual*, which in summary include:

Health, Safety and Security

Provisions for health, safety and security are enacted in Erdene's health, safety and security Guiding Principles as follows:

Working safely is both a corporate obligation and an individual responsibility. Through its business operations, Erdene strives to:

- Generate value for its stakeholders, the environment and local communities
- Identify and mitigate health, safety, and security risks

[1] https://www.voluntaryprinciples.org/

- Protect basic human rights, especially the well-being of children
- Operate transparently and accountably to its stakeholders
- Abide by applicable local laws, regulations and any voluntary commitments

As a core business function, Erdene commits to providing the necessary resources, both human and financial, to ensure the mitigation of health, safety and security risks and achieve optimal performance.

Erdene requires that detailed health, safety, and security policies and procedures be developed according to the needs of a given minerals project, including for affiliated contractors, sub-contractors and consultants, with the following policies as the basic framework for more detailed health, safety and security protocols.

- Health Policy;
- Safety Policy; and
- Security Policy.

Stakeholder Relations and Sustainability Policy

Erdene's Stakeholder Relations and Sustainability Policy articulates the relationship between Erdene's stakeholder relations and sustainability, with sustainability performance defined and measured through six key areas including:

1. growing the value of the company and its operations;
2. supporting local economic development;
3. promoting public health and well-being;
4. improving workforce skills and education;
5. ensuring a culture of ethical business practices; and
6. avoiding and mitigating environmental impacts.

4. MITIGATION MEASURES AND MANAGEMENT CONTROLS

4.1 Overview of Management Controls

Based upon the identified impacts and opportunities presented in the ESIA, the following control measures will be put in place during the construction, operations, and closure phases of the KGP.

The overarching goals of the KGP approach to community health, safety and security are to:

- prevent, minimise and mitigate any adverse community, health, safety and security impacts from KGP activities, both direct and indirect, as appropriate;
- improve health, safety and security service delivery, capacity and indicators in the KGP's Area of Influence; and
- promote a safe environment for community members, including vulnerable groups.

This Management Plan may be supported by additional procedures and guidelines, which present more details on specific aspects of the day-to-day management activities at the KGP. The table below presents the key management controls that Erdene will implement.

Table 3 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability			
				Pre-construction	Construction	Operation	Closure
CHSS01	Increased Pressure on Local Health Services	Liaise with local health professionals to identify ways that the Project can enable improvements in the health services and capabilities.	• Stakeholder engagement records	-	X	X	-
CHSS02	Increased Incidence of Communicable Disease	Identify opportunities to support local public health campaigns that focus on prevention of communicable diseases and STIs.	• Stakeholder engagement records	-	X	X	
CHSS03	Camp Code of Conduct Behavioural Training	Develop and implement a *Camp Code of Behaviour* relevant to all KGP workers. Provide basic community health, safety and security awareness training and induction in the Camp Code of Behaviour. This will include awareness of STIs and other communicable disease prevention. Provide this training on an ongoing basis.	• Training/Toolbox talks/ records checked to ensure complete	-	X	X	X
CHSS04	Increased Incidence of Communicable Disease	Review and identify lessons learned from grievances received that relate to perceived changes in communicable diseases. Update the *Community Health, Safety and Security Management Plan*, as required, to reduce the risk of introduction or spread of communicable diseases.	• Grievance records • Updates to *Community Health, Safety and Security MP*	-	X	X	X
CHSS05	Social Fracture and Reduction in Wellbeing and / or Personal Safety	Communicate with local communities about the Project workforce and the steps taken to mitigate any impacts to the community, and promote use of the Grievance Mechanism to report complaints and any other feedback. Communicate the following: • Actions to discourage alcohol abuse, including but not limited to: o Implementation of a “Dry” site (no alcohol consumption on site); o Leisure facilities provided on site;	• Engagement records • Grievance records	X	X	X	-

		○ Alcohol and controlled substance testing as appropriate.					
CHSS06	Social Fracture and Reduction in Wellbeing and / or Personal Safety	Provide induction training for all Project workers that includes awareness building about gender sensitivity and GBVH, human trafficking and prostitution and ways of identifying risks and reporting related observations or incidents, as well as awareness on gender sensitivity.	• Induction training records	-	X	X	-
CHSS07	Social Fracture and Reduction in Wellbeing and / or Personal Safety	Provide specific training for Community Liaison Officers (CLOs) to ensure they have required skills to effectively and sensitively address GBVH related issues in the course of their jobs.	• Training records	-	X	X	-
CHSS08	Social Fracture and Reduction in Wellbeing and / or Personal Safety	Conduct ongoing consultation with a variety of stakeholder (political, health authorities, women groups, children's groups) throughout the Project lifecycle to provide ongoing information on Project activities, to specifically address GBVH related issues, and to obtain feedback on GBVH issues.	• Stakeholder and Communications MP				
CHSS9		Adhere (Erdene and security contractors) to the provisions enshrined in the Voluntary Principles on Security and Human Rights, including: • Provide Security, Human Rights and Use of Force training, consistent with the provisions of the Voluntary Principles on Security and Human Rights, to employees and contractors engaged in security duties, and support security providers to offer training in security and human rights to their personnel; • As far as permitted under local legislation, conduct screening and background checks of security personnel and service providers prior to hiring; • Conduct regular audits of security service providers to ensure compliance with local legislation; • Develop and implement procedures on control of the use of force by security personnel, which will be only when strictly necessary and will always be proportional to lawful objectives (on-site security personnel will be armed with non-lethal weapons; contractors responsible for gold and magazine transport are expected to be armed with lethal weapons, consistent with Mongolian requirements); • Report and investigate any credible allegations of human rights abuses or excessive use of force or power by security personnel;	• Training records • Recruitment records • Audits of security service providers • Stakeholder engagement records • Grievance records • Reviews of CHSS Management Plan	X	X	X	-

		• Conduct regular consultations with local people, making security procedures publicly available, and properly recording and promptly addressing any complaints related to security personnel.					
CHSS10	Community Access to KGP Facilities and Infrastructure	Exclude the public from active mining areas to minimise impacts of blasting and any other safety risks.	• Workplace inspection records	-	X	X	-
CHSS11	Community Access to KGP Facilities and Infrastructure	Use security personnel to ensure no unauthorised public access to areas with safety risks.	• Security records	-	X	X	-
CHSS12	Community Access to KGP Facilities and Infrastructure	Provide signage at all entrance / exit points and periodically on boundaries / fenced areas.	• Workplace inspection records	-	X	X	X
CHSS13	Community Access to KGP Facilities and Infrastructure	Secure / make safe all plant and machinery at the end of each working day or shift change.	• Workplace inspection records	-	X	X	-
CHSS14	Community Access to KGP Facilities and Infrastructure	Provide regular updates to herders, vulnerable groups and other residents about potential Project hazards and changes to Project activities that may have community safety impacts.	• Stakeholder engagement records	-	X	X	-
CHSS15	Community Access to KGP Facilities and Infrastructure	Implement an outreach program to periodically bring visitors for site visits in a controlled and safe manner.	• Stakeholder engagement records • Visitor log	-	X	X	-
CHSS16	Artisanal and Small-scale Mining Incursion at the KGP	Conduct targeted ongoing stakeholder engagement with local and *aimag* level police, *soum* and *bagh* administrations, and communities: • To understand prevalence / emergence of ASM activities in Shinejinst and Bayan-Undur, including the drivers thereof (e.g. poverty, vulnerability, criminality). • About the nature / type of gold associated with the KGP deposit, which make it unsuitable for ASM processing and access methods; • About the measures in place to protect unauthorised access (including perimeter fencing and security personnel); • To discourage incursions of ASM at the KGP, including potential negative legal consequences of being complicit in illegal mining, as well as the associated health and safety risks of such activities.	• Stakeholder engagement records	-	X	X	X

CHSS17	Artisanal and Small-scale Mining Incursion at the KGP	Liaise with local authorities and police to establish mutual response agreement in the event that an ASM incursion occurs, including awareness of the Company's commitment to the principles enshrined in the Voluntary Principles on Security and Human Rights in relation to the use of force, and expectations in this regard should assistance from local authorities be required.	• Stakeholder engagement records	-	X	X	X
CHSS18	Population increase due to KGP-induced in-migration	Undertake an annual stocktake on published information and information received from stakeholders for any evidence of noticeable in-migration. Subject to data availability, the following information should be monitored: • net change in registered population by gender and *soum*; • estimated total registered and unregistered population by *soum*; • ratio between capacity of the school / kindergarten and actual number of students; • capacity issues reported by hospital health professionals during ongoing engagement; • net change in number and type of registered / unregistered businesses by size (number of employees) by *soum*; • information related to in-migration recorded through the community and worker grievance mechanisms and incident records; • reported crime rates; • reported traffic incident rates; • information related to individual and household incomes recorded through stakeholder engagement records; • number and proportion of people from local communities employed as skilled / unskilled workers (relative to total numbers available for work, disaggregated by gender); and • number of small and medium-sized enterprises (SMEs) established and registered in local communities.	• Annual stocktake records	-	X	X	-

5. MONITORING

5.1 Overview of Monitoring Requirements

The monitoring measures that are to be implemented during the operations phase to assess compliance with Project Standards are described in this section.

In the event that monitoring identifies non-conformance with Project Standards, these will be investigated, and appropriate corrective actions identified.

5.2 Key Performance Indicators

The table below summarises the KPIs and associated key management controls that can be used to assess the progress and effectiveness of proposed mitigation strategies.

Table 4 Key Performance Indicators

Unique ID	KPI	Target
CHSS-KPI 01	Total number of non-compliances with community health safety & security key management controls identified in this Plan	Minimise and target zero
CHSS-KPI 02	Number of communicable and non-communicable diseases and injuries	No significant increase in communicable and non-communicable disease and injury rates at the *bagh* and *soum* level
CHSS-KPI 03	Number of community health safety & security complaints from local communities as recorded in the grievance records	Minimise and continued improvement in number of community health safety and security related complaints
CHSS-KPI 04	Number of reported community health & safety incidents	Minimise and target zero

5.3 Key Monitoring Activities

Key monitoring measures are set out below.

Table 5 Key Monitoring Measures

Unique ID	Topic / Aspect	Method	Periodicity	Location
CHSS-Mon-01	Community Safety and Security	Number of recorded safety / security incidents involving KGP workers and members of the local population	Annual	*Aimag*, *soum*, and *bagh* level
CHSS-Mon-02	Community Health Changes	• *Aimag*, *soum*, and *bagh* key health statistical analysis. • Number of health promotion / awareness activities run with local communities.	Annual	*Aimag*, *soum*, and *bagh* level
CHSS-Mon-03	Population Changes	• Monitoring of published information and information received from stakeholders for any evidence of noticeable in-migration.	Annual	*Soum* and *bagh* level

CHSS-Mon-04	Community Wellbeing and / or Personal Safety / Stakeholder Engagement	• Number of community awareness activities conducted with local communities to raise awareness of risks and mitigation measures associated with the project, including traffic and proximity to site (e.g. blasting, dust).	Annual	*Aimag*, *soum*, and *bagh* level

5.4 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required (as identified through the *Management of Change Procedure* contained within the KGP ESMS Framework), this Management Plan may also be updated on an "as required" basis.

6. TRAINING

All necessary training is provided as part of induction training (to provide general awareness) and job specific training as necessary.

6.1 Induction Training

All employees of Erdene and Contractors working at the Project will be provided with general induction, site specific induction and a broad range of health, safety and environmental awareness training, including the Erdene *Code of Conduct*.

All persons will be tested to ensure that they have understood their inductions and made to re-sit if necessary. Inductions will be available in Mongolian and in English. Erdene will maintain a register of all inducted persons, including any restrictions.

6.2 Job-Specific Training

Additional specialist training is to be provided to security personnel (including on the human rights and the use of force), and drivers (as outlined in the *Traffic and Transport Management Plan*) in relation to community health, safety and security.

6.3 Other Training Requirements

Various community-level training sessions will be provided, including road safety awareness training. The training will target vulnerable groups, such as children.

7. AUDIT AND REPORTING

7.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with the requirements of the Erdene HSEC Management System (including the ESIA and the KGP Project ESMP).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan also may be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

7.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

8. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of management plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the ESMP and the Management Plans form the KGP ESMP. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system as described.

This Management Plan has overlaps and cross-linkages to several other Management Plans, as follows:

Table 6 Context and Overlaps with Other Management System Documentation

Management Plan Title	Overlap / Cross Linkage
Air Quality Management Plan	Management of community exposure to dust generated by KGP activities
Noise & Vibration Management Plan	Management of community exposure to noise generated by KGP activities
Hazardous Materials Management Plan	Protection of local communities from exposure to hazardous waste materials
Water Resources Management Plan	Protection of potable drinking water supplies
Traffic and Transport Management Plan	Minimising traffic accidents, reduction of dust and increase of community awareness on traffic movement and risks
Human Resources Management Plan and Contractor and Procurement Management Plan	Behaviour of Erdene and contractor personnel
Stakeholder and Communications Management Plan	Community awareness on public health, risks and mitigation measures associated with the project, and ongoing community engagement
Crisis and Emergency Response Plan	Community preparedness in case of emergency situations

Other procedures may be developed, as required, to support this management plan in addition to the above Management Plans.

9. LIST OF ABBREVIATION, ACRONYMS AND UNITS OF MEASURE USED

AoI	Area of Influence
ASM	Artisanal and Small-Scale Mining
CHSS	Community Health, Safety and Security
CLOs	Community Liaison Officers
Erdene	Erdene Mongol LLC and Erdene Resource Development Corp.
GBVH	Gender-Based Violence and Harassment
GIP	Good international Practice
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
KGP	Khundii Gold Project
PPE	Personal Protective Equipment
SEP	Stakeholder Engagement Plan
STI	Sexually Transmitted Infection
UN	United Nations
VPs	Voluntary Principles on Security and Human Rights

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan
TMP	D15: Transport Management Plan
LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D8: Contractor and Procurement Management Plan

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Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Contractor and Procurement Management Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP).

1.1 Objectives

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define topic-specific training requirements; and
- set out references for supporting materials and information.

1.2 Scope

This Management Plan covers all Erdene activities, including contractor activities, during the construction, operation and closure phases of the KGP. Erdene is delivering the Project through an owner-delivered model with selected contractor involvement. Construction activities are expected to be largely outsourced. During mine operations, mining services, power generation services, and permanent camp operations are expected to be outsourced.

This document outlines Erdene's commitment and approach to mitigating contractor and procurement risks that may arise as a direct or indirect result of the KGP.

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined below.

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan.
Commercial Leader(s)	• Overall responsibility for the implementation of this Management Plan • Overall responsibility for the management of Contractor and Procurement processes and development initiatives • Approval of this Management Plan • Ensure appropriate resourcing levels to implement the requirements of this Management Plan • Award of contracts
Compliance and Stakeholder Relations Leader	• Responsible for ensuring overall compliance of Contractors with contract conditions
Commercial Team	• Develop, roll-out and maintain Contractor and Procurement policies, procedures and standards • Ensure compliance with Contractor and Procurement Policies and Procedures, and commitments • Monitor the implementation of this Management Plan and associated processes • Develop any additional controls required if the Contractor does not have sufficient skills and experience to address the issues identified in the Scope of Work • Provide advice to the Contractor to meet Erdene standards and requirements • Maintain Contractor and Procurement records • Contractor and procurement bid / tender evaluations • Initiation and management of procurement processes • Investigate, report and follow up on issues, complaints and procedural breaches • Act as interface with Contractor employees
Training Department Head	• Oversee Contractor compliance with training requirements • Support the development of Scope of Works as required
Project Manager (construction and operations)	• Develop the Scope of Work for each Contractor in consultation with the HR team as appropriate • Assist with the selection of suppliers and contractors • Approval of Contractor Project Execution, Construction, and other Management Plans • Supervise the contract works to ensure compliance with the contract and Erdene requirements, budgets and schedules • Provide resources to verify that Contractor tools and equipment are adequate • Provide resources to give workers any necessary area-specific inductions

	• Oversee Contractor activities; including ensuring that actions listed in HSE, Quality, Project Execution, Construction, and other Management Plans are implemented • Complete the Contractor performance monitoring on a periodic basis • Manage work close-out
HSEC Team	• Assist with the selection of suppliers and contractors • Approval of Contractor HSE, Quality Management Plans • Support the development of Scope of Works as required
Contractors	• Execute the works in accordance with the contract • Prepare HSE Management Plan • Complete Erdene inductions, awareness and competency training, and others as identified, prior to commencement of work • Facilitate completion of medical assessment (“fit for work”) prior to commencement of work if required. • Provide necessary vehicles and equipment in good working order and in compliance with the Contract requirements.

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are:

Table 2 Key Interfaces

Team / Unit	Key Interface(s)
HSEC Team	Supporting the development of Contractor Scope of Works, and approval of relevant Contractor Management Plans
Administration Management Team	Worker management
Compliance and Stakeholder Relations Leader	Contractor compliance

3. PROJECT STANDARDS

Applicable standards must be complied with for all Project activities (the “Project Standards”). Project standards are defined in each Environmental and Social Management Plan and the Designated Manager / Leader will identify applicable Project Standards and associated requirements for Contractors as part of the Scope of Work development process.

The *ESIA Chapter A2 Policy and Legal Framework* details legal and other requirements which provide background and contextual information to the Project standards. This includes Mongolian laws and standards, international and lender (European Bank for Reconstruction and Development) standards and guidelines, and Erdene policies and procedures.

4. MITIGATION MEASURES AND MANAGEMENT CONTROLS

4.1 Overview of Management Controls

Based upon the identified impacts and opportunities presented in the ESIA, the following control measures will be put in place during the construction and operations phase of the KGP.

This Management Plan may be supported by additional procedures and guidelines, which present more details on specific aspects of the day-to-day management activities at the KGP. An overview of the contractor and procurement management process is set out in Figure 1 below. Table 3 below presents the key management controls that Erdene will implement to manage contractors and suppliers and ensure alignment and compliance with Erdene requirements and Project standards, as identified specifically in the ESIA. In addition, general contractor management requirements are stipulated thereafter.

Figure 1 Contractor Management Process

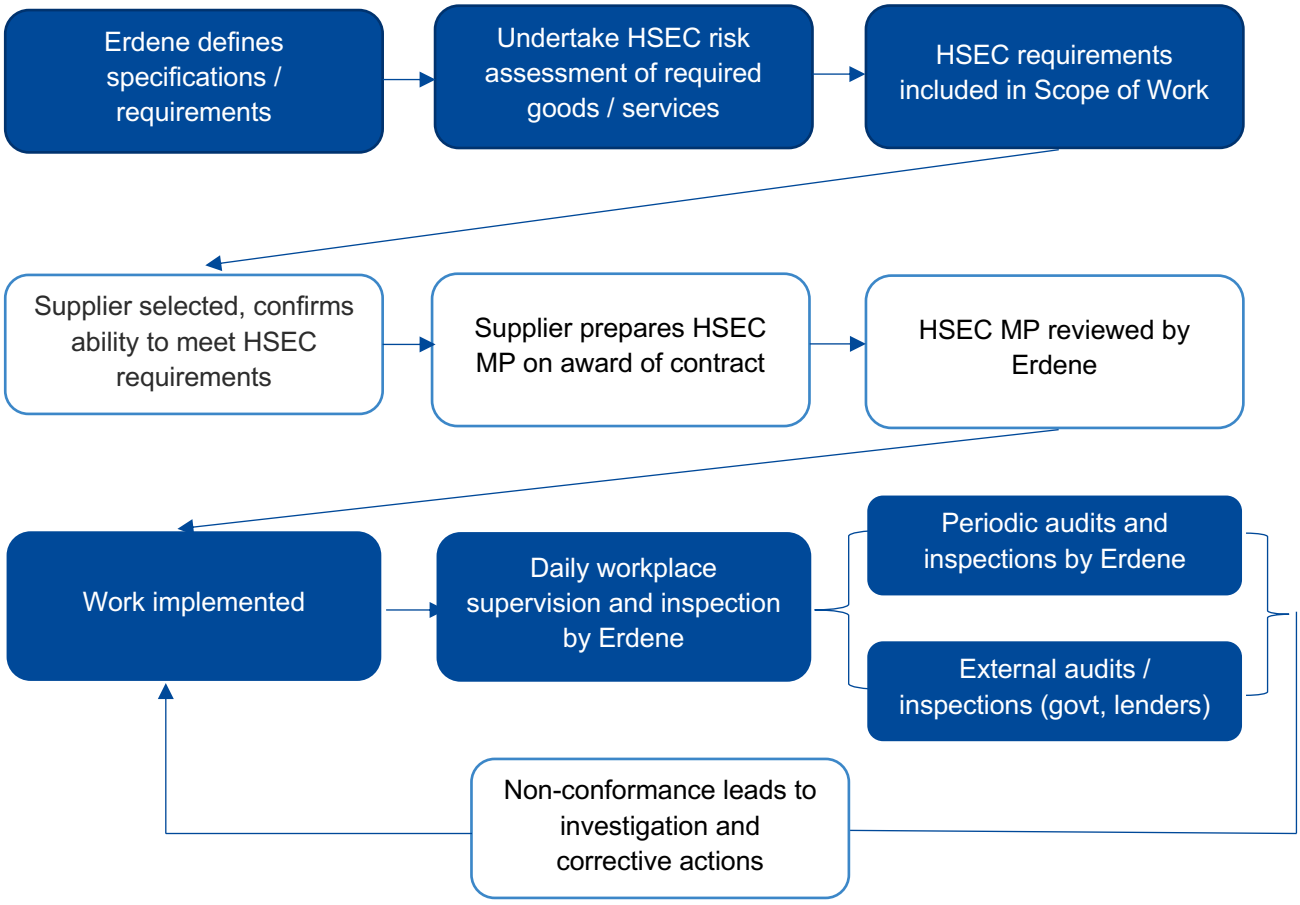

Table 3 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability		
				Construction	Operation	Closure
CPMP01	Direct, Indirect and Induced Employment Generation and Business Opportunities/ Inventory and pre-qualification survey	Conduct an inventory and/or pre-qualification survey, as appropriate, of local sourcing opportunities (e.g. meat, vegetables, dairy products) to identify potential suppliers	• Engagement records (SCMP) • Inventory and/or pre-qualification survey	X	X	-
CPMP02	Direct, Indirect and Induced Employment Generation and Business Opportunities / Supplier Development Programme	Investigate, through consultation with local communities and authorities, the potential for a Supplier Development Programme that provides targeted support and assistance to develop local businesses' capacity.	• Engagement records (SCMP) • Local Cooperation MP	X	X	-
General Contractor Requirements						
CPM03	Implement a process to identify and evaluate risks associated with the planned procurement of materials, equipment, services and labour, including an assessment of the risks of non-compliance or conformance with Project Standards, and analysis of any downstream implications which may be impacted by the selection.		• Scope of Work Development using a Scope of Work checklist • Risk assessment (if required)	X	X	-
CPM04	All requirements of the HR Policy (covering EBRD PR2 requirements) will be delegated to contractors and overseen by Erdene. Implement a process for evaluating a supplier's ability to provide material, equipment and/or services which meet defined specifications, design criteria and Project Standards. Document evaluations and any related actions. This process must be supported by a procedure that specifies the criteria for supplier selection, evaluation and re-evaluation and the rejection of product(s) or material(s).		• Bid evaluation	X	X	-
CPM05	All materials, equipment, services and labour procured or supplied must meet the required specifications for the control of HSEC and compliance risks associated with their intended use or activity, as identified in the risk assessment process.		• Bid evaluation (including verification of HSEC hazard	X	X	-

	All requirements of the HR policy (covering EBRD PR2 requirements) will be delegated to contractors and overseen by Erdene.	identification responses by bidders)			
CPM06	The Contractor must have a procedure, commensurate with the evaluated risk, for receiving, storing, dispatching and transporting of all equipment and materials, consistent with Project Standards.	• Approved contractor HSEC MP	X	X	-
CPM07	The Contractor must have a procedure controlling the safe and approved disposal of surplus/used materials, chemicals, hazardous waste and equipment consistent with Project Standards. It must specify actions required to minimise any future liability.	• Contractor materials records • Contractor HSEC MP	X	X	-
CPOM08	The process for the management of contractors potentially includes the following phases: a) Contractor selection b) Contractor preparation c) Contractor award d) Orientation and training e) Contractor management f) Post-evaluation of contractor Individuals engaged on a temporary or casual basis to work within existing businesses/managed sites are to be inducted in the same way as employees.	• procurement and contract records	X	X	-
CPM09	For all contracted labour or service agreements, there must be an agreed scope of work, which will include an analysis of the risks associated with the activities to be performed by the Contractor, including an assessment of the risks of non-compliance or conformance with Project Standards. The extent of the risk assessment required will be determined during the scope of work development process, but will include, as a minimum, a hazard identification of HSEC, and compliance risks as set out in the SOW Template.	• Scope of Work • Risk Assessment (if required)	X	X	-
	The ESMS applies to Contractors and includes processes to ensure all contractor tools and equipment are inspected and evaluated to be in a safe condition and conform to Erdene standards and site procedures.	• Inspection records	X	X	-

Table 4 below provides a summary of the key actions at each stage. These actions are undertaken by Erdene to ensure that activities are properly specified, resourced, managed and supervised to ensure compliance with Erdene requirements and Project Standards.

Table 4 Key Procurement and Contractor Management Stages and Actions

	Qualifications & Sourcing	Supplier Preparation	Mobilisation	Work Management	Review and Close Out
Action	Direct/Sole Source: • Purchase Requisition • Purchase Order Competitive: • Create SOW • Risk assessment and creation of relevant Erdene contractual requirements • Pre-qualification • SOW issued to bidders • Tender clarifications • Tender evaluation • Contracting • Purchase order	• Prepare tender with HR requirements embedded • On award, prepare HSEC MP • Pre-commencement confirmation of requirements, supervision and monitoring	• Send vehicles tools and equipment to site for inspection • Workers to attend training • Provide details of supervisors and company emergency contacts	• Monitor work permits • Supervise activities • Track time and exposure hours • Run pre-start meetings • Ensure work is carried out safely • Check and audit activities • Communicate regularly	• Complete close-out documentation • Record performance evaluation
Tools	• Purchase requisition form • SOW template • HSEC risk assessment • Erdene HSEC MP	• SOW • Erdene HSEC Requirements • Template for worker equipment and tools listings	• Equipment and tools listing • Equipment and tools checklist • HSEC MP Checklist	• Standard Work Procedures • Job Hazard Assessment	• Demobilisation checklist (for long-term contractors and suppliers)

5. MONITORING

5.1 Overview of Monitoring Requirements

The monitoring measures that are to be implemented to assess compliance with Project Standards are described in this section.

In the event that monitoring identifies non-conformance with Project Standards, these will be investigated, and appropriate corrective actions identified.

5.2 Key Performance Indicators

The table below summarises the KPIs and associated key management controls that can be used to assess the progress and effectiveness of proposed mitigation strategies.

Table 5 Key Performance Indicators

Unique ID	KPI	Target
CP-KPI-01	Number of reported contractor HSEC incidents	Minimise and continued improvement in number of reported incidents
CP-KPI-02	Number of recorded community grievances related to contractors	Minimise and continued improvement in number of reported incidents
CP-KPI-03	Number of complaints received from contract workforce through employee grievance mechanism	Effective and timely resolution of grievances from contracted workforce

5.3 Key Monitoring Activities

Key monitoring activities will focus on ensuring compliance with the Project Standards using the key performance indicators established in Section 5.2.

Contractor monitoring activities are undertaken both by Erdene and contractor supervisory and management personnel and include:

- monitoring compliance against the Contractor HSE Management Plans, and Contract conditions;
- preparing a Performance Scorecard/Report on a monthly or other agreed basis;
- medical examinations as required.
- Contractor performance monitoring is set out in individual contracts via a risk-based approach.

5.4 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required, this Management Plan may also be updated on an “as required” basis.

6. TRAINING

All necessary training is provided as part of induction training (to provide general awareness) and job-specific training as necessary.

6.1 Induction Training

All employees of Erdene and Contractors working at the Project will be provided with general induction, site specific induction and a broad range of health, safety and environmental awareness training, including the Erdene Code of Conduct.

6.2 Job-Specific Training

All employees of Erdene and Contractors working on the KGP shall attend routine toolbox safety briefings.

Procurement staff will be provided with contract management training and other job-specific training that may be required.

As part of the contractor engagement process, worker qualifications and training records will be gathered from the Contractor to verify competency and manage staff competency.

7. AUDIT AND REPORTING

7.1 Auditing

All contractor activities are subject to supervision, inspection and audit by Erdene at any time. This may include third party assessments and audits undertaken on behalf of Erdene, Mongolian regulatory authorities or Project Lenders.

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with requirements of the Erdene HSEC Management System (including the ESIA and the KGP Project ESMP).

All incidents and non-conformances identified during inspections will be reported as per the requirements of the KGP HSEC Management System.

7.2 Contractor Auditing

Contractors will be subject to inspection and audit by Erdene prior to initial appointment, and then on a periodic basis as outlined in this *Contractor and Procurement Management Plan*.

7.3 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

8. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of management plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the ESMP and the Management Plans form the KGP ESMP. This Management Plan must be read in conjunction with the *KGP ESMP Framework, HR Policy and Local Cooperation Management Plan*. The KGP ESMP is a key component of the KGP HSEC management system as described.

As such the requirements of all Erdene Management Plans and Procedures will be applicable to contractors. Requirements will be set out in Contractor contracts and Contractors will also be obliged to comply directly with requirements set out in Management Plans and Procedures.

This Management Plan has overlaps and cross-linkages to several other Management Plans, as follows:

Table 6 Context and Overlaps with Other Management System Documentation

Management Plan Title	Overlap / Cross Linkage
Human Resources Management Plan & Policy	Procedures and requirements for the management of workers
Local Cooperation Management Plan	Skills development, local supply chain development, employability and access to Project community development benefits in the KGP AoI
Stakeholder and Communications Management Plan	Ongoing engagement with local communities and other stakeholders

9. LIST OF ABBREVIATION, ACRONYMS AND UNITS OF MEASURE USED

AoI	Area of Influence
Erdene	Erdene Mongol LLC and Erdene Resource Development Corp.
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HSEC	Health, Safety, Environment and Community
HR	Human Resources
KGP	Khundii Gold Project
SEP	Stakeholder Engagement Plan
SOW	Scope of Work

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan
TMP	D15: Transport Management Plan
LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D9: Crisis and Emergency Response Management Plan

April 2020

Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Crisis and Emergency Response Management Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project).

1.1 Objectives

The *Crisis and Emergency Response Management Plan* is designed to provide a high level overview of the procedures and activities in place to mitigate and control the impacts of an occupational safety, security, health, community or environment incident at the KGP during the construction and operations phase. Procedures will be developed by Erdene to set out specific instructions to manage crisis and emergency response situations, where necessary.

Whereas this document provides the overall approach and commitment to crisis and emergency response and preparedness, specific Procedures will provide detailed command and control and response actions. These Procedures must be used in conjunction with this overarching Management Plan in the event of an emergency situation.

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define topic-specific training requirements; and
- set out references for supporting materials and information.

1.2 Scope

This Management Plan covers all Erdene activities, including contractor activities, during construction, operations and closure phases of the KGP in relation to crisis and emergency response planning activities.

Currently, detailed site-based emergency response procedures exist for Erdene's operations at Bayan Khundii (pre-construction). Further detailed implementing Procedures will be developed by Erdene to set out specific instructions to manage crisis and emergency response situations prior to launching the construction and operations phases of the Project. This Management Plan does not detail the processes and procedures needed to implement it.

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined below.

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan.
Senior Management / VPs / Department Heads	• Approve this Management Plan. • Overall responsibility for the scope and implementation of this Management Plan • Ensure appropriate resourcing levels to implement the requirements of this Management Plan.
HSEC Manager	• Overall responsibility for the scope and implementation of this Management Plan. • Development, monitoring and revision of this Management Plan. • Responsible for ensuring this Plan is available to all employees and Contractors • Responsible for ensuring that relevant activities are undertaken in compliance with this Management Plan and related Procedures
HSEC Team	• Conduct timely implementation of this Management Plan, including coordination with implementing organisations and other stakeholders. • Tracking of compliance to this Management Plan and communication of findings to key stakeholders.
All Employees and Contractors	• Adherence with this Management Plan and implementation of requirements.

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are:

Table 2 Key Interfaces

Team / Unit	Key Interface(s)
Director, Government Relations	Ensuring that crisis and emergency response plans / procedures identify the communities that may be affected by an incident at site
Mine Construction Manager	implementation of construction phase activities to manage sources of potential safety and environmental incidents
Mine Operations Manager	implementing operations phase activities to manage sources of potential safety and environmental incidents
HSEC Department Head	Implementing the related Occupational Health, Safety, and Security Management Plan
Mine General Manager	Overall accountability for emergency preparedness and response

3. PROJECT STANDARDS

Applicable Standards must be complied with for all Project activities (the "Project Standards"). Project Standards comprise:

- applicable Mongolian laws and standards;
- applicable international and lender standards and guidelines; and
- applicable Erdene policies and procedures.

3.1 Applicable Mongolian Laws and Standards

Applicable Mongolian legal and national standards are listed below, detailed descriptions of which may be found in *Chapter A2 Policy and Legal Framework*.

Mongolian laws applicable to the KGP and crisis and emergency response are as follows:

- Minerals Law (In force on 8th July 2006; amended 2nd May 2019);
- Law of Mongolia on Health (In force on 8th July 2006; amended 2nd May 2019);
- The Law on Hazardous and Toxic Chemicals (In force on 25th May 2006; amended 12th May 2017);
- Mongolian Law on Waste (In force 1st July 2004; amended on 12th May 2017)
- Law of Mongolia on Labour Code (In force on 1st July 1999, amended 21st April 2017);
- Law on Labour Safety and Hygiene (In force on 22nd May 2008; amended 27th June 2018); and
- Law on Environmental Impact Assessment (In force 23rd June 2012).

3.2 Applicable International Standards and Guidelines

3.2.1 European Bank for Reconstruction and Development

The international standards which Erdene will implement are those set by the European Bank for Reconstruction and Development (EBRD). EBRD *Performance Requirement 4 Health & Safety* sets out requirements with regard to emergency preparedness and response in accordance with EU requirements under the Seveso III Directive[1]. Key requirements are the preparation and/or undertaking of:

- Major Accident Prevention Policy;
- Safety Management System;
- Safety Report;
- Emergency Response Plan; and
- Disclosure of key information to the public.

[1] Directive 2012/18/EU of 4 July 2012 on the control of major-accident hazards involving dangerous substances (this replaces Directive 96/82/EC).

3.2.2 International Cyanide Management Code

Erdene will align with the provisions outlined in the International Cyanide Management Code. The Code covers emergency response related to the transportation, use and management of cyanide. The following key requirements ("Standards of Practice") are set out:

- Prepare detailed emergency response plans for potential cyanide releases.
- Involve site personnel and stakeholders in the planning process.
- Designate appropriate personnel and commit necessary equipment and resources for emergency response.
- Develop procedures for internal and external emergency notification and reporting.
- Incorporate into response plans monitoring elements and remediation measures that account for the additional hazards of using cyanide treatment chemicals.
- Periodically evaluate response procedures and capabilities and revise them as needed.

3.3 Applicable Erdene Standards

The primary Erdene policies and standards that apply to crisis and emergency response are provided in the *Erdene 2018 Policy and Procedures Manual*, which in summary include:

Health, Safety and Security

Provisions in relation to crisis and emergency response are enacted in Erdene's Health, Safety and Security Guiding Principles as follows:

Working safely is both a corporate obligation and an individual responsibility. Through its business operations, Erdene strives to:

- Generate value for its stakeholders, the environment and local communities
- Identify and mitigate health, safety, and security risks
- Protect basic human rights, especially the well-being of children
- Operate transparently and accountably to its stakeholders
- Abide by applicable local laws, regulations and any voluntary commitments

As a core business function, Erdene commits to providing the necessary resources, both human and financial, to ensure the mitigation of health, safety and security risks and achieve optimal performance.

Erdene requires that detailed health, safety, and security policies and procedures be developed according to the needs of a given minerals project, including for affiliated contractors, sub-contractors and consultants, with the following policies as the basic framework for more detailed health, safety and security protocols.

- Health Policy;
- Safety Policy;
- Security Policy;
- Field Personnel Policy;

- Field Communications Policy;
- Field Camp Rules Policy.

Stakeholder Relations and Sustainability Policy

Erdene's Stakeholder Relations and Sustainability Policy articulates the relationship between Erdene's stakeholder relations and sustainability, with sustainability performance defined and measured through six key areas including:

1. growing the value of the company and its operations;
2. supporting local economic development;
3. promoting public health and well-being;
4. improving workforce skills and education;
5. ensuring a culture of ethical business practices; and
6. avoiding and mitigating environmental impacts.

Other key documents include:

- Erdene's Critical Incident Report Form – which facilitates the recording of fact, findings and recommendations pertaining to a given incident.
- Erdene's Work Site Emergency Response Plan Template – which outlines a template for the posting of necessary emergency response information publicly at a given worksite.

Key sections of the company's Policies and Procedures Manual, including the Erdene Code of Business Conduct and Ethics, are available to the public and may be found at the company's website (https://erdene.com/en/corporate/governance/).

4. MITIGATION MEASURES AND MANAGEMENT CONTROLS

4.1 Overview of Management Controls

In response to an emergency, the prime concerns are to:

- protect Project personnel, the community, the environment, Erdene assets and information;
- ensure that the KGP can continue to operate with as little effect on schedule as possible in the situation;
- ensure that stakeholders and staff do not lose confidence in the Project and its ability to continue in operation.

The primary aim of the *Crisis and Emergency Response Management Plan* is to protect and preserve life, the environment and assets. The implementation of subsidiary crisis and emergency response procedures will include details on the following components:

- first actions;
- alert levels and reporting lines;
- internal and external notification and communication;
- distribution list (phone cascade, electronic and paper messages);
- activation of the Crisis and Emergency Response Team;
- list of key resources (internal / external) and contact information (centre of expertise database);
- onsite command post;
- location of resources;
- logistics;
- site evacuation;
- protection of vital records protocols;
- external emergency services / security protocols, muster points and assembly areas;
- emergency equipment;
- search and rescue teams;
- operations shutdown;
- locking of equipment;
- control of energy sources;
- location of main valves and main switches;
- dangerous goods and hazardous materials;
- site re-integration (recovery);
- post-incident investigation protocols;

- lessons learned review processes including management of implementation of recommendations from this process; and
- Crisis and emergency response training and practice simulations (including, where appropriate, local communities, authorities and service providers).

The table below presents the key management controls that Erdene will implement.

Table 3 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability			
				Pre-construction	Construction	Operation	Closure
CERM01	Unplanned emergency events	Develop and implement a *Crisis and Emergency Response Management Plan* specific to the KGP context, including to respond to Project-related incidents that may affect communities, containing information on possible affected communities as well as communication and notification strategies and procedures.	• Up-to-date *Crisis and Emergency Response Management Plan* and supporting procedures in place • Risk register and emergency response procedures	-	X	X	-
CERM02	Hazard and risk identification	Ensure a hazard and risk identification process is in place and reviewed at least annually. Risk identification process informed by hazards and risks identified at a functional level including Safety, Environment and Communities risks. Risk analysis includes Ulaanbaatar, Bayankhongor City Centre, Shinejinst soum centre, mine site, associated facilities, transport routes and other relevant off-site infrastructure. Erdene Risk Assessment Procedures are used to inform the hazard and risk identification Process.	• Hazard and risk register and emergency response procedures	-	X	X	-
CERM03	Unplanned Emergency Events	Establish mutual support agreements with local and national police and	• Local Cooperation Agreement(s) • Contractor agreements	-	X	X	X

		emergency services, as appropriate and feasible.					
CERM04	Disclosure	Disclose the *Crisis and Emergency Management Plan* and undertake engagement with local emergency response organisations and communities on emergency response issues and awareness.	• Stakeholder engagement records	X	X	X	-
CERM05	Contingency measures	Maintain sufficient inventory and ensure contingency measures are in place to provide heating, water, and power to maintain worker health and safety in the event of an emergency situation.	• Design specifications and commissioning reports (e.g. utilities) • Inventory records • Workplace inspections	-	X	X	-
CERM06	Site evacuation	Evacuate the site in the event that maintenance of health and safety of workers is unable to be achieved.	• Evacuation policy and procedures • Evacuation records	-	X	X	-
CERM07	Training	Crisis and emergency response teams will be appropriately trained to deal with anticipated potential emergency situations, including environmental emergencies.	• Training records, demonstrating that emergency response team members have received initial and annual refresher training on emergency response procedures.	-	X	X	-
CERM08	Incident Reporting	Implement the Erdene Incident / Accident Investigation Program which provides a system that consistently instructs supervisors, managers, and safety representatives on the process involved in reporting, investigating and analysing accidents / incidents. Procedures in place to: • Record incidents; • Investigate incidents; • Analyse the impact(s) and potential risks of a future incident; • Communicate the incident lessons learned to relevant people / groups, as appropriate; and	• Incident records • Workplace inspections • Ongoing audits				

		• Implement corrective actions to prevent recurrence.					
CERM09	Worker Access to Health and Emergency Services	Provide workers with access to site medical services, or health services provision in Ulaanbaatar or elsewhere in the event that medical issues cannot be treated on site, including the ability to conduct medical evacuation (“medivac”) in the event of an emergency, as appropriate.	• Medical service provision agreements / contractors (including medivac service provider)	-	X	X	-
CERM10	Worker Access to Health and Emergency Services	Regular engagement with and auditing of site medical services and any off-site medical service providers (such as medivac) to ensure response capability is maintained.	• Engagement / communication records • Monitoring records	-	X	X	-

5. MONITORING

5.1 Overview of Monitoring Requirements

The monitoring measures that are to be implemented to assess compliance with Project Standards are described in the section.

In the event that monitoring identified non-conformance with Project Standards, these will be investigated, and appropriate corrective actions identified.

5.2 Key Performance Indicators

The table below summarises the KPIs and associated key management controls that can be used to assess the progress and effectiveness of proposed mitigation strategies.

Table 4 Key Performance Indicators

Unique ID	KPI	Target
CERMP-KPI-01	Total number of non-compliances with emergency prevention and preparedness measures identified in this Management Plan.	Minimise and target zero per annum
CERMP-KPI-02	Number of emergencies that have triggered the emergency response plan	Minimise and target zero per annum

5.3 Key Monitoring Activities

Key monitoring activities will focus on ensuring compliance with the Project Standards using the key performance indicators established in Section 5.2.

Erdene will develop a schedule of crisis and emergency response simulations, designed to test and monitor all aspects of the KGP's preparedness for a range of emergencies, including equipment, competencies and procedures.

Following any simulation or actual emergency, a review will be conducted and debrief of all personnel involved. Where any gaps or failures in the response are identified, they will be recorded appropriately, the causes investigated and corrective actions, due dates and responsible persons determined.

5.4 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

This Management Plan will also be reviewed after any incident or test, which provides opportunity for improvements. The revisions will focus on ensuring the factual content, such as contact information and nominated personnel, are correct. The review and revision will ensure that the crisis and emergency response information coordinates with the requirements of Erdene, Mongolian regulatory requirements, and Project Standards.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required (as identified through the *Management of Change Procedure* contained within the KGP ESMS Framework), this Management Plan may also be updated on an "as required" basis.

6. TRAINING

All employees of Erdene and contractors are provided with basic training on health, safety and security, including health awareness training and induction.

Training in emergency response preparedness and response is provided for the following:

- induction training;
- job-specific specialist training, e.g. for plant operators;
- emergency response teams.

Training will be used to communicate business continuity and emergency response and planning to all personnel. An annual training exercise programme will be assembled each year. The programme will be realistic to test response plans and procedures. As a minimum, desktop exercises will take place annually with a full-scale exercise taking place at least every two years.

6.1 Induction Training

All employees of Erdene and Contractors working at the Project will be provided with general induction, site specific induction and a broad range of health, safety and environmental awareness training, including the Erdene *Code of Conduct*.

All employees of Erdene and contractors shall also be provided with basic training in crisis and emergency response as part of general induction training.

6.2 Job-Specific Training

Environmental Training

The HSEC and Training Departments shall provide staff with general information and awareness relating to the management of chemical substances spills, and others as may be identified. It is required that any staff member who is responsible for the use, storage or management of chemical substances complete the training (see further in *Hazardous Materials Management Plan*). Specific environmental emergency response training is to be coordinated and recorded in a training register.

Emergency Response Team Training

Emergency response teams will be appropriately trained to deal with potential emergency situations, including environmental emergencies. Team members will receive initial and annual refresher training to maintain familiarisation and competency. The emergency response team undertakes simulations and training regularly. Training is based around a changing set of activities and is planned and managed on a dynamic basis.

Emergency response simulations have been undertaken in the course of the company's field operations to date. Additional emergency drills, training, and continuous systems assessment will be part of the site based operations during both construction and operations phases.

Emergency Response Training – Interface with Local Agencies and Communities

Erdene will undertake meetings with local emergency services and local communities and their representatives on emergency response planning annually, as a minimum.

7. AUDIT AND REPORTING

7.1 Auditing

Daily inspections will be carried out by operational area superintendents / supervisors covering a range of operational aspects, including community health safety and security issues as appropriate to activities. Any incidents identified during inspections will be reported in the relevant Erdene incident management system.

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with requirements of the Erdene HSEC Management System (including the ESIA and the KGP Project ESMP).

All incidents and non-conformances identified during inspections will be reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan also may be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

7.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene

.

8. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of management plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the ESMP and the Management Plans form the KGP ESMP. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system as described.

This Management Plan has overlaps and cross-linkages to several other Management Plans, as follows:

Table 5 Context and Overlaps with Other Management System Documentation

Management Plan Title	Overlap / Cross Linkage
Occupational Health, Safety and Security Management Plan	Worker health, safety and security
Transport Management Plan	Traffic accidents involving Project vehicles
Hazardous Materials Management Plan	Releases of hazardous materials or fire and explosion
Community Health, Safety and Security Management Plan	Management measures relating impacts on community health, safety and security
Stakeholder and Communications Management Plan	Engagement and communications methods and action plan

Other procedures may be developed, as required, to support this Management Plan in addition to the above management plans.

9. LIST OF ABBREVIATION, ACRONYMS AND UNITS OF MEASURE USED

AoI	Area of Influence
EBRD	European Bank for Reconstruction and Development
Erdene	Erdene Mongol LLC and Erdene Resource Development Corp.
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HSEC	Health, Safety, Environment and Community
KGP	Khundii Gold Project

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
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BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
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ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D10: Human Resources Management Plan

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Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Human Resources (HR) Management Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP).

1.1 Objectives

The purpose of this Management plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define topic-specific training requirements; and
- set out references for supporting materials and information.

This Management Plan sets out the basic procedures and requirements to ensure that Erdene and its Contractors respect and protect the fundamental principles and rights of workers through promoting a decent workplace. This includes:

- fair treatment;
- non-discrimination and equal opportunities of workers;
- establishing, maintaining and improving a sound worker-management relationship;
- promoting compliance with any collective agreements to which Erdene is a party,
- ensuring compliance with national labour and employment laws;
- protecting and promoting the safety and health of workers, especially by promoting safe and healthy working conditions;
- preventing the use of forced labour and child labour (as defined by the ILO and Mongolian legislation).

Implementation of the *HR Management Plan* is also central to maximising the opportunities for local employment and ensuring access to jobs for potential candidates in affected communities. This is vital to establishing a good relationship between the Project and the local community. Therefore, this Management Plan also aims to outline the skills development and training process to support local communities to benefit from the Project over time by developing skills that can be utilised by the Project and potentially transferred post-closure.

1.2 Scope

This Management Plan covers all Erdene and Contractor activities during the construction, operation and closure phases of the KGP relating to human resources management.

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined below.

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan.
Senior Management / VPs	• Approve this Management Plan. • Overall responsibility for the scope and implementation of the Management Plan. • Ensure appropriate resourcing levels to implement the requirements of this Management Plan.
Administration Management Department Head	• Overall responsibility for the implementation of this Management Plan. • Overall responsibility for the management of HR processes and training and development initiatives. • Planning personnel development strategy and strategic initiatives. • Training and development of workforce.
Administration Management Team	• Develop, roll-out and maintain HR policies, procedures and standards. • Ensure compliance with HR Policies and Procedures, and commitments. • Report to Government and other bodies on compliance with commitments and on other occasions as required by legislation. • Manage salaries and benefits, including monitoring of market conditions and proposing changes to salary and benefit arrangements. • Monitor the implementation of this Management Plan and HR processes. • Maintain HR records. • Process HR transactions. • Overall responsibility for the recruitment and selection of new employees and working with managers to develop and review job descriptions. • Investigate, report and follow up on issues, complaints and procedural breaches. • Act as HR interface with Contractors and Contractor employees. • Ensure Contractor compliance with approved recruitment and selection procedures.

Supervisors	• Apply HR Policies, Procedures and Standards in workplace teams.
	• Monitor Contractors on labour and working conditions and adherence to:
	  ○ applicable policies and requirements / Erdene HSEC Management System (HSEC MS) procedures;
	  ○ applicable Mongolian laws;
	  ○ applicable international standards (particularly those of the European Bank for Reconstruction and Development (EBRD) and International Labour Organization (ILO)).
	• Undertake performance assessments, fitness for work and training of workforce.

All Employees and Contractors	• Demonstrate familiarity with HR Policies, Procedures and Standards through induction and other company provided training and communications. • Adhere to the requirements in this Management Plan.

Individual roles and responsibilities related to HR management and training are set out in individual job descriptions.

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are:

Table 2 Key Interfaces

Team / Unit	Key Interface(s)
Erdene Project Construction Manager	• Implementation of Erdene HR policies (Construction phase).
Erdene Mine Operations Manager	• Oversight of implementation of Erdene HR strategy and management. • Implementation of Erdene Human Resources policies (Operations phase.
Erdene Director Compliance and Stakeholder Engagement	• Contractor contract compliance.
Erdene Administration Manager	• Implementation of the HR MP and policies.
Erdene Health, Safety, Environment and Community Team	• Worker health & safety issues, and community engagement.
Training Manager	• Training development and implementation.

3. PROJECT STANDARDS

Applicable standards shall be complied with for all Project activities (the "Project Standards"). The Project Standards comprise:

- applicable Mongolian laws and standards;
- applicable international and lender standards and guidelines; and
- applicable Erdene policies and procedures.

3.1 Applicable Mongolian Laws and Standards

Applicable Mongolian legal and national standards are listed below, detailed descriptions of which may be found in *Chapter A2 Policy and Legal Framework*.

Mongolian laws applicable to the KGP, include:

- Labour Law of Mongolia (In force on 1st July 1999, amended 21st April 2017)
- Social Insurance Law of Mongolia (in force on 31 May 1995);
- Law on Sending Workforce Abroad and Receiving Labour Force and Specialists from Abroad (in force on 8 July 2006);
- Law on Minimum Wages (in force on 16 April 2010);
- Law on Trade Union Rights (in force on 23 May 2003);
- Law on Promotion of Gender Equality (in force on 2 February 2011);
- Law of Mongolia on Health (In force on 5th May 2011; amended 18th January 2019);
- Law of Mongolia on Labour Safety and Hygiene (In force on 22nd May 2008; amended 27th June 2018); and
- Law on Environmental Impact Assessment (In force 23rd June 2012).

3.2 Applicable International Standards and Guidelines

3.2.1 International Labour Organisation Conventions Ratified by Mongolia

Mongolia has ratified a wide range of ILO Conventions including the following ILO Core Conventions:

- *Forced Labour, 1930 (No. 29);*
- *Freedom of Association and Protection of the Right to Organise, 1948 (No. 87);*
- *Right to Organise and Collective Bargaining, 1949 (No.98);*
- *Equal Remuneration Convention, 1951 (No. 100);*
- *Abolition of Forced Labour, 1957 (No. 105);*
- *Discrimination (Employment and Occupation), 1958 (No. 111);*
- *Minimum Age, 1973 (No. 138);*
- *Elimination of the Worst Forms of Child Labour, 1999 (No. 182);*
- *Occupational Safety and Health Convention, 1981 (No. 155); and*

- *Vocational Rehabilitation and Employment (Disabled Persons) Convention, 1983 (No. 159).*

3.2.2 European Bank for Reconstruction and Development

The international standards which Erdene will implement are those set by the EBRD. Under *EBRD Performance Requirement 2 Labour and Working Conditions*, proper human resources management, respect for workers' rights, including freedom of association and the right to collective bargaining, and promotion of workers' health are key to the sustainability of an enterprise. Management of non-employee workers, the process of redundancy and grievances arising at the workplace are also covered by the standard. Erdene will comply with the requirements of *EBRD Performance Requirement 2* when implementing its policies.

3.3 Applicable Erdene Standards

The primary Erdene policies and standards that apply to HR are provided in the *Erdene 2018 Policy and Procedures Manual*, which provided in summary below. Policies and Procedures will be reviewed and updated as necessary in advance of Project construction commencing, consistent with EBRD requirements and the needs of the Project as it is developed.

Human Resources Management

Key provisions in relation to HR management are listed in the HR guiding principles and policies as follows.

- *Employment: Hiring Policy (Mongolia);*
- *Employment: Probation Period Policy;*
- *Employment: Training and Professional Development Policy;*
- *Employment: Monthly Reports Policy;*
- *Employment: Performance Appraisal Policy;*
- *Employment: Termination of Employment Policy;*
- *Employment: Compensation and Benefits Policy*
- *Employment: Share Option Incentive Policy;*
- *Leave and Holidays: Vacation Policy;*
- *Leave and Holidays Accrued Time-Off Policy;*
- *Leave and Holidays: Leave of Absence Policy;*
- *Leave and Holidays: Maternity, Paternity, Parental and Adoption Leave;*
- *Leave and Holidays: Bereavement and Compassionate Leave Policy;*
- *Leave and Holidays: Sick Leave Policy;*
- *Leave and Holidays: Paid Holiday Policy;*
- *Working Conditions: Health, Safety and Security Policy;*
- *Working Conditions: Sexual and General Harassment Policy;*
- *Working Conditions: Working Hours Policy;*
- *Working Conditions: No Smoking Policy;*

- *Working Conditions: Behaviour in the Workplace Policy;*
- *Working Conditions: Work Travel Policy;*
- *Working Conditions: Company-Sponsored Events Policy; and*
- *Working Conditions: Professional Appearance Policy.*

Code of Conduct

Key provisions in relation to Erdene's Code of Conduct has been developed as a Code of Business Conduct and Ethics and covers the following topics:

- *Conflicts of Interest;*
- *Protection and Proper Use of Corporate Assets;*
- *Confidentiality;*
- *Fair Dealing; and*
- *Compliance with Laws, Rules and Regulations.*

Health, Safety and Security

Provisions in relation to human resources are also found within Erdene's health, safety and security Guiding Principles. Furthermore, Erdene requires that detailed health, safety, and security policies and procedures be developed according to the needs of a given minerals project, including for affiliated contractors, sub-contractors and consultants, with the following policies as the basic framework for more detailed health, safety and security protocols.

- *Health Policy;*
- *Safety Policy;*
- *Security Policy;*
- *Field Personnel Policy;*
- *Field Communications Policy; and*
- *Field Camp Rules Policy.*

Stakeholder Relations and Sustainability Policy

Erdene's *Stakeholder Relations and Sustainability Policy* articulates the relationship between Erdene's stakeholder relations and sustainability, with sustainability performance defined and measured through six key areas including growing the value of the company and its operations; supporting local economic development; promoting public health and well-being; improving workforce skills and education; ensuring a culture of ethical business practices; and avoiding and mitigating environmental impacts.

4. MITIGATION MEASURES AND MANAGEMENT CONTROLS

4.1 Overview of Management Controls

Based upon the identified impacts and opportunities presented in the ESIA, the following control measures will be put in place during the construction and operations phase of the KGP, in addition to the management controls developed as part of the *Erdene 2018 Policy and Procedures Manual*.

The table below presents the key management controls that Erdene will implement.

Table 3 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability		
				Construction	Operation	Closure
HRMP01	Direct, Indirect and Induced Employment Generation and Business Opportunities / Implementation of HR policies and procedures	Develop and implement a *Human Resources (HR) Management Plan* (this MP), the provisions of which will apply to all personnel (including Contractors), consistent with Erdene's Human Resources Management Policies, as set out in Section 3.3.	• Policy and Procedures	X	X	-
HRMP02	Direct, Indirect and Induced Employment Generation and Business Opportunities / Contracts and training	Prioritise local and Bayankhongor *aimag* construction employees for operation phase roles and provide these workers with training during the construction phase to help them enhance the skills required for successful transition from construction to operation phase positions.	• Employment records • Training records	X	X	-
HRMP03	Direct, Indirect and Induced Employment Generation and Business Opportunities / Contracts and training	Develop and implement a training plan that takes into consideration the following aspects: • educational and skill levels of local labour pool; • ability of existing local teaching institutions to participate in and/or deliver training; and • differences between mining industry and other heavy industry sectors.	• Training plan • Training/Toolbox talks/ records checked to ensure complete	X	X	-
HRMP04	Direct, Indirect and Induced Employment Generation and Business Opportunities / Contracts and training	Organise training of employees to upgrade employees' skills and provide further practical experience as required, with training ranging from task specific on-the-job training to more formal vocational training, depending on the needs of the individual Erdene or contractor employee.	• Training records	X	X	-
HRMP05	Direct, Indirect and Induced Employment Generation and Business Opportunities / Contracts and training	Training needs will be defined and implemented for everyone on an annual basis through individual training profiles as part of the training system.	• Training Profile records • Training / Employee records	X	X	-

HRMP06	Code of Conduct	Employ strict measures to control the conduct of KGP personnel, including the contractor workforce, through the Code of Conduct. Erdene will include specific provisions in the worker Code of Conduct on gender and Gender-Based Violence and Harassment (GBVH), among other provisions.	• Training / Employee records	X	X	-
HRMP07	Induction Training	Implement an induction program that includes HR Policies, Procedures and Standards, and provisions on cultural heritage, including norms of acceptable behaviour based on the principle of mutual respect for cultural diversity.	• Training / Employee records	X	X	-
HRMP08	Community Expectations About Employment / Preferential Hiring	Implement a preferential hiring policy, with preference given to local citizens if they meet the knowledge, skill and experience requirements of the position. The policy will prioritise employment applicants from Shinejinst and Bayan-Undur *soums*, thereafter applicants from Bayankhongor *aimag*, then beyond.	• Employment records	X	X	-
HRMP09	Recruitment	Establish eligibility for 'local hiring preference' through a specific timeframe of residency in the Project AoI and/or proof of diaspora status.	• Proof of residence / Proof of diaspora status	X	X	-
HRMP10	Recruitment	Conduct targeted recruitment of talented diaspora (of Shinejinst and Bayan-Undur *soum*) to attract skilled workers back to the Project area. Targeted recruitment will also consider previous seasonal employees and Erdene scholarship graduates for recruitment.	• Recruitment records • Employment records	X	X	-
HRMP11	Local Employment and Training / Stakeholder Engagement	Advertise vacancies in local community Labour Offices and / or Community Centres, and on the Erdene website.	• Advertising records	X	X	-
HRMP12	Local Employment and Training / Stakeholder Engagement	Engage and coordinate with local training institutions to encourage applications from potentially suitable local job seekers. As part of this, conduct a study to identify ways in which Erdene can support the strengthening and capacity development of local training / education institutions to assist in the development of local skills required for employment	• Engagement records	X	X	-
HRMP13	Local Employment and Training / Stakeholder Engagement	Implement training / upskilling programmes on site, and investigate potential to collaborate on such programmes with local training institutions to assist with QA / QC of programmes.	• Training / Programme records	X	X	
HRMP14	Local Employment . Stakeholder Engagement	Clearly communicate employment estimates, timeframes and skills requirements to local communities on an ongoing basis through trained Community Relations personnel.	• Engagement records (SCMP)	X	X	-
HRMP15	National Workforce	Use an international workforce for a term-limited period for compliance and training purposes, where a national personnel cannot be sourced.	• Employee contracts	X	X	-

HRMP16	Gender Diversity and Inclusion	Promote employment and career development of women, including for managerial and technical/engineering positions.	• Number of females in different job types • HR Policy and hiring procedures	X	X	-
HRMP177	Gender Diversity and Inclusion	Work with local *soum* Government to identify opportunities to increase women's participation in the KGP. The Project will also explore opportunities for induced employment to support local enterprises that support employment for women, such as dairy products manufacturing and vegetable processing / pickling, which are largely conducted by women in the Project AoI.	• Engagement records (SCMP) • Number of females in different job types • HR Policy	X	X	-
HRMP18	Gender Diversity and Inclusion	Actively encourage women to apply for a diverse range of jobs. The KGP will aim for jobs other than in unskilled or semi-skilled roles (such as cleaning and catering) to also be available to and pursued by women candidates.	• Number of females in different job types • HR Policy and hiring procedures	X	X	-
HRMP19	Harassment	Apply a strict policy of non-harassment to reduce workplace risks to women. See Erdene *Sexual and General Harassment Policy*.	• HR Policy • Review of recorded incidents and grievances	X	X	-
HRMP20	Trade Unions and Employee Groups	Erdene is committed to meeting national labour law and international requirements (specifically EBRD PR2) for protecting the rights and duties of employers and employees. Erdene will work in good faith with trade unions and any other employee group seeking formal representation.	• Ongoing audits • Employee records	X	X	-
HRMP21		All Project-provided worker accommodation will comply with the *IFC / EBRD guidance note on workers' accommodation (IFC / EBRD 2009).*Key requirements on worker accommodation are as follows: • Living facilities are located to avoid flooding and other natural hazards. • Where possible, living facilities are located within a reasonable distance from the worksite. • Transport from the living facilities to worksite must be safe and free. The living facilities are built with adequate materials, kept in good repair and kept clean and free from rubbish and other refuse.	• Inspection records	X	X	-

HRMP22	Working Conditions	Advise all workers of the site conditions, and specifically the remote location of the mine from any urban areas, prior to contracting.	• Employee contracts	X	X	-
HRMP23	Recruitment and working conditions	Prohibit the withholding of workers' passports or identity cards and the employment of people under the age of 18 for hazardous work (with ages to be verified). All workers will be provided with awareness training on workers' rights and issues such as modern slavery as part of induction training. Disciplinary procedures will be clear and penalties for breaking the rules should be proportional and implemented through a procedure allowing workers to defend themselves and to challenge the decision taken.	• Employee contracts / records • Training records			
HRMP24	Discrimination	Apply a strict policy of no discrimination, by gender or any other personal attribute, in terms of hiring, promotion opportunities or pay (applying the principle for equal pay for equal work), as outlined in the *HR Management Policy.*	• HR Management Policy • Employee Complaint Register • Annual monitoring / auditing	X	X	-
HRMP25	Employee Complaint Management	In advance of the construction phase, implement an Employee Complaint Mechanism for the KGP, accessible to all personnel. Key principles in the employee grievance mechanism will include: accessibility through multiple channels (not relying on supervisors to escalate grievances) and in all languages spoken by the workforce; effective documentation; timely resolution. In addition, it will include specific measures to handle GBVH allegations including anonymous reporting channels, and dedicated focal point to handle allegations (see Erdene *Sexual and General Harassment Policy and Whistleblower Policy.)*	• Employee Complaint Register	X	X	-
HRMP26	Contractor Compliance with HR Provisions	Require contractor compliance with the *HR Management Plan*. Contractors will be managed through the *Contractor and Procurement Management Plan*, which provides for ongoing monitoring of compliance by contractors on a regular basis.	• Contractor and Procurement Management Plan • Contractor audits	X	X	-
HRMP27	Employment Contracts	Ensure employment contracts are in place, monitored and enforced, including of indirect employees for consistency and equity across the Project.	• Employment contracts • Annual monitoring / auditing	X	X	-
HRMP28	Employment Contracts and Salaries	Pay salaries commensurate with comparable Projects (in line with national benchmarks and industry standards).	• Employee contracts	X	X	-

HRMP29	Worker Behaviour / Cultural Heritage	Prohibit all KGP personnel and contractors from initiating or participating in any type of illegal exploration or excavation activities that involve searching for, transfer of and/or trade in archaeological and palaeontological objects and any other items that have cultural or historical value.	• Ongoing audits and Inspection records • Grievance records • Induction	X	X	-
HRMP30	Worker Behaviour / Cultural Heritage	Periodically, and as appropriate, provide personnel with the opportunity to visit sites of local cultural significance, as part of ongoing cultural heritage respect and awareness creation.	• Visit records	X	X	-

5. MONITORING

5.1 Overview of Monitoring Requirements

The monitoring measures that are to be implemented to assess compliance with Project Standards are described in this section.

In the event that monitoring identifies non-conformance with Project Standards, these will be investigated, and appropriate corrective actions identified.

5.2 Key Performance Indicators

The table below summarises the KPIs and associated key management controls that can be used to assess the progress and effectiveness of proposed mitigation strategies.

Table 4 Key Performance Indicators

Unique ID	KPI	Target
HR-KPI-01	Percentage of Mongolian nationals in the workforce	Ratio of Mongolian personnel to total workers will be compliant with any requirements set by Government of Mongolia
HR-KPI-03	Number of worker grievances / complaints	Decrease year on year, target zero

5.3 Key Monitoring Activities

Key monitoring activities will focus on ensuring compliance with the Project Standards using the key performance indicators established in Section 5.2.

Monitoring will focus on the following activities:

- employment and development of employees and those from directly affected communities (Shinejinst and Bayan-Undur);
- ensuring discrimination and harassment is not taking place;
- worker/management relations and worker grievances;
- worker accommodation conditions, particularly in relation with applicable Mongolian standards and the guidance contained in the EBRD Guidance Note “Workers Accommodation. Processes and Standards”.

Key monitoring measures are set out below.

Unique ID	Topic/Aspect	Method	Periodicity
HRMP-Mon-01	Employment	Analysis of records of male/female and soum-aimag-national-international workforce ratio, including those in managerial positions (supervisors and above)	Annual
HRMP-Mon-02	Employment	Number of worker grievances submitted, processed and resolved	Annual
HRMP-Mon-03	Training	Percentage of employees completing mandatory training as outlined in Personal Training Profiles and the Annual Training Plan	Annual
HRMP-Mon-04	Policy Implementation	Number of cases of discrimination or harassment reported	Annual
HRMP-Mon-05	Policy and Procedure Implementation	Review of procedure implementation	Annual

HRMP-Mon-06	Contractor compliance	Review of contractor records by Erdene and periodic on-site inspection of contractors to ensure compliance with EHS and HR requirements	Quarterly (construction) Annual (operations)
HRMP-Mon-07	Accommodation standards	Audit / inspection of worker accommodation and facilities in accordance with the *IFC/EBRD Guidance Note "Workers Accommodation Processes and Standards"*	Quarterly (construction) Annually (operations)

5.4 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required (as identified through the *Management of Change Procedure* contained within the KGP ESMP Framework), this Management Plan may also be updated on an "as required" basis.

6. TRAINING

All training is provided as part of induction training (to provide general awareness) and job specific training as necessary.

6.1 Induction Training

All employees of Erdene and Contractors working at the Project will be provided with general induction, site specific induction and a broad range of health, safety and environmental awareness training, including the Erdene *Code of Conduct*.

All persons will be tested to ensure that they have understood their inductions and made to re-sit if necessary. Inductions will be available in Mongolian and in English. Erdene will maintain a register of all inducted persons, including any restrictions.

This will also include cultural sensitivity training in order to ensure that employees and contractors maintain respectful relationships with the local communities.

6.2 Job-Specific Training

Erdene will provide access to vocational training as a means of building local capacity and ensuring that the KGP meets its skills needs. In addition to vocational training, employees will receive on-the-job training to build their capacity in specifically identified fields of work

Contractors will be required to develop and deliver training plans that focus on the transfer of skills to their workers.

7. AUDIT AND REPORTING

7.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with requirements of the Erdene HSEC Management System (including the ESIA and the KGP Project ESMP).

All incidents and non-conformances identified during inspections will be reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan also may be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

7.2 Contractor Auditing

Contractors will be subject to inspection and audit by Erdene prior to initial appointment, and then on a periodic basis as outlined in the *Contractor and Procurement Management Plan*.

7.3 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

8. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of management plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the ESMP and the management plans form the KGP ESMP. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system as described.

This Management Plan has overlaps and cross-linkages to several other Management Plans, as follows:

Table 5 Context and Overlaps with Other Management System Documentation

Management Plan Title	Overlap / Cross Linkage
Contractor and Procurement Management Plan	Procedures for the selection, management and oversight of contractors related to labour management issues
Local Cooperation Management Plan	Skills development, employability and access to Project community development benefits in the KGP AoI
Stakeholder and Communications Management Plan	Ongoing engagement with local communities and other stakeholders

Other procedures may be developed, as required, to support this Management Plan in addition to the above management plans.

9. LIST OF ABBREVIATION, ACRONYMS AND UNITS OF MEASURE USED

AoI	Area of Influence
ASM	Artisanal and Small-Scale Mining
EBRD	European Bank for Reconstruction and Development
Erdene	Erdene Mongol LLC and Erdene Resource Development Corp
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HSEC	Health, Safety, Environment and Community
HR	Human Resources
ILO	International Labour Organisation
KGP	Khundii Gold Project

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan
TMP	D15: Transport Management Plan
LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D11: Land Use and Livelihoods Management Framework

May 2020

Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Land Use and Livelihoods Management Framework* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project).

1.1 Purpose

The purpose of this Management Framework is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, operational procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators (KPIs); and
- set out references for supporting materials and information.

The framework-level Management Plan has been prepared to set out the key objectives, requirements and commitments which will be developed in more detailed, including applicable Procedures once additional information has been gathered / verification conducted, including further definition of management actions.

1.2 Objectives

The specific objectives of this Management Framework are to:

- Specify the potential physical and economic displacement impacts of the Project;
- Develop an eligibility and entitlement framework for economic displacement;
- Define a Herder Livelihood Support Programme proposed as the key measure in regards to livelihood restoration and support activities,
- Identify any additional measures needed to address vulnerable people affected by the Project;
- Define the grievance mechanism related to land use and livelihoods;
- Define monitoring and reporting requirements; and
- Identify future actions and responsibilities in relation to the implementation of this Management Plan.

1.3 Scope

This Management Plan covers the process for livelihood support for those potentially displaced from public pasture land or other land use by the KGP.

This Management Plan covers all Erdene and Contractor activities during the construction, operation and closure phases of the KGP relating to land use and livelihoods.

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

Key roles and responsibilities for the implementation of this Management Plan are outlined below in Table 1.

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan.
Senior Management / VPs	• Approve this Management Plan. • Overall responsibility for the scope and implementation of this Management Plan. • Ensure appropriate resourcing levels to implement the requirements of this Management Plan. • Support execution of this Management Plan.
HSEC Manager	• Overall responsibility for the scope and implementation of this Management Plan • Communicate on a regular basis to relevant team managers in relation to land use requirements • Provide necessary information and regular updates on planned land use and livelihoods activities to the HSEC Team to support effective implementation of this Management Plan
HSEC Team	• Ensure this plan is available to all Erdene Employees and Contractors • Ensure Erdene Employees and Contractors have an adequate knowledge for implementation of this Management Plan • Ensure the associated procedures are enforced and records retained • Support the HSEC Manager in preparation of required reports on implementation of this Management Plan • Communicate in a timely way on community complaints regarding land use and livelihoods and recorded incidents to ensure timely responses to issues • Tracking of compliance to this Management Plan and communication of findings to key stakeholders
All Employees and Contractors	• Adhere to the requirements of this Management Plan

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., teams or units with responsibility for delivering elements of this Management Plan) include:

Table 2 Key Interfaces

Team or Unit	Key Interfaces
KGP Finance Management	Financial aspects linked to implementation of livelihoods support measures
Engineering / Maintenance Team	Ensuring any land disturbance / maintenance activities are conducted in accordance with relevant MPs
Permitting (Legal) Team	All permits and legal aspects relating to land use are appropriately considered and implemented

3. PROJECT STANDARDS

Applicable standards shall be complied with for all Project activities (the "Project Standards"). The Project Standards comprise:

- applicable Mongolian legislation and national standards;
- Detailed Environmental Impact Assessment (DEIA) requirements;
- other commitments to and requirements of Mongolian Government authorities;
- applicable international standards and guidelines; and
- applicable Erdene policies and procedure.

3.1 Applicable Mongolian Law and National Standards

Applicable Mongolian legal and national standards are listed below, detailed descriptions of which may be found in *Chapter A2 Policy and Legal Framework*:

- The Constitution (1992);
- Law on Land of Mongolia (In force on 1st January 2003; amended 2nd May 2019);
- Law on Land Use Fees (In force on 01st July 1997; amended 2nd May 2019).

3.2 Applicable International Standards and Guidelines

Erdene is committed to ensuring that its approach not only complies with Mongolian law but also meets good international practice, and will ensure livelihood support is undertaken in line with the EBRD's *Performance Requirement 5: Land Acquisition, Involuntary Resettlement and Economic Displacement*. The key objectives of EBRD PR5 relating to economic displacement are to:

- Mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of and access to assets and land by:
  - Providing compensation for loss of assets at replacement cost;
  - Ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected.
- Restore or, where possible, improve the livelihoods and standards of living of displaced persons to pre-displacement levels.

Erdene is currently finalising the status of identified herder winter shelters within the Project impact zones that may be affected by minor restrictions on access and disruption to pastureland, and low-level nuisance impacts in regards to dust (as of April 2020 this is effectively complete). Once verification has been completed at DEIA consultation activities proposed to be held in May, further detail will be added to this *Land Use and Livelihoods Management Framework*, as relevant and / or required. PR5 requires that a Livelihood Restoration Plan is established to outline the entitlements of affected persons and communities and to ensure that these are provided in a transparent, consistent and equitable manner. This *Land Use and Livelihoods Management Framework* sets out these provisions for the KGP.

Table 3 provides a summary of differences between Mongolian law and the EBRD requirements in relation to economic displacement, as relevant to the KGP.

3.2.1 Summary of Gaps Between Mongolian Law and EBRD Requirements

Table 3 Gaps Between Mongolian Law and EBRD Requirements (Relating to Economic Displacement Only)

Issue	Provision of Mongolian Law	EBRD Requirement	Gaps and Actions Required
Eligibility	Only registered owners, possessors or users are recognised.	Eligibility includes those who have formal legal rights, recognized legal rights and no legal rights but who use or occupy the land or assets.	Persons may be eligible regardless of ownership or legal status. Occupants and users of land, regardless of title, will be eligible.
Compensation for economic displacement, Income and livelihood rehabilitation	Economic displacement is not explicitly covered in Mongolian law. However, *ad hoc* in-kind compensation measures may be provided on a case-by-case basis in practice.	Compensate economically displaced persons for loss of assets or access to assets prior to displacement. Assistance for livelihood restoration due to loss of land, assets, jobs, income and livelihoods. Provide additional targeted assistance and opportunities to restore, and where possible improve, their income earning capacity, production levels and standards of living.	Project will compensate for temporary or permanent economic displacement. Compensation should ensure that livelihoods of displaced persons are no worse than, and where possible, improved to pre-Project conditions.
Vulnerable people	No specific provisions with respect to differential impacts of displacements on vulnerable people.	Specific assistance to vulnerable people affected by displacement.	Project will identify vulnerable people and consider specific assistance measures, as appropriate as identified in this MP.
Cut-off date	Not covered.	An eligibility cut-off date is to be set and communicated to displaced persons. Cut-off date is planned subsequent to completion of the statutory Mongolian DEIA consultation meeting and any additional herder land use and livelihoods survey required, both tentatively planned in mid-2020.	Cut-off will be established and communicated as part of the DEIA consultation process, as identified in this MP.
Grievance procedure	The Land Law refers disputes over land to the governors of administrative units and eventually the courts (Article 60). The Civil Code and Land Allocation Law refer various types of disputes to the courts.	An adequate grievance redress mechanism for displaced people is required.	Project will establish a Grievance management and resolution mechanism that is easily accessible and disclosed.
Information disclosure and	No specific provisions for public consultation and information	Project displaced persons are to be fully informed and closely consulted on	Project will disclose this MP as part of the ESIA disclosure document.

public consultation	disclosure, except that land acquisition is typically based on amicable and contractual transactions.	compensation options. Resettlement and livelihoods planning documentation is disclosed and consulted upon.	Future MPs will also be available for disclosure.
Monitoring and evaluation	Responsibility of local government and Citizen's Assemblies.	Establish procedures to monitor and evaluate the implementation of resettlement plans.	Project will establish a monitoring and evaluation process as defined in this MP.

3.3 Applicable Erdene Standards

Erdene maintains high standards of business responsibility, which are captured in its high-level policy documents, set out in the *Erdene 2018 Policy and Procedures Manual*.

This includes the following relevant policies:

- *Stakeholder Relations and Sustainability Policy;*
- *Community Relations Policy;*
- *Stakeholder Consultation Policy;*
- *Grievance Policy;*
- *Government Relations Policy;*
- *Media Relations Policy; and*
- *External Communications Policy.*

4. IDENTIFICATION OF PROJECT IMPACTS

The Land Use Baseline (*Chapter B13 Land Use*) and Land Use Impact Assessment (*Chapter C10 Land Use*) provide detailed description of the land use context and anticipated impacts of the KGP on land use and herder livelihoods. This Management Plan does not repeat the content of these Chapters in detail. In summary, the key land use context, and impact sources are described and thereafter a summary of herder households impacted by land use / disturbance is provided.

Land Use Context: The KGP site is located in Bayankhongor *aimag* of Mongolia, approximately 980 km south-west of Ulaanbaatar and 300 km south of Bayankhongor City. The KGP includes two deposits, Bayan Khundii and Altan Nar, located on the separate Mineral License Areas (MLA) of Khundii and Tsenkher Nomin respectively, which are approximately 16 km apart. The KGP is located in the territory of Shinejinst and Bayan-Undur *soums*, with the nearest towns (*soum* centres) being Shinejinst and Bayan Undur, located approximately 70 km northeast and 80 km north, respectively. The Bayan Khundii site will be developed first with all process and mine supporting infrastructure located there. From Year 7 (around 2026), the Altan Nar mine is proposed for development as a satellite operation with minimal facilities. The public Site Access Road between the Bayan Khundii MLA and the Shinejinst *soum* centre is considered as part of the KGP. Land use in the KGP Area of Influence *soums* is predominantly rangeland-based transhumant animal husbandry, with goats, sheep and camels being the most typical types of livestock raised. Seasonal migration of livestock, at times over considerable distances (average of between 10 – 40 km in summer in the Project AoI) is necessary for livestock survival and is, also, a traditional method of pastureland management. Households interviewed as part of the social baseline survey indicated they usually move approximately five times a year.

The vast majority of land is state-owned and used for traditional nomadic herding. Both Shinejinst and Bayan-Undur *soums* are characterised by desert steppe, with sparse and low-lying vegetation, hence the pattern of pastureland use is annually and seasonally, highly variable. Rainfall levels are extremely low and unpredictable. Summer grazing is conducted informally, and there are no designated summer pasture areas, as these change from year to year depending on forage conditions, livestock numbers, weather and the individual requirements of herder families. According to the Law on Land, summer and autumn settlements and rangelands shall be used collectively. However, herders may individually use the winter / spring camps (0.07ha area) via possession certificates (this does not apply to the surrounding pasture).

Herder households frequently move in other seasons depending on pasture conditions; however they often return to a given winter camp site (depending on pasture availability). Seven winter camps are noted to be officially recorded within 10 km of the two MLAs (3 near Bayan Khundii and 4 near Altan Nar). Six out of the seven winter camps are in Urtiin gol *bagh*, and one is in Idren *bagh*. The site access road from Shinejinst *soum* centre to the KGP is located in Urtiin gol *bagh* (Shinejinst *soum*). Twenty-nine winter camps are recorded within 2.5km of either side of the Site Access Road (with the closest winter camp located 0.01 km away). There are no permanent structures associated with any of these camps.

Impact Sources: The KGP construction phase will extend up to 12 months and require the permanent acquisition or ‘allocation’ of land for the purposes of constructing and operating the mine and associated infrastructure. Modest land take of approximately 150 ha is required, with up to approximately 90 ha expected to be fenced. Erdene plans for the Bayan Khundii site to be developed first with the process plant and supporting infrastructure located there, and the Altan Nar site to be developed later (around 2026) as a satellite operation with minimal facilities. The mine site and associated infrastructure will be secured by a stock-proof perimeter fence. No temporary facilities are proposed to be constructed or utilised outside of the land allocated for the

purposes of constructing and operating the mine. There is some limited land disturbance required for borrow material (less than 1 ha) for construction purposes.

The approximately 70 km dirt Site Access Road between the KGP site and Shinejinst *soum* centre (in Urtiin gol *bagh*) will require spot upgrading in parts to support construction activities. Project traffic during construction is estimated at an average of approximately 7.5 average vehicle movements per day (or a 13% increase to existing baseline traffic numbers). During operations, traffic volumes are reduced to approximately 4 vehicle movements per day (or an approximately 1% increase in baseline traffic numbers).

Groundwater is proposed to be provided from a borefield within the Khuren Tsav (KT) and Bosgyn Sair (BS) basins, which will provide the raw water supply for the Project, located approximately 1-3 km to the south of the Bayan Khundii mine licence area in Urtiin gol *bagh*, Shinejinst *soum*. Herder wells are being monitored by Erdene during its field programs (see *Chapter D3 Water Resources Management Plan)*. These are located approximately 2-12 km from the KGP. Herders may use land near these wells periodically for grazing.

Land use impact sources predominantly originate in Urtiin gol *bagh*, Shinejinst *soum*. Urtiin gol *bagh* contains the Bayan Khundii deposit, the development of which will include the majority KGP infrastructure, including processing facilities, accommodation, as well as the Site Access Road.

Land Use and Livelihoods Impacts: A 10 km zone around each of the KGP Mineral Licence Areas (Bayan Khundii and Altan Nar) was delineated as the impact zone based on consideration of the AoI identified in the land use, air quality, water resources, traffic and transport chapters. A 5 km (2.5 km on either side of the Site Access Road) area was delineated as the impact zone for the Site Access Road based on consideration of the AoI identified in the land use, air quality, water resources, and traffic and transport chapters. A 2.5 km zone (5 km total) on either side of the Site Access Road is relatively greater than the AoIs identified for dust impacts along the road, however it is regarded as consistent with the potential range of daily grazing movements of small stock, as well as the average distance listed by Household Survey respondents, to water sources (2.3 km).

The impacts anticipated include minor economic displacement due to potential loss and / or restricted and / or disrupted access to seasonal pastures and land; pasture impacts from nuisance issues to pasture users, specifically noise, dust, and vibration; and the potential for an increase in competition for and conflict about grazing due to loss of and / or restricted access to pasture land.[1] A summary of potential displacement is provided below.

[1] Note that the *Water Resources Management Plan* covers the mitigation measures in relation to herder water use impacts.

Table 4 Summary of Potential Displacement Impacts

Displacement Category	Type of Displacement / Impact	Impact Source and Category	Eligibility Conditions	Estimated Number of Households	Total Footprint of Land Affected
Bayan Khundii Impact Zone	Economic Displacement: • Loss and / or restricted and / or disrupted access to pastures and land; • Nuisance issues to pasture users (noise, dust, vibration). • Increased competition for grazing.	During operations and construction, access to the fenced Project area may be restricted and this may also disrupt access to pasture land by herders.	Registered winter camp located within the Bayan Khundii Impact Zone (10 km) and evidence of historical land use at the time of the cut-off date.	3	Total Project land take of approximately 150 ha is required, with up to approximately 90 ha expected to be fenced.
Site Access Road Impact Zone	Economic Displacement: • Loss and / or restricted and / or disrupted access to pastures and land; • Nuisance issues to pasture users (noise, dust, vibration). • Increased competition for grazing.	During construction (12 months), and less so, during operations there may be intersection and minor disruption in access to pastures and herd movements.	Winter camp within the Site Access Road Impact Zone (5 km) at the time of the cut-off date for winter camps.	29	No additional land take from the existing public Site Access Road

Altan Nar Impact Zone	Economic Displacement: • Loss and / or restricted and / or disrupted access to pastures and land; • Nuisance issues to pasture users (noise, dust, vibration). • Increased competition for grazing.	During operations and construction of the Altan Nar deposit (planned to occur from 2026), access to the fenced Project area may be restricted and this may also disrupt access to pasture land by herders.	Winter camp located within the Altan Nar Impact Zone (10 km) at the time of the cut-off date for winter camps.	4	Total Project land take of approximately 150 ha is required, with up to approximately 90 ha expected to be fenced.
Urtiin gol *Bagh* Seasonal Herders	Economic Displacement: • Loss and / or restricted and / or disrupted access to pastures and land; • Nuisance issues to pasture users (noise, dust, vibration). • Increased competition for grazing.	During operations and construction of the Bayan Khundii deposit, the access to the fenced Project area may be restricted and this may also disrupt access to pasture land by herders. The use of the Site Access road may also disrupt herder pasture land use and herd movements.	Seasonal herders in Urtiin gol *bagh*	Households utilising impact zone areas in Urtiin gol *bagh*	Total Project land take of approximately 150 ha is required, with up to approximately 90 ha expected to be fenced.
Idren *Bagh* Seasonal Herders	Economic Displacement: • Loss and / or restricted and / or disrupted access	During operations and construction of the Altan Nar deposit (planned to occur from 2026), the access to the fenced Project area will be restricted and this may also disrupt access to pasture land by herders.	Seasonal herders in Idren *bagh*	Households utilising impact zone area in Idren *bagh*	Total Project land take of approximately 150 ha is required, with up to approximately 90 ha expected to be fenced.

	to pastures and land; • Nuisance issues to pasture users (noise, dust, vibration). • Increased competition for grazing.				

Figure 1 Illustrates the recorded winter camp locations within the identified impact zones in the Project Area of Influence. These locations have been identified through direct engagement with herders during the social baseline fieldwork, field investigations, registry investigations with *bagh* and *soum* representatives.

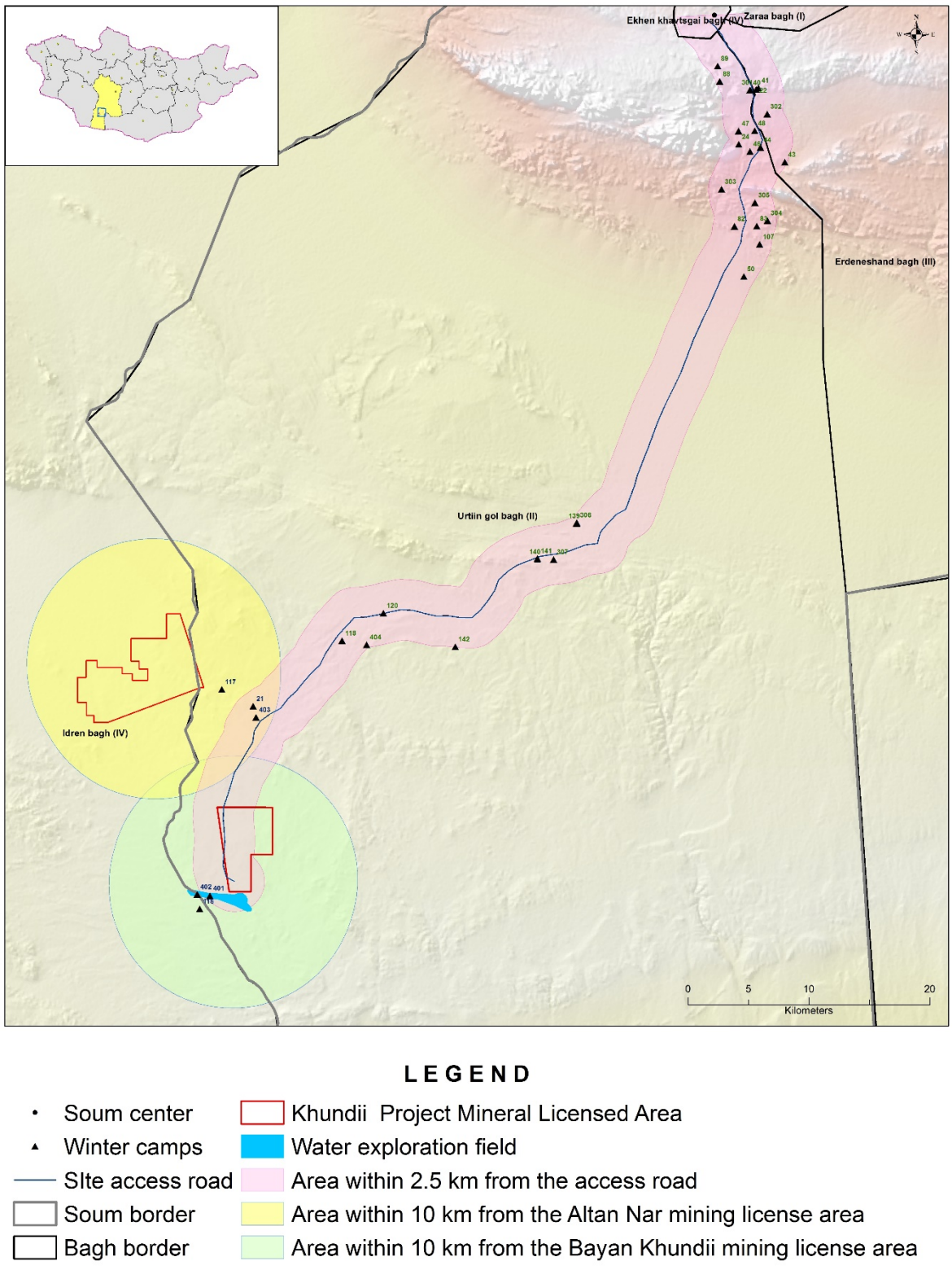

Figure 1 Identified Winter Camps and Impact Zones

5. MITIGATION MEASURES AND MANAGEMENT CONTROLS

5.1 Erdene Approach to Land Access and Livelihood Support

All components of the KGP are in a sparsely populated rural area. Erdene has avoided, as far as practicable, economic displacement due to loss of access to grazing land or disruption to herding practices at several stages throughout the Project development process.

Mine Site Areas: As described above, the mine site area, the fenced area proposed for construction and operations of the mine (approximately up to 90 ha) is the minimum based on the prediction of potential environmental and social impacts, thus ensuring public access to land and pasture is maintained as far as possible.

Site Access Road: The existing unpaved public Site Access Road has been developed to minimise disruption to herders and herding practices. Upgrades to the road to support construction and operations phase traffic are anticipated to include spot repairs in some areas. Road upgrades may also to some extent improve safety on the road and result in fewer new dirt road tracks created by road users.

It is anticipated that minor economic displacement will commence in the construction phase, be in place for the duration of operations, and at closure, will be reduced to key Project infrastructure areas. The following sections outline the key principles used by Erdene and detail the work to date in developing land access and livelihood restoration measures with the impacted group.

5.2 Key Principles

The following key principles have guided the livelihood support process for the KGP:

- The land access process complies with Mongolian legislation and applicable project standards.
- Erdene will avoid physical resettlement (no physical resettlement is planned as part of the Project design).
- Erdene will seek to minimise the area of land required for permanent features and will minimise the time that construction activities disrupt or interfere with land users' access to pasture land.
- Compensation will be offered in-kind only and publicly disclosed for reasonable and legitimate claims of historical land use;
- Identification of affected households is based on administrative information, complemented by engagement with herders, and will be further ground-truthed through consultation with affected herders.
- A grievance mechanism will be in place;
- Affected people are informed and consulted with; and
- Vulnerable individuals are identified and assisted, where needed.

5.3 Compensation and Entitlements for Economic Displacements

The compensation and entitlements proposed for the KGP have been developed to meet the principles outlined in Section 5.2. The entitlements framework for the anticipated economic displacement is described below.

Pastureland is a common resource in Mongolia and as such, any mitigation measures should address both the affected herder households and the broader community. Specifically, the

approach aims to ensure effective impact mitigation, that is supported by broader benefit-sharing measures. For the KGP, the minor economic displacement anticipated to occur is proposed to be addressed through the implementation of a Herder Livelihood Support Programme (HLSP) in tandem with Erdene's broader community development activities through the *Local Cooperation Management Plan*, that will be directed at benefitting local community members in the Project area of influence. The HLSP will include specific provisions regarding impact mitigation, specifically targeted at those herders within Urtiin gol *bagh* with winter shelters in the specified impact zones. It will, thereafter (as soon as practicable and scalable) include potentially affected herders within Urtiin gol *bagh* more broadly, as part of the broader Project benefit-sharing activities.. Scaling of the HLSP to Idren *bagh* will be conducted as the Altan Nar deposit is developed.

Design and management of the HLSP will include further consultation with herders, *bagh* and *soum* administrations, and other specialists as relevant (see Section 5.5). The focus of the HLSP will be directed by this consultation to establish an understanding of any preferences as well as previous herder livelihoods programmes or projects in the area / region that have been successful and / or are noted by affected herders. The following are identified as the types of themes that could be supported under the HLSP:

- Pasture monitoring;
- Seed collection and degraded pasture rehabilitation activities;
- Herd animal health and awareness;
- Cashmere quality improvement
- Rural water protection activities; and
- Training and skills development.

For those herders with winter camps in the impact zones, support measures will be provided based on eligibility (see Table 4), and as defined below in Table 5. Measures are expected to cover between 30-40 households. Where herders may experience a demonstrated seasonal reduction in pasture access / use, such eligible herder households may receive a specified amount of fodder for their animals (or similar support measure based on consultation and preferences).

As noted above, the HLSP is proposed to be included within the umbrella of the *Local Cooperation Management Plan* and Erdene's established Local Cooperation Agreement (LCA). The LCA is an established process that is well known to the local community and is therefore deemed as the most appropriate mechanism to manage these support measures in tandem with the broader community development activities proposed for support by Erdene. Targeted monitoring of and tracking of the effectiveness of the measures proposed in relation to affected herders will be conducted.[2]

Table 5 summarises the draft eligibility and entitlements framework which is proposed for the KGP. The entitlements proposed are based on consultation undertaken to date, including with affected herders. Consultation with and survey of potentially affected households on this framework will be included as part of the DEIA consultation, including establishing a cut-off date for winter shelter registration to avoid opportunistic registration thereof. Note that all mitigation

[2] As the HLSP is also largely concerned with impact mitigation in regard to economic displacement, it will be appended to this Land Use and Livelihoods Management Plan.

controls proposed in relation to land use and livelihoods are further specified in Table 6, including a tentative schedule for implementation.

Table 5 Draft Potential Entitlements Framework

Displacement Type	Type of Displacement	Eligibility Conditions	Potential Entitlements
Bayan Khundii Impact Zone	Economic Displacement: • Loss and / or restricted and / or disrupted access to pastures and land; • Nuisance issues to pasture users (noise, dust, vibration). • Increased competition for grazing.	• Winter camp located within the Bayan Khundii Impact Zone (10 km) and legitimate claim to historical land use in affected areas at the time of the cut-off date for winter camps. • Potential eligibility during construction and operations of the KGP (Bayan Khundii and Altan Nar).	• Access to the HLSP. • Where herders may experience a demonstrated seasonal reduction in pasture access / use, such eligible herder households may receive a specified amount of fodder for their animals (or similar support measure based on consultation and preferences). • Support measures will be further defined and agreed with any affected herders, local government and the company. • Support measures during the operations phase will be assessed on a case-by-case base and defined and agreed with local authorities and affected herders.
Site Access Road Impact Zone	Economic Displacement: • Loss and / or restricted and / or disrupted access to pastures and land; • Nuisance issues to pasture users (noise, dust, vibration). • Increased competition for grazing.	• Winter camp within the Site Access Road Impact Zone (5km corridor) and legitimate claim to historical land use in affected areas at the time of the cut-off date for winter camps. • Potential eligibility during Bayan Khundii construction phase.	• Access to the HLSP. • Where herders may experience a demonstrated seasonal reduction in pasture access / use, such eligible herder households may receive a specified amount of fodder for their animals (or similar support measure based on consultation and preferences). • Support measures will be further defined and agreed with any affected herders, local government and the company. • Support measures during the operations phase will be assessed on a case-by-case base and defined and agreed with local authorities and affected herders .
Altan Nar Impact Zone	Economic Displacement: • Loss and / or restricted and / or disrupted access to pastures and land; • Nuisance issues to pasture users	• Winter camp located within the Altan Nar Impact Zone (10 km) and legitimate claim to historical land use in affected areas at the time of the cut-	• Access to the HLSP. • Where herders may experience a demonstrated seasonal reduction in pasture access / use, such eligible herder households may receive a specified amount of fodder for their animals (or similar support measure based on consultation and preferences).

	(noise, dust, vibration). • Increased competition for grazing.	off date for winter camps. • Potential eligibility during the construction and operations phase of the Altan Nar deposit.	• Support measures will be further defined and agreed with any affected herders, local government and the company..
Urtiin gol *Bagh* Seasonal Herders	Economic Displacement: • Loss and / or restricted and / or disrupted access to pastures and land; • Nuisance issues to pasture users (noise, dust, vibration). • Increased competition for grazing.	Seasonal herders utilising impact zone areas in Urtiin gol *bagh*	• Potential access to the HLSP.
Idren *Bagh* Seasonal Herders	Economic Displacement: • Loss and / or restricted and / or disrupted access to pastures and land; • Nuisance issues to pasture users (noise, dust, vibration). • Increased competition for grazing.	Seasonal herders utilising impact zone areas in Idren *bagh*	• Potential access to the HLSP at the time of development of the Altan Nar deposit.

5.4 Assistance to Vulnerable People

Vulnerable people are people who by virtue of gender, ethnicity, age, physical or mental disability, economic disadvantage, or social status, may be more adversely affected by the land acquisition and resettlement process than others and who may be limited in their ability to claim or take advantage of compensation.

The ESIA assessment identified the following persons and groups as potentially vulnerable as a result of the Project:

- people with disabilities;
- the elderly;
- single-headed households;
- children;
- family members that require a full time caregiver; and.

- low income households.

Through additional proposed consultation with affected herder households within the impact zones identified and with local authorities, persons identified as vulnerable will be assisted to ensure their access to the specified entitlements, including the HLSP, as well as identification of any special measures or assistance because they are less able to cope with economic displacement than the general population.

5.5 Stakeholder Engagement

The KGP is committed to implementing an effective stakeholder engagement program. This program is described in the KGP *Stakeholder and Communications Management Plan*. Ongoing engagement will occur throughout the Project construction and operation period, and the activities described below only address those engagement activities specific to economic displacement and the implementation of livelihoods restoration and support measures. Engagement activities are proposed to be implemented that focus on land access and economic displacement, as follows:

- The DEIA consultation process, at the bagh and soum level, will also establish a cut-off date for winter camps within the specified impact zones. This includes engaging with authorities and herders from Urtiin gol *bagh* of Shinejinst *soum* and Idren *bagh* of Bayan-Undur *soum* to discuss the process for confirming affected herders, participation in further defining entitlements (provided in draft above) and provisions of the HLSP, and additional land use and livelihoods data collection, where deemed relevant and feasible.
- After the DEIA consultation with local residents in the impact zones has been conducted, local stakeholders will be provided with a brief summary of the next steps for Local Cooperation Agreement and any proposed herder support measures and other impact management controls relevant to herders in relation to the construction of the KGP.
- Engagement with herder households will be ongoing and continuous to assess whether support measures are progressing as expected.

5.6 Grievance Procedure

Affected and interested stakeholders need a trusted way to voice and resolve concerns linked to a Project. A locally based grievance resolution mechanism provides such an avenue by offering a reliable structure and set of approaches where local people and the Company can find effective solutions together.

The *Grievance Procedure* that will be employed by the KGP is provided in the *Stakeholder and Communications Management Plan*, which builds on Erdene's existing grievance policy that has been in place throughout the Company's exploration activities in the area.

5.7 Key Management Controls

Table 6 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability			
				Pre-construction	Construction	Operation	Closure
LUL01	Consultation with Herders / Authorities	Engage with local authorities and herders, as appropriate, to further define and facilitate the implementation of a fit for purpose *Land Use and Livelihoods Management Framework.*	• Engagement records • Local Cooperation Agreement executed, including entitlements framework for any affected herders in the Project impact zones.	X			
LUL02	Herder Livelihoods Support Program	Implement the provisions outlined in the HLSP as part of the LCA.	Engagement records		X	X	
LUL03	Consultation with Herders / Authorities	Provide advance notification and conduct consultation with potentially affected herders prior to any construction and operations works that may affect herd movements and access to pasture / water resources (through the *Stakeholder and Communications MP*). Consultation will focus on how impacts can be avoided or minimised.	Engagement records	X	X	X	
LUL04	Consultation with Herders	Should grazing be available within the Mine Licence Area, and based on interest expressed by a herder(s), Erdene will facilitate access to this grazing land, if it is safe to do so.	Engagement records Visitor Entry / Exit Log	X	X	X	
LUL05	Land Disturbance	Ensure that there is clear delineation of work areas prior to commencement of works.	Inspection Records	X	X	X	X
	Traffic Impacts	The *Traffic Management Plan* will be implemented (see Chapter C13 Traffic and Transport) and includes, among others: • Prohibit all off-road driving by any KGP-related vehicle unless in an emergency situation.	• Inspection Records • Engagement Records	X	X	X	

		• Implement road signage and traffic controls.					
LUL06	Land disturbance	All land areas subject to land disturbance for KGP purposes will be progressively rehabilitated after the KGP has ceased works in these areas, returning it to pre-disturbance state. Rehabilitation works will be in accordance with *KGP's Land Disturbance Control and Rehabilitation Management Plan*.	Inspection / Monitoring Records	X	X	X	
LUL07	Grievance Procedure	Maintenance of a grievance mechanism.	Grievance Register	X	X	X	
LUL08	Herder Survey	During the Pre-Construction Phase, conduct a targeted Herder land use and livelihoods survey among directly affected herder households identified in the entitlements matrix for the purpose of allowing livelihoods monitoring and identifying households that meet the vulnerability criteria.	Survey Report	X			

6. MONITORING

6.1 Overview of Monitoring Requirements

The monitoring measures that are to be implemented to assess compliance with Project Standards are described in this section.

In the event that monitoring identifies non-conformance with Project Standards, these will be investigated, and appropriate corrective actions identified.

6.2 Internal Monitoring

Monitoring will, for the most part, be carried out internally by the HSEC team under the supervision of Company Management.

Data collection tools developed for effective and efficient monitoring will include:

- reports or other formal documents including the outcomes of public consultations;
- data collected during the HLSP implementation process;
- grievance records; and
- reports involving general observations encountered in the field and related responses that they developed.

Project monitoring will be initiated in parallel to the pre-construction phase and will end with completion of an external monitoring process. The focus of the internal monitoring activity will be defined as follows:

- To follow-up land access / disturbance process; meaning to ensure all herders, whose pasture lands are affected, receive support as described in the entitlement framework;
- To ensure the grievance mechanism is transparent and accessible for everyone affected;
- To effectively deal with social problems by keeping in touch with local communities and authorities, and to ensure the HSEC Team overcomes any problems appropriately.

These activities may be successfully carried out with the help of systematic documentation and regular contact with all stakeholders.

Table 7 summarises the internal monitoring framework, including KPIs.

Table 7 Monitoring and Key Performance Indicators

ID	Topic / Aspect	Indicators and Measures	Target	Monitoring Frequency	Responsible Parties
LUL-KPI-01	Implementation of the HLSP	• Progress in agreeing support and entitlement framework with potentially affected households and local government. • Implementation of measures as	100% of agreed measures implementation. • 100% of applicable vulnerable households engaged and potentially	Quarterly (during pre-construction) Quarterly during construction. Annually during operations.	HSEC Manager

		outlined in the entitlement framework. • Consideration of potential support to vulnerable households.	supported, as appropriate.		
LUL-KPI-02	Grievances	• Number of grievances received related to land use and livelihoods. • Resolution of any grievances.	• Total number of grievances reduced year-on-year. • 100% of grievances closed within specified timeframes.	Monthly	HSEC Manager
LUL-KPI-03	Community Satisfaction	• Attitudes of affected households to the HLSP of the LCA and process, observation and feedback gathered through interviews. • Attitudes of stakeholders to public consultation – observations and feedback gathered through interviews.	• Satisfaction levels improved at each monitoring opportunity.	Ongoing through all phases to HLSP completion Evaluation of LCA at least annually	HSEC Manager and Team Local government and stakeholder evaluation

6.3 Outcome Evaluation

The purpose of an outcome evaluation is to identify the effectiveness of measures implemented to reduce the adverse impacts of land use upon affected households.

Data collection tools for this monitoring activity of the social aspects of the Project will include Erdene's internal monitoring reports as secondary data. Additionally, field observation and interviews with affected herders will be collected by external stakeholders from time-to-time as directed by the government, stakeholders and/or the Company.

It is planned that the LCA (including HLSP) will be subject to an outcome evaluation annually (including to coincide with the end of the construction phase of the Project). An independent external outcomes evaluation will be conducted one year into the livelihoods restoration programme, and then every three years thereafter, subject to obtaining an acceptable evaluation from the initial independent monitoring..

Outcome evaluation indicators will include:

- Continuation of herding activities consistent with pre-mining development activities.
- Satisfaction of participants with the HLSP.

6.4 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required (as identified through the *Management of Change Procedure* contained within the KGP ESMS Framework), this Management Plan may also be updated on an "as required" basis.

7. AUDIT AND REPORTING

7.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with requirements of the Erdene HSEC Management System (including the ESIA and the KGP Project ESMP).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan also may be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

7.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

8. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of management plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the ESMP and the Management Plans form the KGP ESMP. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system as described.

This Management Plan has overlaps and cross-linkages to a number of other management plans which have land use and livelihoods implications, as follows:

Table 8 Context and Overlaps with Other Management System Documentation

Management Plan Title	Overlap / Cross Linkage
Water Resources Management Plan	Protection of potable drinking water supplies;
Community Health Safety and Security Management Plan	Protection of local communities from physical hazards
Land Disturbance and Rehabilitation Management Plan	Minimising land disturbance that has direct negative impact on pastureland
Biodiversity Management Plan	Minimising adverse impacts on biodiversity
Stakeholder and Communications Management Plan	Communicating and engaging with stakeholders in a coordinated manner
Air Quality Management Plan	Potential damage to pasture land from dust related to construction

9. LIST OF ABBREVIATION, ACRONYMS AND UNITS OF MEASURE

CRK	Citizens' Representatives Khural
DEIA	Detailed Environmental Impact Assessment
EBRD	European Bank for Reconstruction and Development
Erdene	Erdene Mongol LLC
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
HLSP	Herder Livelihood Support Programme
HSEC	Health, Safety, Environmental and Communities
KPI	Key Performance Indicator
PR	Performance Requirements

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan
TMP	D15: Transport Management Plan
LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment:
D12: Occupational Health, Safety and Security Management Plan

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Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Occupational Health, Safety and Security (OHSS) Management Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project).

1.1 Objectives

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define topic-specific training requirements; and
- set out references for supporting materials and information.

1.2 Scope

This Management Plan covers all KGP activities, including contractor activities during the construction, operations and closure phases of the KGP. This document outlines Erdene's commitment and approach to mitigating OHSS risks that may arise as a direct or indirect result of the KGP.

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined below.

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan.
Senior Management / VPs	• Approve this Management Plan. • Ensure appropriate resourcing levels to implement the requirements of this Management Plan. • Support execution of this Management Plan.
HSEC Manager	• Overall responsibility for the scope and implementation of this Management Plan. • Development, monitoring and revision of this Management Plan. • Management of implementation activities.
HSEC Team	• Ensure that relevant activities are undertaken in compliance with this Management Plan and related Procedures • Ensure that Erdene employees are fully trained in OHS management practices • Ensure that Contractors develop their own OHSS management plans and inspection procedures, consistent with the requirements outlined in this plan, prior to the commencement of work • Provide technical support to Erdene Team Managers and contractors to ensure compliance with this Management Plan and related procedures • Prepare monthly and annual OHSS reports • Make this Management Plan available to all Erdene employees and contractors • Report all non-conformances and incidents regarding OHSS and follow-up to correct the problem • Provide a system for monitoring OHSS onsite • Conduct communications on OHSS management with other teams and government agencies when required • Track compliance to this Management Plan and communication of findings to key stakeholders
Workplace Supervisors	• Conduct routine work area inspections to ensure relevant activities are in accordance with this Management Plan and related Procedures • Report all hazards, non-conformances and incidents • Prevent practices that might lead to safety incidents
Training Team	• Provide training on OHSS as required
All Employees and Contractors	• Adherence with this Management Plan and implementation of requirements

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are:

Table 2 Key Interfaces

Team / Unit	Key Interface(s)
HSEC and security teams	Environmental issues, the safety of off-site activities and security issues, and in relation to communication with local communities concerning community health, safety and security issues
Infrastructure, Utilities and Accommodation Team	Infrastructure and services
Management Team	Worker management

3. PROJECT STANDARDS

Applicable Standards must be complied with for all Project activities (the "Project Standards"). Project Standards comprise:

- applicable Mongolian laws and standards;
- applicable international and lender standards and guidelines; and
- applicable Erdene policies and procedures.

3.1 Applicable Mongolian Laws and Standards

Applicable Mongolian legal and national standards are listed below, detailed descriptions of which may be found in *Chapter A2 Policy and Legal Framework.*

Mongolian health, safety and security laws applicable to the KGP are as follows:

- Law of Mongolia on Labour Code (In force on 1st July 1999, amended 21st April 2017);
- Law on Labour Safety and Hygiene (In force on 22nd May 2008; amended 27th June 2018);
- Law of Mongolia on Health (In force on 5th May 2011; amended 18th January 2019);
- The Law on Hazardous and Toxic Chemicals (In force on 25th May 2006; amended 12th May 2017);
- Law on Waste (In force 1st July 2004; amended on 12th May 2017);
- Law of Mongolia on Water (In force on 5th June 1995; amended 2nd May 2019)
- Law on Air (In force on 5th June 1995; amended 12th January 2018); and
- Law on Environmental Impact Assessment (In force 23rd June 2012).

3.2 Applicable International Standards and Guidelines

3.2.1 European Bank for Reconstruction and Development

The international standards which Erdene will implement are those set by the European Bank for Reconstruction and Development (EBRD). *EBRD Performance Requirement 4 Health and Safety* sets out the requirements for worker health and safety. Erdene will comply with the requirements of *EBRD Performance Requirement 4* when implementing its policies. Key requirements include:

- (Para. 9):The client will take steps to identify and prevent accidents, injury and disease to workers and affected communities arising from or associated with, or occurring in the course of the project activities and prepare and implement preventative measures and plans to manage health and safety risks in accordance with the mitigation hierarchy approach and GIP.
- (Para. 10): The client will provide workers and affected communities with relevant information, guidance and training relating to health and safety hazards, risks, protective and preventive measures and emergency arrangements that are necessary for their safety throughout the project.
- (Para. 11) Where any accident, injury and disease arises or occurs in the course of works associated with the project, or there is a potential of such event, the

client will investigate, document and analyse the findings and adopt measures to prevent reoccurrence and, where required by law, notify and cooperate with the relevant authorities.

- (Para. 12): The client will provide workers with a safe and healthy workplace, taking into account inherent risks in its particular sector and specific classes of hazards that may be present. The client will identify the health and safety risks and protection measures appropriate to the stage, size and nature of the project in accordance with relevant substantive EU Occupational Health and Safety (OHS) standards and GIP. The client will develop a project-specific health and safety plan, where appropriate, that will be integrated into the ESMS.
- (Para. 13): The client will implement occupational health and safety measures that will provide: (i) preventive and protective measures, including modification, substitution or elimination of hazardous conditions or substances; (ii) equipment to minimise risks, and require and enforce its use; (iii) personal protective equipment at no cost to the workers; and (iv) training to workers to use and comply with health and safety procedures and protective equipment. The client will require its non-employee workers, contractors and other third parties engaged to work on project sites or perform work directly related to the core functions of the project to comply with the health and safety plan.
- (Para. 14): During the course of any work activity the client will ensure that all workers are provided with continued and appropriate supervision to ensure adequate implementation, maintenance and enforcement of the health and safety measures.
- (Para. 15): The client will monitor the health of its workers and consult and encourage the workers to participate in matters related to health and safety in the workplace. This shall include, although not be limited to, accident investigation, risk assessment and selection of work.
- (Para. 16): Where there are specific risks associated with certain work activities that could result in adverse effects on the health and safety of workers with sensitivities such as age, gender, disability or short-or long-term health conditions, the client will carry out a risk assessment and make adjustments to prevent injury and ill health.

3.3 Applicable Erdene Standards

The primary Erdene policies and standards that apply to community health, safety and security are provided in the *Erdene 2018 Policy and Procedures Manual*, which in summary include:

Health, Safety and Security

Provisions for health, safety and security are enacted in Erdene's health, safety and security Guiding Principles as follows:

Working safely is both a corporate obligation and an individual responsibility. Through its business operations, Erdene strives to:

- Generate value for its stakeholders, the environment and local communities
- Identify and mitigate health, safety, and security risks
- Protect basic human rights, especially the well-being of children

- Operate transparently and accountably to its stakeholders
- Abide by applicable local laws, regulations and any voluntary commitments

As a core business function, Erdene commits to providing the necessary resources, both human and financial, to ensure the mitigation of health, safety and security risks and achieve optimal performance.

Erdene requires that detailed health, safety, and security policies and procedures be developed according to the needs of a given minerals project, including for affiliated contractors, sub-contractors and consultants, with the following policies as the basic framework for more detailed health, safety and security protocols.

- *Health Policy;*
- *Safety Policy; and*
- *Security Policy*.

4. MITIGATION MEASURES AND MANAGEMENT CONTROLS

4.1 Overview of Management Controls

Erdene has developed a clear management control framework for the management of OHSS, located within the *Erdene 2018 Policy and Procedures Manual*. This *OHSS Management Plan* is given at a framework level, to guide the development of more detailed construction and operations phase plans, procedures, and guidelines, among others, which will present detail on specific aspects of the day-to-day management activities for OHSS at the KGP.

4.2 Identification and Management of Risk

4.3 Project Risk Assessment

Erdene will complete a detailed OHS risk assessment for the KGP as part of pre-construction and project planning. The risk assessment will follow a process consistent with ISO 31000:2009 Risk Management – Principles and Guidelines. For each aspect of the Project's development and operation, OHS hazards will be identified, the worst realistic consequences of each hazard determined, and the likelihood of each consequence estimated, to rate the degree of risk. The risk assessment will consider various types of hazards, including:

- Physical hazards, expected to include heat / cold, noise, vibration, dust, electricity, machinery, vehicles, heights, slip/trip hazards, mechanical handling, pressurised plant, and confined spaces.
- Chemical hazards, expected to include cyanide, fuels and other hydrocarbons, process reagents and other chemicals, products and process wastes.
- Ergonomic hazards, expected to include manual handling and other manual or repetitive work.
- Psycho-social hazards, expected to include fatigue and stress.
- Biological hazards: including communicable diseases, drinking water and food hygiene.

Where risks are not As Low As Reasonably Practicable (ALARP) or unacceptably high, controls will be proposed to lower the risk to ALARP and acceptably low, either by mitigating the consequences, or reducing their likelihood. The types of controls proposed will, in order of preference, include:

- Elimination – designing a hazard out of a workplace or work practice altogether.
- Substitution – replacing hazardous practices, materials or equipment with less hazardous alternatives.
- Engineering controls – including isolation and guarding.
- Administrative controls – including procedures, training, tagging and scheduling.
- PPE – as a last line of defence.

Relevant Project participants, including representatives of the Erdene Executive Team and major contractors, will participate in the risk assessment.

4.4 Controls

Where controls have been proposed for a specific aspect of Project development or operations through the risk assessment, these controls will be documented in Safe Work Plans (SWPs), or

where a hazard spans multiple aspects of construction or operations, an over-arching hazard management plan. These documents will address the highest risk aspects of the operations.

Contractors and sub-contractors will be expected to prepare SWPs and/or hazard management plans for their specific areas of work and responsibility, which will be subject to approval by Erdene. SWPs will also incorporate, where relevant, controls for environmental protection.

Preliminary management controls, identified at a framework level as part of the ESIA are included in the below Table 3, consistent with the provisions outlined in the *Erdene 2018 Policy and Procedures Manual.*

Table 3 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability		
				Construction	Operation	Closure
OHSS01	OHSS Management Plan	Develop and implement the *Occupational Health, Safety and Security Management Plan*	• Up-to-date *OHSS Management Plan*	X	X	-
OHSS02	Medical Monitoring	Implement a medical monitoring program, which includes pro-active elements that are predictive and preventive in nature, and outlines the responsibilities of contractors.	• Monitoring records	X	X	-
OHSS03	Contractor OHSS management	Contractor management requirement of a minimum level of occupational health and safety to be met, consistent with Erdene's health and safety policy, standards and procedures, and the provisions of the ISO 45001, through the contract duration, with action / penalties in response to any breaches.	• Contractor agreements and audit records.	X	X	-
OHSS04	OHS Induction and Training	Provide induction, training and supervision for both staff and contractors, including: • New Employee Orientation; • Job-specific Training; • Refresher / Update / Annualised Training; • Management and Supervisory Training; • Safety for Engineers Training; • Contractor Training; • Hazard Communication Training; • Hazard Identification Training; and	• Training records	X	X	-

		• Where applicable, safety topics and awareness should be incorporated in all training programs.				
	Hazard and Risk Identification	• Ensure a hazard and risk identification process is in place and updated annually. Risk identification process informed by hazards and risks identified at a functional level including Safety, Environment and Communities risks. Risk analysis includes Ulaanbaatar, Bayankhongor City Centre, Shinejinst soum centre, mine site, associated facilities, transport routes and other off-site infrastructure. Erdene Risk Assessment Procedures are used to inform hazard and risk identification Process.	• Risk register • Audits			
OHSS05	Incident / Accident Investigation Programme	• Implement the Erdene Incident / Accident Investigation Programme which provides a system which consistently instructs supervisors, managers, safety representatives and Safety Committee members on the process involved in reporting, investigating and analysing accidents / incidents.	• Audits • Incident / Accident reporting, investigation and analysis records	X	X	-
OHSS06	Contractor management and monitoring of OHS implementation	• Conduct contract performance monitoring including of inductions, daily safety toolbox meetings, regular contractor management meetings on safety.	• Monitoring records	X	X	-
OHSS07	Inspections and audits	Review facilities, equipment and the site safety program on a scheduled basis, using uniform methods, procedures and forms. The components of the inspection and audit program will include: • Daily inspections / walk about; • Addressing of local and national compliance requirements; • Management cooperation and participation; • Recommendations; • Follow-up; • Record Retention.	• Inspection and audit records	X	X	-
OHSS08	Health screening	Ensure health screening for employees and contractors is conducted before contracting workers and on a periodic basis throughout their employment / contract.	• Health screening records (confidential)	X	X	-

OHSS09	Healthcare provision	Provide employees and contractors with adequate health care for work-related issues and injuries that is independent of the *soum* health care system, as far as possible	• Ongoing provision of site-based healthcare, including contracts with external providers, as appropriate	X	X	-
OHSS10	Health awareness training	Provide regular health awareness training to workers (for example through toolbox talks);	• Training records	X	X	-
OHSS11	Code of Behaviour	Implement a *Code of Conduct* that is applicable to all KGP workers. All Erdene personnel and Contractors will be given basic community health, safety and security awareness training and induction in the *Code of Conduct*. This will include awareness of STIs and other communicable disease prevention. Provide this training on an ongoing basis.	• Induction records	X	X	-
OHSS12	Prostitution	Enforce a policy of no prostitution, and immediate dismissal of any workers found to be using prostitutes.	• Employee records (confidential)	X	X	-
OHSS13	Security	Adhere to (including security contractors) the provisions enshrined in the Voluntary Principles on Security and Human Rights. See *Community Health, Safety and Security Management Plan* for management controls.	• See *Community Health, Safety and Security Management Plan* for management controls.	X	X	-
OHSS14	Employee Behaviour	Implement actions to discourage alcohol abuse, including but not limited to: • Implementing a "Dry" site (no alcohol consumption on site); • Providing leisure facilities on site; and • Conducting alcohol and controlled substance testing, as appropriate.	• Workplace inspections • Drug and Alcohol Testing	X	X	-

4.5 Personal Protective Equipment

All personnel will be issued with PPE and expected to use it while present on project work sites. Basic PPE common to all jobs and work areas, unless otherwise specified or exempted, is expected to include:

- hard-hat with brim;
- eye protection.
- steel-capped boots, or equivalent.
- long-sleeved, high-visibility shirt with reflective elements, or long-sleeved shirt with high-visibility, reflective over-vest.
- long-legged trousers.

Leather work gloves will be required for many tasks, such as manual handling; ear protection will be required in noisy areas. Additional PPE may be required for specific tasks or work areas such as reagent handling, confined space entry, working at height, electrical work or hot work, and will be specified in SWPs. PPE requirements will be signed in work areas. PPE will conform to relevant and appropriate Project standards. PPE generally will not be required for office tasks or while off duty at the KGP camp site.

4.6 Change Management and Job Hazard Analysis

Any substantial proposed changes to the design, construction, or operation of the Project will require review and if necessary revision of the Project risk assessment and any affected subsidiary SWPs or hazard management plans. Any permanent changes to specific workplaces or practices including changes to designs, work methods, equipment or materials will require review and if necessary revision of the relevant SWPs and hazard management plans. Where necessary, contract variations will be approved to address changes to controls, SWPs or hazard management plans.

Changes to documents and drawings will be subject to document control and the document owner will be responsible for authorising any changes to SWPs and hazard management plans. Audits will confirm that all supervisors and managers have the current and correct versions of documents and drawings, and out-of-date documents will be withdrawn and archived. The document owner will ensure that changes are made to all language editions of a document, where it is available in multiple languages.

In addition to the over-arching Project risk assessment, work crews will be required to participate in on-site risk assessments (Job Hazard Analyses, JHAs) for any jobs that are affected by a change of circumstances (such as adverse weather, new equipment or other crews working nearby), are uncommon, or carry an unusually high degree of risk (such as confined space entries). JHAs will be led by workplace supervisors, and will consider environmental hazards, as well as OHS hazards.

These “field” risk assessments may identify controls for specific jobs, additional to those identified in the Project risk assessment, by taking on-site changes and current conditions into account. Where the risk is still unacceptable despite additional controls identified through a JHA, the job will not be allowed to proceed until adequate controls can be developed.

Where crews work alternating shifts in a job or workplace, supervisors will brief their alternate at handover on any circumstances or changes to the job or workplace during the last shift that may

affect OHS. The alternate supervisor will pass this information to the alternate work crew as part of a pre-start briefing.

4.7 Incident and Emergency Response

Provisions for incident and emergency response are outlined in the *Crisis and Emergency Response Plan*.

5. MONITORING

5.1 Overview of Monitoring Requirements

The monitoring measures that are to be implemented to assess compliance with Project Standards are described in the section.

In the event that monitoring identified non-conformance with Project Standards, these will be investigated, and appropriate corrective actions identified.

5.2 Key Performance Indicators

The table below summarises the KPIs in place on the KGP consistent with the KPIs specified in the *Erdene 2019 Policy and Procedures Manual.* As the KPG further defines OHSS management measures consistent with the Project development (prior to construction phase), Erdene may define additional OHSS key performance indicators (KPIs) for the KGP. It is expected that these will include lead and lag indicators.

The Company executive will appoint a senior management representative to oversee and facilitate monitoring and reporting against the indicators given above through monthly internal reports as well as public disclosures on at least an annual basis. The Company executive will determine appropriate targets for each KPI. Targets will be communicated to contractors and sub-contractors through request for tender documents and contract documents.

Table 4 Key Performance Indicators

Unique ID	KPI	Target
OHSS-KPI 01	Total number of non-compliances with OHSS key management controls identified in this Plan	Minimise and target zero
OHSS-KPI 02	Occupational health, safety, and security policy and procedures in place and continuously monitored for improvement.	100% policy and procedures up-to-date and monitoring conducted as specified
OHSS-KPI 03	Lost time injury frequency	Minimise and target zero
OHSS-KPI 04	Provisioning of personal protective equipment in the working environment.	100% provision to all employees and contractors as required for their position

5.3 Key Monitoring Activities

Key monitoring measures are set out below.

Table 5 Key Monitoring Measures

Unique ID	Topic / Aspect	Method	Periodicity	Location
OHSS-Mon-01	Monitoring of OHSS parameters	• Number of hazards identified • Planned safety meetings • Scheduled inspections • Near misses reported • Number of training hours delivered • Hours worked (employees and contractors) • Lost time injuries • Injury severity rate • Recordable incident frequency rate	Monthly	KGP Site

		• Environmental incident frequency rate • Property damage frequency rate • Total incidents (per category)		
OHSS-Mon-02	Health Monitoring	• Pre-employment medical examinations and periodic medical re-examination and re-testing.	Annual	KGP Site

5.4 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required (as identified through the *Management of Change Procedure* contained within the KGP ESMS Framework), this Management Plan may also be updated on an "as required" basis.

6. TRAINING

All necessary training is provided as part of induction training (to provide general awareness) and job specific training as necessary.

6.1 Induction Training

All persons (employees and contractors) working on the KGP will be required to sit a comprehensive Project induction, addressing key OHS, environmental, community and other requirements, before starting work. The induction will cover general aspects of OHS such as Erdene policy, legal obligations, employer and employee duty of care, PPE, fitness for work, emergency and evacuation procedures, hazard and incident reporting, site road rules, safety signs, mine radio protocols and emergency calls, among others.

All persons will be tested to ensure that they have understood their inductions and made to re-sit if necessary. Inductions will be available in Mongolian and in English. Erdene will maintain a register of all inducted persons, including any restrictions.

6.2 Job-Specific Training

Persons working in specific areas or on specific jobs may be required to attend additional area or job-specific inductions or briefings, which will address specific OHSS requirements and SWPs.

Visitors not doing work on site, including executives and inspectors, may be able to sit a modified visitor's induction, provided that they are accompanied at all times by a duly inducted person with training and permission to guide such visitors.

6.3 Specific Competencies

Erdene will verify that workers are competent to carry out certain types of work with inherently higher risks.

Where there are applicable Mongolian regulatory standards or qualifications (tickets or licences) for such competencies, they will be mandatory as a minimum requirement; where the State requires no such standards or qualifications, Erdene will adopt an appropriate industry standard or qualification. Where worker competency falls short of the required standard, training will be given, or the worker assigned to a different job.

Erdene will maintain a register of worker competencies, qualifications and training, including dates of verification and expiry, where applicable. Contractors and sub-contractors will be required to provide evidence of competency for their staff, where engaged for high-risk types of work.

In summary, training may include:

- New Employee Orientation;
- Job-specific Training;
- Refresher / Update / Annualised Training;
- Management and Supervisory Training;
- Safety for Engineers Training;
- Contractor Training;
- Hazard Communication Training; and
- Hazard Identification Training.

Where applicable, safety topics and awareness should be incorporated in all training programs.

6.4 Awareness

Erdene will promote awareness of OHSS issues among all persons working on the KGP, for the life of the Project, through a variety of forums including safety meetings, safety noticeboards, “toolbox talks”, and posters in the camp mess, offices and other work areas. Information will be available in Mongolian and in English. Issues addressed will be targeted to specific work areas, but will commonly include:

- shared learnings from incidents, hazard or non-compliances within the Project or the wider industry;
- mutual duty of care;
- identifying and reporting hazards;
- proper use of PPE; and
- standard work procedures.

7. AUDIT AND REPORTING

7.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with requirements of the Erdene HSEC Management System (including the ESIA and the KGP Project ESMP).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan also may be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

7.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

8. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of management plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the ESMP and the Management Plans form the KGP ESMP. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system as described.

This Management Plan has overlaps and cross-linkages to several other Management Plans, as follows:

Table 6 Context and Overlaps with Other Management System Documentation

Management Plan Title	Overlap / Cross Linkage
Atmospheric Emissions Management Plan,	Management of worker exposure to dust generated by KGP activities
Noise & Vibration Management Plan	Management of worker exposure to noise generated by KGP activities
Hazardous Materials Management Plan	Protection of workers from exposure to hazardous waste materials
Traffic and Transport Management Plan	Controls around Project traffic and transport and minimising traffic accidents
Human Resources Management Plan, and Contractor and Procurement Management Plan	Behaviour of Erdene and contractor personnel
Crisis and Emergency Response Plan	Crises and emergencies derived from OHSS

Other procedures may be developed, as required, to support this Management Plan in addition to the above management plans.

9. LIST OF ABBREVIATION, ACRONYMS AND UNITS OF MEASURE USED

ALARP	As Low As Reasonably Practicable
AoI	Area of Influence
ASM	Artisanal and Small-Scale Mining
EBRD	European Bank for Reconstruction and Development
Erdene	Erdene Mongol LLC
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
EU	European Union
GIP	Good International Practice
JHA	Job Hazard Analysis
KGP	Khundii Gold Project
OHS	Occupational Health and Safety
OHSS	Occupational Health, Safety and Security
PPE	Personal Protective Equipment
SWP	Safe Work Plan

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan
TMP	D15: Transport Management Plan

LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLCERDENE MONGOL LLC

D13: Stakeholder and Communications Management Plan

April 2020

Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

The European Bank for Reconstruction and Development (EBRD) is providing finance to Erdene Mongol LLC (Erdene) for the development and operation of the Khundii Gold Project (KGP).

The EBRD has assigned the Project as a Category A project, which means that a comprehensive Environmental and Social Impact Assessment (ESIA) of the Project must be undertaken, including the preparation of a Stakeholder Engagement Plan. This document presents the Stakeholder and Communications Management Plan (SCMP) in accordance with EBRD's Performance Requirement (PR)10 Information Disclosure and Stakeholder Engagement, as set in the EBRD's Environmental and Social Policy (ESP) 2014.[1]

The SCMP may be developed in more detail by Erdene prior to the start of construction, as required.

1.1 Objectives

The objectives of this SCMP are to:

- Outline the applicable standards with regards to effective stakeholder engagement;
- Identify stakeholders and their interests and/or issues of concern;
- Identify the stakeholder engagement that has been undertaken to date and additional engagement undertaken to meet EBRD PR10;
- Ensure a systematic approach to future stakeholder engagement that will help build and maintain a constructive relationship with stakeholders;
- Ensure that appropriate environmental and social information is disclosed, and meaningful consultation is held with Project's stakeholders and where appropriate, feedback provided through the consultation is taken into consideration;
- Define roles and responsibilities for stakeholder engagement activities and outline how engagement will be integrated across the Project;
- Define monitoring and reporting procedures; and
- Provide a grievance procedure through which stakeholder concerns are captured and responded to in a constructive and timely manner.

1.2 Scope

In accordance with the objectives above, the SCMP aims to document the stakeholder engagement activities and results to date, as part of a broader framework to guide and document stakeholder engagement during the Project's subsequent phases[2]. It covers the engagement undertaken as part of the local Detailed Environmental Impact Assessment (DEIA) requirements, engagement undertaken as part of the ESIA to meet EBRD ESP 2014 and sets out the approach to the construction and operation phases of the Project. The SCMP has been developed based on Erdene's long-standing engagement in the community hosting the Project.

[1] The EBRD has launched the 2019 Environmental and Social Policy, however as these will come into effect on 1 January 2020 the 2014 policy is referred to in relation to this Project.
[2] As described and provided in the ESIA Chapter A6.

1.3 General Approach to Disclosure of Information

Erdene, consistent with the EBRD PR 10, considers information disclosure and stakeholder engagement as an on-going process which should be started at the earliest stage of Project preparation and should be continued during its implementation. Consequently, this document is a 'living' resource to be referenced and updated periodically to reflect the continuously evolving stakeholder engagement requirements, practices and outcomes of the Project and / or changes in Project design and activities throughout the Project lifecycle.

This SCMP has been prepared by Sustainability East Asia LLC (SEA) as part of the ESIA, in accordance with the following EBRD policies:

- EBRD ESP (2014), particularly PR10; and
- EBRD Public Information Policy (2014).

It builds on the stakeholder engagement undertaken by Erdene since the commencement of exploration activities in the area in 2006, in addition to the engagement conducted as part of the DEIA to meet Mongolian requirements. It will be disclosed by the EBRD as part of the ESIA package of documents to meet the requirements for Category A projects.

1.4 Scope

This Management Plan covers all Erdene activities, including contractor activities, during construction, operations and closure phases of the KGP. This document outlines Erdene's commitment and approach to stakeholder engagement and communications.

2. PROJECT DESCRIPTION

2.1 Project Context

The KGP site is located in Bayankhongor *aimag* of Mongolia, approximately 980 km south-west of Ulaanbaatar and 300 km south of Bayankhongor City. The KGP includes two deposits, Bayan Khundii and Altan Nar, located on the separate Mineral License Areas (MLA) of Khundii and Tsenkher Nomin respectively, which are approximately 16 km apart. The KGP area is located in the territory of Shinejinst and Bayan-Undur *soums*, with the nearest towns (*soum* centres) being Shinejinst and Bayan Undur, located approximately 70 km northeast and 80 km north, respectively (Figure 1). The Bayan Khundii site will be developed first with all process and mine supporting infrastructure located there. From Year 7, the Altan Nar mine is proposed for development as a satellite operation with minimal facilities. The public Site Access Road between the Bayan Khundii mine licence area and the Shinejinst *soum* centre, and the proposed mine water supply bore field area approximately 2-5km south of Bayan Khundii, are considered as part of the KGP.

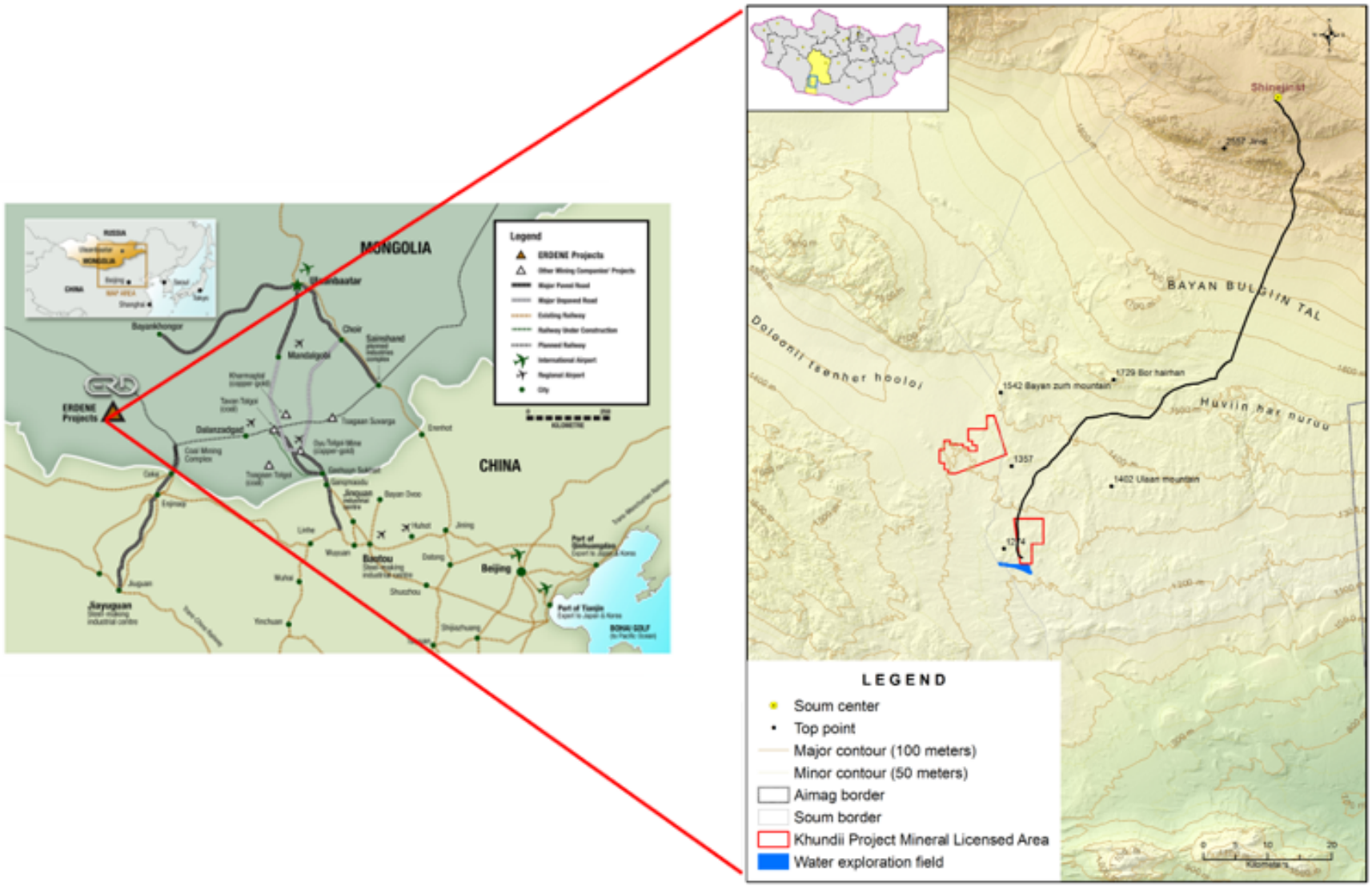


Figure 1 Khundii Gold Project Location

2.2 The Khundii Gold Project

The Project is a "greenfield" site and has only minor, non-permanent infrastructure present associated with Erdene's exploration activity, similar to other remote sites found in the region. During operations the Project will comprise a self-contained remote site, and fly-drive-in, drive-fly-out and bus in, bus-out personnel transfer with on-site accommodations. Erdene plans for the Bayan Khundii site to be developed first with the process plant and supporting infrastructure located there, and the Altan Nar site to be developed later as a satellite operation with minimal facilities. The Project has an expected mine life of 10 years..

2.3 General Site Plan

The Project mine plan is an open-pit mining operation. Mining will use hydraulic excavators. Drilled and blasted material will be loaded into haul trucks, with waste rock deposited in an engineered Integrated Waste Facility (IWF) adjacent to the pits, and plant feed hauled to a run-of-mine pad adjacent to the processing plant which is to be located at Bayan Khundii.

2.4 Mine Facilities at Khundii Gold Project Site

Workers Camp: A mine camp to accommodate workers during construction and operation will be constructed about 4 km north of the proposed Bayan Khundii open pit.

Ore Processing Plant: The current design for the Project ore processing includes ore being stored on the run-of-mine pad. Ore from the run-of-mine pad will be fed to a single stage crushing circuit followed by a Semi Autogenous Grinding and Ball grinding circuit. The Grinding circuit product is passed through a conventional Leach & Carbon-In-Pulp circuit for recovery of gold (and, for Altan Nar, silver) via elution and an electrowinning circuit producing dore. Tailings are passed through a thickener for recovery of water and reagents (cyanide) and minimisation of detoxification reagents. Tailings thickener underflow is then detoxified, filtered and trucked to co-disposal with mine waste. The processing facilities include administration offices and warehousing consistent with the nature and scale of the plant.

Integrated Waste Facility: KGP plans to use an Integrated Waste Facility (IWF) for mine waste rock and tailings. The IWF has been designed in order to create a smaller footprint by co-disposing mineral wastes, improve shear strength of waste landform, and potentially reduce long-term environmental risks.

Access Road: The public road between the Bayan Khundii site and Shinejinst *soum* will be spot repaired and used as the main supply road during construction and operations.

Water Supply: Mine water supply is planned to be sourced from the groundwater aquifer 2-5 km south of the Bayan Khundii deposit. Extraction bores and a pipeline will be constructed for mining water use supply. Potable water will be provided by an on-site reverse osmosis plant and / or bottled water from off-site.

Electricity Supply: An off-grid diesel-solar power station is expected to supply the mine's installed power requirement of maximum up to 6 MW, consisting of up to 7 gensets with 1 MW capacity in 6+1 configuration. An additional unit of 1 MW diesel station will be installed, as tentatively planned, for the workers camp power supply.

Other Mine Support Facilities: One onsite waste landfill, a wastewater treatment facility and up to three coal-fired heat only boilers will be constructed in addition to the above facilities. Additional facilities include a heavy vehicle workshop, warehousing, magazine, and mining offices.

3. STAKEHOLDER ENGAGEMENT AND INFORMATION DISCLOSURE REQUIREMENTS

3.1 Introduction

Stakeholder engagement and information disclosure will comply with the requirements of the legislation of Mongolia and good international practice (GIP), as described in the requirements of EBRD's ESP 2014. These are described in turn below.

3.2 National Requirements

The key provisions for stakeholder engagement in Mongolia are contained in the following laws, and described further in *Chapter A2 Policy and Legal Framework* of the ESIA Report:

- Law of Mongolia on Environment Impact Assessment (EIA) (1998, as amended 2001, 2006 and 2012);
- Law of Environmental Protection (1995, as amended 2012); and
- Minister of Environment and Green Development, Ordinance A-03 (06 January 2014).

In addition, the following ordinance is applicable in relation to disclosure of DEIA results and consultation with the local community:

- Minister of Environment and Green Development, Ordinance A-117 (04 September 2014).

3.3 EBRD Requirements

The EBRD is committed to promoting environmentally sound and sustainable development and sets out stakeholder engagement requirements in the following documents:

- Environment and Social Policy (2014)
- Public Information Policy (2014).
- PR 10 Information Disclosure and Stakeholder Engagement (2014)

The EBRD ESP also required compliance with relevant EU Directives.

3.3.1 EBRD's Environmental and Social Policy (ESP) (2014)

The ESP identifies that the EBRD is committed to the principles of transparency, accountability and stakeholder engagement. The EBRD requires clients to identify stakeholders potentially affected by and / or interested in the project, disclose sufficient information about the impacts and issues arising from a project and consult with stakeholders in a meaningful and culturally appropriate manner. Stakeholder should be engaged in proportion to the potential impacts associated with a project.

3.3.2 EBRD Performance Requirement 10 (2014)

The EBRD's PR10 on information disclosure and stakeholder engagement promotes stakeholder engagement as a focal point to achieve and build a constructive and responsible relationship, essential for the successful management of environmental and social issues. The following are the requirements of EBRD PR10 on information disclosure and stakeholder engagement:

Stakeholder engagement requirements

- Stakeholder engagement should involve the following elements: stakeholder identification and analysis, stakeholder engagement planning, disclosure of information, meaningful consultation, implementation of a grievance mechanism, and ongoing reporting to relevant stakeholders.
- The client should conduct stakeholder engagement on the basis of providing stakeholders with access to timely, relevant, understandable and accessible information, in a meaningful, effective, inclusive and culturally appropriate manner and free from manipulation, interference, coercion, intimidation and retaliation.
- The stakeholder engagement process should begin as early as possible in project development and will continue throughout the project life cycle. The nature and frequency of stakeholder engagement at all phases of the project development will be proportionate to the nature and scale of the project, its potential adverse environmental or social risks and impacts and the level of stakeholder interest. The client will comply with the applicable requirements of national law with respect to public information and consultation, including those host country obligations under public international law.
- The client should define clear roles, responsibilities, and authority as well as designate specific personnel for the implementation and monitoring of stakeholder engagement activities.

Information disclosure requirements

- Where the project has environmental and social impacts, the client will disclose relevant project information, as appropriate, to help stakeholders understand the risks, impacts and opportunities of the project. The client will provide stakeholders with access to the following information:
  - the purpose, nature, scale and duration of the project;
  - risks to, and potential impacts on, stakeholders and proposed mitigation plans highlighting potential risks and impacts that might disproportionately affect vulnerable and disadvantaged groups and differentiate measures to mitigate these;
  - the envisaged stakeholder engagement process, if any, and opportunities and ways in which stakeholders can participate; and
  - the time and venue of any envisaged public consultation meetings, and the process by which meetings are notified, summarised, and reported; and the process by which any grievances will be managed.
- This information will be disclosed in the local language(s) and in a manner that is accessible and culturally appropriate, taking into account any specific needs of groups that may be differentially or disproportionately affected by the project or groups of the population with specific information needs (including disability, literacy, gender, mobility, differences in language or accessibility). Where necessary and culturally appropriate, a third-party may be hired to disclose the information to avoid intimidation, coercion or any form of manipulation.

3.3.3 EBRD's Public Information Policy

The EBRD Public Information Policy (2014) elaborates how the EBRD discloses information and consults with its stakeholders in order to promote better awareness and understanding of its strategies, policies and operations. The following are the requirements of the EBRD Public Information Policy:

- identify people or communities that are or could be affected by the project (including vulnerable groups), as well as other interested parties;
- ensure that such stakeholders are appropriately engaged on environmental and social issues that could potentially affect them, through a process of information disclosure and meaningful consultation; and
- maintain a constructive relationship with stakeholders on an on-going basis through meaningful engagement during project implementation.

3.3.4 EU Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by 2014/52/EU (the EIA Directive)

The EIA Directive and its amendments emphasises the need for effective public participation in decision-making, as well as the participation of associations, organisations especially non-governmental organisations. It also requires that, with a view to strengthening public access to information and transparency, timely environmental information should also be accessible in electronic format. Disclosure of impact assessment documents for public comments is also a requirement under the Directive.

Reasonable timeframes should be provided for the public to prepare and participate in the consultation process. The results of consultation should be recorded and taken into account during the project development.

3.4 Gaps Between National and EBRD Requirements

The national framework in Mongolia is broadly compatible with the EBRD requirements of public consultation and stakeholder engagement, although there are several gaps. The national requirements do not address a detailed identification of stakeholders or detailed, meaningful and empowered consultation. There is also no explicit requirement for a grievance mechanism.

This SCMP takes into consideration all the requirements as set out above and provides a process for future consultation and managing grievances, consistent with Erdene's existing policies and procedures on stakeholder engagement and grievance management, to comply with the EBRD standards and requirements of stakeholder engagement.

The ESIA documents, including this SCMP, are intended to be publicly disclosed for comments on the EBRD website and locally. This SCMP may also be developed further for the construction and operations phases of the Project.

3.5 Applicable Erdene Standards, Policies and Procedures

Erdene's relevant policies and procedures are provided below.

3.5.1 Stakeholder Relations and Sustainability Policy

The purpose of this policy is to articulate the relationship between Erdene's stakeholder relations and sustainability. Sustainability refers to the economic, environmental, social and governance

performance of the company's mineral exploration and mining activities over time. Sustainability performance is defined and measured through six key areas:

- Growing the value of the company and its operations
- Supporting local economic development
- Promoting public health and well-being
- Improving workforce skills and education
- Ensuring a culture of ethical business practices
- Avoiding and mitigating environmental impacts

Erdene tailors its strategy to each stage of the project life-cycle, from early exploration through mine closure[3].

3.5.2 Community Relations Policy

This policy defines Erdene's approach to cultivating and maintaining good community relations.

Community relations require systematic, proactive management in order to enhance the company's value and decrease all associated risks.

Erdene requires that detailed community policies and procedures be developed according to the needs of a given minerals project with the community relations policy as the basic underlying framework for project-specific procedures and protocol.

For each calendar year, Erdene will develop a community relations plan, outlining proposed activities, performance targets and required resources.

3.5.3 Stakeholder Consultation Policy

This policy defines the Company's framework for consulting with stakeholder groups.

Erdene seeks to proactively consult with and engage local stakeholders throughout the life of each minerals project.

Where critical construction decisions are concerned, informed consent to a given project is most likely to emerge when stakeholders are aware of the potential benefits and costs of the project.

3.5.4 Grievance Policy

See Section 8.2 for provision of key *Grievance Policy* provisions.

3.5.5 Government Relations Policy

Erdene is committed to cultivating and maintaining professional working relations with the government authorities, both civil and elected, at the local, provincial and national levels for the jurisdictions within which the company operates. Erdene's core business activities require a wide range of approvals, permits, opinions, licenses and other engagements with government authorities. Erdene will assess opportunities to cooperate with government authorities in fulfillment of government policy priorities. Erdene will disclose all its payments and transactions with any government entity on an annual basis in accordance with the most recent version of the Extractive Industry Transparency Initiative reporting framework and guidelines.

3.5.6 External Communications Policy

The Company maintains an in-house approach, protocols and procedures for managing official Company external communications and messaging.

3.5.7 Media Relations Policy

The Company maintains an in-house approach, protocols and procedures for engaging and working with external media organizations and journalists, including those representing traditional print and broadcast media as well as independent and freelance social media contributors.

4. SUMMARY OF PREVIOUS STAKEHOLDER ENGAGEMENT ACTIVITIES

4.1 Introduction

This section describes the stakeholder engagement activities that have taken place in support of the Project to date, consistent with the description of stakeholder engagement provided in the ESIA *Chapter A6 Stakeholder Engagement*.

Erdene has a history of over 15 years of engagement, including consultation with communities, government and institutions living and working in the area. Since 2004, the Company has spent over USD $50 million on exploration projects in Mongolia, which has led to multiple discoveries. First, Erdene identified the Altan Nar gold-polymetallic resource, with a Mineral Resource estimate announced in 2015. Later that year, Erdene conducted an initial exploration program on the southern portion of its Khundii exploration license. In 2018, the Company announced a maiden Mineral Resource estimate for the Bayan Khundii gold deposit. In 2019, the company converted the Khundii license to a mining license and received state registration of the AN deposit (i.e. the precursor to mining license conversion). Also in 2019, Erdene completed a Preliminary Feasibility Study for BK and an updated Preliminary Economic Assessment for AN. In late 2019, Erdene had launched further detailed studies to deliver a definitive Feasibility Study for BK.

Consultation with communities has included that required by the Government of Mongolia during the preparation of statutory studies, including the General Environmental Impact Assessment (GEIA) and Detailed Environmental Impact Assessment (DEIA) documentation for all components of the Project. In addition, there has been consultation with local communities by the University of British Columbia as part of a research programme facilitated by Erdene on mineral exploration and community development. Erdene has also undertaken extensive engagement with local communities, and authorities in the course of its exploration activities in the region. This engagement is discussed in further detail in the sub-sections below.

4.1.1.1 Mongolian Statutory Engagement for GEIA and DEIA

The statutory consultation conducted as part of the GEIA / DEIA process in 2016 and 2017 by Eco Trade LLC revealed the following issues from the community:

- potential impacts on and disturbance of pastureland, resulting in reduced carrying capacity;
- potential for uncontrolled road development impacting local soils;
- dust creation through mining and mine traffic impacting vegetation in the area.
- positive impacts on local infrastructure development, supply chain and employment opportunities; and
- potential for cooperation between mining companies and communities on protection of wells, water and pastureland, and protecting the environment from desertification.

Statutory engagement in Shinejinst for the BK DEIA has been planned in Q1 2020, subject to the necessary government approvals. The purpose of this session is twofold: 1) provide information about the Project, its potential impacts, and the proposed management plans to residents of the *bagh* within which it is located and 2) give an opportunity to provide input into the mitigation and

management plans of the Project. Participation is targeted of approximately 50 households, plus the local government representatives from *bagh*, *soum* and *aimag* levels.

4.1.1.2 University of British Columbia Stakeholder Engagement and Research

Stakeholder engagement by UBC researchers is documented in two peer-reviewed research publications (Fraser et al, 2019 and Fraser et al, 2018). Engagement in support of this research project included KIIs and FGDs with herder households, local government organisations, civil society representatives, non-governmental organisations, and industry partners, among others. Some of the key findings and themes from this engagement are noted as follows:

- "Erdene's community engagement approach has resulted in positive outcomes for the company and its stakeholders. The majority of respondents said Erdene is trusted to engage with the community and to consider community needs when planning its projects."
- "…herders are worried about mineral development and mining in Bayankhongor. Their unease is driven primarily by concerns about water availability. The potential for mining to cause environmental impacts to the Gobi pastureland, upon which their herds and livelihoods depend, is another key consideration."
- "Herder views appear to be generalized to the industry rather than being solely linked to Erdene. Approximately 25 per cent of external stakeholders interviewed knew about Erdene's water stewardship work."
- "Stakeholders also mentioned the value received from the company for its long-standing scholarship program begun in 2012."
- "Interviewees also attached importance to a new initiative: making available company shares to residents of the two *soums* closest to the Bayan Khundii project."
- Overarching research themes raised by stakeholders during consultation vis-à-vis exploration and mine development (generally, not specific to Erdene) included:
    - Economic development: jobs, opportunities, local procurement, small & medium enterprises;
    - Herd welfare: Declining herd health due to dust, climate change, drought, harsh winters; conflicts over pasture and water;
    - Environment: Climate change, air quality, harsh conditions, decreasing pastureland, soil erosion, impacts of roads, and micro mining;
    - Water: Availability, quality, need for testing and monitoring, withdrawal impacts on surface and aquifer water; and
    - Governance: capacity, corruption, policy uncertainty, low trust, lack of transparency.

4.1.1.3 Erdene Stakeholder Engagement

Table 1 highlights key engagement activities undertaken by Erdene in Shinejinst, Bayan-Undur and/or Bayankhongor historically. It is not meant to be exhaustive, but instead is intended to provide an indication of the breadth and duration of the Company's engagement in the communities hosting the Khundii Gold Project, including prior to the discovery of both Altan Nar

and Bayan Khundii deposits. In some most instances, engagement came through the company's local cooperation programs, providing an entry point for supporting local cultural and social institutions.

Table 1 Summary of Engagement Undertaken by Erdene Historically

#	Year	Activity	Location
1	2006	• Organized livestock support program in cooperation with soum government	• Shinejinst
2	2007	• Organized livestock support program in cooperation with soum government	• Shinejinst
3	2008	• Established community liaison committee • Conducted public outreach on geosciences • Co-funded public park development	• Shinejinst • Shinejinst • Bayankhongor aimag centre
4	2009	• Supported the traditional cultural festival ("Lamiin Gegeen") • Provided emergency relief to local herders in Bagh 2 due to natural disaster • Convened stakeholders to facilitate a range of initiatives via Community liaison committee	• Bayankhongor aimag centre • Shinejinst • Shinejinst
5	2010	• Provided learning materials and volunteer assistance in schools • Provided books and material support for local secondary school • Organized local stakeholder visits to exploration site, including for secondary school eco clubs • Supported the 315th anniversary of the Amarbuyant Monastery and participated in commemorative events • Conducted public workshops on geoscience and natural resource management	• Shinejinst • Bayan-Undur • Bayan-Undur, Shinejinst • Bayan-Undur • Bayan-Undur, Shinejinst
6	2011	• Academic leadership awards (public secondary school) • Supported leadership training for civil service • Organized public education event and consultation on environmental assessment process • Held statutory DEIA consultations for the Zuun Mod molybdenum-copper project	• Shinejinst • Bayankhongor aimag centre • Shinejinst • Shinejinst (Bagh 2)
7	2012	• Initiated the Erdene academic scholarship for students in university who graduated from the soum public schools	• Bayan-Undur, Shinejinst
8	2013	• Supported and participated in the annual spring festival of the soum	• Shinejinst
9	2014	• Negotiated and concluded cooperation agreement to support for local infrastructure	• Bayankhongor aimag centre

		as directed by aimag citizens representative council	
10	2015	• Supported and participated in local camel festival • Supported and participated in the opening of a new bagh centre building	• Bayan-Undur • Shinejinst
11	2016	• Convened stakeholders to facilitate a range of initiatives via Community liaison committee	• Bayan-Undur, Shinejinst
12	2017	• Convened stakeholders to facilitate a range of initiatives via Community liaison committee • Organized site visit for local soum stakeholders	• Bayan-Undur, Shinejinst • Bayan-Undur, Shinejinst
13	2018	• Convened stakeholders to facilitate a range of initiatives via Community liaison committee • Organized site visit for local soum stakeholders • Supported youth basketball league development	• Bayan-Undur, Shinejinst • Bayan-Undur, Shinejinst • Bayankhongor aimag centre

5. STAKEHOLDER IDENTIFICATION

5.1 Introduction

In order to develop effective stakeholder engagement, it is necessary to identify who the stakeholders are and understand their needs and expectations for engagement, and their priorities and objectives in relation to the Project. This section of the SCMP identifies Project stakeholders, following the requirements of EBRD PR10 which takes into account individuals or groups who:

- are affected or likely to be affected (directly or indirectly) by the project (affected parties); or
- may have an interest in the project (other interested parties).

5.2 Approach to Stakeholder Identification

Stakeholder identification is an on-going process, requiring regular review and updates. Sustainability East Asia LLC, building on Erdene's existing stakeholder identification and engagement history in the area, identified the following lists (see Table 3 and Table 4) of stakeholders on the basis of likely potential impacts of the Project and therefore who could be affected by the Project so that engagement can be tailored to inform them and enable their views and concerns to be understood in an appropriate manner. This included the identification of individuals and groups that may be differentially or disproportionately affected by the Project because of their disadvantaged or vulnerable status, and / or whether these individuals or any other stakeholder groups are likely to be excluded from, or unable to participate in, the mainstream consultation process or would require specific measures and / or assistance to do so.

It is expected that other stakeholders may be identified during the Project phases and as such, the list included in this SCMP may be updated, as required. The stakeholder list should be reviewed regularly and updated throughout the Project cycle. The subsequent identification of Project stakeholders is mainly conducted through the application of a combination of procedures that are periodically repeated throughout Project development:

- Consideration of the Project's activities and area of influence;
- Scoping of potential, or review of current, positive and negative Project impacts;
- Contact with Project relevant government bodies and civil society and business groups; and
- Contact made with organisations expressing, or likely to have, an interest in the Project.

As a minimum, the stakeholder list should be reviewed prior the start of the construction phase and at the start of the operation phase.

Project Area of Influence

Key to stakeholder engagement through the ESIA process is the definition of the Project Area of Influence (AoI). The KGP intersects with two *soums* that may experience direct and/or indirect environmental or social impacts from construction and operation of the Project. The Area of Influence (AoI) has been defined as the Bayankhongor *aimag* at the macro-level, with sub-AoIs identified as the Shinejinst and Bayan-Undur *soums*, and in particular, the *baghs* – Urtiin gol and

Idren, respectively (see **Error! Reference source not found.**). Table 2 summarises the KGP components in each of the two *soums*.

Table 2 *Soums* / *Baghs* Located in the Area of Influence

KGP Project Element	***Soum* / *Bagh***
Bayan Khundii deposit and Project infrastructure, including processing and accommodation facilities	Shinejinst *soum*, Urtiin gol *bagh*
Site Access Road	Shinejinst *soum*, Shinejinst *soum* centre, Urtiin gol *bagh*
Altan Nar deposit, including the Altan Nar to Bayan Khundii Link Road	Bayan-Undur *soum*, Idren *bagh*

Locational criteria were used to identify those stakeholders present in the affected *soums* and *baghs*, with a focus on key areas of interest, such as livestock herding, small and medium enterprises, and different perspectives such as those of women and vulnerable people / groups. This provided the basis for engagement with affected communities / groups and, also, regional and local governments at the *aimag*, *soum* and *bagh* levels as part of the social baseline study conducted in August 2019.

5.3 Stakeholder Identification and Analysis

The preliminary stakeholder list is set out in Table 3 and Table 4. An analysis of the stakeholders has been carried out, identifying whether they are affected by or have an interest and / or influence on the Project, in order to assess the best ways to engage with each stakeholder and understand what information is important to them, their interest and influences.

Table 3 Directly Affected Stakeholders

Stakeholder Category	Stakeholder Sub-Category	Impact / Interest / Influence
Local Communities	Seasonally, sporadically resident herder households within the potential impact zones of the Mine Site and Site Access Road.	Impact may experience low level economic displacement or nuisance impacts from the Project
	Vulnerable individuals and groups	Impact May be disproportionately affected by the Project, for example may experience adverse health impacts more acutely than other stakeholders.
	Local community members within the Project area of influence: - Herders - Urban residents in Shinejinst and Bayan-Undur *soum* centre - Residents of Urtiin gol and Idren *baghs*.	Impact May experience potential impacts related to environmental quality, community health, safety and security during construction and operation; jobs and other economic benefits
	Local business owners within the Project area of influence: • Shops / wholesalers; • Cafes / Restaurants; • Vehicle repair shops. • Other SMEs / cottage industries.	Impact Project may provide opportunities for increased revenue from construction and operations workforce.
	KGP employees	Impact

KGP and Core Operations	KGP Shareholders (including local residents of Shinejinst and Bayan-Undur soums)	Employment, economic impacts, including on incomes, occupational and community health, safety and security, procurement and supply chain requirements
	KGP Contractors, Suppliers, and Service Providers	

Table 4 Indirectly Affected Stakeholders

Stakeholder Category	Stakeholder Sub-Category	Impact / Interest / Influence
National Government	Parliament / members	Interest. National economic development, taxes and royalties, infrastructure development Influence. Potential to influence Project in terms of establishing policy, granting permits or other approvals, monitoring and enforcing compliance with national Law through Project life cycle
Bayankhongor *aimag* Government / Regulators / Administration, Government of Mongolia	Governor	Interest. Regional economic development, taxes and royalties, infrastructure development Influence. Potential to influence Project in terms of establishing policy, granting permits or other approvals, monitoring and enforcing compliance with national Law through Project life cycle
	Speaker	
	CRK Members	
	Government of Mongolia / Members for Bayankhongor	
	Bayankhongor *aimag* Administration Departments (Health, Education, Agriculture, Planning, Mining, Commerce)	Interest Regional economic development, taxes and royalties, infrastructure development, permitting and monitoring, protection of employee and public safety. Influence Potential to influence Project approvals and timeframes.
Soum and *Bagh*-Level Government / Regulators / Administration	Shinejinst *soum* Governor, Speaker and *Khural* Members, *soum* administration department / advisors	Interest Local economic development, taxes and royalties, infrastructure development, permitting and monitoring, protection of employee and public safety. Influence Potential to influence Project approvals and timeframes.
	Bayan-Undur Governor, Speaker and *Khural* Members, *soum* administration department / advisors	
Local Services	Shinejinst and Bayan-Undur *soum* hospitals	Interest Interests include community health and safety in relation to the development and operation of the Project and availability of facilities, as well as vulnerable groups and the impacts upon these groups both negative and beneficial of the Project.
	Police	
	Social workers	
Education and Training Institutions	Bayankhongor Vocational Education and Training College Principal / Leaders(s)	Interest Recruitment of graduates by KGP, potential partnerships in supplying further education and skills development of workers.
	Bayankhongor branch of University Leader(s)	

	Shinejinst and Bayan-Undur *soum* school principals	Interest Community development activities to support capacity and facilities development. Scholarship opportunities for children.
Opinion Influencers	*Soums'* Elderly Associations	Interest Community development activities, employment, supply chain and procurement opportunities.
	Regional and National Non-Governmental Organisations (NGOs) and Community-Based Organisations (CBOs)	Interest NGOs with environmental and social concerns, potential partners of the Project. Influence Lobbying and advocacy
	Bayankhongor, Ulaanbaatar, International media (print, radio, TV)	Interest Interested in Project-related activities and management of impacts in the area. Media are also potential partners in providing forums for the Project to communicate with stakeholders. Influence Accountability to readership in the reporting of Project developments and activities and influencing public opinion about the Project.
	Social media channels (LinkedIn, Facebook and Twitter)	Interest Platform for stakeholders to express their interest in the Project, including in relation to impacts. These media are also tools that can be used by the Project to interact with stakeholders on various topics. Influence Potential to influence public opinion based on content.
Industry	Other mining companies operating in Bayankhongor	Interest Business opportunities, labour, and health and safety compliance. Impact Potential impacts including recruitment, employment, retrenchment, health and safety, labour rights.
	Construction, infrastructure, and mining trade bodies	
	Trade Unions	
General Public	Population of Mongolia	Interest Development of the country and responsible mining.
Financial Institutions	EBRD, others	Interest / Influence Interest and influence in minimising risk to their investment by ensuring the Project's compliance with environmental and social performance requirements, tied to Project finance.

5.4 Vulnerable Groups

The stakeholder identification exercise, consultation process conducted to date, and the ESIA process examined if there are any groups of affected people who might be more vulnerable to the potential impacts of the Project than others and who may be limited in their ability to claim or take advantage of the development benefits or opportunities afforded by the Project. During the preparation of this SCMP, groups were examined and assessed to determine if they might be affected by the Project due to their gender, age, ethnicity, religion, physical or mental disability or other attributes.

It should be noted that the Labour and Social Welfare Offices in Shinejinst and Bayan-Undur proactively identify and provide support measures to vulnerable individuals and groups. Social workers in the *soums* have a thorough understanding of households and individuals that are considered as vulnerable, and these include (consistent with the Mongolian Law on Social Welfare, 2012 criteria for the identification of vulnerability) people with disabilities, children in harsh conditions, the elderly, people in need of regular care, orphan children under the age of 18, single mothers / fathers, and those who may be more susceptible to Gender-Based Violence and Harassment (GBVH), such as those of lower socio-economic status or involved in sex work. In Shinejinst *soum*, 30 very poor and vulnerable households were recorded (similar information from Bayan-Undur *soum* was not established at the time of writing), as of December 2019.

Consistent with the above, the ESIA assessment identified the following persons and groups as potentially vulnerable as a result of the Project:

- people with disabilities;
- the elderly;
- single-headed households;
- sex workers
- children;
- family members that require a full time care-giver.
- low income households.

6. STAKEHOLDER ENGAGEMENT CONDUCTED DURING THE ESIA

6.1 Engagement as Part of ESIA

Three engagement phases are relevant to the KGP ESIA:

- ESIA Baseline Engagement Phase (2016-2019);
- ESIA Disclosure and Consultation Phase (2019-2020);
- Ongoing engagement after the ESIA disclosure process is complete and throughout the Project life cycle (from 2020).

For the ESIA baseline engagement phase, a *Plan for Data Collection and Stakeholder Engagement* was prepared to obtain baseline data and undertake consultations. The focus of the baseline study and fieldwork was the affected communities within the KGP AoI and, within these communities, key livelihood and other interests. The social baseline involved extensive planning and engagement with Project stakeholders from April to August 2019, building on the extensive engagement and information gathered by Erdene since it commenced exploration in the area in 2006, and through the DEIA surveys undertaken by Eco Trade LLC from 2016. The specific objectives of engagement during the ESIA baseline phase were to:

- further identify stakeholders related to the Project;
- identify and access relevant data for the baseline;
- gather stakeholder opinions on the Project and ensure that these opinions are fed into the assessment process;
- identify potential impacts and issues to be covered in subsequent phases (scoping)
- to gather stakeholder feedback on the development of management and mitigation measures for potential impacts, particularly where stakeholders have a potential role to play in these measures.

In 2019, the social baseline culminated in a statistically representative Household Survey in which 78 surveys were completed out of a total of 80 planned. Twenty-eight KIIs were planned (12 each in Shinejinst and Bayan-Undur *soums*, and 4 in Bayankhongor *aimag* centre), with 28 (13 in Shinejinst and 11 in Bayan-Undur *soums*, and 4 in Bayankhongor *aimag* centre) conducted. Key Informant Interviews (KIIs) were held with a range of respondents, including Government representatives, community leaders, and institutional representatives.

Focus Group Discussions (FGDs), involving approximately 8-10 people, were organised in each *soum* covering a variety of issues: population, cultural heritage issues; employment, health, local governance and budget revenues; natural resources; businesses, income generation and education, with particular emphasis on local perceptions and concerns. FGDs were organised to ensure representation by a diversity of community members, with particular reference to inclusion of vulnerable groups, including women, elderly, and disabled, where possible. Women's involvement in the FGDs with herders was equal to men's, and in the other two thematic FGDs (Community and SMEs) held, was higher than men's. Six FGDs were conducted in total, three in each *soum*. See Chapter B1 Introduction for further description of baseline consultation and data gathering.

Stakeholder engagement through the ESIA process was conducted with reference to the Erdene Stakeholder Consultation Policy. Engagement activities have made use of Erdene's existing systems and procedures, including the *Erdene Grievance Procedure*.

Table 5 provides a brief summary of key stakeholder issues and feedback identified in relation to mining development and Erdene, which were broadly similar to the issues identified through other engagement activities described above. Note that the Social Baseline Chapters, developed as part of the KGP ESIA contain further detail in relation stakeholder feedback and issues.

Table 5 Summary of Stakeholder Issues Identified

Stakeholder Issues and Concerns
Stakeholder Engagement
• Erdene has maintained a positive relationship with *soum* authorities. When the *soum* makes any request of Erdene, the Company always puts common principles in place first, then responds. • Erdene has shown good practice to build Local Development Committees that consist of representatives of local authorities, local communities and the Company to contribute to community development. This needs to be expanded in the coming project. • Erdene should consider information disclosure as paramount. If people are informed well, there will be less potential for conflict and misunderstanding. • Erdene needs to be aware of social inclusion in its engagement, to ensure that stakeholder engagement is comprehensive and includes a diversity of rural and *soum* centre residents. • Representatives of the Company must inform and engage with communities in person in order for trust to develop. • There is a need to gather community elders for occasions and to organise events in which elders can be involved.
Community Health, Safety and Security
• *Soum* health facilities and capacity are limited and there are many challenges in providing effective healthcare to locals. There is sone concern that the KGP will create communicable health risks which could bring an extra burden to *soum* hospitals, which have no capacity to manage them. • Most crimes in the area can be linked to alcohol use. If Erdene develops the Project, it is possible that more people will come to the *soums* and that there will be an increase in crime. • Traffic violations are common in the *soums*, especially in relation to motorbikes.
Mining
• There are concerns about the development of mining projects in general, particularly the efficiency and sustainability of mining, and potential for mining to impact land and traditional Mongolian livelihoods. • Soil pollution, water scarcity and associated degradation, habitat disturbance, and dust and air pollution are some of the local concerns about mining. • One of the key positive impacts of mining noted is that new mining development could use more advanced and environmentally friendly technology. • In Mongolia, there are a number of bad examples of mining. If mining is conducted responsibly, there might be benefits and positive impacts.
Economy and Employment
• If a mine is developed in the *soum*, local unemployed people should be trained and employed in the first place. Mining is a key factor in determining the sustainable development of the local economy and community development. • Erdene should take measures to encourage food producers, meat suppliers, and local entrepreneurship. • Salaries are perceived to increase if local people are hired by mining companies.

• There is a lack of professional ability / skills in the *soums* to meet Erdene's needs. • There is an opportunity to assist youth to undergo vocational training. • Employment opportunities are needed and expected (especially for women and youth). There will be local competition for job opportunities such as drivers and service workers. Work positions that require special skills will not be competed for as locals do not have these skills. • Capacity building of potential local suppliers and employees by the Company should prioritise behavioural training in order to be successful.
Land Use
• Pasture is overgrazed and desertification is becoming more of an issue. • There is recognition that the *soums* need to reduce the number of livestock by providing alternative industry development. • The Gobi soil is vulnerable, and therefore road development should be limited, and companies should ensure that they conduct comprehensive rehabilitation.

7. STAKEHOLDER ENGAGEMENT PROGRAM

7.1 Introduction

The objectives of external communications are to provide continuous engagement with targeted audiences to inform them about Project activities and performance. This section therefore sets out the framework for the stakeholder engagement programme for on-going future engagement and disclosure, as part of the development and implementation of the Project. It covers the goals of stakeholder engagement, methods of engagement, and provides an outline of the programme for future engagement and the key steps that should be taken to develop the more detailed construction and operations SCMP.

7.2 Engagement Goals and Objectives

The overarching goals of on-going stakeholder engagement, consistent with the *Erdene Stakeholder Consultation Policy*, are to:

- Comply with national regulations and EBRD PRs;
- Build and maintain mutually beneficial and lasting relationships between Erdene, contractors and stakeholders; and
- Ensure that stakeholders are fully aware of the Project, impacts and benefits, providing informed access to redress where necessary and the opportunity to discuss and negotiate potential solutions.

The stakeholder engagement programme set out below therefore aims to:

- Ensure regular, timely, accessible and appropriate dissemination of information in culturally appropriate formats, to facilitate an accurate and realistic understanding of potential impacts and benefits generated by the Project;
- Ensure planned and transparent engagement where necessary, with appropriate notification, clear disclosure of objectives and an agreed process of interaction, recording and follow-up;
- Build on communication programmes and mechanisms already in place and take into account local sensitivities that have been identified to date on the Project;
- Provide stakeholders and especially communities with the means to address concerns and grievances, in a structured, reliable and responsive manner;
- Include vulnerable people and their representatives in stakeholder engagement initiatives;
- Report regularly and in a structured manner to all stakeholders, with special attention to appropriate forms of reporting among the participating communities; and
- Establish and maintain the management capacity, responsibilities and systems to ensure the effective implementation of the detailed SCMP.

7.3 Methods of Engagement

Erdene uses a variety of stakeholder engagement tools and methodologies to ensure effective consultation. Building upon the engagement methods utilised to date, and feedback gathered through previous consultation activities, the following are the key methods (other methods may

also be identified / used, as appropriate) that are planned to be employed for effective stakeholder engagement and information disclosure (organised alphabetically):

Company Website

Erdene maintains a website, which provides news updates, and Project information that is updated regularly and available in both English and Mongolian languages.

Focus Group Discussions

Small group meetings or FGDs will continue to be used in future engagement for specific groups e.g., women, youth, as appropriate or required.

Formal Correspondence

Formal written correspondence will continue to be used for communications with Mongolian authorities, the public, and other targeted stakeholders, as appropriate.

Formal Solicitation of Public Input

This may include the establishment of a community liaison committee, for example, or decision put to the local Citizens Representative Khural.

Grievance Procedure

A *Grievance Procedure* has been developed to foster the effective resolution of grievances and stakeholder concerns. The *Grievance Procedure* is central component of the Project's stakeholder engagement toolkit for the life cycle of the project.

Information Boards

Information boards may be used to provide the public access to leaflets and information materials. They will allow the public to obtain information about the Project. These may be established in Shinejinst and Bayan-Undur *soums* (at community centre / Government offices).

Information Materials

Information and awareness materials in appropriate and targeted formats will be used to create awareness and inform communities of project activities and plans. These types of materials include posters and / or brochures. ERD observes the practice of continuous material disclosure, providing ongoing public information releases about any material information related to the company in both English and Mongolian languages. These material press releases are available on the company's website, on SEDAR and at www.mse.mn.

Key Informant Interviews

KIIs will continue to be conducted to obtain detailed understanding / information from people with firsthand / specialised knowledge of particular issues, or interest in an issue. KIIs resemble a conversation among acquaintances and also provide the opportunity to verify data collected in FGDs.

Local Media, Radio, and Newspaper Articles

The Project may use media such as TV, radio, newspaper, and social media to disseminate information and create awareness.

Official Company Outreach Events and Activities

Official activity organised by the Company to facilitate engagement, including organised meals, and town hall events (see also public meetings).

Public Meetings

Public meetings typically involve a range of activities such as slideshow presentations, poster displays, a question and answer period or roundtable discussions and dissemination of printed materials. Questionnaires may also be provided to attendees. The intention of public meetings is to facilitate opportunities for dialogue and a meaningful two-way exchange of information.

Site Tours

Site tours organised periodically to bring interested stakeholders to site.

Targeted Meetings (informal)

Will be used with individual project affected persons to discuss individual issues, and include household visits.

Table 6 below shows which key methods and tools are primarily used to engage with different stakeholder groups.

Table 6 Engagement and Disclosure Methods for Different Stakeholders

Stakeholder Group	Key Engagement and Disclosure Methods
Resident herder households within the Mine Site and Site Access Road impact zones	Public Meetings, Official Company Outreach Events and Activities, Focus Group Discussions, Information boards, Key Informant Interviews, Targeted Meetings, Information Materials, *Grievance Procedure*
Vulnerable individuals and groups within households	Official Company Outreach Events and Activities, Key Informant Interviews, Targeted Meetings, Information Materials, *Grievance Procedure*
Local community members within the Project area of influence	Public Meetings, Official Company Outreach Events and Activities, Focus Group Discussions, Information boards, Information Materials Formal Solicitation of Public Input, *Grievance Procedure*, Media, website, Site tours
KGP and Core Operations	Public Meetings, Official Company Outreach Events and Activities, Focus Group Discussions, Information boards, Key Informant Interviews, Targeted Meetings, Information Materials, *Grievance Procedure*, website, Site tours, Formal Correspondence
Local business owners within the Project area of influence	Public Meetings, Official Company Outreach Events and Activities , Focus Group Discussions, Information boards, Key Informant Interviews, Targeted Meetings, Information Materials, Formal Solicitation of Public Input, *Grievance Procedure*, Media, website
National Government / Bayankhongor *aimag* Government / CRKs/ Regulators / Administration	Official Company Outreach Events and Activities, Key Informant Interviews, Targeted Meetings, Formal Correspondence, Site tours, website and information materials
Soum and *Bagh* Level Government / Regulators / Administration	Public Meetings, Official Company Outreach Events and Activities, Focus Group Discussions, Key Informant Interviews, Targeted Meetings, Formal Correspondence, Information Materials, Formal Solicitation of Public Input, Site tours, website
Local Services	Public meetings, Focus Group Discussions, Key Informant Interviews, Formal Correspondence, Formal Solicitation of Public Input
Education and Training Institutions	Public meetings, Focus Group Discussions, Key Informant Interviews, Formal Correspondence, Formal Solicitation of Public Input, information materials
Media	Key Informant Interviews, Formal Correspondence, Information Materials, Formal Solicitation of Public Input, Website
NGOs / CBOs	Public Meetings, Official Company Outreach Events and Activities, Focus Group Discussions, information materials, website, Key Informant Interviews, *Grievance Procedure*
Industry	Formal correspondence, Website, Media

General Public	Information Materials, Media, Website
Financial Institutions	Targeted Meetings, Formal Correspondence

7.4 Stakeholder Engagement Programme

The stakeholder engagement programme comprises several phases which have been designed to correspond with the overall development phases of the Project:

- ESIA disclosure; and
- Future stakeholder engagement activities (construction and operations).

Future activities will be identified and planned as the Project progresses (see section 7.4.3). This SCMP will be continually reviewed and updated as the Project progresses and as stakeholder dynamics evolve. Subsequent versions of the SCMP document will address the results that come from the engagement process and describe action plans in more detail for later steps in the stakeholder engagement programme.

7.4.1 ESIA Disclosure

The Project ESIA Disclosure Package consists of documents developed to meet the requirements of the EBRD. ESIA disclosure will involve dissemination and presentation of the final ESIA Report to stakeholders. Disclosure and consultation on the KGP ESIA Report is planned to ensure that stakeholders have had the opportunity to make themselves aware of the environmental and social impacts that may occur and how the KGP will avoid, minimise and / or manage these impacts. Key activities are:

- The KGP ESIA Report, all Management Plans and a Non-Technical Summary will be posted on the Erdene website and will be available in Erdene offices in Ulaanbaatar, and governors' offices in Bayankhongor *aimag*, Shinejinst and Bayan-Undur *soums*, and Urtiin gol and Idren *baghs*.
- Disclosure of the ESIA documentation, including Management Plans and summary information will be in Mongolian and English, as relevant to the location.
- A Non-Technical Summary on key ESIA themes / topics and commitments by Erdene to manage impacts will be prepared in English and Mongolian and used during consultation with residents in Shinejinst and Bayan-Undur *soums*.
- Erdene will publicly notify how a copy of the KGP ESIA documentation can be accessed for stakeholders to give feedback, including electronically, comment books at Erdene field offices and through Erdene staff as part of routine consultation activities.
- Links to the Erdene website from the EBRD website will be provided in accordance with Lender disclosure requirements.

Erdene will conduct pre-disclosure planning with *aimag* and *soum* authorities and lenders to settle on a process for ESIA disclosure that is reasonable, fit-for-purpose, and agreed by all key parties. As this is a Category A project, documents will be available for a minimum consultation period of 60 days.

7.4.2 Stakeholder Engagement Programme

Table 7 summarises the stakeholders, engagement methods and information to be disclosed during the ESIA disclosure, and Project construction phases. The engagement programme will

build on the already existing system and structure of engaging stakeholders. The Stakeholder Engagement Programme for the operations phase, building on the actions identified for Construction, will be further specified prior to the commencement of operations.

The Stakeholder Engagement Programme identifies target stakeholder groups and the specific range of engagement activities required for each group. The Programme will be reviewed regularly, at least quarterly during construction, and bi-annually during operations to ensure that it remains valid and meets the needs of Erdene, the KGP, local communities, and other relevant stakeholders as identified in this SCMP.

Table 7 Stakeholder Engagement Programme

ID	Target Stakeholder / Group	Purpose / Information to be Disclosed	Method	Responsible Parties	Schedule / Frequency
ESIA Disclosure Phase / Pre-Construction					
SCMP01	• All stakeholders	**ESIA Disclosure:** • Disclosure of all ESIA documents (as agreed with the EBRD): ESIA, Non-Technical Summary, SCMP, Management Plans. • Announcement of the availability / timeframes for the disclosure materials through local print media, as well as *bagh* and *soum* meetings, as possible.	• EBRD / Erdene website • Hard copies in Erdene and EBRD offices in UB • Hard Copies in Erdene office in Shinejinst soum centre • Media • Public Meetings	Erdene / EBRD	Upon completion of the ESIA, targeted by end of Q1 2020.
SCMP02	• Local Communities	**Information Sharing:** • General pre-construction planning and site preparation prior to construction. • Overall schedule for construction, including sub-activities, key stages and potential aspects of interest to stakeholders. • Information on safety measures, and impact management. • Collection of opinions and concerns in the course of statutory DEIA consultation and ESIA disclosure period. • Awareness of the *Grievance Procedure.*	• Public event in Shinejinst and Bayan-Undur prior to the start of construction to conduct awareness raising / information sharing. • Information materials • Information boards • Local Media and Newspaper Articles • *Grievance Procedure*	• HSEC Department	Prior to construction
SCMP03	• Bayankhongor *aimag*, *soum* and *bagh* Government /	**Information Sharing and Approvals:** • Approvals and permits.	• Attendance at formal *Soum* and *Bagh* meetings for statutory DEIA consultation	• HSEC Department	Prior to construction

ID	Target Stakeholder / Group	Purpose / Information to be Disclosed	Method	Responsible Parties	Schedule / Frequency
	• Regulators / Administration, • Government of Mongolia •	• General pre-construction planning and awareness prior to construction. • Overall schedule of site preparation and construction, including sub-activities, key stages, and potential aspects of interest to stakeholders.	• Targeted meetings • Information Materials • Mongolian Feasibility Study (TEZU)	• Senior Management	
SCMP04	• Vulnerable groups	**Information Sharing, Recruitment and Procurement, *Grievance Procedure*:** • Specific consultation, including information on Project components, in particular community health, safety and security, GBVH related issues, plans for community development activities, potential employment opportunities including skills required and training opportunities, and awareness of *Grievance Procedure* and Erdene's community relations personnel .	• Targeted meetings with identified vulnerable groups (households visits, as appropriate) • Provision of information materials • *Grievance Procedure*	• HSEC Department	Prior to construction
SCMP05	• Local communities • Industry • Education and Training Institutions, • General Public	**Recruitment and Procurement:** • Upcoming construction phase employment estimates, opportunities, application processes, skills required, timeframes, training of staff. • Engagement to include active encouragement of women to apply for a diverse range of jobs.	• Notices on information boards, local offices etc in each *soum* / *bagh*, and Bayankhongor City • Notification via local CRKs • (*aimag*, *soum*, and *bagh*) • Information materials • Local media / newspapers • Website • Public meetings	• HSEC Department • Human Resources Department	Prior to construction

ID	Target Stakeholder / Group	Purpose / Information to be Disclosed	Method	Responsible Parties	Schedule / Frequency
SCMP06	• Education and Training Institutions • *Aimag*, *soum* and *bagh* Governments	**Recruitment and Training:** • Relevant workforce and training requirements such that potential recruits may be sourced from these institutions, and recruits are able to uphold international standards; and with relevant Government departments to encourage applications from potentially suitable job seekers.	• Information materials • Formal correspondence • Targeted meetings, as appropriate	• HSEC Department • Human Resources Department	Prior to construction
SCMP07	• Contractors and Suppliers	**Procurement:** • Contract information / Calls for tenders and awareness of timing, requirements, etc.	Tender documents and specifications through (as appropriate): • local media / newspapers • Website • Notices on information boards, local offices etc in each soum / bagh, and Bayankhongor City	• Procurement Officer	Prior to construction
SCMP08	• *Aimag*, *soum*, and *bagh* Government / Regulators / Administration, • Local Services • Local Communities	**Crisis and Emergency Response:** • Disclose the *Crisis and Emergency Management Plan* and undertake engagement with local emergency response organisations and communities on emergency response issues and awareness.	• Targeted meetings • Information materials • Public meetings	• HSEC Department	Prior to construction
SCMP09	• EBRD	**Lender Compliance:** • Formal correspondence and engagement in relation to	• Formal meetings / correspondence	• Senior Management	As required

ID	Target Stakeholder / Group	Purpose / Information to be Disclosed	Method	Responsible Parties	Schedule / Frequency
		environmental, social and governance performance and compliance.			
SCMP10	• All stakeholders	**Information Sharing:** Key Project construction information (dates / schedule, activities, safety awareness (as applicable)	• Media • Website • *Grievance Procedure*	• HSEC Department	Prior to construction
SCMP11	• Resident herder households with winter shelters within the Mine Site and Site Access Road impact zones, with specific reference to economic displacement, • *Soum* and *bagh* Government Departments	**Land Use:** • Engage with local authorities and herders, to further define and facilitate the implementation of the *Land Use and Livelihoods Management Framework* (implementation details are provided in the *Land Use and Livelihoods Management Framework*)	• Targeted meetings (households visits) • Focus Group Discussions / Key Informant Interviews, as appropriate	• HSEC Department	Prior to construction
Construction / Operations Phase					
SCMP12	• Local Communities • *Soum* and *bagh*-level Government	**Ongoing Information Sharing:** • Periodic engagement and awareness creation with local communities on the KGP and current and upcoming activities, impacts and impact management measures, Project schedule, including providing information consistent with stakeholders interests about the Project.	• Public Meetings (including attendance at *bagh* meetings / *soum* meetings) • Information boards • Information materials • Official Company Outreach Events and Activities	HSEC Department	Monthly / when needed Six-monthly

ID	Target Stakeholder / Group	Purpose / Information to be Disclosed	Method	Responsible Parties	Schedule / Frequency
SCMP13	All affected stakeholders (including local communities and KGP and Core Operations)	***Grievance Procedure*:** • Training / awareness creation on *Grievance Procedure* • Grievances received that relate to perceived / actual changes to community context (for example communicable diseases) will be reviewed and lessons identified will be used to update the relevant *Management Plans*.	• Public Meetings (including attendance at *bagh* meetings / *soum* meetings) • Information boards • Information materials • Official Company Outreach Events and Activities	HSEC Department	Monthly / when needed Six-monthly
SCMP14	• Local Communities, and particularly: Resident herder households within the Mine Site and Site Access Road impact zones	**Land Use:** • Advance notification and consultations with potentially affected herders prior to any construction and operations works that may affect herd movement and access to pasture / water resources. These consultations will focus on how impacts can be avoided or, if this is not feasible, minimised.	• Targeted meetings (household visits) • Information materials	HSEC Department	As required during construction and operations
SCMP15	• Local communities • *Aimag*, *soum* and *bagh* Governments / regulators	**Recruitment and Procurement:** • Provide information employment estimates, opportunities, application processes, skills required, timeframes, training of staff. • Engagement to include active encouragement of women to apply for a diverse range of jobs. • Engagement on procurement of supplies and services and local	• Public meetings • Information materials • Information boards; • Media • Targeted meetings	HSEC Department	When needed / when requested Monthly

ID	Target Stakeholder / Group	Purpose / Information to be Disclosed	Method	Responsible Parties	Schedule / Frequency
		sourcing opportunities / potential local suppliers • Engagement on potential for a Supplier Development Programme that provides targeted support and assistance to develop local businesses' capacity			
SCMP16	• Local Communities	**Community Health, Safety and Security**: • Consultations with local communities about security procedures in place. • Provide regular updates to herders, vulnerable groups and other residents about potential Project hazards and changes to Project activities that may have community safety impacts.			
SCMP17	• Local Communities; • Local Services • Media • *Soum* and *bagh*-level Government / Regulators / Administration •	**Public Health:** • Identify opportunities to support local public health campaigns that focus on prevention of communicable diseases and STIs. • Liaise with local health professionals to identify ways that the Project can provide support to the local health services and capabilities. • Communicate about the Project workforce and steps taken to mitigate any impacts to the community, including: Actions to discourage alcohol abuse, including but not limited	• FGDs • Public Meetings • Information Materials • KIIs	HSEC Department	When needed / when requested Six monthly

ID	Target Stakeholder / Group	Purpose / Information to be Disclosed	Method	Responsible Parties	Schedule / Frequency
		to: implementation of a Dry" site (no alcohol consumption on site); leisure facilities provided on site; and Alcohol and controlled substance testing as appropriate.			
SCMP18	• Local Communities • Local Services	**Crisis and Emergency Response:** • Ongoing communication and disclosure of the provisions of the *Crisis and Emergency Management Plan* on emergency response strategies and capabilities, issues of concerns to communities.	• Public meetings • FGDs • Information materials	HSEC Department	When needed / when requested Annually
SCMP19	• Local Services • Local Communities • *Aimag*, *soum*, and *bagh*-level Government / Regulators and Administration • Communities and community groups	**Artisanal Mining Dynamics:** Targeted ongoing stakeholder engagement with local and *aimag* level police, *soum* and *bagh* administrations, and communities: • To understand prevalence / emergence of ASM activities in Shinejinst and Bayan-Undur, including the drivers thereof. • About the nature / type of gold associated with the KGP deposit, which make it unsuitable for ASM processing and access methods; • About the measures in place to protect unauthorised access (including perimeter fencing and security personnel);	• Public meetings • FGDs • Information materials • Media • KIIs	HSEC Department	As needed, annually

ID	Target Stakeholder / Group	Purpose / Information to be Disclosed	Method	Responsible Parties	Schedule / Frequency
		• To discourage incursions of ASM at the KGP, including potential negative legal consequences of being complicit in illegal mining, as well as the associated health and safety risks of such activities.			
SCMP20	• Local Communities • *Soum* and *bagh*-level Government / Regulators / Administration	**In-migration:** • Undertake an annual check on published information and information received from stakeholders to check for any evidence of noticeable in-migration. • Ongoing engagement to monitor inflation and, depending upon the results, collaborate to identify potential targeted and time-bound remedial measures, as feasible, including in relation to potentially vulnerable groups.	• KIIs • Targeted meetings (with local Government departments and social workers)	HSEC Department	As requested / when needed Annually
SCMP21	• Local communities • National, *aimag*, *soum* and *bagh* Government / Regulators / Administration • Opinion Influencers	**Cultural Heritage:** • Report of any unlawful underground survey and excavation activities detected near the KGP to relevant authorities. • Engage with local communities about the possibility of including cultural heritage participatory monitoring with other participatory programmes that are implemented (e.g. monitoring of water resources).	• FGDs • Public meetings • *Grievance Procedure* • Official Company Outreach Events and Activities	HSEC Department	As needed, annually

ID	Target Stakeholder / Group	Purpose / Information to be Disclosed	Method	Responsible Parties	Schedule / Frequency
		• Work with the *soum* governments and local community communities to support and strengthen local cultural events and conserve and reinforce local traditions and culture. • Should it be determined that intangible cultural heritage is being impacted, or community members express a concern that it is being adversely affected (e.g. through the *Grievance Procedure*); mitigation measures may be employed to minimise these effects.			
SCMP22	• National, *aimag*, *soum*, and *bagh* level Government / Regulators / Administration • Local communities • Opinion influencers	**Transparency:** • Disclose payments to government through Erdene's financial reporting obligations. • Conduct ongoing communications and engagement with local communities on the Project and its financial payments and contributions at state and local levels, to assist in fostering community level awareness of the KGP and its local economic contribution(s).	• Public Meetings • Targeted meetings • Media • Information Materials • Information Boards •	HSEC Department	As required, Annually
SCMP23	• Local communities • *Soum* and *bagh*-level Government / Regulators / Administration • Local Services	**Community Development and Investment:** • Conduct community consultation and needs assessment to further define and target the community development activities for support by the Company.	• FGDs • Survey • Public Meetings • Media • Information materials • Information boards	HSEC Department	As required, Quarterly

ID	Target Stakeholder / Group	Purpose / Information to be Disclosed	Method	Responsible Parties	Schedule / Frequency
	• Opinion Influencers	• Engage with local *soum* Government to identify opportunities to increase women's participation in the KGP, including opportunities for induced employment to support local enterprises that support employment for women. • See *Local Cooperation Management Plan.*			
SCMP24	Contractors	**Contractor Responsibilities:** • Monitoring of contract tasks and responsibilities for maintaining stakeholder engagement and relationships.	Monthly HSEC meetings	• HSEC Department • HR Department • Contractor	Monthly
SCMP25	• Local communities • *Soum* and *bagh*-level Government / Regulators / Administration • Local Services • Opinion Influencers	**Reporting Back to Communities on Monitoring Results:** • Ongoing monitoring objectives and activities, and regular reporting back to stakeholders on results (i.e. on nuisance issues, water, livelihood restoration, accidents/incidents). • Potential stakeholder participation in participatory monitoring (e.g. water, land use), subject to stakeholder interest and agreement, to examine key areas of concern.	• Public Meetings • Media • Information materials • Information boards	• HSEC Department	Semi-annually during construction Annually during operations and as needed

8. GRIEVANCE MANAGEMENT

8.1 Introduction

Building on Erdene's existing *Grievance Policy* and procedure, a formal community *Grievance Procedure* will be implemented to ensure that Erdene (and its contractors) are responsive to any concerns and complaints, particularly from affected people and communities; and to ensure that there is a central approach and record of grievances.

Special attention will be paid to the training of designated staff involved in the management of the *Grievance Procedure*. This *Grievance Procedure* covers non-employees (i.e. affected people and other relevant stakeholders). A separate internal grievance procedure (Employee Complaint Mechanism) for employees / Project workers will be provided.

8.2 Erdene's Grievance Policy

Erdene's *Grievance Policy* commits to handling any grievances from its stakeholders about its operations in a professional and timely fashion.

8.3 Proposed Erdene *Grievance Procedure*

8.3.1 Purpose

The *Grievance Procedure* describes the way the Company and community can work together to find solutions to grievances. It provides for a fair hearing and procedural justice, access to information and access to a fair remedy – without fear of retaliation.

8.3.2 Goals

- To be respectful of complainant culture, values, traditions and views;
- To resolve grievances at the local level and in a timely manner;
- To identify the root causes of grievances and address systemic issues;
- To provide a process that is dialogue-based, with the complainant and the Company cooperating in the investigation, discussion, resolution and announcement of the grievance and result;
- To ensure fair, equitable and consistent outcomes to resolve grievances;
- To enhance and continuously improve the ability of the Company to fairly address community concerns.

8.3.3 Scope

The *Grievance Procedure* is primarily for the community to raise relevant concerns about the Company's activities. The concerns raised should be a direct result of the Company's activities in and around the mine site. The concerns must be raised by the person / people who are directly affected by the particular complaint with the Company's activities. The Procedure respects Mongolian laws and regulations. The Company prefers to handle grievances at a local level, before they escalate, if applicable, to a judicial or other national process. The grievance process will apply to contractors (primarily during the construction phase), and contractor management of grievances will be overseen by Erdene.

8.4 Grievance Procedure - Steps

1. **Register a Grievance**

A grievance can be submitted in a written letter, e-mail or on the Company grievance form (see Appendix 1) to:

- Attention: Community Relations Department, Erdene Mongol LLC,
- Postal Address: Monrud LLC Building, 2nd Floor, United Nations Street 6/6, Chingeltei District, Ulaanbaatar, Mongolia
- Tel: +976 11 319758
- Fax: +976 11 315988
- Email: info@erdene.com
- Company Website: https://www.erdene.com/en/contact/

- Complaints may also be raised verbally and documented by Community Relations personnel (or other relevant Company representative). In the event that a complaint is raised verbally Community Relations personnel must obtain the approval of the complainant as to the documented complaint (by way of signature of the Receipt of Grievance Form). Should the complainant have literacy issues, Community Relations personnel may request that a third party (friend / relative of complainant) is available to verify / approve the contents of the documented complaint to the satisfaction of the complainant.
- The submission should include the nature of the grievance, the date when it occurred and the name and contact details of the complainant.
- If there are Erdene Community Relations personnel in the area, a grievance can be discussed with them prior to being officially submitted.
- Grievances will be accepted anonymously or through a third party (e.g. unions, NGOs, local authorities, elders' committees, etc.).
- Individuals have the right to request that their name be kept confidential throughout the grievance process.
- As men and women may communicate their grievances differently, and also may have different types of grievances, the complainant may request that their grievance is processed by a female / male representative of the Company, as appropriate. In the event that such a request is made, Erdene will, as far as reasonably practicable, accommodate this request.

2. **Within a Week (7 days) of Receiving the Grievance, Erdene will:**

- Enter the grievance into the Company records that track grievances;
- Provide a written acknowledgement of the grievance including the name of the Company person to contact about progress, an explanation of the steps that will be taken to investigate, discuss and resolve the grievance, and an anticipated timetable for processing the grievance, as appropriate.

3. **Processing the Grievance**

The Company Grievance Coordinator will:

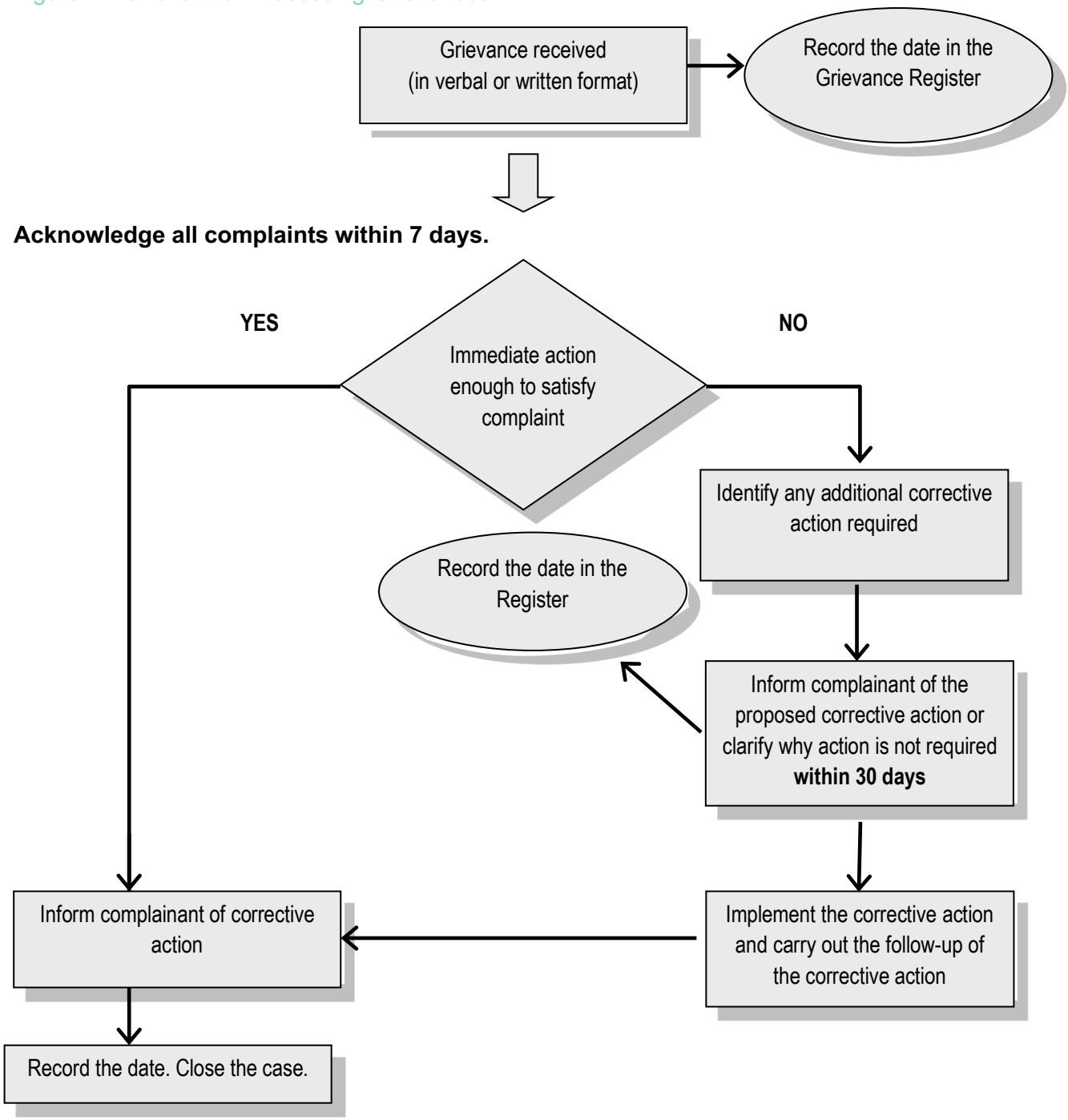
- Identify the parties involved.

- Clarify issues and concerns raised by the grievance through direct dialogue (if possible).
- Classify the grievance in terms of seriousness according to the severity of the allegation, the potential impact on an individual's or a group's welfare and safety, or the public profile of the issue.
- Convene a staff group with expertise relative to the grievance to conduct an internal investigation of the grievance. This will include evaluation by Erdene's executive and the relevant senior management personnel, where required
- If required, gather views of other stakeholders, including those of the Company and if necessary, an agreed neutral technical opinion.
- Prepare an investigation report that examines the grievance, including its source, evidence, consequences, any financial and other risk implications, and any recommended corrective measures. The most common measures for resolving the grievance, not excluding others, include:
    - The Company proposes a solution;
    - The Company and complainant decide together the solution;
    - The Company and complainant defer to a third party to decide;
    - The Company and complainant utilise traditional or customary practices that are in place locally.
- Based on the investigation report, issue a written response to the complainant that outlines the corrective measures.
- Conduct any measures, as agreed.
- Close the grievances by signing the Complaint Close-Out Form (i.e. that the grievance has been resolved satisfactory to both parties).
- The Company may "close" the grievance even if the complainant is not satisfied with the outcome. This option may be pursued by the Company in the case that the complainant is unable to substantiate a grievance, or if there is an obvious speculative or fraudulent attempt. In such situations, the Company's efforts to investigate the grievance and to arrive at a conclusion will be well documented and the complainant advised of the situation. Erdene (or contractors) will not dismiss grievances based on a cursory review and close them in their grievance record unless the complainant has been notified and had the opportunity to provide supplementary information / evidence;
- Keep a record that tracks the progress and communications for each grievance.

8.5 Processing Timeline

Erdene will aim to bring the grievance to a resolution within 30 calendar days of receiving the grievance. The grievance will be acknowledged within 7 days by Erdene, and responded to within 30 days. If the matter takes longer than 30 days to resolve, the complainant will be informed through dialogue and in writing, of the reason for the delay, any difficulties encountered and the anticipated new resolution date.

Figure 2 Flowchart for Processing Grievances



8.6 Disclosure of the Grievance Procedure

The *Grievance Procedure* will be made public through:

- This SCMP;
- Local information boards (as applicable);
- Through community meetings;
- By informing the local CRK and Governors; and
- Regular reporting / awareness raising to the Community.

8.7 Acknowledgement of a Satisfactory Process

At the resolution stage of a grievance negotiation, the Company will ask the complainant to complete a form where the complainant assesses the way the grievance was handled, even if the complainant is not happy with the result (see Appendix 2). This form will refer to the goals of the *Grievance Procedure* and ask the complainant if their experience of the grievance process is aligned with the goals the Company has set for itself. For example, the following questions will be asked:

- Did the Company and its representatives act in a respectful manner?
- Did the Company do all it could to resolve the grievance locally?
- Did the Company look for the underlying cause of the issue you have raised?
- Did you feel an equal partner in the process of resolving your grievance?
- Is the resolution of your grievance fair and consistent with similar resolutions in the same area?

This feedback will help the Company to adjust and improve the *Grievance Procedure*.

8.8 Recourse

If the complainant is not satisfied with the outcome of the grievance process the Company will cooperate in forwarding the grievance to another mechanism. The recourse mechanism will vary depending on the nature of the grievance. For example, if it is a legal matter it could be moved into the judicial system..

Independent external parties may be invited / needed to be involved in the processing of grievances. These could include, for example, a local legal practice, a well-regarded NGO or well-respected individuals from the community. External parties' involvement and remit would only be those grievances which have been addressed through the *Grievance Procedure* and have been declared resolved but the complainant is dissatisfied with the proposed resolution. External parties may be involved with one or both of the following objectives/functions:

- Mediation, which is the facilitation of both parties' efforts to reach an acceptable solution; and / or
- Binding arbitration, whereby both parties agree to be bound by the decision of an independent arbiter.

8.9 Managing and Tracking Grievances

The Company will appoint a senior manager to oversee the *Grievance Procedure*. Erdene Community Relations personnel will work with relevant departments within the Company depending on the nature of the grievance.

The Company will maintain a *Register of Grievances*. All transactions including registration of the grievance and the progress to outcome will be recorded.

Contractors are expected to follow this *Grievance Procedure*. Contractors shall be proactive and available to participate in Erdene's grievance resolution processes. Contractor participation is intended to allow for specific contractor grievances to be addressed efficiently. Contractors shall ensure that all individual contractor employees are aware of Erdene's *Grievance Procedure*. In the event that contractors receive a grievance from a community members / group, Erdene will be notified thereof, immediately. Contractors shall not make any direct agreements or resolution with the complainant(s) without prior coordination of such actions with Erdene. Erdene will conduct regular audits on contractors to ascertain compliance with this *Grievance Procedure*.

9. MONITORING

9.1 Overview of Monitoring Requirements

The monitoring measures that are to be implemented to assess compliance with Project Standards are described in the section.

In the event that monitoring identifies non-conformance with Project standards, these will be investigated, and appropriate corrective actions identified and implemented.

9.2 Key Performance Indicators

The table below summarises the Key Performance Indicators (KPIs) and associated key management controls that can be used to assess the progress and effectiveness of proposed stakeholder engagement strategies and activities..

Table 8 Key Performance Indicators

ID	KPI	Target	Monitoring Measure
SCMP-KPI-01	Number of grievances	Total number reduced year on year	Grievance Register
SCMP-KPI-02	Number of grievances resolved within one month	Target of 90%	Complaints Log / Database
SCMP-KPI-03	Reporting back to stakeholders on implementation of the *Grievance Procedure*	Delivery of regular reports to stakeholders on the outcomes of the *Grievance Procedure*	Reporting
SCMP-KPI-04	Auditing SCMP and *Grievance Procedure* to ensure they are being implemented	Bi-annual audit complete Target 90% of grievances closed-out to satisfaction of complainant within 30 days	Audit report
SCMP-KPI-05	Number of positive feedback from community / stakeholders	Total number increasing year on year	Community feedback / engagement
SCMP-KPI-06	Number of community members in attendance at engagement activities	Participant numbers meet / exceed targeted attendance at activities	Stakeholder Engagement Register / Programme
SCMP-KPI-06	Number of engagement records completed	100% of engagement activities recorded (including informal engagement)	Stakeholder Engagement Register
SCMP-KPI-007	Maintenance of Community Profile Forms	100% of Community Profile Forms maintained and updated annually	Community Profile Forms

9.3 Key Monitoring Activities

Key monitoring activities are set out below:

Table 9 Monitoring Measures

ID	Topic / Aspect	Method(s)	Responsible Parties	Frequency
SCMP-MON-01	Grievances	Erdene will review Grievance Register, including grievances closed and those unresolved per period (at a minimum	Community Relations Manager	Monthly

		monthly but more likely as they occur) to include: • number of outstanding complaints and grievances opened in the month; • number of grievances opened in the month and evolution since Project start (graphic presentation); • number of grievances closed in the month; and • type of grievance. The Community Relations team will provide regular reporting back to the community on the treatment of community grievances (including the type of grievance, how they have been addressed and the outcomes arising). An annual audit will be conducted of the *Grievance Procedure.*		
SCMP-MON-02	Community engagement activities	Community Relations team members record formal and informal engagement with local communities in Stakeholder Engagement Register. Summarise in Monthly Department performance report.	Community Relations Manager	Monthly
SCMP-MON-03	Disclosure materials disseminated	Community relations staff will keep records of the types of information materials prepared and distributed, by location and report to the Community Relations Manager per period.	Community Relations Manager	Quarterly
SCMP-MON-04	Community Profile Forms	Community relations staff to document key factual information about the communities that host the KGP in "Community Profiles".	Community Relations Manager	Annually, as needed

9.4 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required (as identified through the *Management of Change Procedure* contained within the KGP ESMS Framework), this Management Plan may also be updated on an "as required" basis.

10. TRAINING

10.1 Introduction

All necessary training is provided as part of induction training (to provide general awareness) and job-specific training as necessary.

10.2 Induction Training

All employees of Erdene and contractors are required to participate in community relations and Code of Conduct training as part of the standard induction programme. This training is designed to help workers on the KGP understand and respect different cultures and points of view and operate effectively as team members, as well as behave appropriately when they are within local communities.

10.2.1 Job-specific Training

Specific training on stakeholder engagement and the application of the *Grievance Procedure* will be provided to senior management, Community Relations personnel, and supervisors of Erdene and contractors involved in or overseeing activities with local communities.

10.3 Other Training Requirements

Additional specialist training shall be provided to key personnel involved in community and stakeholder engagement on an “as needed” basis.

11. AUDIT AND REPORTING

11.1 Internal Auditing

Conformance with the SCMP will be subject to internal inspection regularly, and audit on an annual basis. Conformance will be monitored via an annual internal audit programme. This internal auditing will also apply to contractors who will be expected to monitor their compliance to the required actions.

11.2 Contractor Auditing

Contractors will be subject to inspection and audit prior to initial appointment and then on an annual basis to ensure their compliance with SCMP implementation.

11.3 External Auditing

Conformance with this plan may be subject to periodic assessment by Erdene corporate audit and assurance programmes and separately by Project Lenders (e.g. EBRD), as required.

11.4 Stakeholder Engagement and Grievance Register

All stakeholder contact details, engagement activities and all grievances will be maintained confidentially within a *Stakeholder Engagement Register* and a *Grievance Register* to allow tracking and monitoring of the engagement process and all grievances received.

11.5 Reporting

Community Relations personnel will prepare regular reports which include the key monitoring measures outlined above, including:

- Engagement activities conducted;
- Grievances raised / addressed; and
- Plans for engagement activities.

Report frequency and form will be specified prior to Construction of the KGP.

11.6 Annual Reports

Erdene will compile a report summarising stakeholder engagement and grievance management results on an annual basis. This report will provide a summary of all public consultation and engagement, grievances, resolution and outcomes.

11.7 Record-Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

12. ROLES AND RESPONSIBILITIES

12.1 Key Roles and Responsibilities for SCMP Implementation

Principal roles and responsibilities for the implementation of this plan are outlined below.

Table 10 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan.
Senior Management / VPs	• Approve this Management Plan. • Ensure appropriate resourcing levels to implement the requirements of this Management Plan. • Support execution of this Management Plan.
Compliance and Stakeholder Relations Department Head	• Overall responsibility for the scope and implementation of this Management Plan. • Development, monitoring and revision of this Management Plan. • Management of implementation activities.
HSEC Team	• Timely implementation of this Plan, including coordination with implementing organisations and other stakeholders.
All Employees and Contractors	• Adherence with this Management Plan and implementation of requirements • Report any community complaints or incidents

12.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e. roles with responsibility for delivering elements of this Management Plan) include:

Table 11 Key Interfaces

Team / Unit	Key Interface(s)
Erdene Project (Construction) Manager	Safe management of activities and associated stakeholder engagement during construction;
Mine General Manager	Safe management of activities and associated stakeholder engagement during operations

13. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of management plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the ESMP and the Management Plans form the KGP ESMP. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system as described.

This Management Plan has overlaps and cross-linkages to a number of other Management Plans which have community and stakeholder engagement implications and/or requirements, including:

Table 12 Context and Overlaps with Other Management System Documentation

Management Plan Title	Overlap / Cross Linkage
Air Quality Management and Monitoring Plan, including a Greenhouse Gas Management Plan	Engagement / awareness requirements on MP topic
Noise and Vibration Management Plan	Engagement / awareness requirements on MP topic
Hazardous Materials Management Plan	Engagement / awareness requirements on MP topic
Waste Management Plan	Engagement / awareness requirements on MP topic
Biodiversity Management Plan	Engagement / awareness requirements on MP topic
Water Resources Management Plan	Engagement / awareness requirements on MP topic
Transport Management Plan	Engagement / awareness requirements on MP topic
Community Development Plan	Engagement / awareness requirements on MP topic
Land Use and Livelihoods Management Framework	Engagement / awareness requirements on MP topic
Crisis and Emergency Response Management Plan	Engagement / awareness requirements on MP topic
Occupational Health, Safety and Security Management Plan	Engagement / awareness requirements on MP topic
Community Health, Safety and Security Management Plan	Engagement / awareness requirements on MP topic
Closure Management Plan	Engagement / awareness requirements on MP topic

14. LIST OF ABBREVIATIONS, ACRONYMS AND UNITS OF MEASURE USED

aimag	The Provincial unit of administration in the territory of Mongolia
ASM	Artisanal and Small-Scale Mining
bagh	Village; The lowest level of administration in the territory of Mongolia
CRK	Citizens Representative Khural
EBRD	European Bank for Reconstruction and Development
Erdene	Erdene Mongol LLC
DEIA	Detailed Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESP	Environment and Social Policy
GIP	Good Industry Practice
IWF	Integrated Waste Facility
PR	Performance Requirement
Project Area of Influence	The project's Area of Influence includes the primary project site(s) and related facilities that the client (including its contractors) develops or controls; associated facilities that are not funded as part of the project , and whose viability and existence depend exclusively on the project and whose goods or services are essential for the successful operation of the project; areas potentially impacted by cumulative impacts from further planned development of the project; and areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location. The Area of Influence does not include potential impacts that would occur without the project or independently of the project.
SCMP	Stakeholder and Communications Management Plan
soum	Sub-province area; The second level of administration in the territory of Mongolia

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan

CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan
TMP	D15: Transport Management Plan
LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan

Appendix A: Provisional Form 1: Receipt of Grievance

No.	
Date:	*dd/mm/yy*
Name of Aggrieved:	
Contact Address of Aggrieved:	*incl. aimag, soum, bagh, street, building / apartment*
Tel (mobile):	
Tel (home):	
Email:	
Nature of grievance (what happened):	
When occurred:	*dd/mm/yy*
Frequency:	*daily / weekly / monthly*
Place (where grievance occurred):	*incl. aimag / soum / bagh / area*
Who was involved:	*incl. name / job title / description (if known)*
Why it is relevant to Erdene / the Khundii Gol Project:	
Your proposed/desired solution:	

Office Use Only:		
Company officer who received grievance:	*Name / job title*	
Decided to – ACCEPT:	**Category:**	
	Next steps:	
Decided to – REJECT:	**Reasons:**	
Signature of Aggrieved:		
Signature of Staff:		

Appendix B: Provisional Form 2: "Acknowledgement of Solution"

No.	
Name of Aggrieved:	
Contact Address of Aggrieved:	*incl. aimag, soum, bagh, street, building / apartment*
Please tick your answer to each of the questions below:	
1. Did the Company and/or its representative act in a respectful manner to You?	YES □ NO □
2. Did the Company do all it could to resolve the grievance locally?	YES □ NO □
3. Did the Company look for the underlying cause of the issue you have raised?	YES □ NO □
4. Did you feel an equal partner in the process of resolving your grievance?	YES □ NO □
5. Is the resolution of your grievance fair and consistent with similar resolutions in the same area?	YES □ NO □
Signature	
Date:	



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D14: Local Cooperation Management Plan

April 2020

Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Local Cooperation Management Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP).

1.1 Objectives

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define topic-specific training requirements; and
- set out references for supporting materials and information.

This Management Plan has been prepared at a framework level to set out the key objectives, requirements and commitments which will be developed further as the Project progresses towards the construction phase, and in consultation with local communities.

The specific objective of this Management Plan is to maximise the positive long-term impacts on local communities around the KGP.

The *Local Cooperation Management Plan* goes beyond the specific impact mitigation measures that the Project will employ.

The *Local Cooperation Management Plan* is at the core of Erdene's commitment to the creation of "shared benefits". Erdene aims for the KGP to generate benefits to those communities within the vicinity of the mine site as part Erdene's efforts and commitment to good corporate citizenship, consistent with Erdene's policies and the commitments set out in the ESIA. This plan is focused on the key project-affected communities as defined in the ESIA, namely the communities located in Shinejinst and Bayan-Undur *soums*, consistent with Erdene's community development focus in the past.

1.2 Scope

This Management Plan covers all Erdene activities, including contractor activities during the construction, operation and closure phases of the KGP. This document outlines Erdene's commitment and approach to mitigating community development risks and maximising beneficial impacts that may arise as a direct or indirect result of the KGP.

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined below.

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan.
Senior Management / VPs	• Approve this Management Plan. • Ensure appropriate resourcing levels to implement the requirements of this Management Plan. • Support execution of this Management Plan.
Compliance and Stakeholder Relations Department Head	• Overall responsibility for the scope and implementation of this Management Plan. • Development, monitoring and revision of this Management Plan. • Management of implementation activities.
HSEC Team	• Conduct timely implementation of the Management Plan, including coordination with implementing organisations and other stakeholders. • Tracking of compliance to this Management Plan and communication of findings to key stakeholders.
All Employees and Contractors	• Adherence with this Management Plan and implementation of requirements. • Report any community complaints.

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are:

Table 2 Key Interfaces

Team / Unit	Key Interface(s)
KGP Construction / Operations Manager	• Safe implementation of off-site activities during construction / operations
KGP Training Manager	• Training needs of the KPG, and links to community development activities that seek to develop local skills;
KGP Finance Manager	• Financial aspects of community development activities
KGP Administration Management Department Head	• Labour, contractor and procurement management

3. PROJECT STANDARDS

Applicable Standards shall be complied with for all Project activities (the "Project Standards"). Project Standards comprise:

- applicable Mongolian laws and standards;
- applicable international and lender standards and guidelines; and
- applicable Erdene policies and procedures.

3.1 Applicable Mongolian Laws and Standards

Although there are no specific laws on corporate social responsibility in Mongolia, there are aspects reflected in Mongolian law which support this agenda. Of priority, is how companies are expected to engage with citizens, and the most important in relation to community development planning and engagement in Mongolia are:

- The Minerals Law of Mongolia (2006)[1];
- The Mongolian Law on Environmental Impact Assessment (2012)[2]; and
- The Law on Anti-Corruption (2006)[3];

Furthermore, in 2006 the Government of Mongolia approved adherence to the Extractive Industries Transparency Initiative (EITI) and in October 2007 Mongolia was designated as a Candidate Country, subsequently achieving Compliant status with the EITI.

3.2 Applicable International and Lender Standards and Guidelines

There are no specific requirements directly related to community development. This Management Plan seeks to support the broad community relations objectives of Erdene – in line with the broad requirements of the European Bank for Reconstruction and Development (EBRD) to avoid, minimise and mitigate Project-related impacts.

3.3 Applicable Erdene Standards

Erdene has developed a range of Policies and Procedures that define and support the KGP development objectives. These are set out in the *Erdene 2018 Policy and Procedures Manual,* key among which includes:

Stakeholder Relations and Sustainability Policy

The purpose of this Policy is to articulate the relationship between Erdene's stakeholder relations and sustainability.

Erdene tailors its strategy to each stage of the project life-cycle, from early exploration through mine closure.

Community Investment Policy

The purpose of this policy is to define the framework for voluntary company contributions to community development.

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[1] Establishes the requirements for relations of a license holder with Local Administrative Bodies. The law requires a license holder to establish Local Cooperation Agreements with the local administrative bodies on issues of environmental protection, mine exploitation, infrastructure development in relation to the mine-site development and job creation.

[2] Requires that in preparing an EIA report, the project sponsor must include minutes of meetings at which local people who are to be affected by a proposed project were consulted

[3] Provides public for access to information, engagement of interested parties in policy dialogue, and provides the opportunity to propose and comment on specific methods of oversight and monitoring of the prevention of corruption.

Erdene's community investments seek to build the capacity of local stakeholders and institutions in the areas of education, health, livelihoods and the environment.

Local Content Policy

The purpose of this policy is to define the company's approach to employing local stakeholders and contracting with local businesses.

Corporate Donations Policy

The purpose of this policy is to define the protocols and procedures for granting in-kind resources to external stakeholder groups.

Cultural Heritage Policy

The purpose of this policy is to ensure Erdene respects cultural heritage and maintains appropriate protocols to avoid disturbing any culturally important artefacts and practices in the course of its operations.

Other relevant Erdene Policies include the Community Relations Policy, the Stakeholder Consultation Policy, the Grievance Policy, Government Relations Policy, and the External Communications Policy.

4. MANAGEMENT APPROACHES

4.1 Summary

Community development and local cooperation for Erdene comprises the company's commitment to generating value for stakeholders. Erdene's involvement in community development involves a range of activities to ensure that local communities are provided with opportunities to benefit from the presence of the Project and that any potentially negative socio-economic impacts of the Project are avoided or minimised. A key focus will be to ensure that dependencies on the Project are not established during operations that will lead to significant adverse impacts upon mine closure.

The *Local Cooperation Management Plan* provides a holistic framework to coordinate activities across a wide range of activities and throughout all phases of the Project mine life. The specific objectives of local cooperation and community development at Erdene are to invest in:

- Education in order to promote professional development, enhance learning resources and opportunities, as well as strengthen cultural identity and resilience.
- Health in order to promote public health and well-being.
- Livelihoods to improve the viability and security of local livelihoods, including through direct and indirect employment and contracting.
- Environment to increase public awareness of environmental issues and support evidence-based environmental stewardship, including but not limited to the natural resources critical for the development of the company's mining projects.

4.2 Principles

The following principles will be adopted by Erdene to support implementation of this *Local Cooperation Management Plan*:

- Focus on the communities of greatest impact for investment and support (Urtiin gol and Idren *baghs*, followed by Shinejinst and Bayan-Undur *soums*, and thereafter Bayankhongor *aimag*).
- Community participation – community representatives will be involved in decision-making.
- Self-sustaining projects – the focus will be to minimise expenditure on big capital projects, concentrating on projects that prioritise human capital, with long-lasting impacts and no demand for ongoing expenditure by Erdene to sustain the proposed activity.
- Encourage partnership and co-investment – with local / national / international organisations (where possible and appropriate).
- Encourage community ownership – seek to minimise dependency risks by avoiding projects that require ongoing investment by Erdene for enduring viability.
- Inclusiveness – ensure that all community members will have access to benefits arising from the overall community investment "portfolio".

In addition to the above principles, the following additional criteria will be used to assess the appropriateness of proposed activities and investments:

- Needs based - Projects must be designed in consultation with appropriate local stakeholders and others with the interest of the community at heart. The intention being to focus on real needs and root causes of socio-economic issues.
- Build on existing structures and capacities - use the corporate presence of Erdene to increase the leverage of proposed projects to maximise benefits and impacts, and build capability within the community to effectively scale up community development projects as the KGP progresses.
- Transparency – ensure that all projects have effective control and oversight mechanisms and are open to internal and external scrutiny.
- Prevention of duplication - In selecting projects, coordinating with local governments to avoid duplication of the efforts of other organisations, international and local agencies or government departments. However, leveraging opportunities with existing programmes and co-operating with existing organisations is acceptable and desirable.
- Measurement - Identifiable targets and quantifiable measures of project effectiveness.
- Local implementation - Encourage, as far as possible, local implementation through the Local Cooperation Agreement and locally-based implementing partners, allowing for transfer of experience and capacity building and hand-over of long-term delivery.
- Cost-effectiveness – comprehensive, well thought-out budgets offering value for money.
- Exit planning – ensure that all projects have an exit plan from the outset so that Erdene does not incur long-term or recurring liabilities.
- Vulnerable groups – ensure that vulnerable groups are prioritised in receiving positive benefits from projects.
- Core competencies – focus activities on priority areas where Erdene and its implementation partners (where applicable) have skills and experience.

4.3 Approach

Erdene will develop a long-term local cooperation strategy with consideration of closure from the outset. The objective will be to ensure that investment and support by Erdene is focused on building the economic resilience and diversity of local communities so that at mine closure there are not the significant dislocations in local economies that often accompany mine closure.

Erdene will seek to coordinate the implementation of the strategy using its internal resources, by engaging local communities directly on local cooperation. Third parties (CBOs, NGOs etc.) may be engaged as implementing partners for specific investment projects, where appropriate. Third parties may also be engaged to undertake monitoring and evaluation of the effectiveness of individual projects and of the overall local cooperation strategy.

Mining companies operating in Mongolia have a statutory obligation under the 2006 Minerals Law (Article 42.1) to establish a Local Cooperation Agreement. Since then, in 2015 and 2016, the national government has issued a standardised Local Cooperation Agreement template. Erdene has entered into formal cooperation agreements with Bayankhongor, Shinejinst, and Bayan-

Undur governments since 2014[4]. These Local Cooperation Agreements aim to enable Erdene's operations to contribute to the development of the local area and the livelihoods of citizens, consistent with local development priorities, and to provide ways for local communities to gain information about and opportunities to participate in the company's operations. Erdene's approach to local cooperation and community development as the KGP progresses will be to continue to use Local Cooperation Agreements as the basis for coordinating and managing all community development activities in cooperation with local communities.

4.3.1 Key Actions and Management Controls

This section presents the key actions and management controls that Erdene will implement to enact community development and local cooperation and ensure alignment and compliance with Erdene requirements and Project standards, as identified specifically in the ESIA. Erdene will undertake the following actions:

- Undertake Local Cooperation Agreement review with stakeholders (based on social baseline and further engagement with community members, local Government officials (*bagh* and *soum* Governors, Citizen's Representative Khural (CRK) representatives and leaders) and institutions (including social workers), and other community representatives / experts, as identified: Q1 - Q2 2020.

  Consultation should also include:

  - Identification of likely dependencies or areas of over-reliance on Erdene by local communities (for example, within local procurement / employment);
  - Identification of other complementary business and employment activities that can be undertaken by local communities.
  - Investigation of the potential for a Supplier Development Programme that provides targeted support and assistance to develop local businesses' capacity.

- Review the multi-stakeholder community liaison committee operations (the Committee, as noted in Erdene's *Community Investment Policy*) to determine whether the Committee is fit for purpose to manage increased functions during the KGP mine construction and operations: Q1-Q2 2020.
- Based on the consultations and review, annual budgets and schedules will be agreed and the overall budget will be set out in the LCA agreement documentation and executed, as appropriate: Q1 - Q2 2020.
- Implement agreed LCA activities: Q2 – Q4 2020.
- Further detail this *Local Cooperation Management Plan*, as appropriate – Q2-Q4 2020.
- Conduct monitoring and evaluation of LCA activities and results – Q2 - 4 2020.
- Commence engagement and evaluation of 2020 LCA activities and discussions about 2021.

[4] The Company's community development support and relations date back earlier to at least 2006, when the Company first began exploring in Shinejinst *soum*. Before 2014, no standard cooperation agreement template existed in Mongolia, so the Company supported various community development initiatives and governance structures through Memorandum of Understanding (MoU) arrangements and a "local cooperation committee".

4.3.2 Proposed Themes for Local Cooperation

A number of themes are proposed for the *Local Cooperation Management Plan*. These will be evaluated and developed as appropriate within the construction and operations phase *Local Cooperation Management Plan* and into the *Closure Management Plan*.

Themes proposed below, build on those core themes and activities that have been implemented by Erdene in consultation with local communities over time, those identified as part of the ESIA consultation and social baseline data gathering, as well as the body of work conducted by Fraser et al (2019)[5] in relation to Erdene's mining projects and the creation of shared value with communities.

It should also be noted that the specific measures in place to address impacts on land use and herder livelihoods will be coordinated within the framework of the *LCA*s. These measures (and monitoring thereof) are contained within the *Land Use and Livelihoods Management Framework*.

Table 3 Potential Themes for Local Cooperation

Theme	Potential Components
Education, Employment and Training	• Scholarship Programme • Internship Programme • Potential partnering with existing (*aimag*-level) training centres • Job-readiness training for the KGP (e.g. recognised trades / skills that are transferrable) • Provision of opportunities for local people with education, but without jobs / actively looking for jobs • Women in mining activities, including awareness, pathways to employment / procurement
Public Health	• Water supply, access, quantity and quality • Water awareness • Waste management, particularly recycling activities • Health services and capabilities • Support local public health campaigns that focus on prevention of communicable diseases and STIs

Livelihoods	• Herder Livelihoods Support Programme (HLSP)[6], including potential themes as follows:
	  ○ Pasture monitoring;
	  ○ Seed collection and degraded pasture rehabilitation activities;
	  ○ Herd animal health and awareness;
	  ○ Cashmere quality improvement
	  ○ Rural water protection activities; and
	  ○ Training and skills development.
	• Business skills and Small and Medium Enterprise (SME) support training / development, including specific measures targeted at women and women-centred enterprises (e.g. dairy products, vegetable pickling)
	• Enhanced livestock health, in cooperation with local veterinarians / institutions.

[5] Fraser, J., Kunz, N. C., & Batdorj, B. 2019. Can Mineral Exploration Project Create and Share Value with Communities? A Case Study from Mongolia. Resources Policy Vol. 63.
[6] See additional detail on the HLSP in the *Land Use and Livelihoods Management Framework.*

	• Shared infrastructure activities / development
Environment	• Support mitigating soil erosion / desertification • Studying opportunities to address the impacts of climate change • Support developing capacity for community monitoring of key environmental impacts (detailed further in Environmental MPs) • Support efforts to enhance pastureland availability / quality and monitoring • Conservation and support for local cultural events, local traditions, and culture, including: o Support to local institutions to be able to meet the information and educational needs of communities with respect to cultural heritage in response to evidence of the lack of local expertise in cultural heritage. o Establish an oral history program based in *soum* cultural centres to enhance oral traditions (e.g. "Chuluun tsargil" instrument playing; Takhil tile game; Amarbuyant worship ceremonies; and also, prepare exhibits and public programs that inform local residents about intangible and tangible cultural heritage. o Continue existing participation in and support for local cultural heritage celebrations, such as Naadam and Tsagaan Tsar.

Note that the thematic areas and type of projects presented in Table 3 above are indicative and will be subject to the review and approval of the local cooperation committee and/or local CRK.

4.4 Planning Framework

A three-year planning framework is proposed for local cooperation / community development planning. This provides a medium-term perspective to enable objectives to be met even if expenditure is re-allocated from year to year. A medium-term horizon also helps to reduce the annual planning/approval hiatus that can occur, and this is particularly important for a short mine life project.

4.4.1 Governance

The *Local Cooperation Management Plan* is proposed to be directed by the multi-stakeholder community liaison committee (the Committee) within the framework of the LCA, comprising Erdene and local community representatives. Governance aspects are proposed will be finalised based on stakeholder preference and agreement during the consultation and review activities described above (see Section 4.3.1). Key elements of the proposed approach to governance include:

- The Committee will be guided by an agreed term of reference that separates, as appropriate, financial allocations and decision-making from delivery;
- The Committee will approve the three-yearly and annual plans and reports;
- The Committee will be accountable to local communities through the LCA;
- Other community representatives will be selected based on the recommendation of Erdene, who have either a particular standing in the community or who have relevant skills or experience;
- The outcomes of meetings will be publicly disclosed at least annually.

- The Committee will assist in disseminating information about Erdene and its business operations.
- The Committee will help manage and monitor Erdene's community investments in a given target area.
- The Committee may opt to have a formal charter.

The Committee will be responsible for the selection and oversight of projects, in addition to budgeting and financial management, as specified in the LCA, among others.

4.4.1.1 Investment / Selection Criteria

Investment selection and priority-setting will be informed by the ESIA and also by the annual community development review. Priorities may evolve based on the results of ongoing monitoring.

While criteria and priorities will be defined by the Committee, criteria are likely to include:

- Self-sustainability;
- Enduring impacts;
- Limit dependency on Erdene;
- Support vulnerable groups;
- Proportionality (i.e. communities with greatest impact get greatest investment);
- Leverages / facilitates action by other organisations (where possible); and
- Links to local and national development plans.

5. MONITORING

5.1 Overview of Monitoring Requirements

The monitoring measures that are to be implemented to assess compliance with Project Standards are described in the section.

In the event that monitoring identified non-conformance with Project Standards, these will be investigated, and appropriate corrective actions identified.

5.2 Key Performance Indicators

Indicators will be formulated during local cooperation project / programme development. Objectives of each project should be defined such that they are specific, measurable, achievable, relevant and time-bound. Project-specific indicators will gauge the effectiveness of each project based on these criteria. Each local cooperation project will require a summary (i.e. cost, purpose) and an evaluation. Indicators will be determined and stakeholder participation in data collection and assessment will be defined annually and may vary by project.

An ex-post evaluation will be carried out of the Local Cooperation programme by Erdene. Depending on the result, activities may be adjusted after the evaluation if it is considered by the Committee and Erdene that this will help to achieve stated project goals. The ex-post evaluation will be used to evaluate the overall effectiveness of each project and the long-term impact of each project.

5.3 Key Monitoring Activities

Key monitoring activities will focus on ensuring compliance with the Project Standards using the key performance indicators established in Section 5.2. Monitoring of this Management Plan is necessary to measure and improve performance. It is also a critical component of transparency and stakeholder participation. In the latter context, accessible reporting is extremely important. The following monitoring measures are proposed:

- Monitoring of inputs (funds, human resources) and the effectiveness of their deployment. Input monitoring should be undertaken on an annual cycle;
- Monitoring of participation (extent and effectiveness). Participation monitoring should take place annually. Sources of information will be the Erdene Community Relations personnel, representatives of specific stakeholder groups (e.g. Committee), development partners (if any) and programme beneficiaries;
- Monitoring of outputs (products of local cooperation projects or programmes) and the extent to which they match the outputs originally planned. Output monitoring should be undertaken annually. Information will be derived from Erdene, LCA Committee, development partners(if any), implementing agents and programme beneficiaries; and
- Evaluation of impacts (the outcomes of community development projects and programmes) and the extent to which they match the impacts originally planned. Evaluation should take place annually. Sources of information will include Erdene staff, LCA Committee, development partners(if any), implementing agents and programme beneficiaries.

A variety of methods may be used to collect monitoring information including stakeholder interviews, focus groups, workshops, review of meeting minutes and reports, and surveys.

5.4 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required (as identified through the *Management of Change Procedure* contained within the KGP ESMS Framework), this Management Plan may also be updated on an "as required" basis.

6. TRAINING

All necessary training is provided as part of induction training (to provide general awareness) and job specific training as necessary.

6.1 Induction Training

All employees of Erdene and Contractors working at the Project will be provided with general induction, site specific induction and a broad range of health, safety and environmental awareness training, including the Erdene *Code of Conduct*.

All persons will be tested to ensure that they have understood their inductions and made to re-sit if necessary. Inductions will be available in Mongolian and in English. Erdene will maintain a register of all inducted persons, including any restrictions.

6.2 Job-Specific Training

All employees of Erdene and Contractors on the KGP are provided with basic training on community relations, including general awareness training and induction in the *Code of Conduct*.

7. AUDIT AND REPORTING

7.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with requirements of the Erdene HSEC Management System (including the ESIA and the KGP Project ESMP).

All incidents and non-conformances identified during inspections will be reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan also may be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

7.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

8. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of management plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the ESMP and the Management Plans form the KGP ESMP. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system as described.

This Management Plan has overlaps and cross-linkages to a number of other Management Plans which have local cooperation and community development implications, including:

Table 4 Context and Overlaps with Other Management System Documentation

Management Plan Title	Overlap / Cross Linkage
Crisis and Emergency Response Management Plan	• Protection of local communities from the effects of accidents and incidents
Human Resources Management Plan	• Local employment
Contractor and Procurement Management Plan	• Local employment and local procurement
Water Resources Management Plan	• Protection of water supplies
Closure Management Plan	• Protection of local communities from physical hazards remaining once the mine has stopped operating and ensuring enduring positive benefits from the Project after closure
Land Use and Livelihoods Management Plan	• Implementation of the HLSP. • Ensuring livelihoods of those directly affected by the Project are protected.
Stakeholder and Communications Management Plan	• Ensuring that local stakeholders are appropriately informed and engaged concerning community development activities

9. LIST OF ABBREVIATIONS, ACRONYMS AND UNITS OF MEASURE USED

AoI	Area of Influence
CBO	Community-Based Organisation
Erdene	Erdene Mongol LLC
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HLSP	Herder Livelihood Support Programme
HSEC	Health, Safety, Environment and Community
HR	Human Resources
KGP	Khundii Gold Project
LCA	Local Cooperation Agreement
NGO	Non-Governmental Organisation

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan
TMP	D15: Transport Management Plan
LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D15: Transport Management Plan

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Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Transport Management Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project).

1.1 Objectives

Given the remote location of the KGP, road transport is a core element of the Project. The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define topic-specific training requirements; and
- set out references for supporting materials and information.

1.2 Scope

This Management Plan covers all KGP activities, including contractor activities during construction, operations and closure phases of the KGP. This document outlines Erdene's commitment and approach to managing transport risks.

The construction phase is scheduled to be a one-year period and will be the more active and diverse in terms of traffic movements. Construction will involve a variety of vehicles, a larger workforce (up to an estimated 500 at peak times) and the use of transport routes from Ulaanbaatar in the north east and the Peoples Republic of China (PRC) in the south east.

In operational terms the Bayan Khundii deposit will be developed first with all infrastructure located there, and the Altan Nar site will be developed later as a satellite operation with minimal facilities. The total operational life is forecast to be 9 years with Altan Nar coming on stream in year seven. The operational phase will be more predictable in terms of traffic movements, though internal haulage of materials from Altan Nar to the BK processing plant will require targeted management actions.

Closure is likely to occur over up to a two-year period.

1.2.1 Project activities

The TMP covers all forms of transport to and from the Project site. In summary, the key transport activities are:

- Workforce – both for construction period and during operational phase utilising a 42-seat bus
- Fuel – predominantly diesel fuel transport by 40 tonne truck from Ulaanbaatar (UB)

- Freight – a variety of general freight trips from both UB and the Chinese border
- Building Materials – mostly during the construction phase
- Chemicals – sodium cyanide and other approved reagents for mineral processing

2. PROJECT DESCRIPTION

2.1 Project Context

The KGP site is located in Bayankhongor *aimag* of Mongolia, approximately 980 km south-west of Ulaanbaatar and 300 km south of Bayankhongor City. The KGP includes two deposits, Bayan Khundii and Altan Nar, located on the separate Mineral License Areas (MLA) of Khundii and Tsenkher Nomin respectively, which are approximately 16 km apart. The KGP area is located in the territory of Shinejinst and Bayan-Undur *soums*, with the nearest towns (*soum* centres) being Shinejinst and Bayan Undur, located approximately 70 km northeast and 80 km north, respectively. It is 140 km from the border of the Inner Mongolia province of China.

Refer to Figures 1 and 2 below.

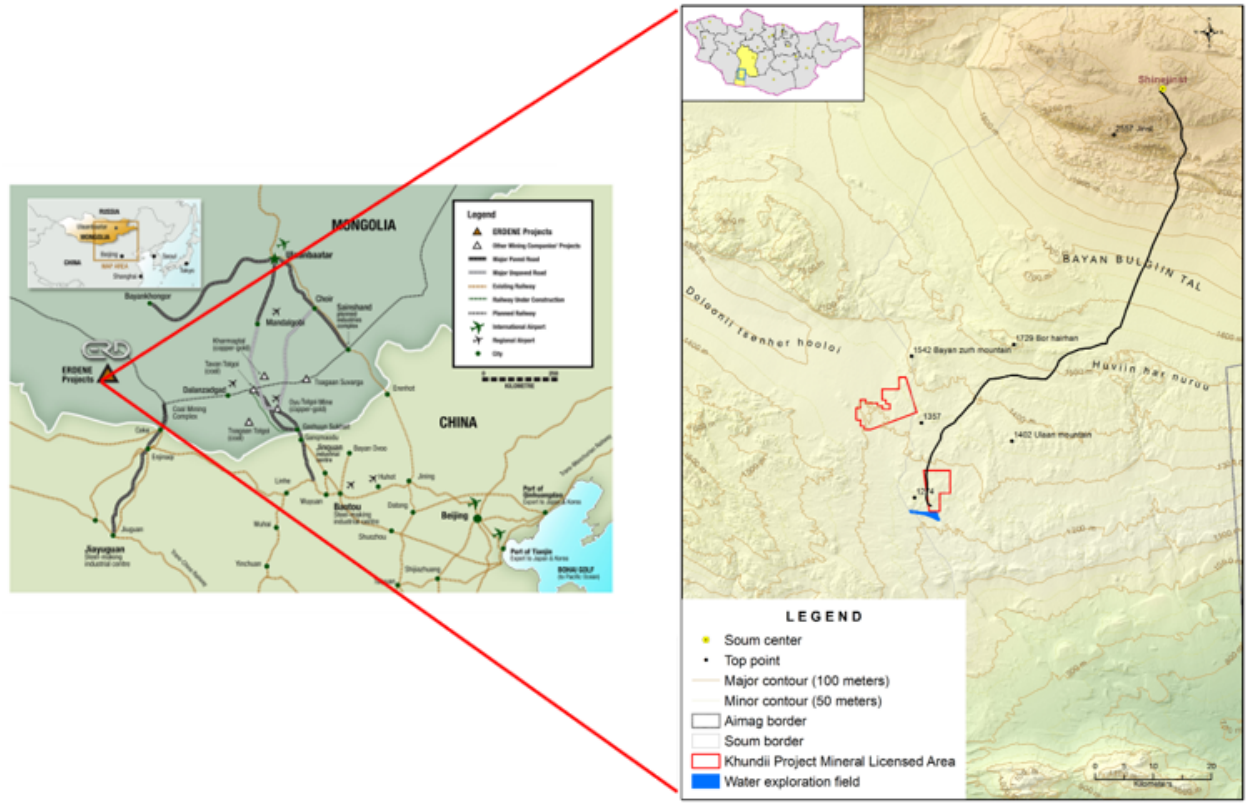

Figure 1 Map of Khundii Gold Project location

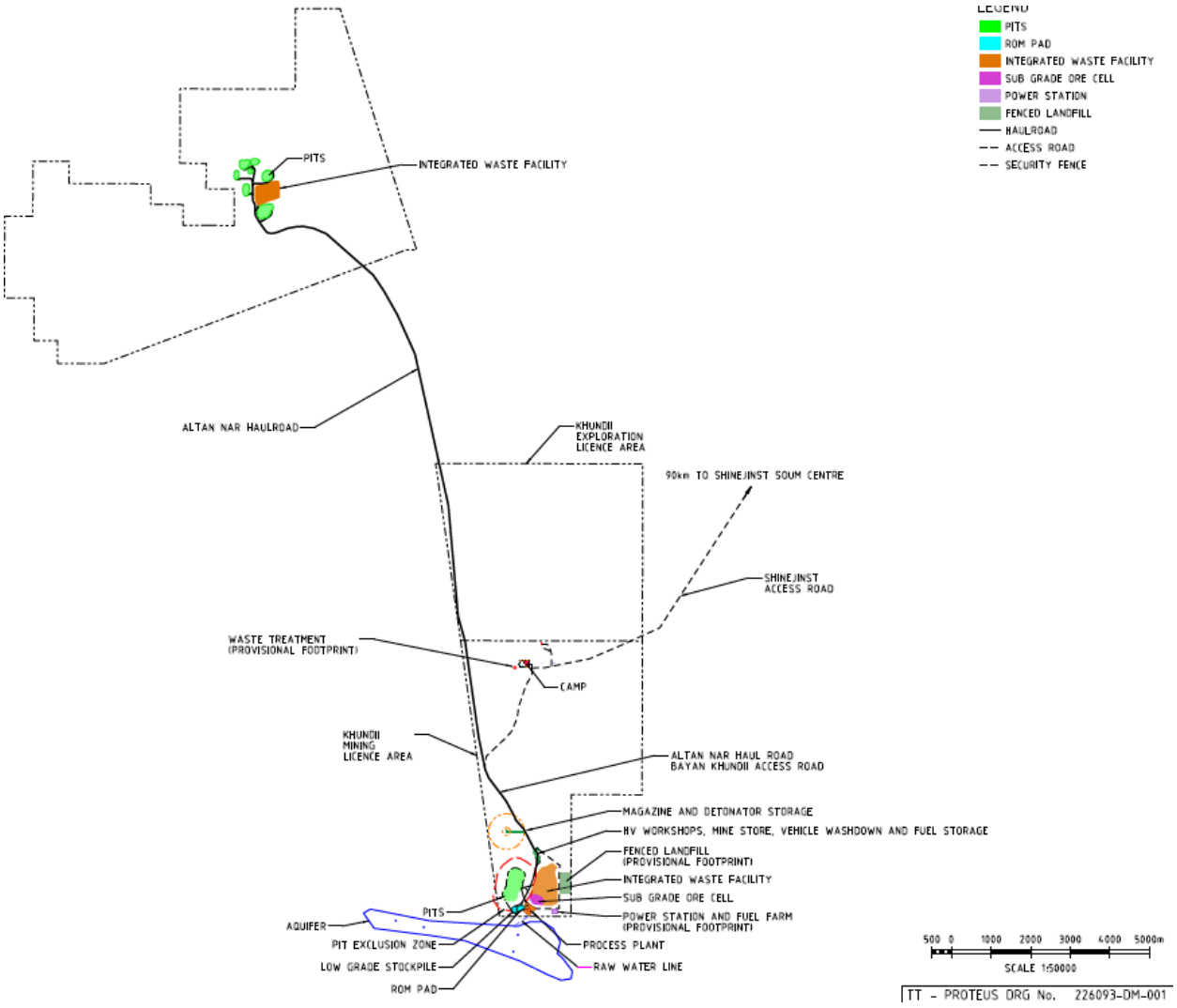

Figure 2: Provisional General Arrangement of Bayan Khundii and Altan Nar mining operation

3. ROLES AND RESPONSIBILITIES

3.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined in Table 1 below.

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan. • Set the vision for implementation of this Management Plan
Senior Management / VPs / Department Heads	• Overall responsibility for the scope and implementation of this Management Plan • Ensure appropriate resourcing levels to implement the requirements of this Management Plan • Support execution of this Management Plan • Management of implementation activities
HSEC Manager	• Responsible for the overall implementation of this Management Plan • Responsible for ensuring this Plan is available to all employees and Contractors • Responsible for ensuring that contractors develop transport management plans/actions and inspection procedures, consistent with the requirements outlined in this plan, prior to the commencement of work • Responsible for ensuring that relevant activities are undertaken in compliance with this Management Plan and related procedures • Responsible for ensuring that Erdene employees are fully trained in transport management practices • Responsible for reviewing and approving and overall implementation of corrective actions as a result of non-conformances relating to transport management
HSEC Team	• Develops transport impact monitoring actions plan and schedule • Undertakes periodic audits and inspections of the traffic impacts at locations with high risks • Reports traffic complaints to the HSEC Team Manager and implements corrective actions
Workplace Supervisors	• Plan work activities involving high traffic generating activities according to the requirements of this plan • Conduct routine work area and work plan inspections to ensure this Management Plan requirements are in place and followed

	• Ensure that any breaches of the requirements of this Management Plan are reported, and corrective actions are taken
Procurement Team	• Ensure transport equipment purchase is sourced from reputable manufacturers • Where possible, ensure that environmental performance of transport equipment, is considered in procurement decision making
Contractors	• Ensure that management plans are developed to align with this plan and approved prior to commencement of work • Adhere to the requirements of this Management Plan
All Employees	• Adhere to the requirements of this Management Plan

3.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are introduced in Table 2

Table 2 Key Interfaces

Executive and Senior Management	• Sets strategy and provides corporate direction to operational personnel
HSEC Team	• Implements corporate strategy and impact management commitments • Consults with stakeholders including herder groups and residents • Managing and processing community grievances from traffic impacts • Feedback of community responses to executives and senior management
Operations	• Operating procedures targeted to minimise traffic impacts
Engineering and Maintenance	• Responsible for ensuring continual maintenance of transport to comply with air quality, noise and vibration requirements

3.2.1 Overview

This section expands on the key interfaces in the implementation of the TMP (i.e. roles with responsibility for delivering elements of the Management Plan). Areas where these interfaces will occur are discussed below.

3.2.2 Construction Contractors

Erdene will commission the building of the camp, mine and plant through an EPCM contract arrangement with an engineering/construction contractor. The management of many of the transport impacts during the construction phase will therefore be the responsibility of the EPCM contractor. The management of construction related traffic impacts will be recognised in any agreements between Erdene and the Contractor.

3.2.3 Operations Contractors

Erdene's intent is to contract out the operation of the mine. As with the construction contractor, the operations contractors and their infrastructure teams will have responsibility to manage many of the traffic impacts. The management of operational related traffic impacts will be recognised in any agreements between Erdene and the Operational Contractor.

3.2.4 Supporting Consultancy Firms

There will be a range of specialist consultancy partners Erdene will call on to provide specialist services during construction and operation. These parties could include: supporting biodiversity partners, air quality consultants and transport engineers. These entities may be assisting Erdene with certain aspects of project development and transport management actions may form part of their scope of works.

4. PROJECT STANDARDS

Applicable standards shall be complied with for all Project activities (the "Project Standards"). Project Standards comprise:

- applicable Mongolian legislation and national standards;
- applicable international standards and guidelines; and
- applicable Erdene policies and procedure.

4.1 Applicable Mongolian Law and National Standards

Applicable Mongolian legal and national standards are listed below, detailed descriptions of which may be found in *Chapter A2 Policy and Legal Framework*.

Mongolian Laws applicable to transport are as follows:

- Traffic Safety Law (1996)
- Law on Driver's Insurance (2011)

Mongolian Government Regulations and Procedures:

- Government Resolution on Traffic Rules, No.74 (in force 2004)
- Regulation for the Transportation of Hazardous Materials to Safety or the Environment, approved by the Order 119 of Minister of Infrastructure Development, 2000
- Regulation for Storage, Transportation, Usage and Disposal of Toxic Chemical and Hazardous Substances, Joint Order 28/40/29 of Minister of Tourism, Nature and Environment, Minister of Health and Chairman of National Emergency Management Agency, 2009

The Mongolian National Standards (MNS) issued by the Mongolian Agency for Standardization and Metrology in relation to transport include the following:

- MNS 6278:2011 Heavy Truck Vehicle General Technical Requirements;
- MNS 5831:2007 Transportation of Freight and Passenger Between Countries;
- MNS 4598:2003 Requirement for Technical Condition of Transportation Means;
- MNS 5345:2003 Large, Length and Heavy Freight Transportation. Classification and General Requirement;
- MNS 5013:2003 Petrol engine vehicle – Maximum acceptable level and measuring method of exhaust emission;
- MNS 5014:2009 Diesel engine vehicles – Maximum acceptable level and measuring methods of opacity;
- MNS5031:2003 Mongolian emission standards for emissions from petrol engines;
- MNS5014:2003 Mongolian emission standards for emissions from diesel engines;
- MNS 5011: 2003 Guideline on Vehicle Inspection. General Requirement; and
- MNS 5345:2011 General Requirement for the Large Loads Transportation.

4.2 Applicable International Standards and Guidelines

4.2.1 European Bank for Reconstruction and Development

Funding for the KGP project may be provided under the European Bank for Re-construction and Development (EBRD) framework. EBRD involvement dictates that the project has been developed to meet the EBRD's Environmental and Social Policy (2014) and the EBRD Performance Requirements (PR). Erdene will comply with the requirements of *EBRD Performance Requirement 1 Assessment and Management of Environmental and Social Impacts and Issues* (PR1) when implementing its policies. PR1 identifies the importance of developing management plans for residual impacts created by projects under the EBRD funding framework.

PR1 states that:

- Taking into account the findings of the environmental and social assessment process and the outcomes of stakeholder engagement, the client will develop and implement a programme of actions to address the identified project's environmental and social risks and impacts and other performance improvement measures to meet the PRs. Depending on the project, the programme may consist of a combination of documented operational policies, management systems, procedures, plans, practices and capital investments, collectively known as environmental and social management plans (ESMP).

PR1 also notes the following:

- The client will establish, maintain, and strengthen, as necessary, an organizational structure that defines roles, responsibilities, and authority to implement the ESMS for ensuring on-going compliance with relevant national laws and regulatory requirements and the PRs.
- It is the client's responsibility to ensure that contractors working on project sites meet the ESMS requirements by adopting and implementing an appropriate contractor management system.
- The client will ensure that adequate systems, resources and personnel are in place to carry out monitoring. The client will review the results of monitoring and initiate corrective actions as necessary.
- The client will provide regular reports to EBRD on the environmental and social performance of the project, including compliance with the PRs and implementation of the ESMS, ESMP, ESAP and stakeholder engagement plan where appropriate.

4.3 Applicable Erdene Standards

Erdene, as a corporate entity, has a Policies and Procedures Manual (2018) that guides its activities and provides standards by which mineral development projects will be undertaken. The Manual states that Erdene seeks to manage the potential environmental impacts of its business operations starting from early exploration stage in the following key areas:

- Landscape integrity and resource use.
- Waste and hazardous materials handling and disposal.

- Water quality and availability.
- Traditional environmental practices.
- Air quality.
- Biodiversity and ecosystem services.
- Others, as appropriate to a specific minerals project.

The Manual also notes the importance of Performance Monitoring in relation to the environmental management of its project activities to define the methods of assessing and evaluating the company's performance and risk management as per the policies and procedures manual.

The Manual commits Erdene to develop a plan for Environmental Management, outlining proposed activities, performance targets and required resources, for each calendar year.

5. MITIGATION MEASURES AND MANAGEMENT CONTROLS

5.1 Overview of Management Controls

Based upon the identified impacts and opportunities presented in the ESIA, the following control measures will be put in place during the construction, operations, and closure phases of the KGP.

The key management controls to mitigate and manage the Project transport impacts are provided in Table 3.

Table 3 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of Verification	Phase Applicability			
				Pre-construction	Construction	Operation	Closure
TKMC 1-1	Carry out an engagement program about the impacts of traffic changes that may result from the advent of the construction and operation of the KGP.	Consultation on traffic awareness with community and herder groups affected by the KGP and related traffic generation. These stakeholders are potentially unfamiliar with the transport needs of construction and operation of a gold mine and a wide engagement program should be undertaken to improve this knowledge.	-consultation program attendance. -number of incidents and complaints.	-	X	X	X
TKMC 1-2		Consultation with police, border and emergency services agencies who will be dealing with the traffic management on an administrative basis.	-Emergency response plans -number of incidents attended by government personnel.	-	X	X	X
TKMC 1-3		Specific consultation initiatives to occur with herder groups to advise when large vehicles or busy periods are likely.	-consultation program attendance -number of incidents and complaints	-	X	X	X
TKMC 2-1	Physical upgrades to the road network	Ensure measures are in place to mitigate transport impacts through *soum* centres including speed restrictions and bypass routes where appropriate.	-management measures in *soum* centres -number of incidents and complaints	-	X	X	-
TKMC 2-2		Improving road sections that are unsafe.	-Regular (quarterly) road condition audits. -Identification of points	-	X	X	-

			where road improvements are required and feasible.				
TKMC 2-3		Installation of appropriate signage to advise of changed road or traffic conditions.	-number of traffic incident numbers within *soums*	-	X	X	-
TKMC 3-1	Implement a driver and workforce safety program	Drivers to follow pre-determined routes that have been subject to risk assessments.	-completion rate of mandatory driver training program	-	X	X	X
TKMC 3-2		All driving by mine and service personnel is to occur during day-time hours where possible to improve safety outcomes.	-completion rate of mandatory driver training program	-	X	X	-
TKMC 3-3		Restrictions on transport operators servicing the construction and operational phases of the mine in relation to maximum driving hours per day and week.	-completion rate of mandatory driver training program	-	X	X	-
TKMC 3-4		Strict adherence to speed limits, traffic regulations and pre-agreed traffic routing.	-completion rate of mandatory driver training program	-	X	X	X
TKMC 3-5		Driver training standards to be prescribed and monitored.	-completion rate of mandatory driver training program	-	X	X	X
TKMC 4-1	Wildlife and Livestock	Drivers made aware of the likelihood of wildlife and livestock to stray onto remote roadways. Protocols developed to manage such incidents to avoid collisions and accidents.	Drivers to undertake wildlife and livestock awareness training program as part of the project induction process	-	X	X	X
TKMC 5-1	Dust	Dust can be generated during the use of remote unsealed roads. This can be managed through traffic speed controls and driver behaviours.	Implementation of a dust control program	-	X	X	X
TKMC 6-1	Noise	Noise impacts can be created through increased truck related traffic, particularly within Shinejinst *soum* centre.	Implementation of a noise control program.	-	X	X	X
TKMC 7-1	Road Damage	The *soum* communities and herders rely on the rudimentary road network to provide a continuity of access to various locations. Mine related traffic has the potential to cause damage or improvement to the road network.	Regular (quarterly) road condition audits	-	X	X	X

5.2 Design Controls

Brief descriptions of applicable design controls for impact mitigation are set out below:

- Road Improvements – Erdene acknowledges that there are portions of the road network that will require upgrading to efficiently and safely accommodate the traffic to be generated during the construction and operational phases of the project.
- Signage – both permanent and temporary signage will be important to advise communities and road users of the potential impacts of increased road use forecast during the phases of the KGP.
- Consultation program – this is an important initiative from both an impact management and safety management perspective. The program will be developed by Erdene and applicable to contractors, as appropriate.
- Driver training program – to be implemented by Erdene for its applicable personnel and through its various contractors
- Dust suppression to be implemented, especially through sensitive locations and along unpaved roads.

6. MONITORING

6.1 Overview of Monitoring Requirements

The Monitoring measures that are to be implemented during the construction and operation phase to assess compliance with Project Standards are described in this section.
In the event that monitoring identifies non-conformance(s) with Project Standards, appropriate corrective actions will be identified based on an investigation.

6.2 Key Performance Indicators

The key performance indicators for monitoring are set out below in Table 4.

Table 4 Key Performance Indicators

Unique ID	KPI	Target	Measure
T-KPI-01	Minimal accidents	Nil	Number of accidents
T-KPI-02	Minimal road damage	Nil	Evidence of erosion or damage on or near roads
T-KPI-03	Dust suppression measures taken	100% as planned Zero incidents	Observed road conditions; Number of personnel and community complaints
T-KPI-04	Avoid and limit noise generation	100% manufacturer recommended heavy equipment maintenance Zero incidents	Percentage completion of maintenance to plan; Number of personnel and community complaints
T-KPI-05	Minimal wildlife incidents	Nil	Number of incidents involving wildlife

6.3 Key Monitoring Activities

A description of the key monitoring requirements for the TMP activities with the objective of assessing the effectiveness of impact management controls are:

- Number of traffic accidents to measure the traffic accident control measures success.
- Air quality and noise monitoring of vehicles to ensure that air quality and noise targets are being met.
- Road condition monitoring to assess the impacts of construction and operational traffic .
- Land rehabilitation success in degraded areas for rehabilitation program effectiveness.

6.4 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required as identified through the *Management of Change Procedure* contained within the KGP ESMP Framework), this Management Plan may also be updated on an “as required” basis.

7. TRAINING

All necessary training is provided as part of induction training (to provide general awareness) and job specific training as necessary.

7.1 Induction Training

All employees of Erdene and Contractors working at the Project will be provided with general induction, site specific induction and a broad range of health, safety and environmental awareness training, including the Erdene Code of Conduct.

All persons will be tested to ensure that they have understood their inductions and made to re-sit if necessary. Inductions will be available in Mongolian and in English. Erdene will maintain a register of all inducted persons, including any restrictions.

General aspects of transportation management applicable to all workers will also be covered.

7.2 Job Specific Training

Persons working in specific areas or on specific jobs may be required to attend additional area or job specific inductions or briefings, which will address specific transport management requirements.

8. AUDIT AND REPORTING

8.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with requirements of the Erdene HSEC Management System (including the ESIA and ESMP).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan may also be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

8.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

9. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of Management Plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the Framework and Management Plans form the KGP ESMPs. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system.

This Management Plan has overlaps and cross-linkages to several other Management Plans (Table 5).

Table 5 Context and Overlaps with Other Management System Documentation

Management Plan Title	**Overlap / Cross Linkage**
Air Quality Management Plan	Contains measures to manage air quality impacts including dust generation
Noise and Vibration Management Plan	Contains measures to manage noise and vibration impacts
Water Resources Management Plan	Contains actions to manage erosion and stabilise drainage channels
Waste Management Plan	Contains actions to manage the IWF and any air quality risks created with the IWF concept
Community Health, Safety and Security Management Plan	Contains procedures to minimise dust generation as a health issue
Occupational Health, Safety and Security Management Plan	OH&S issues in relation to air quality are dealt with in the OHSSMP.
Stakeholder and Communications Management Plan	Contains stakeholder engagement framework which sets out where grievances related to air quality complaints can be processed.
Land Disturbance and Rehabilitation Management Plan	Contains provisions relating to land disturbance and erosion management during construction

10. LIST OF ABBREVIATIONS, ACRONYMS AND UNITS OF MEASURE USED

AoI	Area of Influence
AQMP	Air Quality Management Plan
CEMP	Construction Environmental Management Plan
EBRD	European Bank for Reconstruction and Development
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
EU	European Union
KGP	Khundii Gold Project
KM	Kilometres
KPI	Key Performance Indicators
MNS	Mongolian National Standards
TMP	Transport Management Plan

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
OHSSMP	D12: Occupational Health, Safety and Security Management Plan
SCMP	D13: Stakeholder and Communications Management Plan
LCMP	D14: Local Cooperation Management Plan
TMP	D15: Transport Management Plan
LDRMP	D16: Land Disturbance Control and Rehabilitation Management Plan
CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D16: Land Disturbance and Rehabilitation Management Plan

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Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Land Disturbance Control and Rehabilitation Management Plan* for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project).

1.1 Objectives

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define topic-specific training requirements; and
- set out references for supporting materials and information.

1.2 Scope

This Management Plan covers all KGP activities, including contractor activities during construction, operations and closure phases of the KGP. Disturbance to all onsite and offsite lands under the Project's scope are covered under this Management Plan.

This document outlines Erdene's commitment and approach to managing land disturbances and land rehabilitation activities with the aim of minimising land disturbances and maximising rehabilitation success.

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined below (Table 1).

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of this Management Plan.
Senior Management / VPs / Department Heads	• Approve this Management Plan • Overall responsibility for the scope and implementation of this Management Plan • Ensure appropriate resourcing levels to implement the requirements of this Management Plan • Support execution of this Management Plan • Management of implementation activities • Interpretation of monitoring results • Corrective actions • Provide leadership on land disturbance and rehabilitation management issues
HSEC Manager	• Responsible for ensuring this Plan is available to all employees and Contractors • Responsible for developing and maintaining land disturbance inventory • Responsible for ensuring that relevant activities are undertaken in compliance with this Management Plan and related Procedures • Liaise with other departments to plan all land disturbance activities • Responsible for planning, approval and implementation of rehabilitation plans • Responsible for reviewing and approving and overall implementation of corrective actions as a result of non-conformances relating to land disturbance and rehabilitation management
HSEC Team	• Ensure all land disturbance related records are maintained in the land disturbance inventory • Maintain land use GIS data base for all onsite and offsite land disturbance activities • Review LDP requests and make recommendations for decision making • Inspect and ensure all land disturbance control measures are implemented • Provide training and guidance to Erdene and contractors' employees on the requirements of this management plan • Track compliance to this management plan and reporting • Coordinate and implement land all rehabilitation activities
Workplace Supervisors	• Prepare and submit all planned land disturbance plans to HSEC Managers • Prepare LDP request for all individual land clearing activities on undisturbed and rehabilitated lands • Implement land disturbance mitigation measures specified in the LDP review • Plan and implement all work activities according to the requirements of this plan • Ensure that any breaches of this Management Plan requirements are reported, and corrective actions are to be taken

Employees and Contractors	• Adhere to the applicable requirements of this Management Plan

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are shown in Table 2.

Table 2 Key Management Interfaces

Team / Unit	Key Interface(s)
HSEC Team	Liaising with local residents especially in relation to consulting and managing community grievances resulting from land disturbance issues.
Engineering and Maintenance Team	Ensuring all land clearing and rehabilitation activities to comply with this Management Plan requirements;
Transport and Mining Fleet Team	Planning all road transport activities to comply with requirements of this plan

3. PROJECT STANDARDS

Applicable standards shall be complied with for all Project activities (the "Project Standards") and the Project Standards comprise:

- applicable Mongolian legislations and national standards;
- applicable international standards and guidelines; and
- applicable Erdene policies and procedure.

3.1 Applicable Mongolian Law and National Standards

Applicable Mongolian legal and national standards are listed below, detailed descriptions of which may be found in *Chapter A2 Policy and Legal Framework*. Mongolian Laws applicable to land disturbance and rehabilitation are as follows:

- Law on Environmental Protection (1995);
- Law on Land (2002);
- Law on Subsoil (1988);
- Law on Soil Protection and Prevention from Desertification (2012);
- Law on Special Protected Areas (1994);
- Law on Special Protected Area Buffer Zones (1997);
- Law on Environmental Impact Assessment (2012); and
- Law on Cultural Heritage Protection (2014).

Mongolian Government Regulations and Procedures:

- Rehabilitation and Closure Procedure for Mining and Processing Plants. Joint Order No A/181,A/458 between Minister for the Mining and Heavy Industry and Minister for the Environment and Tourism (28 August 2019)

Mongolian National Standards (MNS) applicable to land disturbance and rehabilitation include:

- MNS 4920: 2000 Environment. Slope of Destroyed Land. Technical Requirements;
- MNS 5914:2008 Environment. Land Reclamation. Terms and Definitions;
- MNS 5915:2008 Environment. Classification of Land Destroyed Due to Mining Activities;
- MNS 5916:2008 Environment. Requirements for Fertile Soil Removing and its Temporary Storage during the Earth Excavation;
- MNS5917:2008 Environment. Reclamation of Land Destroyed Due to Mining Activities;
- MNS5918:2008 Environment. Re-Vegetation of Disturbed Land. Technical Requirements; and
- MNS 5850:2008. Environment. Soil quality. Soil pollutant elements and substances.

3.2 Applicable International Standards and Guidelines

The following good international industry practice guidance and legislation have been taken into account:

- EBRD Performance Requirements (PR) (2014) (particularly PR3: Resource Efficiency and Pollution Prevention and Control; PR5: Land Acquisition and Involuntary Resettlement; PR6: Biodiversity Conservation and Sustainable Management of Living Natural Resources; PR8: Cultural Heritage);
- IFC Environmental, Health, and Safety General Guidelines (April 2007); and

3.3 Applicable Company Standards

The primary Erdene policies and standards that apply to land disturbance and rehabilitation management are provided in the Erdene (2018) *Policy and Procedures Manual*, which includes the *Landscape Integrity Policy*. The Policy identifies the company's commitments to avoiding, minimising and rehabilitating land disruptions during the course of KGP's activities.

Key sections of the company's Policies and Procedures Manual, including the Erdene Code of Business Conduct and Ethics, are available to the public and may be found at the company's website (https://erdene.com/en/corporate/governance/).

4. MITIGATION MEASURES AND MANAGEMENT CONTROLS

4.1 Overview of Management Controls

This Management Plan intends to ensure sound management measures are in place to manage potential land disturbance impacts to landscape integrity, community livelihoods and cultural heritage in order to ensure the optimal execution of the Project activities.

Based upon the identified impacts and opportunities presented in the ESIA, the following control measures will be put in place during the construction, operations, and closure phases of the KGP.

The key management controls to mitigate, manage and rehabilitate the Project land disturbance impacts are provided in Table 3.

Table 3 Key Management Controls

Unique ID (Source ID)	Topic / Activity	Control Description	Means of verification	Phase Applicability		
				Construction	Operation	Closure
LD01	Minimise Land Disturbances	• Implementation of a Land Disturbance Permit Procedure (LDP) for all land clearing work for previously undisturbed or rehabilitated lands	• LDP records	X	X	X
LD02		• Undertake regular inspection of land disturbances for all areas under KGP control and update the land disturbance inventory	• Incident reports • Land disturbance inventory	X	X	X
LD03	Topsoil removal and storage	• Develop and implement topsoil handling and storage procedure. The procedure to specify topsoil stripping depth, equipment to be used, and topsoil storage conditions	• Inspection records	X	X	X
LD04		• Undertake periodic quality monitoring in stored topsoil stockpiles	• Soil quality test results	X	X	X
LD05	Rehabilitation of disturbed land	• Implement progressive land rehabilitation programme annually for disturbed area no longer needed for KGP activities, as feasible	• Annual rehabilitation • Land rehabilitation inspection acts approved by local government • Internal inspection records	X	X	X
LD06		• Collect and use native plant species seeds for rehabilitation works	• Rehabilitation records	X	X	-
LD07		• All disturbed lands and slopes to be recontoured to blend with the surrounding landscape with minimal visual residual impact, as feasible	• Land rehabilitation report • Inspection records	X	X	X
LD08	Transport and Traffic	• Regular maintenance of dirt roads to prevent road widening or creation of multiple tracks	• Road maintenance records	X	X	

			• Inspection records			
LD09		• Develop no off-road driving, except emergency, policy and enforcement	• Inspection records	X	X	X
LD10		• Erection of road signs to regulate onsite and offsite traffic to avoid unnecessary degradation	• Installed road signs • Inspection records	X	X	X
LD11		• Environmental awareness training that includes driver education for land disturbance and KGP policy and controls	• Training records	X	X	X
LD12	Land disturbance and Cultural Heritage	• Cultural heritage screening to be included in the LDP	• LDP and records of its implementation	X	X	X
LD13		• Develop Chance Find Procedure and Implement	• Chance Find Procedure • Inspection Records	X	X	X
LD14	Potential Soil Quality Deterioration from Hazardous Materials accidental spill/leaks or Hazardous waste management	• As per *Waste Management* Plan and *Hazardous Materials Management Plans*	• As specified in the *Waste Management Plan* and *Hazardous Materials Management Plans*	X	X	X
LD15		• Undertake regular soil quality tests around Integrated Waste Facility (IWF), Low-Grade Stockpile, Run-of-Mine (ROM) pad, Maintenance workshops, Fuel and Explosives storage areas and Landfill areas and take corrective actions if contamination is found.	• Soil quality test results	-	X	X
LD16	Land Disturbance Impacts to Pasture	• Control descriptions in the Land use and Livelihood Management Framework.	• Refer to the *Land use and Livelihood Management Framework* verifications	-	-	-
LD17	Training and Awareness	• Provide environmental awareness training to all employees and contractors	• Training records			

4.2 Design Controls

Recommended design controls for prevention and/or minimisation of the land disturbance and enhancement of rehabilitation works are defined as follows:

- Maintenance of roads to avoid unnecessary land disturbance;
- Create topsoil storage piles according to the standard dimensions and shape to reduce soil quality deterioration;
- Install secondary containment or bunding for liquid hazardous materials storage to prevent accidental discharge of soil contaminating substances;
- Install appropriate design criteria for the key mine facilities (especially, the IWF, ROM pad and Landfill areas) to reduce the risk of potential leaching of contaminants to within acceptable levels; and
- Place warning signs to regulate traffic to prevent land disturbance.

5. MONITORING

5.1 Overview of Monitoring Requirements

The Monitoring measures that are to be implemented during the construction and operation phase to assess compliance with Project Standards are described in this section.

In the event that monitoring identifies non-conformance(s) with Project Standards, appropriate corrective actions will be identified based on an investigation.

5.2 Key Performance Indicators

Erdene will evaluate land disturbance and rehabilitation management performance within and beyond the Project site boundary on continual basis. Key Performance Indicators (KPI) to assess its land disturbance and rehabilitation management are presented in Table 4.

Table 4 Key Performance Indicators

Unique ID	KPI	Target	Measure
LD-KPI-01	Number of unauthorised land disturbance	Target: Zero	Inspection reports
LD-KPI-02	Percentage completion of planned rehabilitation	Target: 100%	Land rehabilitation inspection acts that has been signed-off by regulators
LD-KPI-03	Soil contamination incidents including topsoils in storage	Target: Zero	Soil quality test results
LD-KPI-04	Number of incidents of off-road driving without approval	Target: Zero	Traffic incident reports

5.3 Key Monitoring Activities

Key monitoring requirements for assessing the effectiveness of land disturbance management controls at KGP are provided in Table 5. If the monitoring results identify exceedances over the Project KPI investigations will be undertaken and corrective actions will be identified for improvement.

Table 5 Monitoring Measures – Land Disturbance and Rehabilitation

ID	Topic/ Aspects	Methods	Periodicity	Location
LD-MON-01	Unauthorised land disturbances	Inspection of disturbed areas under KGP control against approved LDP	Quarterly	All disturbed areas
LD-MON-02	Topsoil removal during construction	Observation of topsoil removal process vs topsoil removal specifications	Continuous during Construction Phase	Randomly selected disturbance areas
LD-MON-03	Topsoil stockpile management	Inspection of topsoil storage vs storage requirements	Annually	All topsoil stockpile areas
LD-MON-04	Topsoil stockpile quality	Soil quality test	Spring and Autumn	All topsoil stockpile areas

ID	Topic/ Aspects	Methods	Periodicity	Location
LD-MON-05	Soil contamination	Soil quality tests	Quarterly	• IWF • Low-Grade Stockpile • ROM • Maintenance Workshops • Fuel and Explosive Storage Areas • Landfill Areas • Topsoil piles
LD-MON-06	Avoidance of multiple road tracks	Inspection of road conditions	Monthly or after heavy rain or snow	All roads used by KGP
LD-MON-07	Progressive rehabilitation	Annual rehabilitation percentage vs annual rehabilitation plan	Annually	All rehabilitated areas

5.4 Review and Revision of this Plan

This Management Plan will be reviewed during construction at a minimum of every six months. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of Erdene and the KGP.

Any holder of the plan is to make HSEC Leadership aware of any errors, omissions or changes as soon as they are aware of them. If material changes to operating procedures are required as identified through the *Management of Change Procedure* contained within the KGP ESMP Framework), this Management Plan may also be updated on an "as required" basis.

6. TRAINING

All necessary training is provided as part of induction training (to provide general awareness) and job specific training as necessary.

6.1 Induction Training

All employees of Erdene and Contractors working at the Project will be provided with general induction, site specific induction and a broad range of health, safety and environmental awareness training, including the Erdene Code of Conduct.

All persons will be tested to ensure that they have understood their inductions and made to re-sit if necessary. Inductions will be available in Mongolian and in English. Erdene will maintain a register of all inducted persons, including any restrictions.

General aspects of land disturbance and rehabilitation management applicable to all workers will also be covered.

6.2 Job-Specific Training

Persons working in specific areas or on specific jobs may be required to attend additional area or job specific inductions or briefings, which will address specific land disturbance and rehabilitation management requirements.

7. AUDIT AND REPORTING

7.1 Auditing

Conformance will be monitored via an annual internal audit programme. This will be undertaken to assess broad compliance with requirements of the Erdene HSEC Management System (including the OHS and the KGP Project ESMP).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the KGP HSEC management system.

Conformance with this Management Plan also may be subject to periodic external assessment as part of the Erdene audit programme and separately by Project Lenders, as required.

7.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with Erdene procedures.

8. CONTEXT AND OVERLAPS WITH OTHER MANAGEMENT SYSTEM DOCUMENTATION

This Management Plan is part of the overall suite of Management Plans developed for the KGP and as described in the *KGP Environmental and Social Management Plan (ESMP) Framework.* Collectively the Framework and Management Plans form the KGP ESMPs. This Management Plan must be read in conjunction with the *KGP ESMP Framework*. The KGP ESMP is a key component of the KGP HSEC management system.

This Management Plan has overlaps and cross-linkages to several other Management Plans (Table 6).

Table 6 Context and Overlaps with Other Management Plans

Management Plan Title	Overlap / Cross Linkage
Biodiversity Management Plan	Flora species management and monitoring requirements
Transport Management Plan	Road upgrade/maintenance and transporting hazardous materials
Air Quality Management Plan	Managing dust issues
Hazardous Materials Management Plan	Managing accidental release of hazardous materials into the environment
Water Resources Management Plan	Waste water treatment and ground water contamination
Waste Management Plan	Managing waste collection, handling and disposal
Stakeholder and Communications Management Plan	Engagement with local community and land disturbance related complaints
Contractor and Procurement Management Plan	Contractor compliance with the Project requirements.

The following procedures will support implementation of this Management Plan at KGP providing detailed information:

- *Land Disturbance Permit Procedure;*
- *Land Rehabilitaion Procedure; and*
- *Topsoil handling and Storage Procedure;*

Necessity of developing additional procedures to support effective implementation of this Management Plan will be evaluated based on the monitoring results.

9. LIST OF ABBREVIATIONS AND ACRONYMS, AND UNITS OF MEASURE USED

EBRD	European Bank for Reconstruction and Development
Erdene	Erdene Mongol LLC
ESMP	Environmental and Social Management Plan
HSEC	Health, Safety, Environment and Community
IWF	Integrated Waste Facility
KGP	Khundii Gold Project
KPI	Key Performance Indicator
LDP	Land Disturbance Permit
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
ROM	Run-of-Mine

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
NVMP	D2: Noise and Vibration Management Plan
WRMP	D3: Water Resources Management Plan
BMP	D4: Biodiversity Management Plan
WMP	D5: Waste Management Plan
HMMP	D6: Hazardous Materials Management Plan
CHSSMP	D7: Community Health, Safety and Security Management Plan
CPMP	D8: Contractor and Procurement Management Plan
CERMP	D9: Crisis and Emergency Response Management Plan
HRMP	D10: Human Resource Management Plan
LULMF	D11: Land Use and Livelihoods Management Framework
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SCMP	D13: Stakeholder and Communications Management Plan
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CMP	D17: Closure Management Plan



SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Environmental and Social Impact Assessment: D17: Mine Closure Framework Management Plan

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Sustainability East Asia LLC

T +976 7011 4921
F +976 7010 4921

State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's Street-29
8th Khoroo, Sukhbaatar District
Ulaanbaatar-14200 Mongolia
mongolia@sustainability.net.au

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1. INTRODUCTION

This document is the *Mine Closure Framework* Management Plan for Erdene Mongol LLC's (Erdene) Khundii Gold Project (KGP or the Project).

1.1 Objectives

Erdene acknowledges that conceptual mine closure planning begins during exploration. The company approaches mine closure in an integrated manner, combining social, environmental and economic considerations, and iteratively. Temporary or, in some cases, irreversible land disturbance is unavoidable from its the proposed Project operations. To avoid or mitigate the potential impacts from the any unavoidable land disturbance, Erdene has developed specific policies and principles to be followed during its operation.

Erdene's overarching policy objectives with regard to mine closure include avoiding disruptions to existing landscape integrity from its operations, and striving to add value to the local community and environment with regard to generally accepted impact indicators.

The purpose of this Management Plan is to:

- provide the basis for closure planning, mine de-commissioning, demobilisation, rehabilitation and post closure after-care and monitoring;
- introduce Erdene's KGP conceptual mine closure objectives and key approaches;
- define roles and responsibilities; and
- outline the applicable Project Standards relevant to this Management Plan.

1.2 Scope

This Framework Management Plan covers indicative activities and processes that Erdene will implement during the KGP mine closure period. Detailed mine closure plan is expected to be developed three years prior to the KGP closure, as required by Mongolian Law. At the appropriate time, the detailed Mine Closure Management Plan will supersede the Operational Management Plans.

2. ROLES AND RESPONSIBILITIES

2.1 Key Roles and Responsibilities for Management Plan Implementation

The key roles and responsibilities for the implementation of this Management Plan are outlined below (Table 1).

Table 1 Key Roles and Responsibilities

Role	Responsibilities
Executive	• Approve the budget for the execution of Mine Closure Plans
Senior Management / VPs / Department Heads	• Approve this Management Plan • Overall responsibility for this Framework Plan implementation • Develop the Detailed Mine Closure Plan in accordance with this framework plan requirements • Provide leadership on mine closure commitments • Facilitate regulatory compliance and fulfilment of statutory obligations
HSEC Manager / Community Relations Manager	• Implementation of this Plan • Engagement with stakeholders regarding the mine closure objectives and plans

2.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e., departments or units with responsibility for delivering elements of this Management Plan) are introduced in Table 2.

Table 2 Key Management Interfaces

Team / Unit	Key Interface(s)
HSEC Team	Safe implementation of activities during the mine closure process; Engaging with relevant stakeholder regarding the mine closure objectives and activities
Engineering and Maintenance Team	Ensuring all mine closure activities are undertaken according to the mine closure requirements
Environmental Managers	Ensuring all mine closure environmental requirements are met

3. PROJECT STANDARDS

Applicable standards shall be complied with for all Project activities (the "Project Standards") and the Project Standards comprise:

- applicable Mongolian legislations and national standards;
- applicable international standards and guidelines; and
- applicable Erdene policies and procedure.

3.1 Applicable Mongolian Law and National Standards

Mongolian main laws applicable to mine closure are as follows:

- Law on Environmental Impact Assessment (2012);
- Mongolian Minerals Law (2006);
- Law on Soil Protection and Prevention of Desertification (2012);
- Law on Subsoil (1988); and
- Law on Waste (2017);
- Law on toxic chemicals and hazardous waste (2006); and
- Law on Workplace Safety and Hygiene (2008).

Mongolian Government Regulations and Procedures:

- Rehabilitation and Closure Procedure for Mining and Processing Plants. Joint Order No A/181,A/458 between Minister for the Mining and Heavy Industry and Minister for the Environment and Tourism (28 August 2019)

Mongolian National Standards (MNS) applicable to mine closure and reinstatement and rehabilitation include:

- MNS 5914:2008 Environment. Land Reclamation. Terms and Definitions;
- MNS 5915:2008 Environment. Classification of Land Destroyed Due to Mining Activities;
- MNS 5916:2008 Environment. Requirements for Fertile Soil Removing and its Temporary Storage during the Earth Excavation;
- MNS5917:2008 Environment. Reclamation of Land Destroyed Due to Mining Activities;
- MNS5918:2008 Environment. Re-Vegetation of Disturbed Land. Technical Requirements; and
- MNS 5850:2008. Environment. Soil quality. Soil pollutant elements and substances.

3.2 Applicable International Standards and Guidelines

The following good international industry practice guidance and legislation have been taken into account:

- EBRD Performance Requirements (PR) (2014) (particularly PR1: Assessment and Management of Environmental and Social Impacts and Issues); and
- Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries and amending Directive 2004/35/EC.

3.3 Applicable Erdene Standards

Erdene's *Policy and Procedures Manual* (2018) provides high level mine closure approaches. Erdene's Biodiversity and Ecosystem Services Policy identifies the company's commitments to biodiversity restoration, as applicable.

4. MITIGATION MEASURES AND MANAGEMENT CONTROLS

4.1 Overview of Conceptual Mine Closure Activities

Erdene plans to implement progressive rehabilitation throughout the life of mine, with the aim of the majority of reclamation earthworks completed by the time mining and processing activities cease. Containment of process tailings and mined waste rock within an integrated waste facility is proposed to reduce the footprint and potential impact of this material on the site and surrounding areas. The remainder of the operations infrastructure and buildings will be removed following mine closure, with subsequent rehabilitation of any impacted areas completed over one season.

This Framework Management Plan provides an overview of conceptual mine closure for the main mine infrastructure at KGP.

4.1.1 Closure plans for Bayan Khundii

Mining and processing of Bayan Khundii ore is a relatively short-term project, scheduled to be completed in six years. The closure strategy is based on progressive rehabilitation throughout that period, which will result in the majority of earthworks having been completed by the time mining and processing ceases.

Central to this strategy is the Integrated Waste Facility (IWF) which has been designed to contain all the tailings and waste rock produced by the Bayan Khundii Project. Erdene has adopted the concept of an IWF as opposed to constructing a conventional tailings storage facility and a separate waste rock dump.

The overall vision of closure for the site is to have all evidence of the operation removed, with the exception of the Integrated Waste Facility and open pit void. The remainder of the areas impacted by the operation will be returned to their preoperation form and revegetated. As the IWF is designed to facilitate progressive rehabilitation during the operational phase, works remaining at closure are substantially reduced. The works remaining at closure include

- completion of the IWF cover,
- demolition and disposal of the processing plant,
- disposal of infrastructure and
- rehabilitating areas impacted during the operations.

It is expected that all of these activities will be completed in one season.

4.1.2 Closure plans for Altan Nar

The overall vision of closure for the Altan Nar site is to have all evidence of the operation removed, with the exception of the seven final voids and the IWF to be created. The remainder of the areas impacted by the operation will be returned to their pre-operation form and revegetated.

Tailings and waste rock produced by the seven pits in the Altan Nar project will be placed in a single IWF. Constructing a single IWF minimises loss of land and optimises use of resources including material to construct a cover over the IWF.

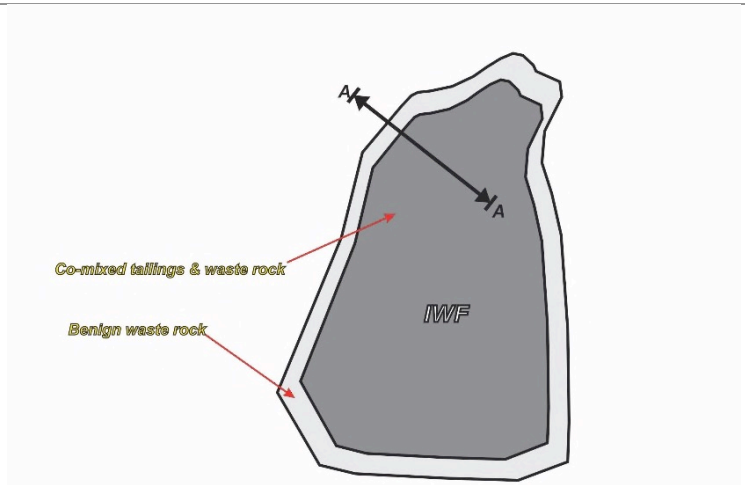
The selection of this conceptual design including the final batter slope has been developed based on both the closure objectives and the expected properties of the material being used to construct the outer layers of the IWF.

4.2 Conceptual Mine Closure Approach

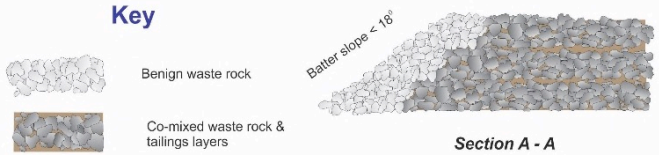
The Khundii Gold Project NI43-101 Technical Report (TetraTech 2019) provides the following concept and approaches for the closure of the main mine infrastructure for the KGP (Table 3).

Table 3 Khundii Gold Project Mine Infrastructure and Conceptual Closure Approach

Mine Infrastructures	Closure Approach
Integrated Waste Facility	The IWF will be constructed and operated in the following manner: • The footprint of the IWF (approximately 57 ha) will be cleared of topsoil and sub-soil. The topsoil and sub-soil will be stockpiled for subsequent placement on the surface of the IWF during rehabilitation • An initial starter layer (approximately 2.0 m thick) of the IWF will be constructed across the entire footprint. It will consist of an outer circumference of benign waste rock around a core of co-mixed tailings and waste rock. • Tailings and waste rock will be co-mixed on the surface of the IWF and then placed in 2.0 metre lifts until completion • Tailings placed in the IWF will have been passed through filter presses to recover process liquor and are anticipated to have a moisture content of around 15%. They will be transported to the IWF by truck from the process plant • The 2.0 metre lifts will be compacted using dedicated compaction equipment. • The batter slopes of the IWF will nominally be ≤ 180, with the actual slope to be based on the erosion resistance properties of the available cover material • A vegetation growth supporting layer will be placed over the final surface of the IWF, it is anticipated that the stockpiled topsoil and sub-soil will be used for this layer • Rip-rap for erosion protection will be incorporated into the growth supporting layer Constructing the IWF in this manner will mean that at the completion of mining and ore processing there is only a small portion of the final layer that will require completion, with all of the external slopes having been completed progressively during operations. It is expected that this small portion will be less than 15 ha of the upper surface. Design sketches of the IWF are provided below

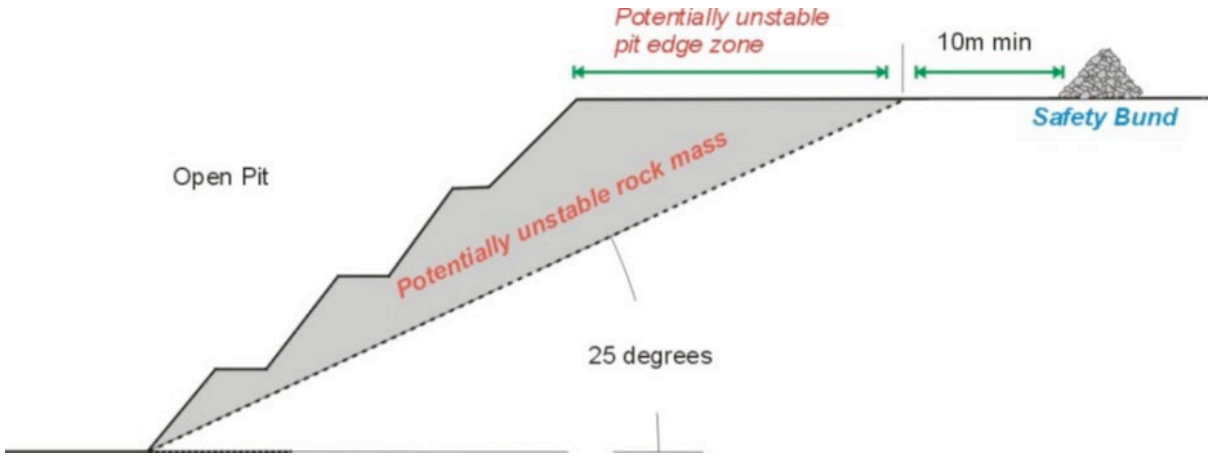


Plan view of initial construction of the IWF



Section view of initial construction of the IWF

Open Pits	• The open pits will not be backfilled after the mine operations have ended, but closed with the ultimate objective of ensuring long term safety for the public and livestock • Once the open pit footprint has been established, an abandonment bund will be constructed around its entire perimeter, with the exception of the access ramp entry point • The bund will use benign waste rock and will have 2 m high with 1:1 slope ratio with 4 m wide at its base for stability • The bund will be constructed 10 metres beyond the pits zone of potential instability.

	See below for the conceptual open pit design wall after closure. 
Processing Plant	All elements of the processing plant will be removed and the footprints will be rehabilitated. The following approach will be used for the processing plant decommissioning: • Disposal of processing plant equipment will be through a combination of selling items that can be used at other operations or have high scrap value, and demolition. High value items are likely to include; the mill, crushing circuit, filter presses, electrowinning, pumps, electric motors, tank agitators and electrical control. Prior to this occurring the plant will be decommissioned, and all reagents removed, pipelines disconnected and flushed and electrical supplies de-energized. Stores of reagents will be run down and any remaining will either be sold on, neutralized on site, or taken for disposal at an approved hazardous waste receival point • Once all the high value equipment has been removed the remainder of the plant will be demolished and disposed of as scrap. The main items requiring demolition will be leach and adsorption tanks, their supporting steel structures, pipework and cable trays. Demolition will be undertaken by a specialist contractor, as required • Upon completion of demolition all that will remain are the concrete footings, bunded concrete pads around the tanks and the concrete tank ring beams. These will be cleared of any trip hazards, pump sumps filled to surface, and the pad bunding broken at strategic locations to ensure the pad doesn't retain water • As far as practicable underground cabling will be dug up. This is important as it removes the temptation for people to enter the site to collect it for salvage and sale. This is a common issue with closed sites and has safety risks and can jeopardise remediation works through uncontrolled entry to the site • Rehabilitate and revegetate the cleared areas according to the applicable Project standards and in accordance with the pre-mining landscape conditions

ROM Pad and Low-Grade Stockpile	• The ROM Pad and low-grade stockpile area will, at the cessation of operations be scraped clean to ensure that no potentially contaminated material remains. Recovered material will either be processed through the plant or transported to the IWF for disposal. Once reclaiming of residual ore and contaminated material has been completed the area will be reshaped to form a free draining landform and the surface will be ripped/scarified then sown with low moisture requirement endemic native species • In accordance with Mongolian requirements, sub-grade material (defined as material below the process plant feed grade and above an agreed cut-off grade) will be placed in a discrete section of the IWF. The south-west section of the IWF has been identified as the preferred location for the sub-grade stockpile. It will be integrated into the overall IWF and have the same cover system placed over it. Should in the future the sub-grade become economic to process, it can be reclaimed from the IWF efficiently without disturbing the overall landform or sterilizing the sub-grade ore
General Site	• Demountable (transportable) buildings will be sold at the end of operations and removed from site. Steel framed buildings will also be sold for removal from site, if this is unsuccessful, they will be demolished and removed as with other scrap metal. Roads and tracks will be assessed and those not required for ongoing site access will be rehabilitated • It is possible that local authorities or other businesses may wish to acquire and maintain some infrastructure post closure (solar farm etc.). Should this occur future revisions of the closure strategy will be amended to reflect any changes

4.3 Progressive Rehabilitation and Mine Closure Cost

Erdene, consistent with the Mongolian Government and Lender requirements, will provide adequate finding for progressive annual rehabilitation programmes and for the KGP mine closure activities. Repairs and maintenance requirements are expected to be low given the intent to progressively rehabilitate the site, any requirements are likely to be focused on the IWF.

4.4 Monitoring

Post-closure monitoring is fundamental to demonstrating that the site has achieved its nominated closure objectives and completion criteria. Where monitoring results indicate that criteria are not being met, or there is a trend of decreasing performance, action will be undertaken to determine the cause and remedial actions initiated where necessary.

A monitoring programme addresses the following parameters:

- Groundwater, including around the IWF and potential pit lake formation;
- Geotechnical stability;
- Soil erosion due to changes in local hydrology from the mining development;
- Vegetation; and
- Any applicable social parameters.

5. DETAILED MINE CLOSURE PLAN

Erdene is committed to developing a detailed Mine Closure Management Plan at least three years prior to the cessation of mine operations. The detailed mine closure plan will provide greater details of the mine closure for each of the mine facilities based on the increased knowledge and information from the operational phase.

The detailed Mine Closure Plan will provide Erdene's approach to social issues that are likely to be triggered at closure, such as the decline in direct, indirect and induced employment previously made possible due to the KGP operations.

6. LIST OF ABBREVIATION AND ACRONYMS

EBRD	European Bank for Reconstruction and Development
Erdene	Erdene Mongol LLC
ESMP	Environmental and Social Management Plan
HSEC	Health, Safety, Environment and Community
IWF	Integrated Waste Facility
KGP	Khundii Gold Project
ROM	Run-of-Mine

Management Plans (including numbering) developed for the KGP are as follows:

AQMP	D1: Air Quality Management Plan
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SUSTAINABILITY EAST ASIA LLC

ERDENE RESOURCE DEVELOPMENT

ERDENE MONGOL LLC

Critical Habitat Assessment

May 2020

Sustainability East Asia LLC
T +976 7011 4921
F +976 7010 4921
State registration number:
9019036111

801 San Business Centre
Prime Minister Amar's
Street-29
8th Khoroo, Sukhbaatar
District
Ulaanbaatar-14200
Mongolia
mongolia@sustainability.net

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Appendices

Appendix A: List of Species Screened for Critical Habitat Assessment

Abbreviations

AoI	Area of Influence
CAGD	Central Asian Gobi Desert
CHA	Critical Habitat Assessment
CHSA	Critical Habitat Assessment Study Areas
CR	Critically Endangered
EBRD	European Bank for Reconstruction and Development
EN	Endangered
GGSPA	Great Gobi Strictly Protected Area
GGSNP	Gobi Gurvan Saikhan National Park
GN6	Guidance Note 6 (IFC)
IBA	Important Bird Area
IFC	International Finance Corporation
KGP	Khundii Gold Project
MLA	Mineral Licenced Area
PR	Performance Requirement (used by EBRD)
PS	Performance Standard (used by IFC)
TBNR	Tost, Toson Bumbiin Nuruu Natural Reserve
TNC	The Nature Conservancy

1. INTRODUCTION

1.1 Project Overview

The Khundii Gold Project (KGP) site is located in Bayankhongor *aimag* of Mongolia, approximately 980 km south-west of Ulaanbaatar and 300 km south of Bayankhongor City. The KGP includes two deposits, Bayan Khundii and Altan Nar, located on the separate Mineral License Areas (MLA) of Khundii and Tsenkher Nomin respectively, which are approximately 16 km apart. The KGP area is located in the territory of Shinejinst and Bayan-Undur *soum*s, with the nearest towns (*soum* centres) being Shinejinst and Bayan Undur, located approximately 70 km northeast and 80 km north, respectively (Figure 1). The Bayan Khundii site will be developed first, with all process and mine supporting infrastructure located there. From Year 7, the Altan Nar mine is proposed for development as a satellite operation with minimal facilities. The public Access Road between the Bayan Khundii mine licence area and the Shinejinst *soum* centre, and the proposed mine water supply bore field area approximately 2-5 km south of Bayan Khundii are considered as part of the KGP.

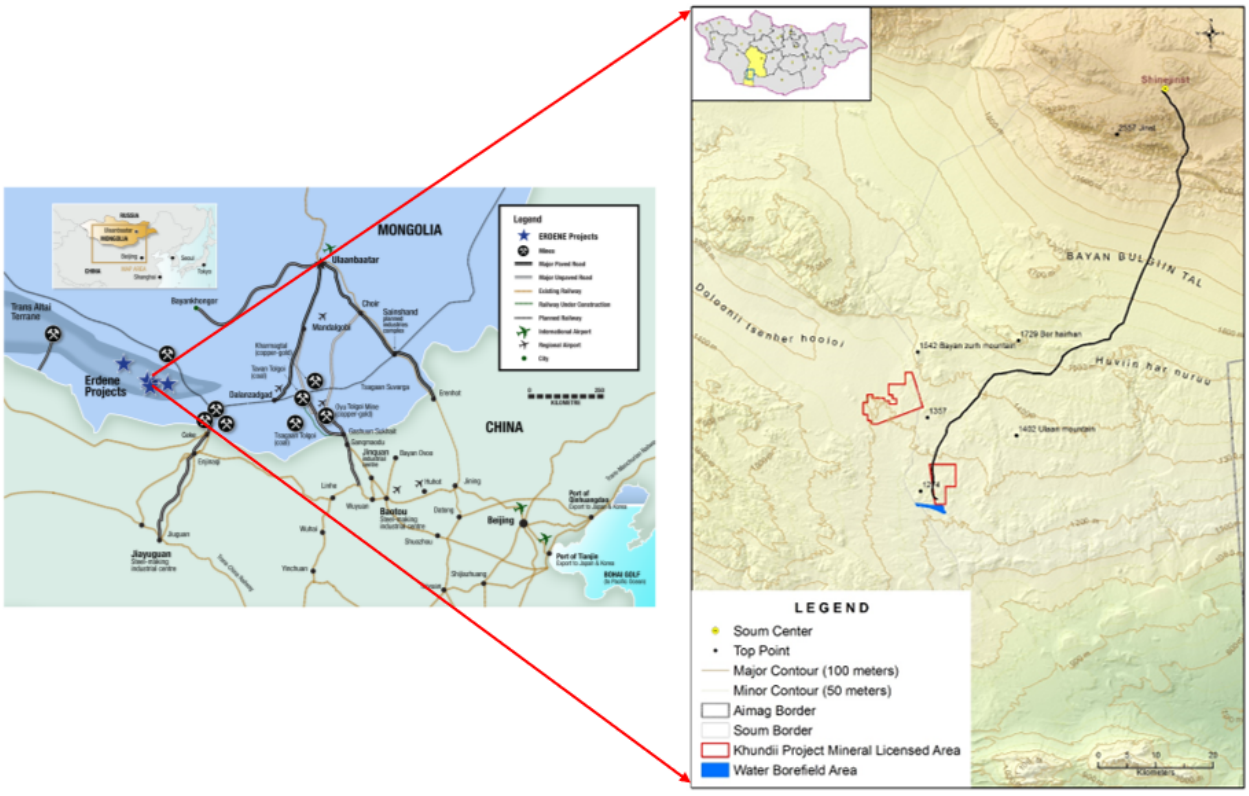


Figure 1 Khundii Gold Project Location

The Khundii Gold Project will contain the following key infrastructure components:

- Workers camp to accommodate up to an estimated 421-500 people during construction and operation;
- Ore Processing Plant;
- Integrated Waste Facility;
- Unpaved, existing public access road between Bayan Khundii MLA and Shinejinst *soum*;

- Water supply buried pipeline linking the processing plant and bore field 2-5 km south of the Bayan Khundii MLA;
- Onsite diesel genset/solar hybrid power station; and
- Other onsite mine support facilities (e.g. landfill, wastewater treatment facility, workshops, offices and warehouse).

1.2 Purpose

The European Bank for Reconstruction and Development (EBRD) Performance Requirement 6 (PR6) on Biodiversity Conservation and Sustainable Management of Living Natural Resources requires assessment of Critical Habitat within a project Area of Influence (AoI). Paragraph 14 of the 2014 PR describes critical habitat as the most sensitive biodiversity features.

This report provides a technical analysis to understand if the KGP triggers the Priority Biodiversity Features or Critical Habitat requirements of PR6. The CHA is required to identify areas where additional actions may be required to achieve No Net Loss for Priority Biodiversity Features and/or Net Gains for Critical Habitat (where appropriate) and outlines the steps to achieve this. This assessment used biodiversity data collected under the KGP baseline environmental surveys (by Eco Trade LLC in 2016, 2017 and together with Sustainability East Asia LLC in 2019), and additional species information from reference studies for Critical Habitat Assessment (CHA) screening.

1.3 Standards and Requirements

The EBRD as well as other financial institutions are considering providing financing to Erdene to construct and operate the Project. Thus, the following standards and guidance notes are used for this assessment:

- EBRD (2014) Performance Requirement (PR) 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- Guidance Note: EBRD Performance Requirement 6;
- International Finance Corporation's (IFC) Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources; and
- Mongolian Law on Environmental Impact Assessment (2012).

This report has been prepared to meet the EBRD (2014) PR6 requirements. The IFC's Guidance Note 6 recommendations for critical habitat determination thresholds were also used as directed by the Guidance Note: EBRD PR6.

The EBRD requires its clients to assess all projects with social or environmental risks and potential impacts against a series of 10 Performance Requirements (PR). The client is required to demonstrate whether a PR is triggered or not. Where projects trigger a Requirement, they must show in a detailed report whether mitigation measures can be designed and implemented in a satisfactory way following the requirements set out in the relevant PR. The implementation of actions necessary to meet the requirements of the PR is managed through the client's Social and Environmental Management System – in the case of PR6, this is the Biodiversity Management Plan.

The Mongolian Law on Environmental Impact Assessment (2012) requires Detailed Environmental Impact Assessments (DEIA) for all mining projects. The DEIA does not require separate CHA assessment but requires project proponents to take systematic impact mitigation

measures (including biodiversity offsets) for identified potential impacts to biodiversity habitat and ecosystems through an environmental management plan.

2. DEFINITIONS

2.1 Priority Biodiversity Features

The EBRD PR6 adopts a critical habitat criterion-based approach for priority biodiversity features combining the concept of irreplaceability (the limited number of places in which the feature is found) and vulnerability (the risk of the feature being lost over time). The following characteristics are provided for assessment in determining whether any given habitat has priority biodiversity features:

1. Threatened habitats – For example, those that are considered to be under pressure by national, regional, or international assessments.
2. Vulnerable Species – For example, those species listed by the International Union for Conservation of Nature (IUCN) or any other national/regional lists (such as national Red Lists) as Vulnerable (VU) or equivalent. These include animal and plant species of community interest identified under the EU Habitats Directive (Annex II and Annex IV).
3. Significant biodiversity features identified by a broad set of stakeholders or governments – For example, Key Biodiversity Areas and Important Bird and Biodiversity Areas (IBAs), nationally or internationally important species or sites for conservation of biodiversity, areas meeting national habitat definitions.
4. Ecological structure and functions needed to maintain the viability of priority biodiversity features – For example, riparian zones and rivers, dispersal or migration corridors, hydrological regimes, seasonal refuges or food sources, keystone or habitat-forming species, where these are essential for priority biodiversity features.

The regulatory designated[1] 'Rare' or 'Very Rare' species are also assessed under the Priority biodiversity feature Criterion 3 as significant biodiversity features identified by the Mongolian Government.

As defined in the Guidance Note on EBRD PR6, the priority biodiversity features have a high, but not the highest degree of irreplaceability and/or vulnerability. Although a level below critical habitat in sensitivity, they still require careful consideration during project assessment and impact mitigation.

2.2 Critical Habitat

Critical Habitat is a concept developed by major international lending organisations to protect areas essential to the conservation of high value biodiversity features. The term is defined by Paragraph 14 of EBRD PR6 and Paragraph 16 of International Finance Corporation (IFC) Performance Standards (PS) 6. References to species conservation status refer to the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (hereafter "the IUCN Red List").

Paragraph 14 of the EBRD PR6 defines the most sensitive biodiversity features as Critical Habitat, which comprise one of the following:

1. highly threatened or unique ecosystems;

[1] Mongolian Law on Fauna (2012) and the Mongolian Law on Natural Plant (1995) requirements

2. habitats of significant importance to endangered or critically endangered[2] species;
3. habitats of significant importance to endemic or geographically restricted species;
4. habitats supporting globally significant (concentrations of) migratory or congregatory species; and
5. areas associated with key evolutionary processes.; and
6. ecological functions that are vital to maintaining the viability of biodiversity features described as Critical Habitat features.

EBRD's Guidance Note on PR6 provides further definitions (Table 1) and examples for critical habitat and its relationship with Priority Biodiversity Features.

Table 1 Examples of Features for Critical Habitat and Relationship with Priority Biodiversity Features Criteria

Critical Habitat	Examples	Priority biodiversity features
1. Highly threatened or unique ecosystems	Ecosystems that are at risk of significantly decreasing in area or quality; have a small spatial extent; and/or contain concentrations of biome-restricted species. For example: • Ecosystems listed as, or meeting criteria for, Endangered or Critically Endangered by the IUCN Red List of Ecosystems • Areas recognised as priorities in official regional or national plans, such as National Biodiversity Strategy and Action Plans • Areas determined to be of high priority/significance based on systematic conservation planning carried out by government bodies, recognised academic institutions and/or other relevant qualified organisations (including internationally recognised NGOs).	Threatened habitats
2. Habitats of significant importance to endangered or critically endangered species	Areas supporting species at high risk of extinction (Critically Endangered or Endangered) on the IUCN Red List of Threatened species (or equivalent national/regional systems). For example: • Alliance for Zero Extinction sites • Animal and plant species of community interest in need of strict protection as listed in EU Habitats Directive (Annex IV).	Vulnerable species

[2] As listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. The determination of critical habitat based on other listings is as follows: (i) if the species is listed nationally/regionally as critically endangered or endangered, in countries that have adhered to IUCN guidance, the critical habitat determination will be made on a project-by-project basis in consultation with competent professionals; and (ii) in instances where nationally or regionally listed species' categorisations do not correspond exactly to those of the IUCN (for example, some countries more generally list species as "protected" or "restricted"), an assessment will be conducted to determine the rationale and purpose of the listing. For the latter case, the critical habitat determination will be based on such an assessment.

Critical Habitat	Examples	Priority biodiversity features
3. Habitats of significant importance to endemic or geographically restricted species	Areas holding a significant proportion of the global range or population of species qualifying as restricted range under Birdlife or IUCN criteria. For example: • Alliance for Zero Extinction sites • Global-level Key Biodiversity Areas and Important Bird and Biodiversity Areas identified for restricted-range species	Significant biodiversity features identified by a broad set of stakeholders or governments (such as Key Biodiversity Areas or Important Bird Areas)
4. Habitats supporting globally significant (concentrations of) migratory or congregatory species	Areas that support a significant proportion of a species' population, where that species cyclically and predictably moves from one geographical area to another (including within the same ecosystem), or areas that support large groups of a species' population that gather on a cyclical or otherwise regular and/or predictable basis. For example: • Global-level Key Biodiversity Areas and Important Bird and Biodiversity Areas identified for congregatory species • Wetlands of International Importance designated under criteria 5 or 6 of the Ramsar Convention.	
5. Areas associated with key evolutionary processes	Areas with landscape features that might be associated with particular evolutionary processes or populations of species that are especially distinct and may be of special conservation concern given their distinct evolutionary history. For example: • Isolated lakes or mountaintops • Populations of species listed as priorities by the Edge of Existence programme.	
6. Ecological functions that are vital to maintaining the viability of biodiversity features described (as critical habitat features)	Ecological functions without which critical biodiversity features could not persist. For example: • Where essential for critical biodiversity features, riparian zones and rivers, dispersal or migration corridors, hydrological regimes, seasonal refuges or food sources, keystone or habitat-forming species.	Ecological structure and functions needed to maintain the viability of priority biodiversity features

Table Source: Guidance Note: EBRD Performance Requirement 6. Biodiversity Conservation and Sustainable Management of Living Natural Resources

2.2.1 IFC PS6, Paragraph 16

Paragraph 16 of the IFC PS6 defines critical habitat as areas with high biodiversity value according to the following criteria:

1. habitat of significant importance to Critically Endangered and/or Endangered species;
2. habitat of significant importance to endemic and/or restricted-range species;
3. habitat supporting globally significant concentrations of migratory species and/or congregatory species; and
4. highly threatened and/or unique ecosystems; and/or

5. areas associated with key evolutionary processes.

The IFC and EBRD definitions for critical habitats are closely aligned, except the sixth additional requirement by EBRD that focuses on the ecological functions vital to the critical habitat features.

2.3 Protected Areas

In circumstances where a proposed project is located within a legally protected area or an internationally recognized area, the project is required to meet the requirements of Paragraph 20, as applicable. Guidance Note: EBRD PR6 (Section 4.5) provides clarifications for protected area definitions and project owner responsibilities if proposed project activities have potential impacts on the protected areas.

3. METHODOLOGY

There is no universally accepted method for determining critical habitat. However, both IFC's Guidance Note 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources and EBRD's Guidance Note: EBRD PR6 recommend closely aligned approaches for critical habitat determination.

The common approach for CHA starts with undertaking a scoping and screening assessment to focus the CHA on those areas that both have

(i) the potential for the presence of Priority Biodiversity Features and/or Critical Habitat; and

(ii) which may potentially be impacted by project activities.

Following this screening assessment, the CHA then focuses on the assessment of these areas to systematically identify:

- whether these areas include any features/species that trigger classification of priority biodiversity and/or critical habitat; and
- any qualifying priority or Critical Habitats that may be impacted by the proposed development and for which either additional mitigation and/or additional conservation actions/offsets may be required to achieve the appropriate mitigation. That is, no net loss (NNL; for priority features) and net gain (NG; for Critical Habitat).

3.1 Steps in Critical Habitat Assessment

Commensurate with Guidance Note: EBRD PR 6, the CHA is conducted in following steps:

- Step 1: Define the Study Area;
- Step 2: Stakeholder Consultation and Initial Desktop Review of all Available Data;
- Step 3: Verification of Available Information;
- Step 4: Confirmation of Biodiversity; and
- Step 5: Determination of Critical Habitat Status.

The methodology followed for each of these steps is described below.

3.1.1 Step 1: Define the Study Area

Both IFC and EBRD requirements recommend CHA studies to cover broad landscape level areas for critical habitat study to capture potential direct and indirect impacts. In other words, the CHA area must not narrowly focus on the project site. For example, Guidance Note: EBRD PR6 recommends CHA study area to include a relatively broad landscape or seascape unit that provides the required ecological functions to maintain the biodiversity features of interest. Considering the KGP activities' coverage on areas that may contain potential critical habitat qualifying biodiversity species and those species' habitat requirements, the following two different geographic units have been identified as Critical Habitat Assessment Study Areas (CHSA) for this assessment. The selected study areas are considered to correspond with the KGP AoI for direct and indirect impacts.

3.1.1.1 Non-Migratory Biodiversity Features Critical Habitat Assessment Study Area

This study area is determined to assess critical habitat for non-migratory biodiversity features that do not require a large habitat coverage for their survival. The following buffer areas around the KGP components are considered for this study area:

- 10 km buffer areas covering both Khundii and Tsenkher Nomin MLA;
- 10 km buffer area covering the water exploration bore field area; and
- 500 m buffer area covering both sides of the mine site access road from Shinejinst *soum.*

Buffer areas around the above features overlap due to the close proximity to each other. The total overlap area is 1,230 km^2 (Figure 2). Footprints of the proposed haul road between the MLAs, and proposed water supply pipeline between the water exploration field and the Khundii MLA are included in the above area, thus not shown in Figure 2. For the water exploration field, the 10 km average extent buffer was calculated conservatively from the outer edges of the potential groundwater drawdown area identified by hydrogeological study.

This study area is anticipated to include all direct and indirect potential impacts of construction and operation of the KGP on non-migratory biodiversity species such as plants, reptiles and small mammals etc. that do not require large habitat for their survival.

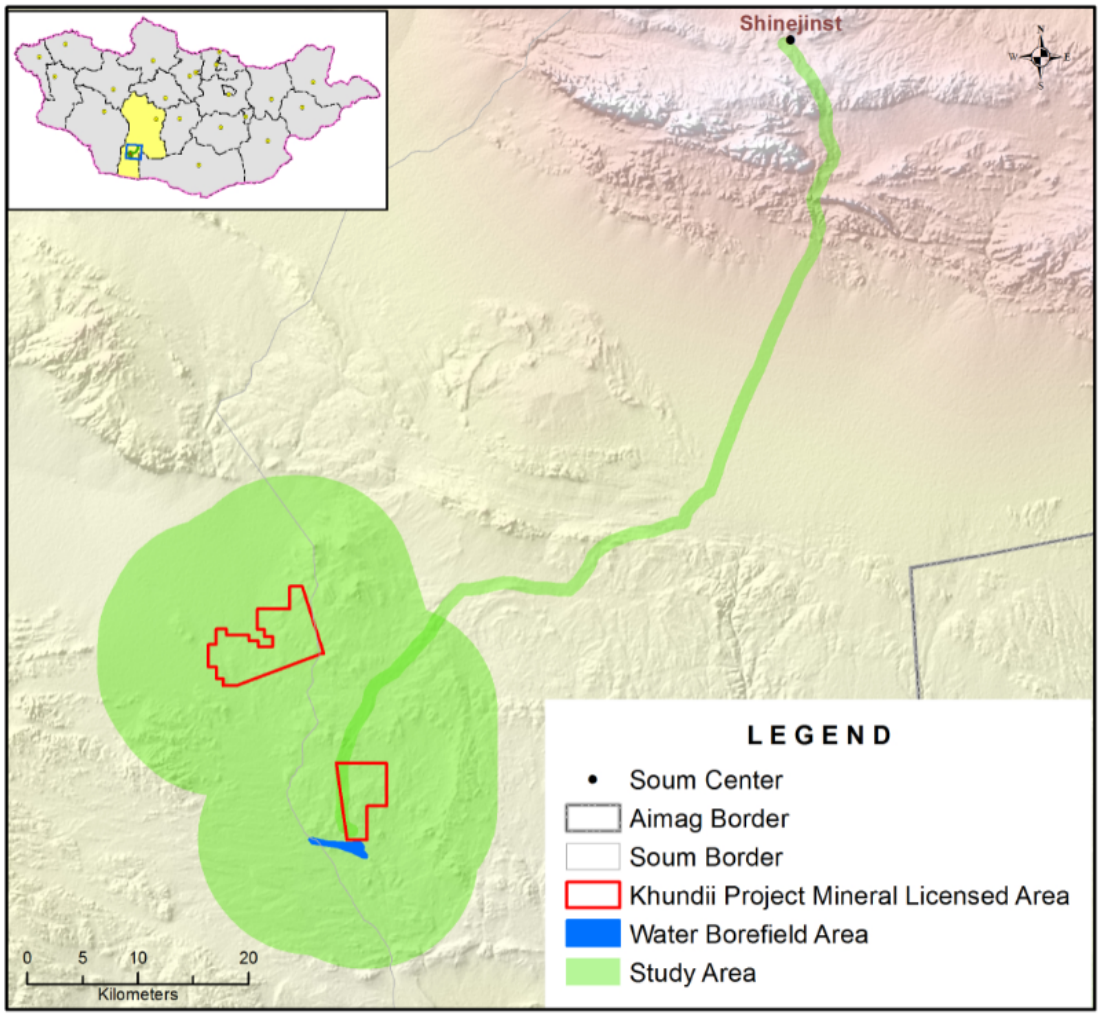


Figure 2 Non-Migratory Species Critical Habitat Assessment Study Area

3.1.1.2 Large Mammal Critical Habitat Assessment Study Area

Large mammal CHSA is considered to adequately characterise potential broader ecosystem-level impacts from KGP activities to migratory species that require large habitats. The large mammal CHSA is conservatively considered as the three legally protected areas. Additionally, two areas that have been identified by experts for legal protection (TNC 2014) are also included in the large mammal CHSA.

The existing legally protected areas include the Great Gobi Strictly Protected Area (GGSPA) Part A, 27 km south of the KGP, the Gobi Gurvan Saikhan National Park (GGSNP), 48 km east of the KGP, Tost, Toson Bumbiin Nuruu Natural Reserve (TBNR), about 70 km south-east of the KGP (Figure 3).

The additional two areas (i.e. the Nomingiin Gobi and the Edrengiin Nuruu shown on Figure 3 as expert-designated priority conservation areas) included in this assessment are not designated as protected areas by the Mongolian government, but identified as important areas for potential protection due to the occurrence of rare biodiversity species and their location as movement corridors for large ungulates between the existing protected areas (TNC 2013, 2014) (Figure 3). This assessment conservatively included them in the KGP large mammal CHSA to adequately encompass the regional level habitat required for large ungulate movement.

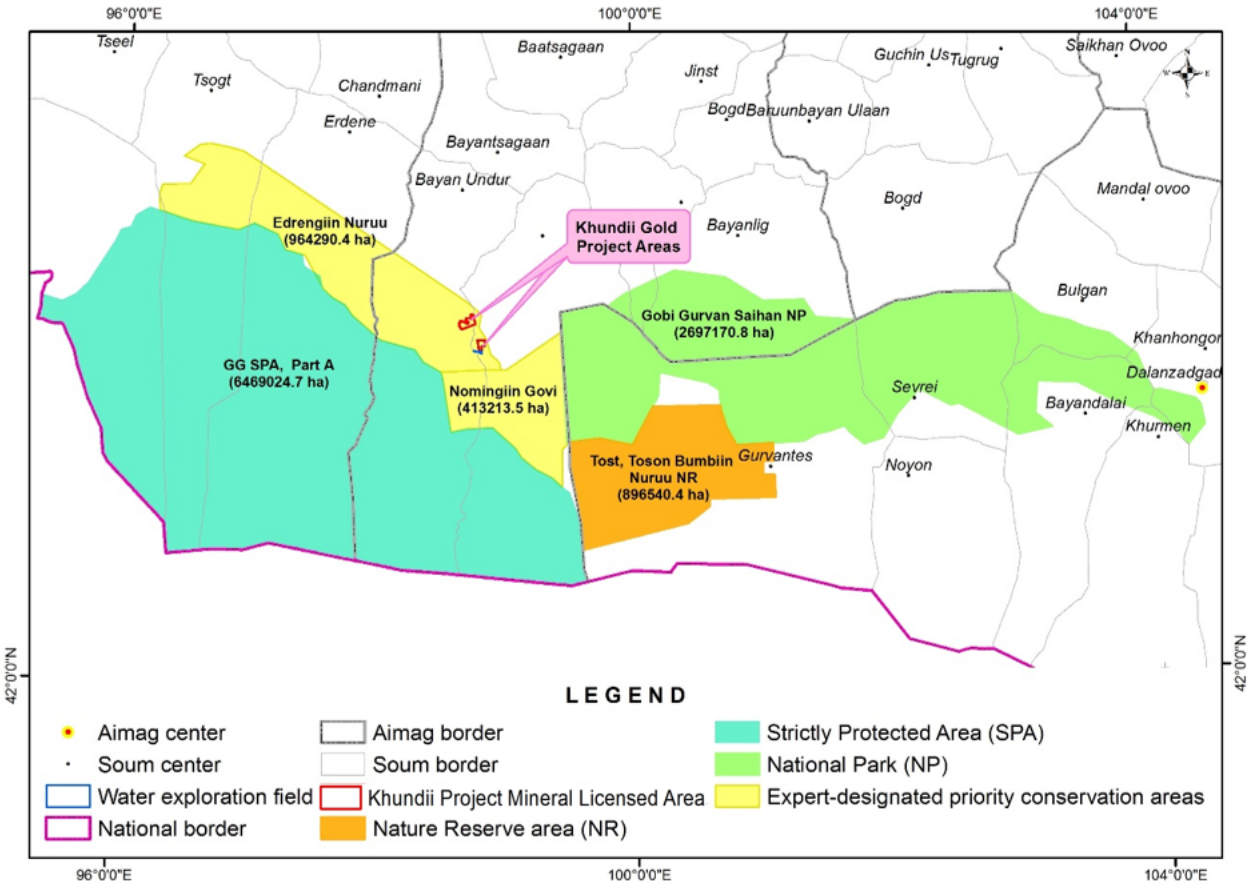


Figure 3 Critical Habitat Assessment Study Area for Large Mammals

The total area for the large mammal critical habitat is 114,402 km^2. As mentioned earlier, these areas are conservatively selected to encompass potential direct and indirect impacts of the KGP to large mammals whose habitat requires large home range at regional level and migratory corridor for searching food sources for their survival. The main mammal species of concern for this unit of study area include goitered gazelle *(Gazella subgututturosa)*, asiatic wild ass *(Equus hemionus)*, wild bactrian camel *(Camelus ferus)*, snow leopard *(Uncia uncia)*, Siberian ibex *(Capra sibirica)* and argali sheep *(Ovis ammon)*.

This study scoped out the Gobi bear *(Ursus arctos gobiensis)* from this assessment as no direct or indirect impacts are expected from the KGP activities to this species and its habitat.

Gobi bear population size is believed to have been relatively stable over the last 50 years (Montsame 2019), but low reproductive rates, the potential effects of inbreeding, and extreme environmental conditions continue to constitute severe threats to this species. Gobi Bear is listed as Critically Endangered on the Mongolian Red List due to its known very low population (i.e. maximum of 50 individuals) in Mongolia (Batsaikhan et al. 2004). The Gobi bear is not assessed under the IUCN Red List as it is considered a subspecies of *Ursus arctos* (Brown bear). The current estimated habitat range of this species is restricted to about 18,000 km^2 areas including Atas Bogd, Shar Khuls and Tsagaan Bogd mountains, near to oases in the southern part of the GGSPA Part A (Figure 4). Distance between the Gobi bear known home range and the KGP site is about 80 km.

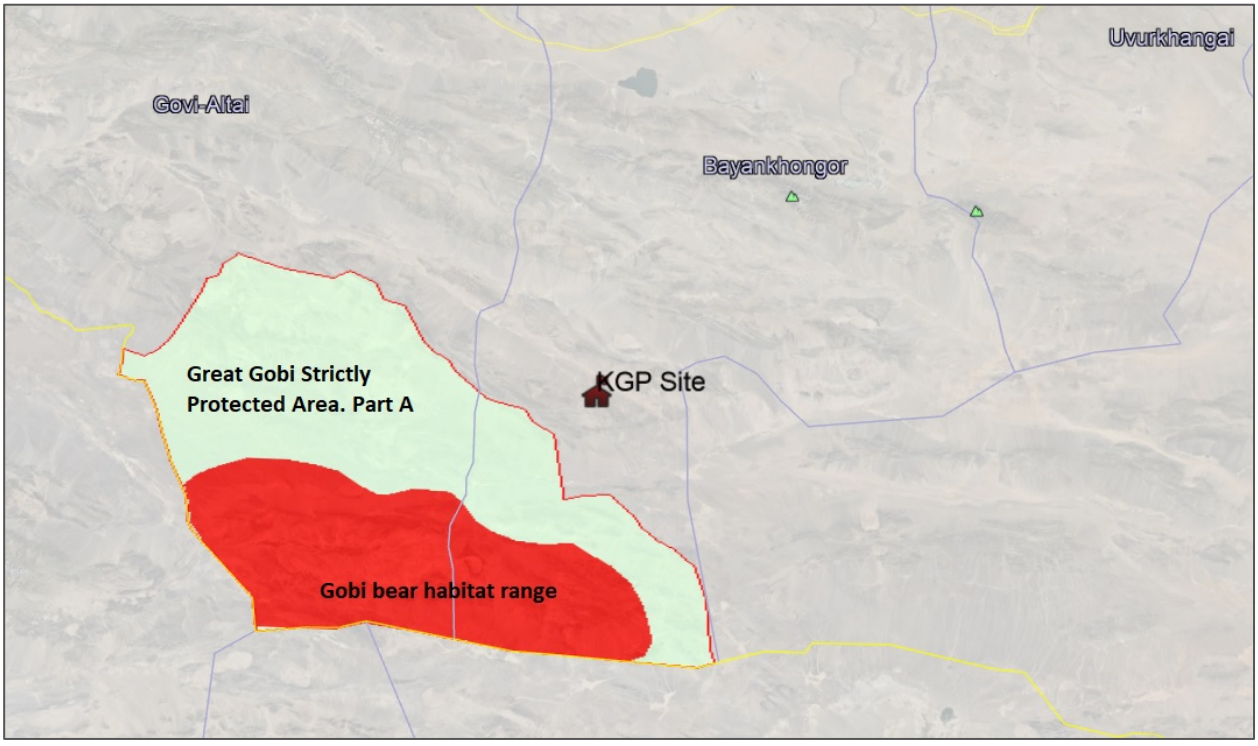
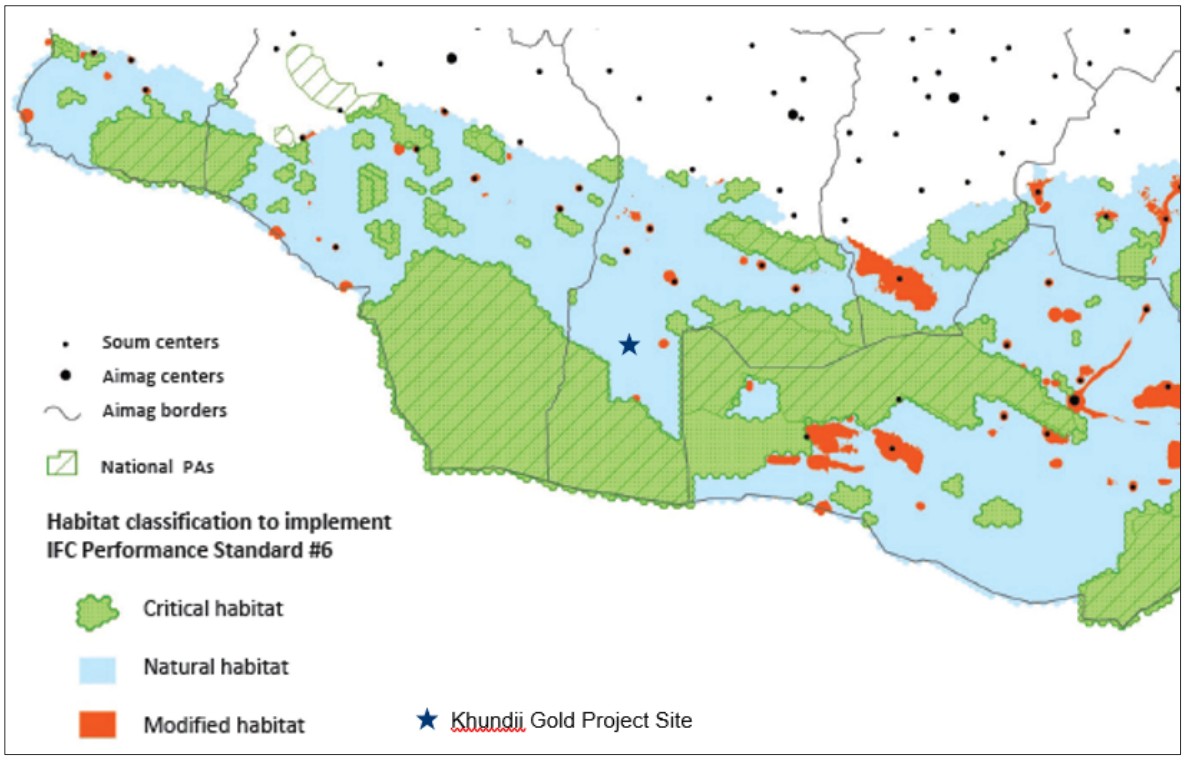


Figure 4 Gobi bear *(Ursus arctos gobiensis)* Habitat Range and the Khundii Gold Project Location

This assessment conservatively allowed large areas for large mammal species, which require regional level landscape (Figure 3) that may be impacted by the KGP activities directly or indirectly. In case of Gobi bear, the KGP AoI is not expected to overlap and impact the known Gobi bear habitat and ecological functions that support the species.

The selected study area for large mammals for this CHA is similar to the critical habitat areas recommended by TNC (2013) in the western part of the Mongolian Gobi under the IFC critical habitat determination, shown in Figure 5.



Map source: The Nature Conservancy (2013)

Figure 5 The Nature Conservancy (2013) Recommended Critical Habitat Areas in the South-West Region of Mongolia

The study areas determination for the CHA was informed from a literature review and consultations with experts considering the candidate habitat types and species general location, spatial extent, sensitivity, regional and global uniqueness, and vulnerability (considering potential impacts from the Project as well as potential cumulative impacts).

3.1.2 Step 2: Stakeholder Consultation and Desktop Review of Available Data

The focus of this stage is to develop an impartial understanding of the environmental-social landscape with respect to biodiversity values, as elicited through the stakeholder consultation process and literature review. The knowledge base to develop this understanding originates with the collection of baseline data on population and demographics, cultural resources, and biodiversity and ecosystem services.

For flora, vegetation, and fauna, the following literature sources were used:

- Appendix to Mongolian law on natural plants – "List of very rare plant species";
- Batsaikhan et al. 2014. Conserving the World's Finest Grassland Amidst Ambitious National Development;
- Clark et al. 2006. Mongolian Mammal Red List;
- Eco Trade LLC. 2017. Altan Nar Environmental and Social Baseline Study;
- Eco Trade LLC. 2017. Bayan Khundii Environmental and Social Baseline Study;

- Eco Trade LLC. 2019. Altan Nar Environmental and Social Baseline Study Update;
- Eco Trade LLC. 2019. Bayan Khundii Environmental and Social Baseline Study Update;
- Gombobaatar et al. 2011. Mongolia Red List of Birds;
- IUCN. 2019. The IUCN Red List of Threatened Species;
- Government of Mongolia decree No. 165 (2004) and No. 410 (2015). List of Rare Plants;
- Michael et al. 2019. Making space: Putting landscape-level mitigation into practice in Mongolia;
- Munkhbaatar et al. 2011. Mongolian Red List of Reptiles and Amphibians;
- Nyambayar et al. 2012. Red List of Mongolia and Conservation Plan compilation;
- Terbish et al. 2006. Mongolian Amphibian and Reptiles Red List;
- The Nature Conservancy and Ministry of Environment and Green Development. 2013. Identifying Conservation Priorities in the Face of Future Development: Applying development by Design in the Mongolian Gobi;
- The Nature Conservancy and Ministry of Environment and Green Development. 2014. Applying development by Design in the Mongolian Gobi: Brief descriptions of areas designated for protection and ecologically important areas;
- Ulziikhutag, N. 1989. Overview of the plants of Mongolia; and
- Urgamal, M. 2018. Species Catalogue of Rare and Threatened Vascular Plants of Mongolia.

Throughout the CHA, the authors held consultations with biodiversity specialists including Professor Batsaikhan. N and Dr. Buuveibaatar. B. Both Professor Batsaikhan and Dr. Buuveibaatar have an extensive knowledge of biodiversity species in southern Mongolia. They have authored peer reviewed scientific articles and reports on biodiversity research and conservation in Mongolia.

3.1.3 Step 3: Verification of Available Data

A combination of methods was used to compile data and other information for conducting this CHA, including inter alia literature review, ecological field surveys (including consultation with local people) and social research methods. Information was gathered on species, habitats, ecosystems, evolutionary processes, ecosystem services and biodiversity-based livelihoods and culture – both within the study areas and in the broader national, regional and global contexts. Particular attention was given to components of biodiversity likely to trigger Priority Biodiversity Features and Critical Habitat triggering species.

Most of the flora and fauna species information was obtained from the KGP environmental baseline surveys conducted by Eco Trade LLC in 2016 (28 May - 04 June), 2017 (17 – 23 July), and 2019 (11-19 June) for the Project AoI. The baseline field surveys included the following components:

- Botanical surveys and habitat/vegetation mapping;

- Reptile surveys;
- Small and large mammal surveys; and
- Bird surveys.

Additional rare plant species information collected by Erdene Mongol LLC since 2018 in the Khundii MLAs is included in the baseline data assessment.

The environmental baseline surveys were conducted across the KGP MLAs, water exploration bore field, site access road from Shinejinst to Bayan Khundii, and the proposed ore haul road between Altan Nar and Bayan Khundii deposits.

3.1.3.1 Vegetation Survey

A total of 31 vegetation plots (8 plots in Khundii MLA, 3 in Tsenkher Nomin MLA, 15 in Water exploration field, 3 along the site access road, and 2 along the planned haul road between Altan Nar and Bayan Khundii deposit areas) were sampled for the vegetation baseline assessment (Figure 6).

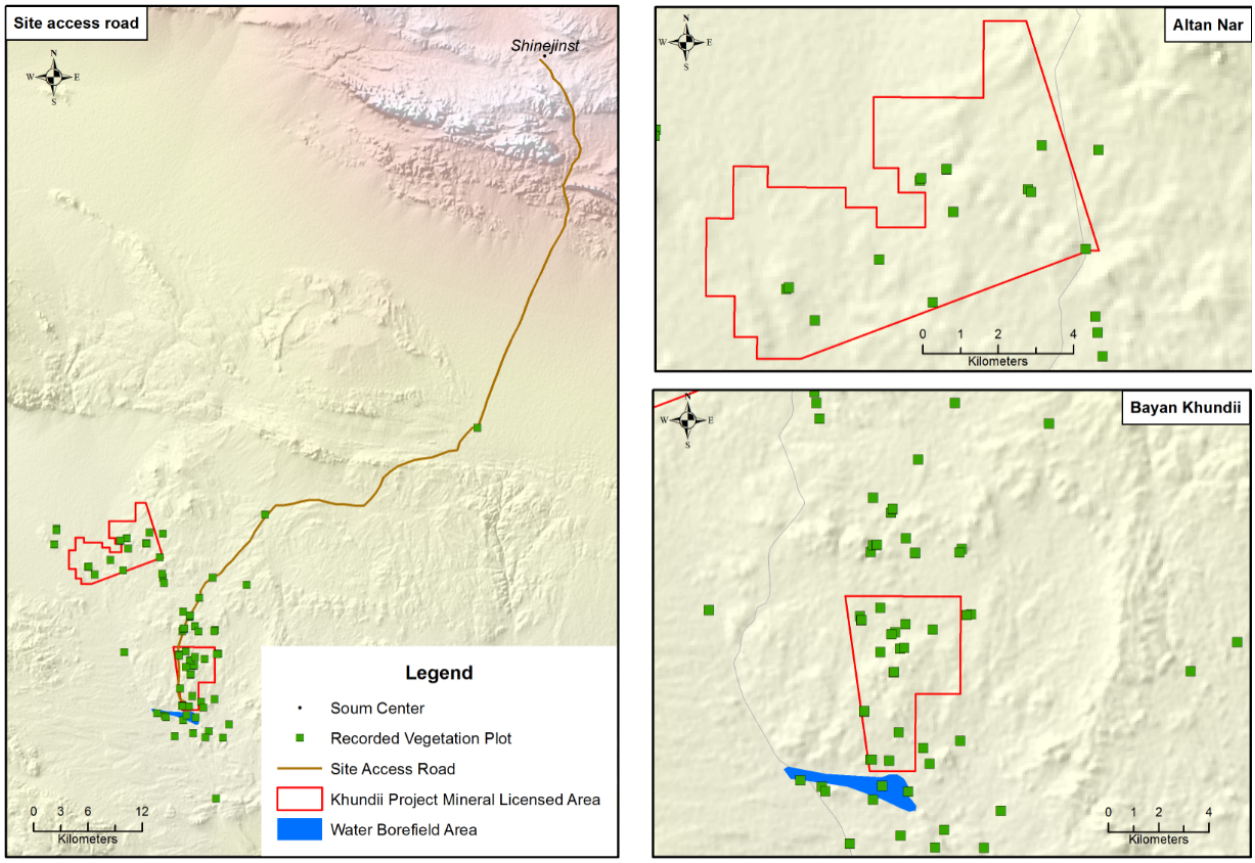


Figure 6 Location of the Vegetation Survey Plots (2019)

Eco Trade's field team used 10 m x 10 m (100 m^2) survey plots to study plant species representative of the vegetation communities in the study areas. Smaller, 1 m^2 (1 m x 1 m) plots nested within the 100 m^2 plots were used to determine vegetation biomass.

Detailed survey for rare plant species

The Mongolian Gobi-desert region is a known habitat for endemic or rare plants due to its unique landscape characterised by strong continental climate with cold winters and hot summers with very low annual precipitation (i.e. about 100 mm per year). Riverbeds or valleys with groundwater

tables close to the surface provide suitable local habitat for plants species in the region. To identify any rare or endemic plants within the KGP proposed mine development areas (i.e. camp, and mine construction, and proposed mine pits and waste rock dumps), Eco Trade's field team undertook a detailed vegetation survey in 2019 by walking through the direct mine development footprint areas and riverbeds that may support rare plant species. See Figure 7 for the rare plant survey tracks at Bayan Khundii and Tsenkher Nomin licensed areas.

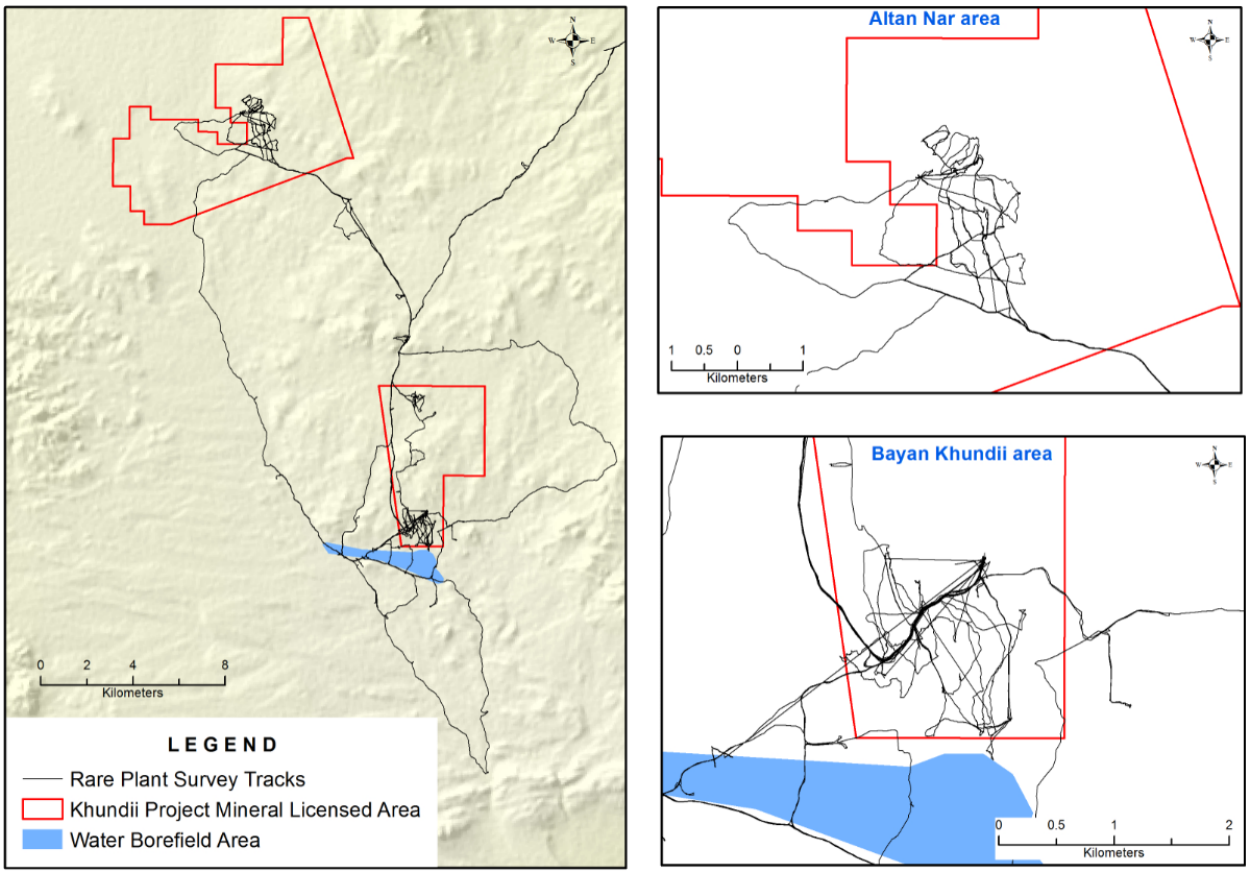


Figure 7 Rare Plants Survey Tracks on Proposed Mine Development Areas (2019)

3.1.3.2 Fauna Survey

Initial fauna baseline surveys for the Project area were undertaken in May-June 2016 and June 2017. The 2019 field survey areas included the water borefield area and areas along the planned haul road between Altan Nar and Bayan Khundii deposits, in addition to the MLAs.

The fauna baseline field surveys were undertaken by observation of species while driving and walking in the study areas, and investigation of animal tracks, droppings and rodent burrows for potential occurrences of wildlife in the study areas. All observed species locations and abundances were recorded and photographed. . In addition to direct observation, Eco Trade's survey team collected oral information from local community regarding regional fauna.

Small mammals were surveyed at night-time by driving and using a spotlight as most of the small mammals in the area are nocturnal. Small mammal survey tracks mostly covered the daytime mammal survey areas for large mammal and bird observation.

3.1.4 Step 4: Confirmation of Biodiversity

During this step, the list of candidate habitats and biodiversity species collected from the environmental baseline surveys, literature review and stakeholder consultation were screened to identify priority biodiversity and critical habitat triggering species.

To determine species conservation status, all listed species were screened against the IUCN Red List (2019) and Mongolian Regional Red List for endangered species and Mongolian regulatory requirements[3] designating rare plants and animals.

All habitats and species potentially triggering the Priority diversity features and Critical Habitat are shortlisted for further analysis for habitat determination. See Appendix A for the complete list of biodiversity species screened for this assessment.

3.1.5 Step 5: Determination of Priority Biodiversity Features and Critical Habitat Status

The aim of this step is to determine whether the Khundii Gold Project critical habitat study area is situated in Priority Biodiversity Features or Critical Habitat. IFC's PS6 Guidance Note provides detailed guidance on undertaking critical habitat assessment, and EBRD PR6 Guidance Note recommends using the IFC's critical habitat assessment guidance until internationally agreed methods are developed. Use of the IFC's guidance for Critical Habitat assessment to satisfy EBRD's Critical Habitat assessment is considered acceptable. The following thresholds recommended by IFC's PS6 Guidance Note (2019) have been used to assess the Critical Habitat Criterion in this report.

3.1.5.1 Critically Endangered and Endangered Species –IFC Criterion 1, EBRD Criterion 2

IFC PS6 Guidance Note recommends species with global extinction and listed as Critically Endangered (CR) and Endangered (EN) on the IUCN Red List of Threatened Species to be considered as part of Criterion 1. Inclusion in Criterion 1 of species that are listed nationally/regionally as CR or EN in countries that adhere to IUCN guidance shall be determined on a project-by-project basis in consultation with competent professionals as suggested by the PS6 Guidance Note.

The following thresholds are used for the Criterion 1:

a) Areas that support globally important concentrations of an IUCN Red-listed EN or CR species ($\geq$ 0.5% of the global population AND $\geq$ 5 reproductive units of a CR or EN species);

b) Areas that support globally important concentrations of an IUCN Red-listed VU species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet threshold a) above; and

c) As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species.

Consideration of the Criterion 1 thresholds was based on consultation with experts and expert judgment for nationally listed CR or EN species. The following steps were taken to evaluate species relative to the threshold, and the results of these assessments also informed evaluation of Criteria 2 to 4 (to the extent available data permitted quantitative assessment):

- identify the Extent of Occurrence (EOO) according to methodology described by IUCN (2001);

[3] Mongolian Law on Plants (2012), and Mongolian Law on Fauna (2012)

- identify the Area of Occupancy (AOO) according to methodology described by IUCN (2001);
- estimate the total known surface area for each habitat area;
- estimate population size if data are available or default to estimates of EOO and AOO;
- for CR and EN species, calculate the national EOO and AOO or total area of known sites or population;
- calculate the population or area of occupation within the assessment area; and
- calculate the proportion of the global population within the assessment area.

3.1.5.2 Endemic and Range Restricted Species and Highly Distinctive Assemblages –IFC Criterion 2, EBRD Criterion 3

Next, the species list was screened to identify any restricted range species. Recognising that Mongolia has few areas of distinct endemism, the South Gobi was defined as an area of endemism based on its biogeographic assemblage of species and habitats that are more internally similar than they are similar to surrounding areas (TBC and FFI 2012). By this definition, then, any species that is endemic to South Gobi is assumed to be not known anywhere else in the world.

Restricted range refers to a limited extent of occurrence (EOO) and for terrestrial vertebrates and plants with ranges of 50,000 km^2 or less. According to IFC Guidance Note 6 (GN6), the single threshold for Criterion 2 is the following:

(a) Areas that regularly hold ≥10% of the global population size and ≥10 reproductive units of a species.

3.1.5.3 Migratory and Congregatory Species –IFC Criterion 3, EBRD Criterion 4

Species that have a significant proportion of the population moving from one geographical area to another on a cyclical or periodic basis are considered migratory. Species that gather in globally significant numbers at a particular site on a seasonal or permanent basis are considered congregatory. Both groups are particularly vulnerable to disturbance to their places of migration or congregation as impacts could affect a globally significant portion of their populations. Examples of potentially Critical Habitat for migratory or congregatory species are areas used by breeding colonies or sites used for colonial roosting, and so-called bottleneck sites which are spatially constricted areas through which significant numbers of individuals of a species pass during a concentrated period of time (e.g., during migration). Among the taxonomic groups covered in the baseline studies for KGP, birds and some large ungulates are identified as having the highest potential to trigger the migratory criterion.

According to GN6, thresholds for Criterion 3 are the following:

a) areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle.

b) areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress.

3.1.5.4 Highly Threatened and/or Unique Ecosystems –IFC Criterion 4, EBRD Criterion 1

IFC GN6 provides a definition of ecosystems considered to be 'highly threatened' or 'unique' as those (i) that are at risk of significantly decreasing in area or quality, (ii) with a small spatial extent; and/or (iii) containing unique assemblages of species including assemblages or concentrations of biome-restricted species.

According to GN6, thresholds for Criterion 4 are the following:

a) Areas representing ≥5% of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.

b) Other areas not yet assessed by IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning.

3.1.5.5 Areas Associated with Key Evolutionary Processes –IFC Criterion 5, EBRD Criterion 5

IFC GN6 states two key factors in defining Criterion 5: 1) the physical features of a landscape, and 2) subpopulations of species that are phylogenetically or morpho-genetically distinct. These processes are considered at a scale finer than a broad geographic region. Areas associated with key evolutionary processes were screened using expert advice and appropriate cartography. In particular, the processes by which speciation has occurred within southern Mongolia were investigated. No quantitative significance thresholds exist for this criterion: therefore, there is a reliance on expert opinion and qualitative value judgement. While no thresholds are given in Guidance Note 6, for illustrative purposes, some potential examples of spatial features associated with evolutionary processes are as follows:

- Landscapes with high spatial heterogeneity are a driving force in speciation, as species are naturally selected based on their ability to adapt and diversify.
- Environmental gradients, also known as ecotones, produce transitional habitat, which has been associated with the process of speciation and high species and genetic diversity.
- Edaphic interfaces are specific juxtapositions of soil types (for example, serpentine outcrops, limestone, and gypsum deposits), which have led to the formation of unique plant communities characterized by both rarity and endemism.
- Connectivity between habitats (for example, biological corridors) ensures species migration and gene flow, which is especially important in fragmented habitats and for the conservation of metapopulations. This also includes biological corridors across altitudinal and climatic gradients and from "crest to coast."
- Sites of demonstrated importance to climate change adaptation for either species or ecosystems are also included within this criterion.

3.1.5.6 Ecological functions vital to maintaining the viability of biodiversity features – EBRD criterion 6

Although not included in the the IFC critical habitat criteria, the consideration of ecological functions that are vital to maintain the viability of biodiversity features described as critical habitat features is part of the guidance for the EBRD PR6. The Guidance Note: EBRD PR6 provides examples of this criterion for both critical habitat and priority biodiversity features. In summary, ecological functions without which available critical habitat species could not exist in a given ecosystem will qualify under this criterion. Ecological structure and functions needed for maintaining the viability of identified priority biodiversity species in a given ecosystem will also satisfy this criterion as a priority biodiversity feature. There are no quantitative thresholds that have been developed for assessment. Thus, qualitative assessments have been performed for this study. Potential ecological functions, for example, providing nesting habitat for birds, required for the identified critical habitat / priority biodiversity species existence within the study areas were assessed through consultation with the biodiversity experts involved in this CHA.

3.1.6 Limits and Robustness of this Assessment

Best available information was used to conduct this assessment, complemented by expert consultations. With respect to some terrestrial species, the region is data-poor. However, it is unlikely that the overall designation of Critical Habitat status would be affected. Where residual uncertainty exists, a precautionary approach to determination of Critical Habitats has been applied.

4. RESULTS OF THE CRITICAL HABITAT DETERMINATION

4.1 Critically Endangered and Endangered Species

4.1.1 Plants

No IUCN listed CR, EN and VU plant species were found from the species observed during the baseline surveys or known to occur in the KGP critical habitat study area for plants from literature. Within the critical habitat study area the following plant species do occur:

Species listed as Endangered (EN) in the Mongolian Red List:

- Mongolian Almond (*Amygdalus Mongolica)*
- Desert living cistanche *(Cistanche deserticola)*

Species listed as Vulnerable (VU) in the Mongolian Red List:

- Horsetailed ephedra (*Ephedra equisetina Bunge)*
- Brittle budara (*Iljinia Regelii)*
- Potanin's Incarvillea (*Incarvillea potanini)*
- Wild Rue (*Peganum harmala)*
- Euphrates poplar (*Populus diversifolia)*
- Snow lotus (*Saussurea involucrate)*
- Potanin's beancaper (*Zygophyllum Potaninii)*

Locations of the observed Mongolian Red Listed Threatened plant species are shown in Figure 8.

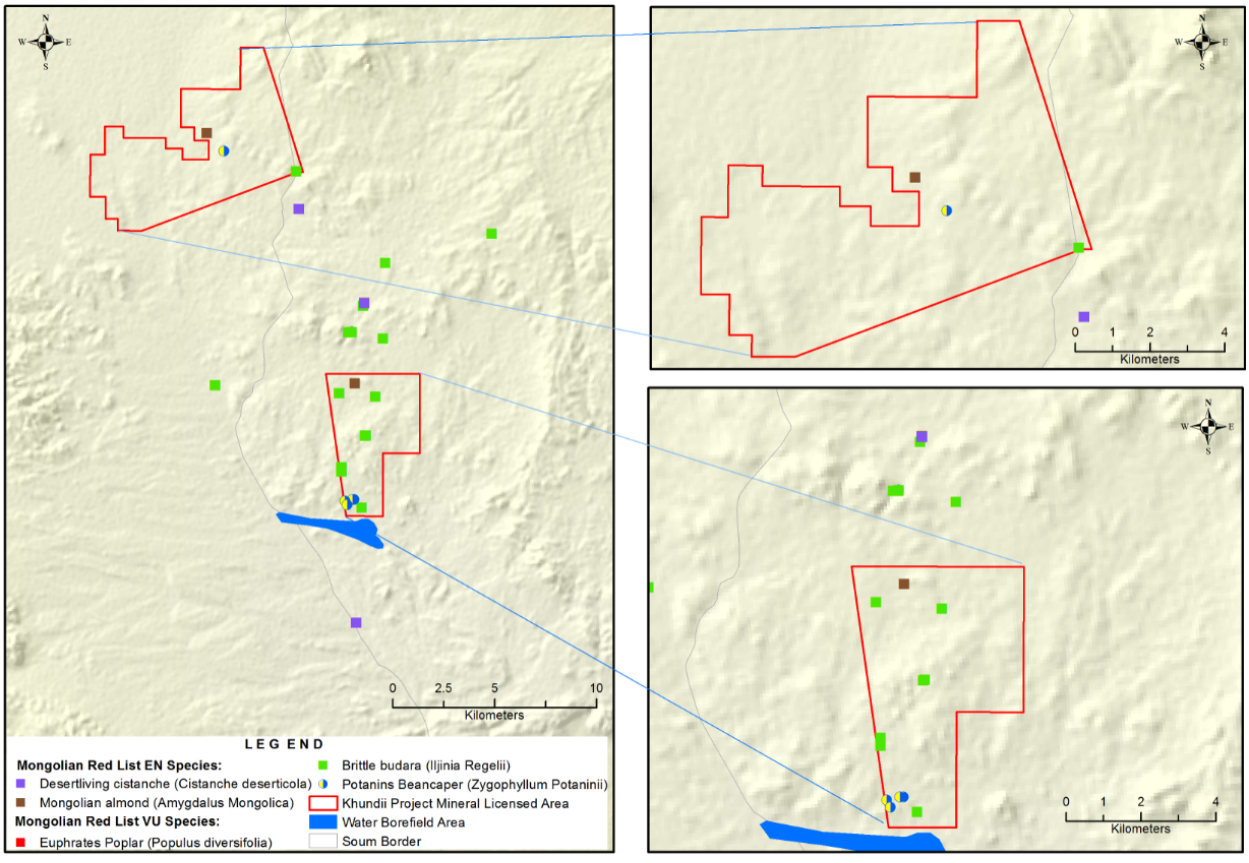


Figure 8 Identified Locations of Mongolian Red Listed Threatened Plant Species (2019)

Mongolian almond



Mongolian Almond *(Amygdalus Mongolica*) conservation status was assessed as EN in Mongolian Red List (2012). The rationale for this assessment was that uncertainty of regional population and known limited range of distribution which is known to be limited to 5,000 km^2 areas in the southern part of the Galbyn Gobi, Borzongyn Gobi in southern Mongolia, and Khurkh Uul in Gobi-Altai *aimag* (Nyambayar et al. 2012). Its known distribution has increased over the years including new areas further west (i.e. Bayantsagaan of Gobi Altai mountain, Ikh Bogd, Noyon Bogd, Nemegt, Tostyn mountains) of its known distribution after the initial assessment (MEGD 2014). The Wildlife Conservation Society (2018) studies in southern Mongolia have revealed at least 6,749 individuals of this species growing in Khanbogd *soum* of Umnugobi *aimag.* It is also known to grow in the Inner Mongolian region of China (eFloras 2019).

The detailed rare plants survey by Eco Trade (2019) (See Section 3.1.3 of this report) found two individuals of Mongolian almond in the KGP AoI.

Desert living cistanche



Desert living cistanche (*Cistanche deserticola*) is assessed as EN in the Mongolian Red List due to its decreasing population from medicinal and commercial use, decrease in its host plant (i.e. saxual - *Haloxylon ammodendron*) population from fuel use, and land degradation pressure (Nyambayar *et al.* 2012; MET 2014). Desert cistanche distribution in Mongolia includes Dornogobi, Galbyn Gobi, Khar Zagiin Khooloi in the southern Altai mountains, Baruun Khuurai of Dxuungariin Gobi, Olon nuuriin khundii, Ulaan nuur, Bayan zag and Ergiin zag areas (MET 2014).

Detailed vegetation survey in 2019 identified four individuals of desert living cistanche in Khundii MLA (2 individuals) and water borefield (2 individuals) south of the Khundii MLA.

Mongolian almond and Desert living cistanche species distribution and population in Mongolia are not quantitatively known, thus the critical habitat determination was qualitatively assessed through consultation with experts. Based on this assessment, it is concluded that there was no critical habitat for any species of plant in the study areas. All plant species listed as threatened (i.e. VU and EN) in the Mongolian Red List or designated as ‘rare’ or ‘very rare’ by the Mongolian regulations are assessed as Priority Biodiversity Features. See Table 2 for CHA conclusions for plant species for the KGP.

Table 2 List of Plant Species Screened for Critical Habitat or Priority Biodiversity Features Assessment

#	Scientific Name	Common Name	IUCN Red List of Plants	Mongolian Red List of Plants	Mongolian Legal Designation	Critical Habitat Determination Triggered	Priority Biodiversity Feature Triggered
1	*Amygdalus Mongolica*	Mongolian almond	NE	EN	Rare	No	Yes
2	*Amygdalus pedunculata*	Almond	DD	No	Rare	No	Yes
3	*Arnebia guttata*	Spotted arnebia	NE	LC	Very rare	No	Yes
4	*Asterothamnus centrali-asiaticus Novopokr.*	Central Asian Asterthamnus	NE	LC	Very rare	No	Yes
5	*Cistanche deserticola*	Desert living cistanche	NE	EN	Very rare	No	Yes
6	*Cynomorium songaricum*	Desert thumb	NE	No	Rare	No	Yes
7	*Ephedra equisetina Bunge.*	Horsetailed Ephedra	NE	VU	Very rare	No	Yes
8	*Iljinia Regelii*	Brittle budara	NE	VU	Very rare	No	Yes
9	*Incarvillea potanini Batal.*	Potanin's Incarvillea	NE	VU	Very rare	No	Yes
10	*Oxytropis acanthacea*	Whorled Spiny Oxytrope	NE	NT	Very rare	No	Yes
11	*Peganum harmala L*	Wild Rue	NE	VU	Very rare	No	Yes
12	*Phragmites communis*	Common reed	LC	No	Rare	No	Yes
13	*Populus diversifolia*	Euphrates poplar	NE	VU	Very rare	No	Yes
14	*Saussurea involucrata Bip*	Snow Lotus	NE	VU	Very rare	No	Yes
15	*Stellaria dichotoma L*	Chickweed	NE	No	Rare	No	Yes
16	*Zygophyllum Potaninii Maxim.*	Potanins Beancaper	NE	VU	Very rare	No	Yes

Locations of the Priority Biodiversity Feature triggered plant species around the KGP site are shown in Figure 9.

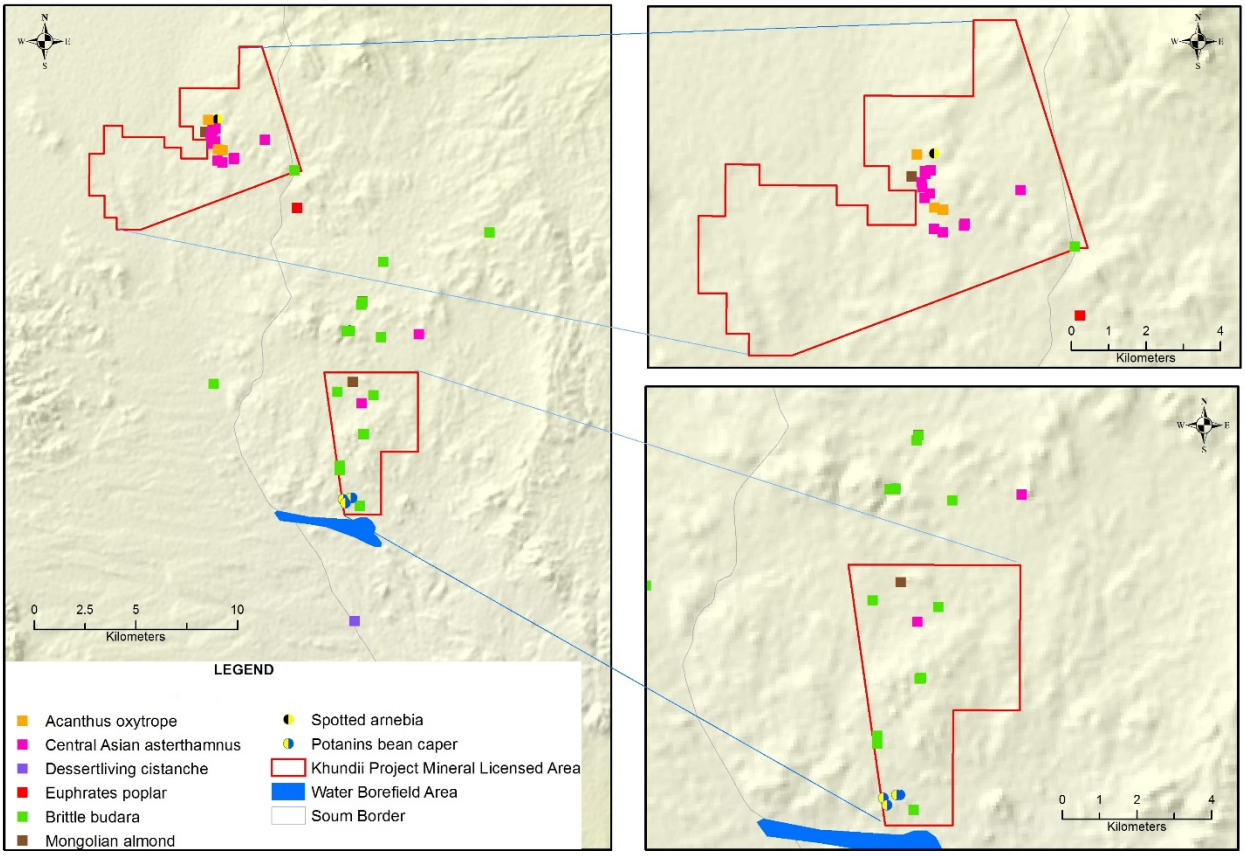


Figure 9 Locations of Priority Biodiversity Feature Triggering Plant Species Around the KGP site

4.1.2 Mammals

Six threatened or Mongolian government designated rare species that have been reported to occur in the KGP region (ME, GD and NC 2014) were assessed under this criterion. These were:

- Wild bactrian camel (*Camelus ferus*) – CR on IUCN Red list, EN on Mongolian Red List;
- Asiatic wild ass (*Equus hemionus*) – NT on IUCN Red List, EN on Mongolian Red List;
- Snow leopard (*Uncia uncia*) – VU on IUCN Red List, EN on Mongolian Red List;
- Argali (*Ovis ammon*) – NT on IUCN Red List, EN on Mongolian Red List;
- Marbled polecat (Vormela peregusna) – VU on IUCN Red List, DD on Mongolian Red List; and
- Siberian ibex (*Capra sibirica*) – Mongolian legal status 'rare'.

Results of the mammal species critical habitat assessment are summarised in Table 3 followed by assessment details in this section.

Table 3 Summary of CHA mammal species under Critically Endangered or Endangered Species Criterion

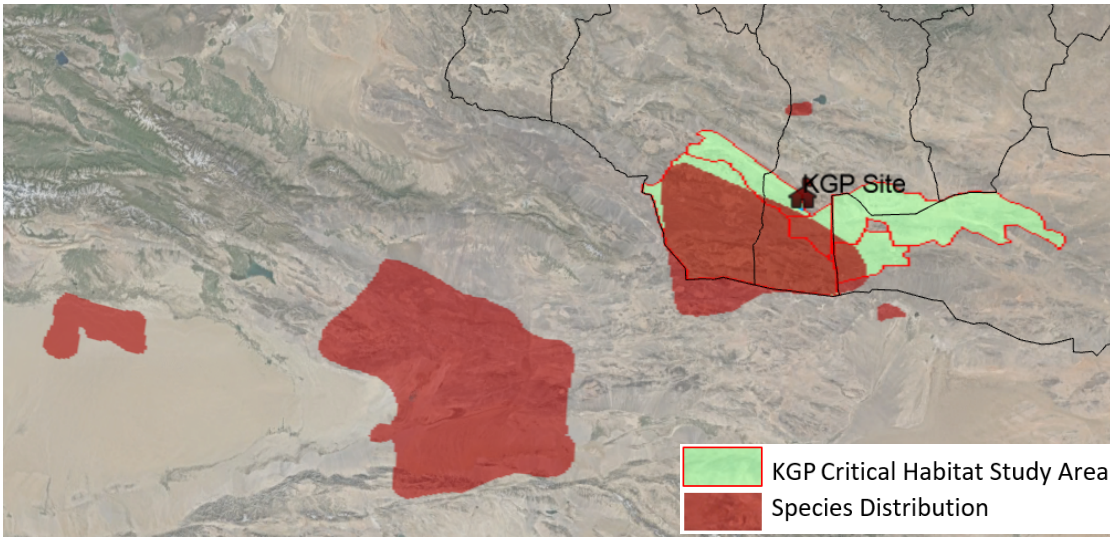
#	Scientific Name	English	IUCN Red List	Regional Red List	Mongolian Legal Status	Critical Habitat or Priority Biodiversity Determination Triggered
1	*Camelus ferus*	Wild bactrian camel	CR	EN	Very Rare	Yes- CH
2	*Equus hemionus*	Asiatic wild ass Mongolian	NT	EN	Rare	Yes – CH
3	*Uncia uncia*	Snow leopard	VU	EN	Very Rare	Yes – CH
4	*Ovis ammon*	Argali	NT	EN	Rare	Yes- CH
5	*Vormela peregusna*	Marbled polecat	VU	DD	Rare	Yes - PBF
6	*Capra sibirica*	Siberian ibex	LC	NT	Rare	Yes – PBF

Note: CR – Critically endangered; EN – Endangered; VU – Vulnerable; LC – Least concern; NT – Near threatened; DD – Data deficient; CH – Critical Habitat; PBF – Priority Biodiversity Feature.

Wild bactrian camel

Wild bactrian camel is listed as Critically Endangered on the IUCN Red List and Endangered on the Mongolian Red list. Its global distribution is limited to GGSPA Part A in Mongolia and adjacent areas in China. Other areas of distribution include Taklamakan desert, northern slopes of Arjin Shan mountains and adjacent areas in Lop Nur Wild Camel National Reserve in China. The Taklamakan desert population is likely to be extinct (Hare, 2008; Clark et al. 2006). Regional distribution in Mongolia includes the Trans Altai Gobi Desert from the foothills of the Edren Range to Shiveet Ulaan, and from Khukh Tumurtei Range to the state border (Clark et al. 2006), shown in Figure 10 below.

The GGSPA Part A is the main habitat for the wild bactrian camel in Mongolia and on rare occasions, mostly in winter, this species may move to southern parts of Bayanlig, Bayangovi *soum*s of Bayankhongor *aimag*, Gurvantes, Nemegtein gorge, Ingen Khoovryn gorge and Sevree *soum* southern desert areas in Umnugobi *aimag* (MET 2014). The estimated population was about 600 individuals in China and 350 individuals in Mongolia as of 2005, with numbers continuing to decrease (Clark et al. 2006).



Source: Hare, J. 2008. Camelus ferus. The IUCN Red List of Threatened Species 2008

Figure 10 Global Distribution Range of Wild Bactrian Camel

The large mammals CHSA for this assessment meets the CH threshold of;

- *Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (> 0.5% of the global population AND > 5 reproductive units of a CR or EN species)* (Refer to Section 3.1.5 for detailed description of the thresholds).

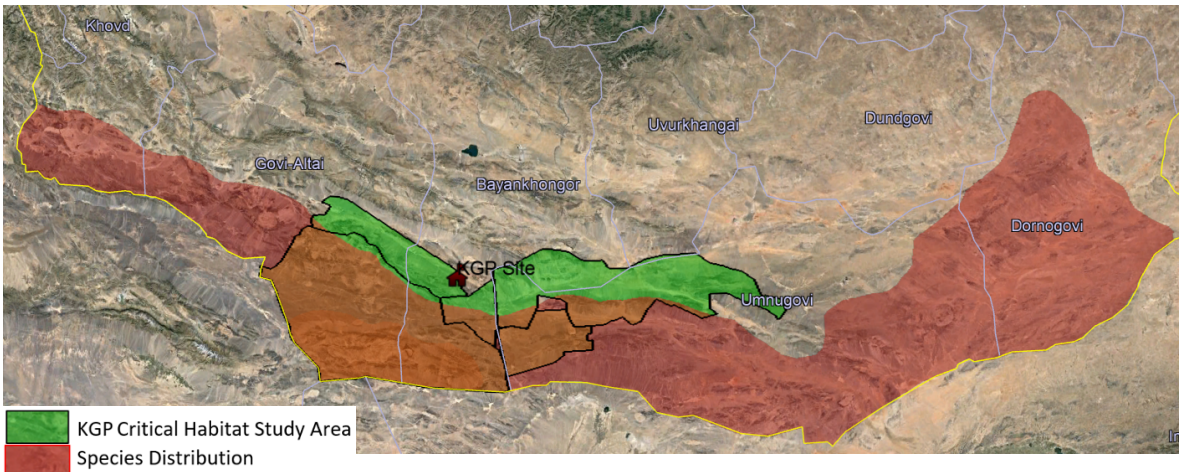
Therefore, based on the above information it is concluded that the KGP CHSA for large mammals is situated on Critical Habitat for wild bactrian camel under the IUCN listed Critically Endangered, Endangered species habitat criterion.

Asiatic wild ass

Asiatic wild ass habitat is assessed within the national context as it is not listed as threatened in the IUCN Red List, but as Endangered on the Mongolian Red List. This species is also designated as Rare species by the Mongolian regulation.

Asiatic wild-ass range in Mongolia includes steppe and semi-desert desert habitats, from the extreme west of the country to the Mongolian-Russian-Chinese border in the extreme north-east (Figure 11). Asiatic wild ass has experienced a major decline in population and range size, and are currently only found in Trans Altai Gobi Desert, Northern Gobi, Alashan' Gobi Desert and Dzungarian Gobi Desert, and as far north as Ikh Nartiin Chuluu Nature Reserve in Eastern Gobi. Recent evidence suggests that the population has either expanded or shifted further north and east over the past 20-25 years, but rarely crosses the Ulaanbaatar-Beijing railway line (Clark et al. 2006). There are important populations in GGSPA Part B in Dzungarian Govi, and GGSPA Part A. Due to the variability in plant productivity in its habitat, asiatic wild ass migrates between suitable pastures – particularly in times of drought or harsh winters.

Asiatic wild ass population in Mongolia was estimated to be around 19,000-20,000 individuals in 2003, and it is reported that the population was declining due to illegal hunting and habitat loss (Clark et al. 2006). The latest assessment of the IUCN Red List estimated 28,000 mature individuals (Kaczensky et al. 2015). Asiatic wild ass population research results between 2013 and 2015 in eastern part of the species habitat estimated about 36,000 individuals in southern Gobi khulan range covering around 78,700 km (WCS 2015). This species population in the western part of the species habitat is estimated to be over 7,000 with approximately 5,700 in Dzungarian Gobi, and about 1,500 individuals in Trans Altai Gobi as of 2010 (Ransom et al. 2012). Total population of asiatic wild ass in Mongolia is estimated to account for about 75% of the global population (Kaczensky et al. 2015).



Source: Google Earth; MET Environmental Information Data Base (2019)

Figure 11 Asiatic wild ass (*Equus hemionus)* Distribution Range in Mongolia

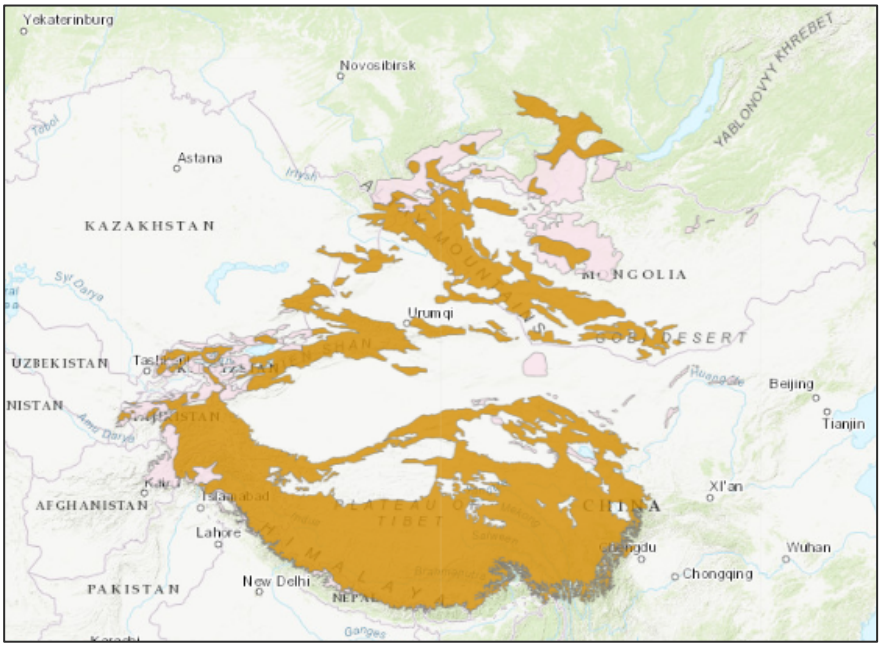
Based on the large distribution and migratory habits to search for better forage of this species, and the species high conservation status in Mongolia, it is concluded that the KGP large mammal CHSA is critical habitat for Asiatic wild ass under the threshold of:

- *As appropriate, areas containing important concentration of nationally listed Endangered species* (Refer to Section 3.1.5 for detailed description of the thresholds).

Snow leopard

The snow leopard (*Uncia uncia)* is assessed as Vulnerable under the IUCN Red List (McCarthy et al. 2017) and Endangered under the Mongolian Red List due to their declining population globally and in Mongolia. Snow leopard is under strict conservation by the Mongolian regulation with being included in the nationally designated Very Rare species.

The global range of the snow leopard is estimated to be about 2.8 million km^2 extending from the Himalayas in the south to the mountains of southern Siberia in the north (Figure 12). It inhabits mountainous rangelands at elevations of 3,000 m to over 5,000 m in the Himalaya and Tibetan Plateau but can occur as low as 500 m on small hills in the Altai and Gobi regions (McCarthy et al. 2017).



Source: IUCN 2019

Figure 12 Global Distribution Range of Snow Leopard (*Uncia Uncia)*

Snow leopard population is difficult to estimate accurately due to the elusive behaviour of this species. Estimated global population of mature snow leopard is believed to be between 2,500 and 10,000 (McCarthy et al. 2017). Its decline is attributed to decreasing habitat from increased livestock, intensified road and resource development activities, and poaching. Snow leopard distribution range in Mongolia (McCarthy 2000) is estimated to be around 103,000 km^2, with most sightings occurring in the central Trans Altai Gobi Desert and northern Gobi Altai Mountain Range.

Snow leopard population in Mongolia has been estimated to be somewhere between 500 and 1,000 individuals (Clark et al. 2006). Study results by the Mongolian Snow Leopard Foundation[4]

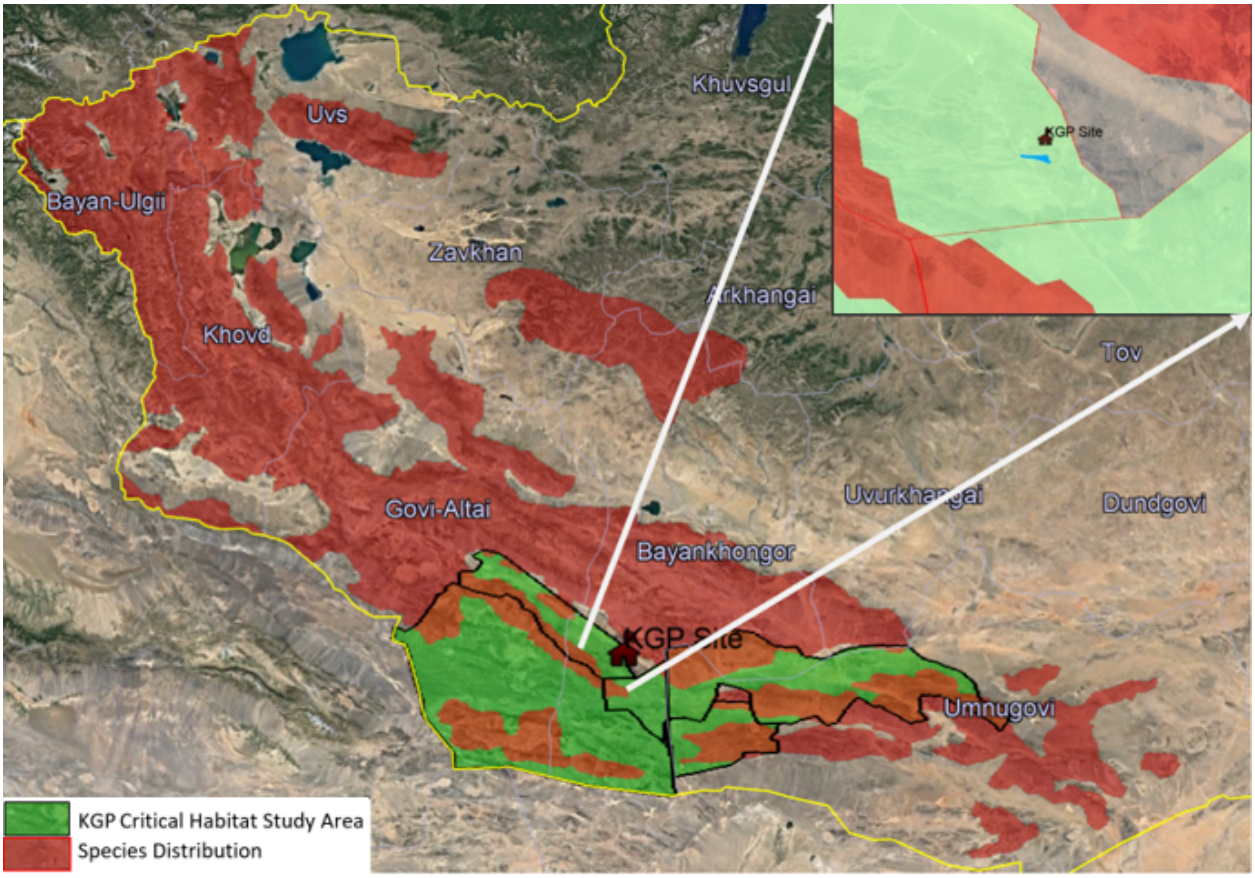
[4] http://www.snowleopard.mn/hutulbur/sudalgaa/irves-huzuuvchleh-sudalgaa/

(using camera traps and movement monitoring with GPS collared individuals) indicate that the closest observed snow leopard habitat to the KGP site is the Tost, Toson Bumba National Reserves, about 140 km south east (McCarthy et al. 2010). See Figure 13 below for distance from species habitat to KGP site.

The KGP site is not located on the snow leopard habitat range, but it is located about 20 km distance from this species known habitats of Edrengiin Nuruu in the south-west and Jinst uul range in the north-east (Figure 13). Based on the KGP's location between the species known habitats and the close proximity to the habitats, and this species high conservation status in Mongolian regulations, it is conservatively considered that the KGP CHSA for large mammals is critical habitat for snow leopard under the threshold of:

- *As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species* (Refer to Section 3.1.5 for detailed description of the thresholds).

nationally Endangered species Criterion.



Source: IUCN 2019

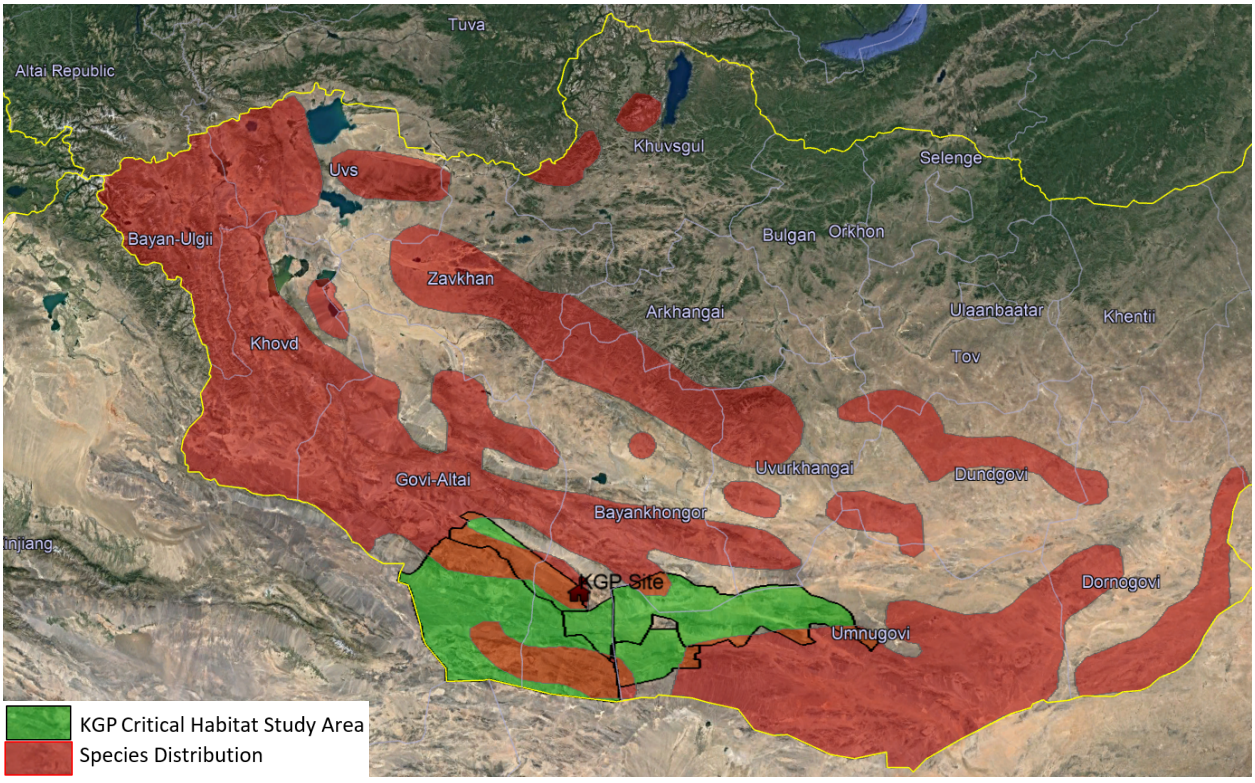
Figure 13 Regional Distribution Range of Snow Leopard *(Uncia uncia)*

Argali

Argali sheep (*Ovis ammon)* is listed as globally Near Threatened on the IUCN Red List of Threatened Species, as it is close to qualifying, due to population declines. In Mongolia, it is considered Endangered at the regional level (Clark et al. 2006) and also included in the Rare species designation list by the regulators.

Historically, argali occurred in disjunct populations across all but eastern Mongolia, in areas with rolling hills, mountains, rocky outcrops, canyons, and plateaus (Harris and Reading 2008). The current distribution of argali in Mongolia covers large areas including the mountains of Mongol Altai, Gobi Altai, Dzuungarian Gobi, Trans Altai Gobi, Alashan Gobi and Dornod Gobi from the north of the Gobi Region to the south of steppe, forest steppe and mountain taiga. There are also some argali sheep populations around the Central Khalkha Mountains, Khan-Khukhiin Mountain, Khangai Mountain, and the Arsain River in Khuvsgul Province. Most argali live on alpine grasslands at 3,000 to 5,500 m altitude, descending lower in winter, but in arid southern Mongolia they permanently live at lower elevation areas (TBC and FFI 2012). Argali appear to be expanding their distribution in eastern Mongolia, but contracting and becoming even more fragmented in western Mongolia (Harris and Reading 2008).

Argali population in Mongolia is estimated to be around 13,000-15,000 individuals with an estimated habitat of around 530,000 km^2 (Harris and Reading 2008). Estimated distribution of argali in Mongolia is shown Figure 14.



Source: Google Earth; MET Environmental Information Data Base (2019)

Figure 14 Argali (*Ovis ammoni)* Distribution Range in Mongolia

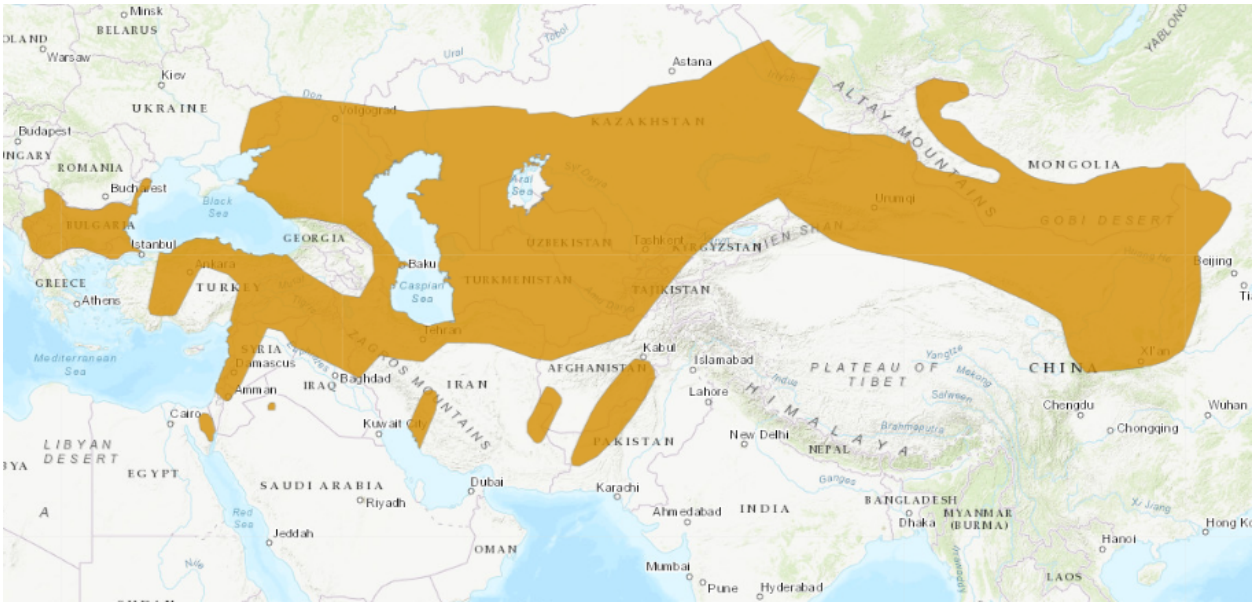
Based on the available information for argali habitat and the KGP AoI, and this species high conservation value by the Mongolian regulation, it is concluded that the KGP CHSA for large ungulate is considered Critical Habitat for argali under the threshold of:

- *As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species* (Refer to Section 3.1.5 for detailed description of the thresholds).

Marbled polecat

Marbled polecat (*Vormela peregusna*) is listed as Vulnerable on the IUCN Red List, but Near Threatened on the Mongolian Red List of threatened mammals. This species is also included in the Annex II of the European Union Habitat Directive and in the Mongolian list of Rare species

by regulations. Its habitat range stretches from south-east Europe through Asia Minor, the Middle East, the Caucasus, and Central Asia, to northern China and Mongolia in various geographical regions with an altitude of up to 3,000 m above sea level (Abramov et al. 2016). Marbled polecat occurs mostly in the Gobi Desert regions including the trans Altai Gobi Desert, and in the great lakes depression areas in the west (Dulamtseren et al. 2009; Clark et al. 2006). Global and Mongolian distribution of Marbled Polecat is shown in Figure 15.
Loss of natural steppe and desert habitats through cultivation and decline in its prey species are the main threats to this species population. In Mongolia the main threat to this species is occasional accidental mortality through traps intended for other species (Clark et al. 2006). Marble polecat use and trade is not known in its distribution range areas, except in Israel where hunting is a known threat to marbled polecat population (Abramov et al. 2016).



Source: IUCN 2019

Figure 15 Marbled polecat *(Vormela peregusna)* Global Distribution Range

Marbled polecat is not a migrant species; thus, this assessment used the Critical Habitat assessment study area for KGP AoI (Refer to Section 3.1.1.1). The KGP study area for small mammal species (i.e. the 2,230 km^2 area) is located in the marbled polecat habitat range. However, given the wide range of its global and Mongolian distribution, and the unlikely threats from the KGP to this species, it is considered that the KGP CHSA for small mammals is not critical habitat for marbled polecat. Even, under the complete habitat loss scenario around the KGP site, the species status VU category is not likely to be changed to EN or CR category by the IUCN Red List. Instead, it is assessed as a Priority biodiversity feature under the threshold of:

- *Vulnerable species (Species listed by the International Union for Conservation of Nature (IUCN) or any other national/regional lists (such as national Red Lists) as Vulnerable (VU) or equivalent (Refer to Table 1 in Section 2.2 for detailed description of the PBF thresholds).*

Siberian ibex

Siberian Ibex (*Capra sibirica*) is not listed as threatened either on the IUCN (LC) or Mongolian Red List (NT). Thus, this species was not assessed as a Critically Endangered or Endangered species criterion for this study, but assessed as PBF due to its Rare designation by the Mongolian government regulations (The Law on Fauna 2012).

Illegal and unsustainable hunting for meat or trophies, and habitat loss from increased livestock grazing and resource development are believed to be the main man-made threats to the Siberian ibex population in Mongolia (Clark et al. 2006). It is designated as 'rare' species by Mongolian regulations[5]. The closest Siberian ibex habitat to the KGP is Edrengiin Nuruu, about 20 km to the south-west, and Jinst Uul, about 50 km to the north-east of the KGP site (Figure 16).

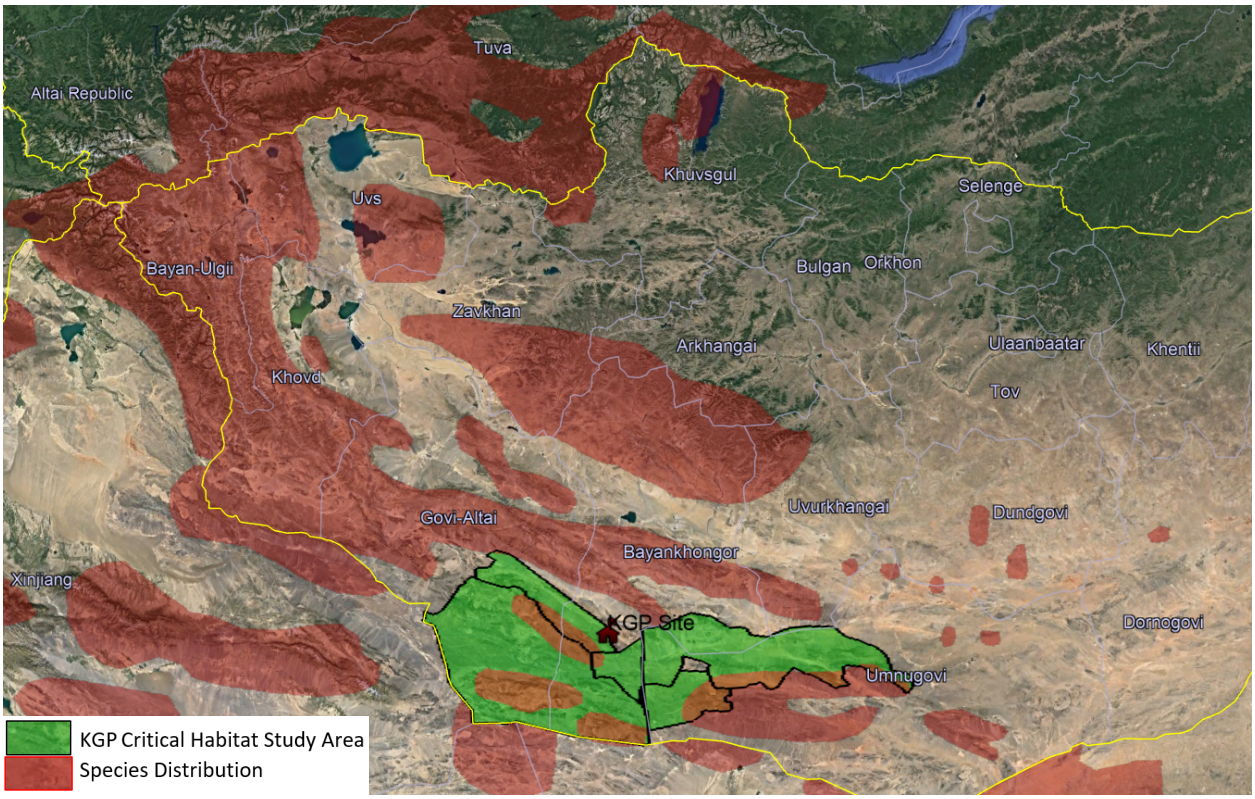


Figure 16 Siberian ibex (*Capra sibirica)* Regional Distribution Range

Based on the close proximity to this species habitat and its designation as Rare species for conservation by the Mongolian regulations, it is considered that Siberian ibex is a Priority Biodiversity Feature for KGP under the threshold of:

- *Significant biodiversity features identified by a broad set of stakeholders or governments (Refer to Table 1 in Section 2.2 for detailed description of the PBF thresholds).*

4.1.3 Birds

Three species of birds, Saker falcon (*Falco cherrug*), Houbara bustard *(Chlamydotis undulata*) and Mongolian ground jay (*Podoces hendersoni*) have been assessed under the Critically Endangered, Endangered species Criterion. Among these species, Houbara bustard and Mongolian ground jay species were observed during the environmental baseline surveys around the KGP areas, whereas the Saker falcon was recommended to be included in the assessment by the experts involved in this assessment. See Table 4 for summary of the bird species critical habitat determination results.

[5] Mongolian Government Resolution No. 7 on Approving Rare Fauna Species List. 11 January 2012.

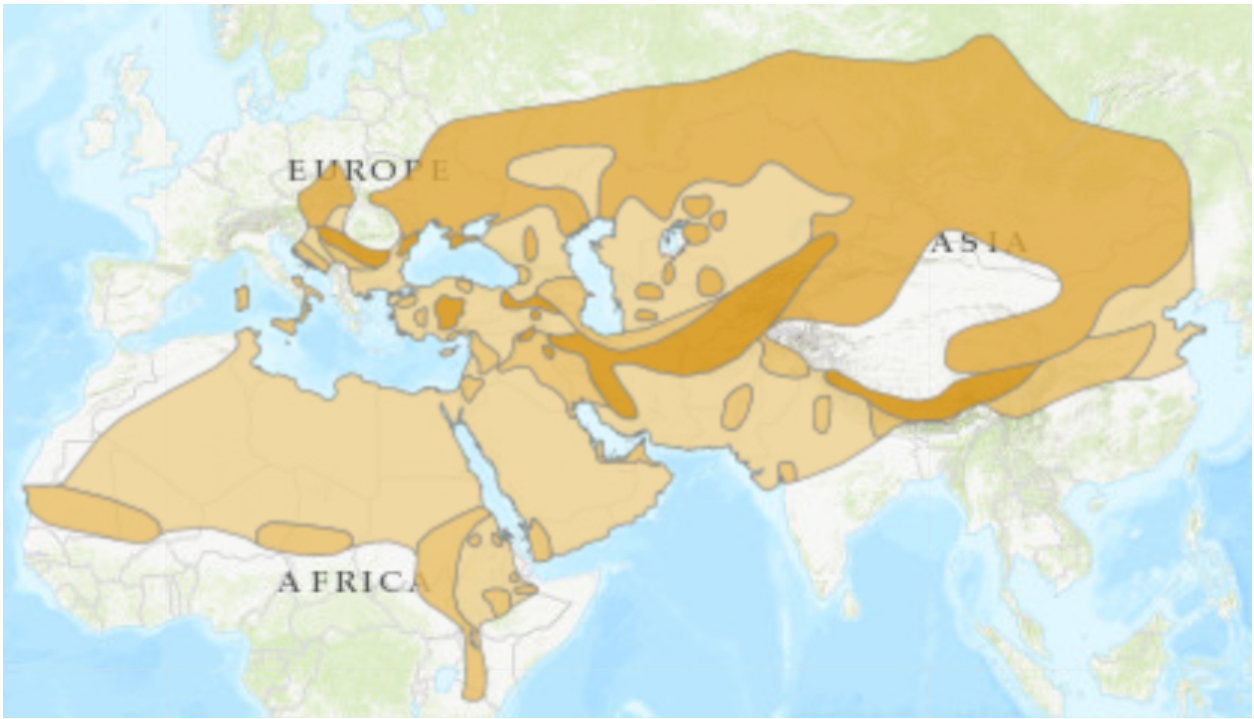
Table 4 Summary of Bird Species Critical Habitat Determination Assessment

#	Scientific Name	English	IUCN Red List	Regional Red List	Mongolian Legal Status	Critical Habitat Determination Triggered	Priority Biodiversity Feature Triggered
1	*Falco cherrug*	Saker falcon	EN	VU		No	Yes
2	*Chlamydotis undulata*	Houbara bustard	VU	VU	Very Rare	No	Yes
3	*Podoces hendersoni*	Mongolian ground jay	LC	VU	Rare	No	Yes

Note: CR – critically endangered; EN – endangered; VU – vulnerable; LC – least concern; NT – near threatened; DD – data deficient.

Saker falcon

The saker falcon (*Falco cherrug)* is listed as Endangered on the IUCN Red List (BirdLife International 2017), and Vulnerable on the Mongolian Red List (Gombobaatar and Monks 2011) due to its decreasing global and regional population. Saker falcon habitat range stretches from eastern Europe to China in the east, and from central Siberia in the north to the Arabian peninsula to the south (see Figure 17). This species estimated global extent of occurrence is about 21 million km^2 (BirdLife International 2017). The global population is estimated to number approximately 12,200-29,800 mature individuals, based on national population estimates of breeding pairs (BirdLife International 2017).



Source: IUCN 2019

Figure 17 Saker falcon (*Falco cherrug*) Global Distribution Range

Saker falcon occurs practically all over Mongolia in areas up to 3,500 m above sea level, excluding wetlands, taiga, deep forest, sand dunes, and areas that lack nesting substrates in the Gobi Desert. It migrates through all of the above-mentioned areas (Gombobaatar and Monks 2011). In Mongolia, this species has suffered mainly from illegal and legal trade in the species, poisoning

of its preys, electrocution from power lines, human disturbance and habitat loss and degradation (Gombobaatar and Monks 2011).

The KGP AoI and its study areas for critical habitat assessment do not overlap with the saker falcon habitat, except the northern part of the Edrengiin nuruu (see Figure 3 for experts recommended protected areas) and most of the Gobi Gurvan Saikhan National Park (GGSNP). The total area of the Edrengiin nuruu and GGSNP areas (i.e. 36,600 km^2) accounts for only 0.17 % of the saker falcon global estimated extent of occurrence (Figure 18). Thus, it is considered that the KGP is not located in saker falcon critical habitat. This assessment considers saker falcon to be a Priority Biodiversity Feature due to its VU status on the Mongolian Red list of threatened birds.

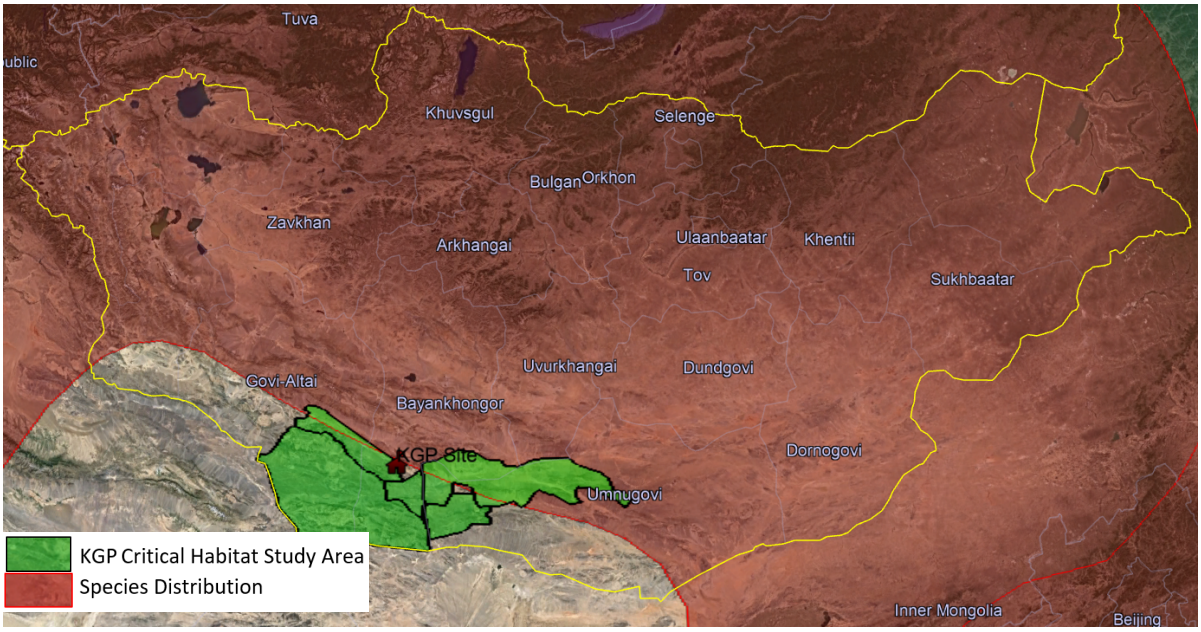
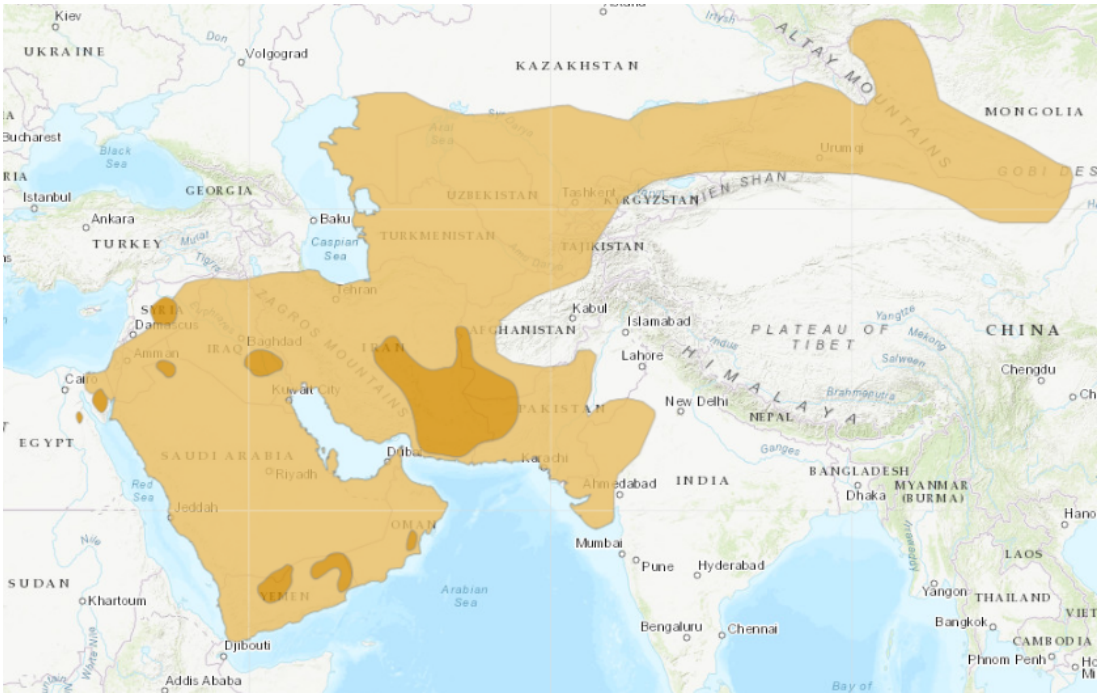


Figure 18 Saker Falcon *(Falco cherrug)* Regional Distribution Compared to Khundii Gold Project Critical Habitat Assessment Areas

Houbara bustard

Houbara bustard (*Chlamydotis undulata)* is classified as Vulnerable in both IUCN and Mongolian Red Lists due to its declining population. Globally, major threats to the species are posed by hunting and trapping as well as habitat fragmentation due to development, especially in the oil and gas, and mining industries (BirdLife International 2017). Global population of the houbara bustard is estimated to be 33,000-67,000 mature individuals with about 13,200,000 km^2 distribution range from the Arabian peninsula in the west to the Mongolian southern Gobi in the east (Figure 19) (IUCN 2019).



Source: IUCN 2019

Figure 19 Houbara bustard (*Chlamydotis undulata*) Global Distribution Range

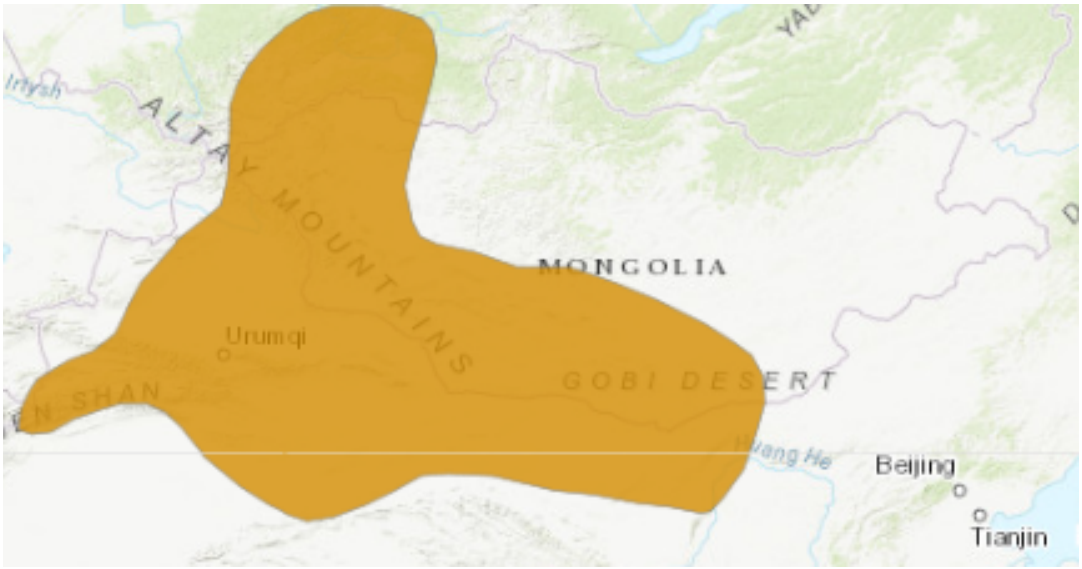
In Mongolia, overgrazing in breeding and feeding sites, impacts from mining extraction activities on breeding success, habitat loss from infrastructure development and mortality from power line collision are identified as the major threats to this species (Gombobaatar and Monks 2011). Population of the species is estimated to be 200-300 with a density of 0.03-0.22, depending on the season, individuals per km^2 in the Galba Gobi IBA in the south eastern Mongolia (Gombobaatar and Monks 2011). There is no detailed study for houbara bustard in the KGP CHA study areas.

The KGP CHA study area houbara bustard population range is estimated to be between 286 and 581 individuals accounting only 0.01% of the global population estimate. Although the KGP AoI and the critical habitat study areas overlap with the global distribution of this species, it is not considered as critical habitat for houbara bustard considering this species estimated population within the KGP study area. Instead, houbara bustard is considered a Priority Biodiversity Feature for KGP. Houbara bustard is listed as a 'very rare' species by the Mongolian government.

Mongolian ground jay

Mongolian ground jay (*Podoces hendersoni*) is listed as Least Concern on the IUCN Red List but assessed as Vulnerable on the Mongolian Red List due to its limited number of population (i.e. less than 10,000 mature individuals) (Gombobaatar and Munks 2011).

Mongolian ground jay occurs in the southern, south-western and western parts of Mongolia including desert and desert steppe areas, Mongol-Altai and Gobi-Altai mountain ranges, Uvs and Great lakes depression areas (Figure 20).



Source: IUCN 2019

Figure 20 Mongolian ground jay (*Podoces hendersoni)* Global Distribution Range

Threats to Mongolian ground jay include illegal hunting due to misunderstanding that its meat is used for healing purposes, and loss of habitat especially decreasing numbers of bushes, which provides a nesting habitat for this species (MET 2014).

Mongolian ground jay is not listed as threatened on both IUCN and Mongolian Red Lists, thus, this species is not assessed under the Critically Endangered or Endangered Criterion. However, it is considered as a Priority Biodiversity Feature for KGP.

4.1.4 Reptiles

No IUCN listed Critically Endangered or Endangered reptile species were identified for the reptile species screened under this assessment. Slender racer *(Coluber spinali*), Multi-oscillated racerunner *(Eremias multiocellata)* and Tuva toad-head agama (*Phrynocephalus versicolor*) were assessed for this study.

See Table 5 summary of the CHA determination assessed for reptile species.

Table 5 Summary of Reptile Species Critical Habitat Determination Assessment

#	Scientific Name	English	Regional Red List	Mongolian Legal Status	Critical Habitat Determination Triggered	Priority Biodiversity Feature Triggered
1	*Coluber spinali*	Slender racer	NT	Rare	No	Yes
2	*Eremias multiocellata*	Multi-oscillated racerunner	LC	Rare	No	Yes
3	*Phrynocephalus versicolor*	Tuva toad-head agama	LC	Rare	No	Yes

Note: CR – critically endangered; EN – endangered; VU – vulnerable; LC – least concern; NT – near threatened; DD – data deficient.

As none of the reptile species are listed as CR or EN on the both IUCN and Mongolian Red List no critical habitat determination was conducted for the reptile species. Mongolian regulatory designated ‘rare’ reptile species in Table 5 are considered as Priority Biodiversity Features for KGP.

4.2 Endemic or Restricted Range Species

Any terrestrial[6] vertebrates and plants species whose extent of occurrence is limited to 50,000 km^2 are considered as restricted or endemic range species (GN6 for IFC's PS6). Areas that regularly hold ≥10% of the global population size and ≥10 reproductive units of a restricted range species trigger this Criterion.

4.2.1 Plants

All plant species (i.e. 66 species) observed or predicted to occur in the KGP AoI were screened for this assessment. The plant species were screened against the list of 153 vascular plants identified as endemic (Urgamal 2018) to Mongolia. By this assessment no restricted-range plants are known or predicted to occur in the KGP's critical habitat assessment areas.

4.2.2 Birds

There are no restricted range or endemic birds that are known to occur in the KGP critical habitat assessment areas, thus this criterion is not triggered for bird species.

4.2.3 Reptiles

Among the all reptile species screened under this criterion, Gobi naked-toed gecko (*Cyrtopodion elongatus*) is further assessed for critical habitat determination. This species is reported to occur only in Mongolia in limited places in the south-western Gobi in Trans Altai Gobi, Nogoon tsav, Ingen khuuvriin hooloi and Tsuglabariin nuruu (Terbish et al. 2006). Its region with an estimated range of 25,500 km^2 (Terbish et al. 2006), thus meets the restricted range criterion.

This species occurs in desert environments with limited food sources and is vulnerable to any environmental change, such as drought, which reduces this species food source insects (MET 2014).

Based on the available information for this species habitat range and vulnerability to habitat change, it is concluded that the KGP AoI is located in Critical Habitat for Gobi naked-toed gecko species under the Endemic and Restricted Range Criterion.

4.3 Migratory and/or Congregatory Species

Guidance Note: EBRD PR6 suggests areas that support a significant proportion of a species' population such as Global-level Key Biodiversity Areas and Important Bird and Biodiversity Areas must be identified for migratory and congregatory species criterion.

4.3.1 Mammals

All mammal species observed or expected to occur in the KGP critical habitat study areas were assessed first to determine if they qualify for the migratory and congregatory species category. From the assessment, Goitered gazelle (*Gazella subgututurosa*) was identified as a candidate mammal species to meet the migratory category. Khulan could be considered as migratory, but was excluded from this level of assessment as it is already assessed under the Critically Endangered, Endangered criteria.

Goitered gazelle

The goitered gazelle is listed as Vulnerable by both the IUCN Red List and the Mongolian Red List. This is a species of semi-desert and desert habitat, which migrates seasonally in search of pasture and water. The goitered gazelle range stretches from south-eastern Mongolia to south

[6] The KGP area has no marine or coastal or riverine or other aquatic ecosystem.

Caucasus through northwest China, Kazakhstan, Turkmenistan, Uzbekistan, and marginally in Tajikistan and Kyrgyzstan, Iran, Afghanistan and Pakistan, although its habitat is decreasing (IUCN 2017). This species Mongolian range is estimated to be about 526,600 km^2 covering much of the Dzungarian Gobi Desert, Great Lakes Depression, Valley of the Lakes, Trans Altai Gobi Desert, Eastern and Alashan' Gobi Desert areas (Clark et al. 2006), shown in Figure 21.

Global population of this species is reported to be decreasing in all of its ranges due to continued illegal hunting and habitat loss (IUCN 2017), with a current estimate of around 42,000-49,000 (IUCN 2017). Up to half of the global goitered gazelle population is estimated to be in Mongolia (Clark et al. 2006; IUCN 2017). The latest population survey in Mongolia estimated this species population to be about 23,000 in southern Mongolia (Sustainability and WCS 2018). This estimate agrees with the statement that Mongolia holds about half of the global goitered gazelle population. Population of this species is not known for the KGP critical habitat study area for large mammals.

Nearly all of the KGP critical habitat assessment study area for large mammals overlaps with the goitered gazelle distribution area in Mongolia (see Figure 21). The KGP critical habitat study area accounts for 21.7 % of the Mongolian goitered gazelle range. If half of the global goitered gazelle population is in Mongolia, then it is inferred that the KGP critical habitat study area for large mammals holds about 10.9 % of the global population of this species. Based on this estimate it is concluded that the KGP is in critical habitat for goitered gazelle species under the migratory and congregatory species criterion.

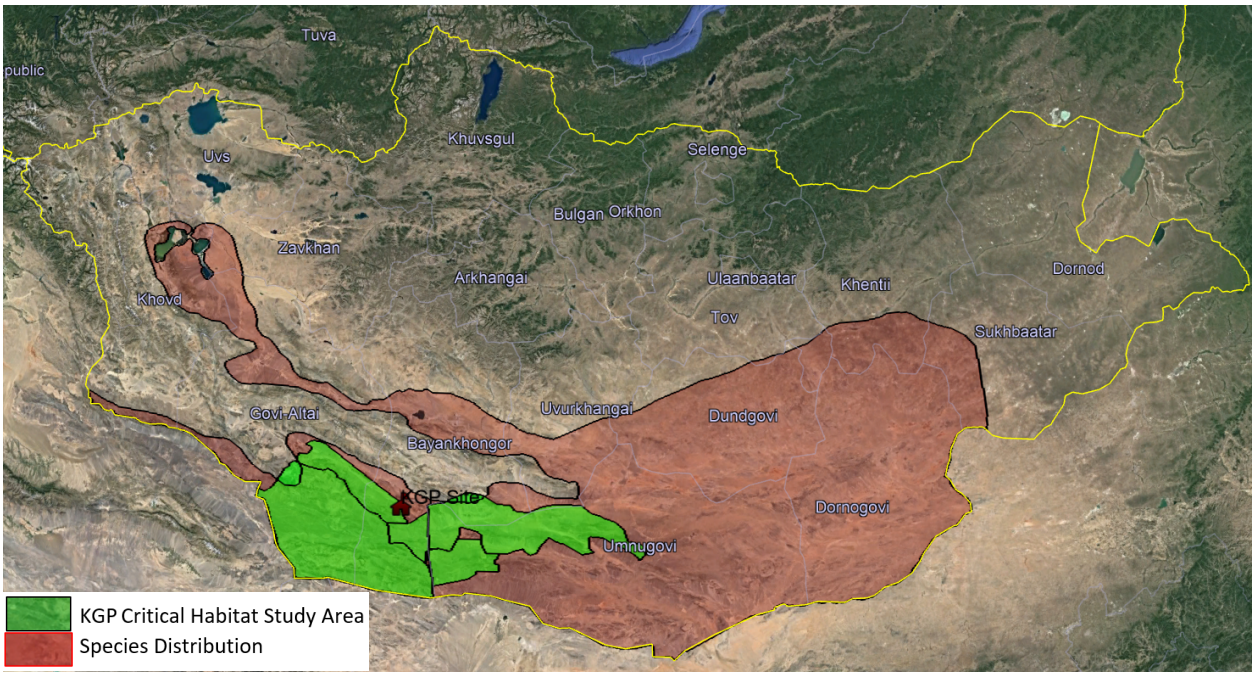


Figure 21 KGP Study Area and Goitered gazelle (*Gazella subgututturosa*) Distribution in Mongolia

4.3.2 Birds

The critical habitat study area for non-migratory species is considered for bird species assessment for this CHA criterion due to the study area's proximity to the KGP AoI and potential impacts to bird species that may migrate through or congregate in the area.

Mongolia has few resident bird species, owing to its northerly location and harsh winters. Of the 23 bird species predicted or known to be present in the selected critical habitat study area, 21 are considered to be candidate (i.e., migratory) species (Table 6). All of the candidate bird species are widespread north Asian species, and thus the selected study area comprises a small fraction

of their global extent of occurrence. Of all the remaining migrant birds, none are considered endangered or critically endangered, except saker falcon. Saker falcon is assessed under Critically Endangered or Endangered species criterion in Section 4.1.3.

Despite the known or predicted occurrence of migrant bird species around the study area, there is currently no indication that the study area constitutes a major flyway where migratory birds regularly concentrate in numbers exceeding the 1% threshold specified under Criterion 3. There are no Important Bird Areas (IBA) or Ramsar Convention sites in the KG region. The closest IBAs to the KGP AoI are Ikh Bogd Mountain and Gobi Gurvan Saikhan IBAs situated about 140 km north-east and 270 km east, respectively, of the site (see Figure 22). The Valley of the Lakes Ramsar Convention site is situated about 170 km north of the KGP site, also shown in Figure 22

Table 6 Migratory Bird Species Screened for Migratory Species Criterion

#	Latin	English	IUCN Red List	Regional Red List	Mongolian Legal Status
1	*Buteo rufinus*	Long-Legged Buzzard	NE	NE	No
2	*Calandrella cheleensisf*	Asian short-toed Lark	NE	NE	No
3	*Chlamydotis undulata*	Houbara bustard	VU	VU	Very Rare
4	*Corvus corax*	Common raven	NE	NE	No
5	*Cuculus canorus*	Common Cuckoo	NE	NE	No
6	*Emberiza buchanani*	Grey-necked Bunting	NE	NE	No
7	*Eremophila alpestris*	Horned lark	NE	NE	No
8	*Falco cherrug*	Saker falcon	EN	VU	No
9	*Fulica atra*	Common coot	NE	NE	No
10	*Lanius isabellinus*	Rufous-tailed Shrike	NE	NE	No
11	*Milvus migrans*	Black kite	NE	NE	No
12	*Motacilla citreola*	Citrine wagtail	NE	NE	No
13	*Motacilla flava*	Yellow wagtail	NE	NE	No
14	*Oenanthe deserti*	Desert wheatear	NE	NE	No
15	*Oenanthe isabellina*	Isabelline wheatear	NE	NE	No
16	*Oenanthe oenanthe*	Northern wheatear	NE	NE	No
17	*Oenanthe pleschanka*	Pied wheatear	NE	NE	No
18	*Podoces hendersoni*	Mongolian ground jay	LC	VU	Rare
19	*Sturnus cineraceus*	White-cheeked starling	NE	NE	No
20	*Syrrhaptes paradoxus*	Pallas's sandgrouse	NE	NE	No
21	*Upupa epops*	Eurasian hoopoe	NE	NE	No

Note: CR – critically endangered; EN – endangered; VU – vulnerable; LC – least concern; NT – near threatened; DD – data deficient; NE – not evaluated.

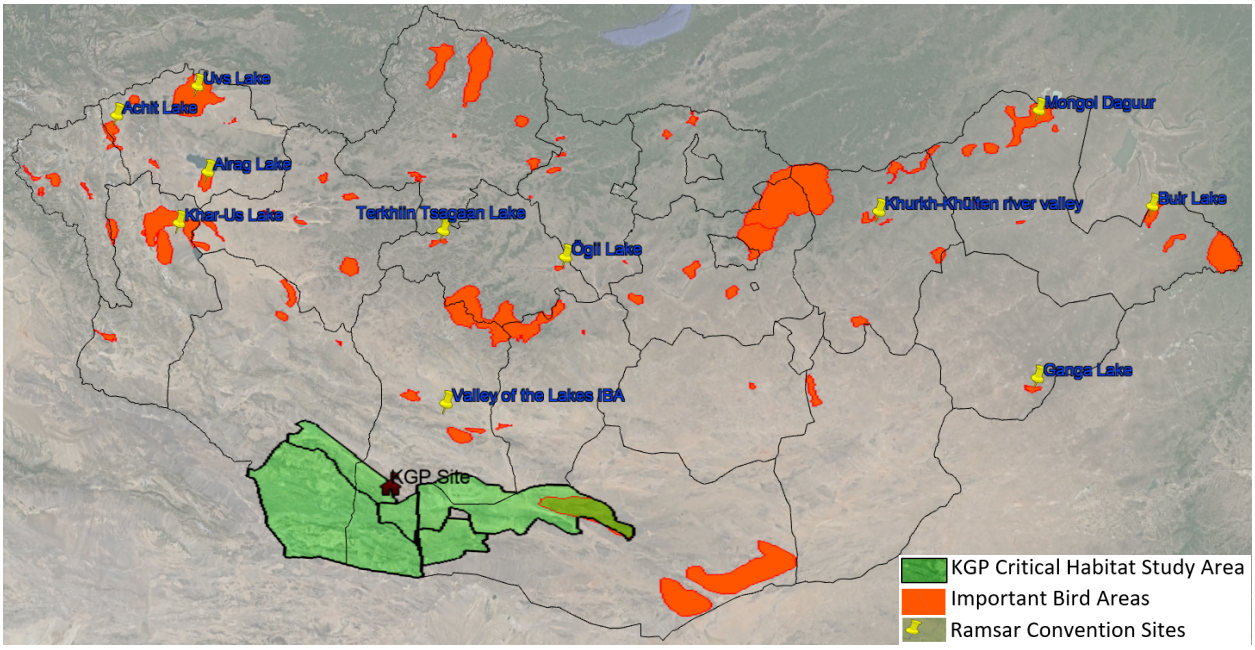


Figure 22 KGP Critical Habitat Study Areas, Important Bird Areas and Ramsar Convention Sites

Based on the above information, it is concluded that no candidate migratory or congregatory bird species were found to qualify for Critical Habitat under Criterion 3.

4.4 Highly Threatened and/or Unique Ecosystems

Concepts of ecosystems are used to provide structure to the understanding of the varied ecological conditions prevailing in an area. Ecosystems can be described at various levels from regional to local levels depending on the complexity of the landscape and study needs.

There are four broader ecoregions in Mongolia. These are Altai-Sayan, Hangay, Daurian Steppe and the Central Asian Gobi Desert (CAGD) region. Above broader scale ecoregions further divided into 16 different subregions (Figure 23). The CAGD Ecoregion constitutes about nearly one third of the total Mongolia's territory. This ecoregions represents dry ecosystems in the southern part of the country with three subregions i.e. the Dzungarian Gobi Desert, Gobi-Altai, Southern Gobi and the Eastern Gobi Desert subregions (Figure 23).

The CAGD ecosystem is completely dominated by different types of desert ecosystems including some of the driest on earth. The homogeneity of the landscape is broken by a few mountain chains and scattered patches of temporary water bodies as dry riverbeds. The key representative biodiversity species and plant community of this broader ecosystem in the Southern Mongolia include:

- Asiatic Wild Ass
- Gobi Bear
- Bactrian Camel
- Goitered Gazelle
- Mongolian Gazelle
- Argali sheep
- Mongolian ground jay
- Short toed snake eagle
- Gobi Naked-toed Gecko *(Cyrtopodion elongatum)*

- *Potaninia mongolica* dominated desert
- N*itraria sphaerocarpa* dominated desert
- *Gymnocarpos przewalskii* dominated desert
- *Amygdalus mongolica* dominated desert
- *Stipa gobica-Achnatherum saposhnikovii* community dominated mountain steppe.

The KGP is located in the semi-desert terrestrial region within the Southern Gobi sub ecoregion of the CAGD region (Figure 23). The KGP subregion exhibits flora and fauna typical of the semidesert and desert of Central Asia. Desert steppe plant species in the KGP area are found primarily on lower elevation along the dry riverbeds. The habitat modelling (Chimed-Ochir et al. 2010) in the CAGD region shows some areas have higher capacity to support more representative species (i.e. up to 15 species including mammals, birds, reptiles and plant associations), but other areas can support much fewer species depending on the geography of the areas (Figure 23).

The numbers and types of species assessed throughout this CHA are representative of the regional species reported or modelled by independent research studies referenced in this study.

This CHA used the IFC's GN6 approaches (i.e. use of the IUCN Red List of Ecosystems) for the Highly Threatened and/or Unique Ecosystems criteria. There is no IUCN listed Endangered or Critically Endangered Ecosystems, or areas determined to be high priority/significance based on systematic conservation planning carried out by government bodies, recognised academic institutions and/or other relevant qualified organisations within the KGP critical habitat study areas to meet the Highly Threatened and/or Unique Ecosystems criteria. Therefore, the KGP CHA study areas are not considered to qualify this criterion.

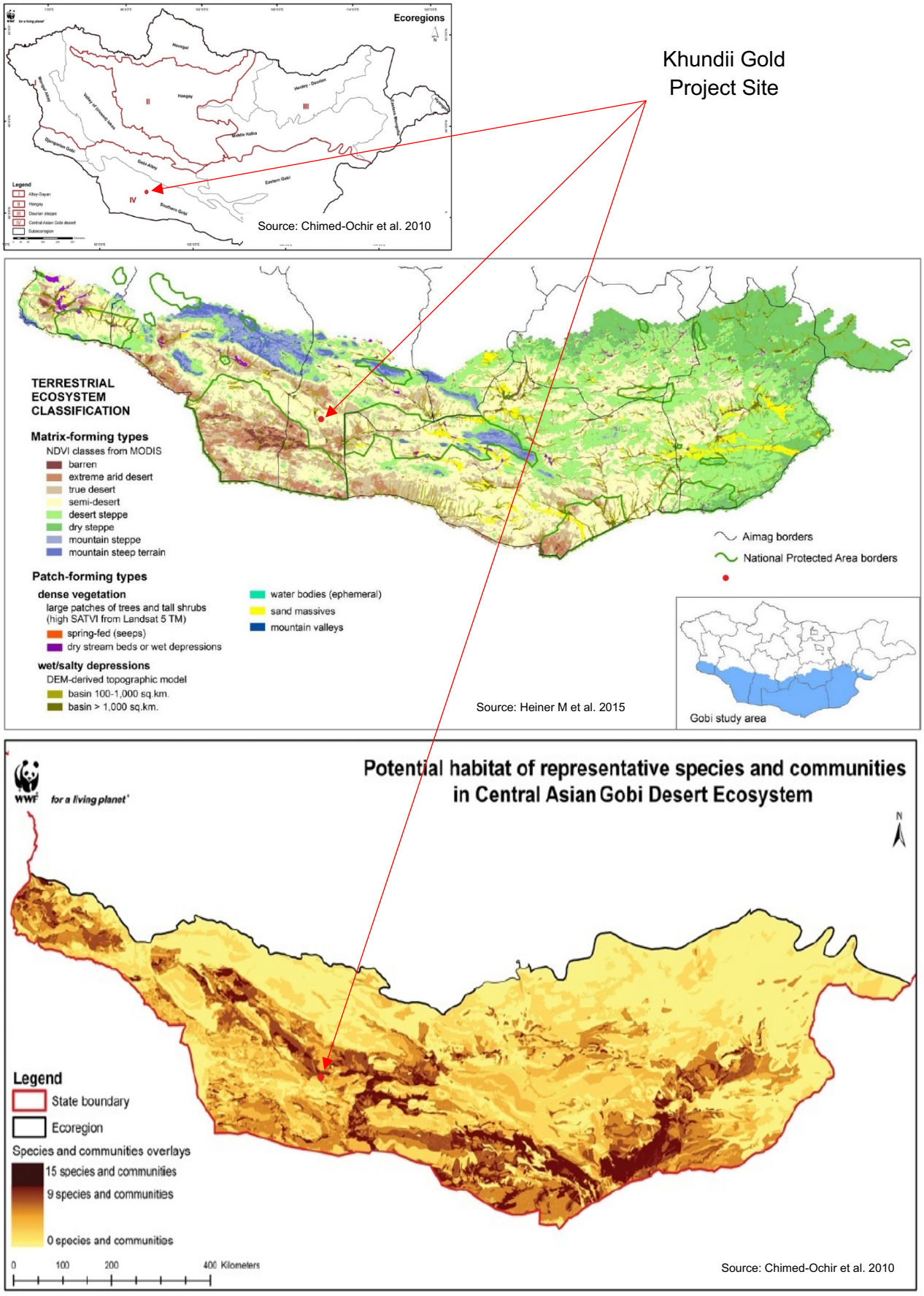


Figure 23. Broader Ecoregions of Mongolia (top), Classification of Central Asian Gobi Desert (middle), and the Potential Habitat of Representative Species (bottom)

4.5 Areas Associated with Key Evolutionary Processes

This criterion is principally defined by the physical features of a landscape that might be associated with particular ecological and evolutionary processes. Although key evolutionary processes may operate at various spatial scales, in the context of PS6, the most appropriate unit of analysis is that which may potentially experience direct, primary impacts from the KGP (i.e., the smaller unit of analysis comprising the KGP AoI. See Section 3.1.1.1).

This unit of analysis, with an area of 1,230 km^2, is not known to contain any endemic species or assemblages of species of unusual evolutionary provenance and is representative of the broad ecoregion within which it is embedded.

At larger scale (i.e. critical habitat study area for large mammals) and Gobi naked-toed gecko *(Cyrtopodion elongatus)* can be candidate species for this criterion due to their limited habitat range in the region. However, these species are assessed under the endemic and restricted range species, and their habitat is considered as critical habitat.

There are no other candidate species or habitat areas (such as isolated lakes or mountains) that support the evolutionary process of species in the study area considered for this assessment. Thus, KGP critical habitat study areas are not considered as critical habitat for key evolutionary processes for the species assessed.

4.6 Ecological Functions Vital to Maintaining the Viability of Biodiversity features Described as Critical Habitat features

Guidance Note: EBRD PR6 requires assessment of ecological functions and structures that are vital to maintaining the viability of Critical habitat or Priority Biodiversity Features. To meet this CHA requirement, projects need to assess ecological functions without which critical biodiversity features could not persist.

Based on the CHA results (Sections 4.1-4.5 of this assessment) and recommendation by the biodiversity experts involved in this assessment, the following two features are assessed for this Criterion:

- Mongolian almond (*Amygdalus mongolica*); and
- Saxaul forest (*Haloxylon ammodendron).*

Both the Mongolian almond and saxaul trees provide vital habitat for the Priority biodiversity feature species of Mongolian ground jay (*Podoses hendersonii*) and Houbara bustard (*Chlamydotis undulata*). Mongolian ground jay breeds in small saxaul trees or scattered tall bushes including Mongolian almond in desert steppe and Gobi desert regions (Batsaikhan and Stubbe 2008). Breeding pairs of Mongolian ground jay build nests within Mongolian almond and saxaul trees close to the ground. For example, recent study in southern Mongolia shows that the Mongolian ground jay almost exclusively uses the Mongolian almond for its nesting habitat (134 out of 142 nests) followed by saxaul and other bushes (8 out of 142 nests) (Valentin et al. 2017).

Saxaul forest also provides habitat for the Priority biodiversity plant species of Desert living cistanche (*Cistanche deserticola*). Desert living cistanche grows on saxual roots (MET 2014). Saxaul forest also provides an important breeding and resting habitat for houbara bustard, and any threat to saxaul directly impacts this species habitat (Gombobaatar and Monks 2006).

Saxaul dominated vegetation communities are scattered in the following areas within and between the KGP MLAs (Eco Trade 2019):

- Central part of Khundii area (*Haloxylon ammondendron-Ephedra przewalskii-Tamarix ramosissima* community);
- Along dry riverbeds in the water exploration area (*Haloxylon ammodendron-Tamarix ramossima- Reaumuria soongorica - Salsola passerine* community);
- Northern part of the Khundii MLA (sparsely distributed *Haloxylon ammondendron-Zygophyllum xanthoxylon* community)
- Tsenkher Nomin MLA (*Haloxylon ammondendron-Ephedra przewalskii* community); and
- Areas along the haul road between Tsenkher Nomin and Khundii MLAs (*Haloxylon ammondendron*).

The Environmental baseline survey (Eco Trade 2019) identified several occurrences of Mongolian almond bushes in central parts of the KGP MLAs and along the access road to Shinejinst *soum*.

Based on the above information, it is considered that the Mongolian almond and saxaul forests trigger the Ecological structure and functions needed to maintain the viability of Priority biodiversity features (i.e. Mongolian ground jay, Houbara bustard and Desert living cistanche) Criterion for this assessment.

4.7 Protected Areas

The following three legally protected areas are located in the KGP region:

- Great Gobi Strictly Protected Area Part A (27 km south-east);
- Gobi Gurvan Saikhan National Park (48 km east); and
- Tost, Toson Bumbiin Nature Reserve Area (70 km south-east).

Refer to Figure 3 for locations of these protected areas.

Great Gobi Strictly Protected Area

The presence of important populations of threatened biodiversity species led to the creation of the Great Gobi Protected Area in two Parts (A and B) located along the Mongolian-Chinese border in the south-west of Mongolia in 1975. The Protected Area status was upgraded to Strictly Protected Area in 1991 by Mongolian Parliament. The GGSPA Part A expands over the territories of Bayankhongor and Gobi-Altai *aimags* and covers 45,149 km^2 area. The GGSPA has rich biodiversity with around nearly 400 species of vertebrates, two species of amphibians, 281 species of birds and 91 species of mammals in its territory. The GGSPA is home to endangered animals, such as Gobi bear (*Ursus arctos gobiensis*), wild camel (*Camelus ferus*), wild ass (*Equus hemionus*), goitered gazelle (*Gazella subgutturosa*), snow leopard (*Uncia uncia*), argali (*Ovis ammon*), and siberian ibex (*Capra sibirica*) which are of high conservation status. Over 400 species of vascular plants have been recorded within the GGSPA, approximately 40 of which are medicinal plants. Flora species in the GGSPA also include a range of rare species such as *Amygdalus pedunculata*, *Populus diversifolia*, *Cynomorium soongaricum*, *Allium*, *Ajania, Ephedra, Artemisia and Oxytropis* species.

The Khundii Gold Project is located about 27 km from the GGSPA Part A in the south-west.

Gobi Gurvan Saikhan National Park

The Gobi Gurvan Saikhan National Park (GGSNP) protection initiated in 1965 by taking the Yolyn Am canyon under the state protection. Since 1965, coverage of the national park expanded progressively by adding more areas in 1993, 1995 and 2000. With these expansion the current GGSNP are reached a total of 2,7 mln ha. The GGSNP include a range of ecosystems including mountains, valley, dry steppe, semi-desert and desert areas that support a diverse range of biodiversity species. Nearly one-fifth of the park is covered with saxaul forest. Over 290 species of vascular plants has been recorded within the park with over 90 species of native plants in the region. Fauna species for this national park include rare and endangered mammals such as argali (*Ovis ammon*), siberian ibex (*Capra sibirica*), snow leopard (*Uncia uncia*), goitered gazelle (*Gazella subgutturosa*), marbled polecat (*Vormela peregusna*), beech marten (*Martes foina*), eurasion lynx (*Lynx lynx*) and asiatic wildcat (*f. Lybica ornata*).

The Khundii project area is located about 48 km west of the Gobi Gurvan Saikhan National Park.

Tost, Toson Bumbiin Nuruu Natural Reserve

Tost, Toson Bumbiin Nuruu Natural Reserve (TBNR), situated in Gurvantes *soum* of Umnugobi *aimag*, was one of the recommended areas, by TNC (2014), in the southern Gobi to be upgraded from local protection to state protection. Following this recommendation, the Tost, Toson Bumbiin Nuruu was first designated as a legally protected Nature Reserve Area by Mongolian Government Resolution No. 91 in 2017. In August 2019, the Mongolian Government extended (Resolution No. 319) its coverage area by shifting the reserve's southern boundary further south to protect rare biodiversity species habitat.

TBNR is one of the main habitats for the IUCN Red Listed (VU) and the Mongolian Red listed (EN) snow leopard and its prey, Siberian ibex. The Snow Leopard Conservation Centre operates in the reserve. Currently 15 snow leopards have been captured and fitted with satellite collars for study by the Snow Leopard Conservation Centre (Omnogovi Tourism 2019).

5. NEXT STEPS

This assessment identified critical habitats for six mammal and one reptile species. The critical habitat features and assessment justifications are provided in Table 7. This study also identified 17 different species of plants, two mammals species, three birds species, three reptile species and two habitats as Priority Biodiversity Feature under the EBRD's PR6 requirements. List of the priority biodiversity features, and their assessment justifications are provided in Table 8.

Table 7 Khundii Gold Project Critical Habitat Assessment Summary

Biodiversity Feature	Common name	Critical Habitat Criteria (EBRD PR6 - Paragraph 14)	Assessment Justification
Mammal			
Camelus bactrianus	Wild bactrian camel	ii. Habitats of significant importance to endangered or critically endangered species	IUCN **CR** species Mongolian Red List **EN** species
Equus hemionus	Asiatic wild ass		Mongolian Red List **EN** species
Uncia uncia	Snow leopard		Mongolian Red List **EN** species
Ovis ammon	Argali		Mongolian Red List **EN** species
Gazella subgututurosa	Goitered gazelle	iv. Habitats supporting globally significant (concentrations of) migratory /congregatory species	Listed as VU on both the IUCN and Mongolian Red List Rare species by Mongolian regulation
Reptile			
Cyrtopodion elongatus	Gobi naked-toed gecko	iv. Habitats of significant importance to endemic or geographically restricted species	Known habitat meets restricted Range criteria of 50,000 km^2

Table 8 Priority Feature Biodiversity

Biodiversity Feature	Common name	Critical Habitat Criteria (EBRD PR6. Paragraph 12)	Assessment Justification
Plants			
Amygdalus Mongolica	Mongolian almond	ii. Vulnerable species	**Rare** species by Mongolian regulation
Amygdalus pedunculata	Almond		**Rare** species by Mongolian regulation
Arnebia guttata	Spotted arnebia		**Very Rare** species by Mongolian regulation
Asterothamnus centrali-asiaticus	Central Asian Asterthamnus		**Very Rare** species by Mongolian regulation
Cistanche deserticola	Desert living cistanche		**Very Rare** species by Mongolian regulation
Cynomorium soongaricum	Desert thumb		**Rare** species by Mongolian regulation
Ephedra equisetina Bunge.	Horse tailed Ephedra		**Very Rare** species by Mongolian regulation
Iljinia Regelii	Brittle budara		**Very Rare** species by Mongolian regulation

Biodiversity Feature	Common name	Critical Habitat Criteria (EBRD PR6. Paragraph 12)	Assessment Justification
Incarvillea potanini Batal.	Potanin's Incarvillea		**Very Rare** species by Mongolian regulation
Oxytropis acanthacea	Whorled Spiny oxytrope		**Very Rare** species by Mongolian regulation
Peganum harmala L	Wild rue		**Very Rare** species by Mongolian regulation
Phragmites communis	Common reed		**Rare** species by Mongolian regulation
Populus diversifolia	Euphrates poplar		**Very Rare** species by Mongolian regulation
Saussurea involucrata Bip	Snow lotus		**Very Rare** species by Mongolian regulation
Stellaria dichotoma L	Chickweed		**Rare** species by Mongolian regulation
Zygophyllum Potaninii Maxim.	Potanins Beancaper		**Very Rare** species by Mongolian regulation
Mammal			
Vormela peregusna	Marbled polecat	ii. Vulnerable species	IUCN VU species Mongolian Gov't designated **Rare** species
Capra sibirica	Siberian ibex		Mongolian Gov't designated **Rare** species
Birds			
Falco cherrug	Saker falcon	ii. Vulnerable species	IUCN **EN** species
Chlamydotis undulata	Houbara bustard		**Very Rare** species by Mongolian regulation
Podoces hendersoni	Mongolian ground jay		**Rare** species by Mongolian regulation
Reptile			
Coluber spinali	Slender racer	ii. Vulnerable species	**Rare** species by Mongolian regulation
Eremias multiocellata	Multi-oscillated racerunner		**Rare** species by Mongolian regulation
Phrynocephalus versicolor	Tuva toad-head agama		**Rare** species by Mongolian regulation
Habitat			
Saxaul forest		vi. Ecological structure and functions needed to maintain the viability of priority biodiversity features	Ecological structure and functions needed to support the **Very Rare** *Cistanche deserticola* species
Amygdalus Mongolica habitat			Ecological structure and functions needed to support the **Rare** *Podoces hendersoni* species

Paragraphs 13 and 16 of EBRD PR6 define project requirements when a project may have potential impacts on Priority Biodiversity Features and Critical Habitats. For example, projects with potential significant, adverse and irreversible impacts to Priority Biodiversity Features (EBRD PR6 Paragraph 13) should not implement any project related activities unless:

- There are no technically and economically feasible alternatives;
- The overall benefits outweigh the project impacts on biodiversity;
- Stakeholders are consulted in accordance with PR 10;

- The project is permitted under applicable environmental laws, recognising the priority biodiversity features; and
- Appropriate mitigation measures are put in place, in accordance with the mitigation hierarchy, to ensure no net loss and preferably a net gain of priority biodiversity features over the long term, to achieve measurable conservation outcomes.

EBRD PR6 Paragraph 16 requires projects with potential significant, adverse and irreversible impacts to Critical Habitat (Paragraph 16) not to implement any project activities unless the following conditions are met:

- No other viable alternatives within the region exist for development of the project in habitats of lesser biodiversity value;
- Stakeholders are consulted in accordance with PR 10;
- The project is permitted under applicable environmental laws, recognising the priority biodiversity features;
- The project does not lead to measurable adverse impacts on those biodiversity features for which the critical habitat was designated;
- The project is designed to deliver net gains for critical habitat impacted by the project;
- The project is not anticipated to lead to a net reduction in the population of any endangered or critically endangered species, over a reasonable time period; and
- A robust and appropriately designed, long-term biodiversity monitoring and evaluation programme aimed at assessing the status of critical habitat is integrated into the client's adaptive management programme.

EBRD PR6 Paragraph 17 requires projects to develop mitigation measures to be developed and included in a project Biodiversity Management Plan or Biodiversity Action Plan, when projects meet the above conditions for critical habitat.

The KGP potential impacts to Priority Biodiversity Features and Critical Habitats are assessed in *C6. Biodiversity Impact Assessment Chapter* of the ESIA.

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Appendix A: List of Species Screened for Critical Habitat Assessment

#	Scientific name	IUCN Red List	Regional Red List	Mongolian Legal Status
MAMMALS				
1	*Allactaga bullata*	NT	DD	No
2	*Allactaga sibirica*	LC	LC	No
3	*Allocricetulus curatus*	LC	LC	No
4	*Alticola semicanus*	LC	LC	No
5	*Camelus bactrianus*	CR	EN	Very Rare
6	*Canis lupus (EU Habitat Directory ANNEX II species)*	LC	NT	No
7	*Capra sibirica*	LC	NT	Rare
8	*Cricetulus sokolovi*	LC	DD	No
9	*Cricetulus migratorius*	LC	DD	No
10	*Crocidura sibirica*	LC	DD	No
11	*Dipus sagitta*	LC	LC	No
12	*Equus hemionus*	NT	EN	Rare
13	*Ellobius tancrei*	LC	LC	No
14	*Gazella subgutturosa*	VU	VU	Rare
15	*Ursus arctos gobiensi*	NE	CR	Very Rare
16	*Hemiechinus auritus*	LC	LC	No
17	*Lasiopodomys brandti*	LC	LC	No
18	*Lepus tolai*	NE	LC	No
19	*Meles leucurus*	LC	LC	No
20	*Meriones meridianus*	LC	LC	No
21	*Microtus gregalis*	LC	LC	No
22	*Meriones unguiculatus*	LC	LC	No
23	*Mustela altaica*	LC	LC	No
24	*Mustela eversmanni (EU Habitat Directory ANNEX II species)*	LC	LC	No
25	*Phodopus campbelli*	LC	LC	No
26	*Phodopus roborovskii*	LC	LC	No
27	*Pygerethmus pumilio*	LC	LC	No
28	*Ochotona dauurica*	LC	LC	No
29	*Otocolobus manul*	NT	NT	No
30	*Ovis ammon*	NT	EN	Rare
31	*Salpingotus crassicauda*	LC	DD	No
32	*Stylodipus andrewsi*	LC	LC	No
33	*Uncia uncia*	VU	EN	Very Rare
34	*Vormela peregusna (EU Habitat Directory ANNEX II species)*	VU	DD	Rare
35	*Vulpes corsac*	LC	NT	No
36	*Vulpes vulpes*	LC	NT	No
REPTILES				
1	*Alsophylax pipiens*	NE	LC	No
2	*Bufo raddei*	LC	LC	No
3	*Coluber spinali*	NE	NT	Rare
4	*Cyrtopodion elongatus*	NE	VU	Rare
5	*Elaphe dione*	NE	LC	No
6	*Eremias multiocellata*	NE	LC	Rare
7	*Eremias argus*	NE	LC	No
8	*Eremias przewalskii*	NE	LC	No
9	*Gloydius halys*	NE	LC	No
10	*Phrynocephalus versicolor*	NE	LC	Rare
11	*Psammophis lineolatus*	NE	LC	No
12	*Teratoscincus przewalskii*	NE	NT	No
BIRDS				
1	*Bucanetes mongolicus*	NE	NE	No
2	*Buteo hemilasius*	NE	NE	No
3	*Buteo rufinus*	NE	NE	No

4	*Calandrella cheleensisf*	NE	NE	No
5	*Chlamydotis undulata*	VU	VU	Very Rare
6	*Corvus corax*	NE	NE	No
7	*Cuculus sp*	NE	NE	No
8	*Emberiza buchanani*	NE	NE	No
9	*Eremophila alpestris*	NE	NE	No
10	*Falco cherrug*	EN	VU	No
11	*Fulica atra*	NE	NE	No
12	*Lanius isabellinus*	NE	NE	No
13	*Milvus migrans*	NE	NE	No
14	*Motacilla citreola*	NE	NE	No
15	*Motacilla flava*	NE	NE	No
16	*Oenanthe deserti*	NE	NE	No
17	*Oenanthe isabellina*	NE	NE	No
18	*Oenanthe oenanthe*	NE	NE	No
19	*Oenanthe pleschanka*	NE	NE	No
20	*Podoces hendersoni*	LC	VU	Rare
21	*Sturnus cineraceus*	NE	NE	No
22	*Syrrhaptes paradoxus*	NE	NE	No
23	*Upupa epops*	NE	NE	No

FLORA				
1	*Achnatherum splendens (Trin.) Nevski.*	NE	NE	No
2	*Ajania fruticulosa*	NE	NE	No
3	*Allium Mongolicum Rgl.*	NE	NE	No
4	*Allium polyrrhizum Turcz. Ex. Rgl.*			No
5	*Amygdalus Mongolica Maxim.*	NE	**EN**	Rare
6	*Amygdalus pedunculata*	NE	NE	Rare
7	*Anabasis brevifolia C.A.Mey*	NE	NE	No
8	*Arnebia fimbriata Maxim*	NE	NE	No
9	*Arnebia guttata Bge.*	NE	LC	Very rare
10	*Artemisia frigida Willd.*	NE	NE	No
11	*Artemisia pectinata*	NE	NE	No
12	*Artemisia xerophytica*	NE	NE	No
13	*Asterothamnus centrali-asiaticus Novopokr.*	NE	LC	Very rare
14	*Atraphaxis pungens (M.B) Jaub. Et Spach*	NE	NE	No
15	*Bassia dasyphylla Fisch ex Mey*	NE	NE	No
16	*Calligonum mongolicum Turcz*	NE	NE	No
17	*Cancrinia discoides (Ldb.) Poljak.*	NE	NE	No
18	*Caragana Leucophloea Pojark.*	NE	NE	No
19	*Chenopodium album*	NE	NE	No
20	*Chenopodium frutescens*	NE	NE	No
21	*Cistanche deserticola Ma.*	NE	**EN**	Very rare
22	*Cistanche salsa* C.A.Mey	NE	NE	No
23	*Convolvulus Ammanii Desr.*	NE	NE	No
24	*Convolvulus fruticosus Pall.*	NE	NE	No
25	*Convolvulus Gortschakovii Desr.*	NE	NE	No
26	*Corispermum mongolicum*	NE	NE	No
27	*Cynomorium songaricum Rupr.*	NE	NE	Rare
28	*Dontostemon Integrifolius C.A.Mey*	NE	NE	No
29	*Echinops Gmelinii*	NE	NE	No
30	*Ephedra Przewalskii Stapt.*	NE	NE	No
31	*Ephedra equisetina Bunge.*	NE	**VU**	Very rare
32	*Eurotia ceratoides (L.) C.A.Mey.*	NE	NE	No
33	*Goniolimon speciosum (L.) Boiss.*	NE	NE	No
34	*Halogeton glomeratus*	NE	NE	No
35	*Haloxylon ammodendron C.A.Mey*	NE	NE	No

36	*Iljinia Regelii (Bge.) kor.ex Shishk*	NE	**VU**	Very rare
37	*Incarvillea potanini Batal.*	NE	**VU**	Very rare
38	*Kalidium foliatum (Pall.) Moq.*	NE	NE	No
39	*Lagochilus ilicifolius Bge.*	NE	NE	No
40	*Micropeplis arachnoidea*	NE	NE	No
41	*Nitraria sibirica Pall.*	NE	NE	No
42	*Nitraria sphaerocarpa.*	NE	NE	No
43	*Oxytropis acanthacea*	NE	NT	Very rare
44	*Peganum harmala L*	NE	**VU**	Very rare
45	*Phragmites communis*	NE	NE	Rare
46	*Populus diversifolia*	NE	**VU**	Very rare
47	*Ptilagrostis Pellotii (Danguy.)*	NE	NE	No
48	*Ptilotrichum canescens C.A.Mey*	NE	NE	No
49	*Reaumuria soongarica (Pall.) Maxim.*	NE	NE	No
50	*Rheum nanum Sievers*	NE	NE	No
51	*Salsola arbuscula*	NE	NE	No
52	*Salsola collina*	NE	NE	No
53	*Salsola Laricifolia Turcz. e Litv*	NE	NE	No
54	*Salsola passerina Bge.*	NE	NE	No
55	*Salsola pestifera*	NE	NE	No
56	*Saussurea involucrata Bip*	NE	**VU**	Very rare
57	*Stellaria dichotoma L*	NE	NE	Rare
58	*Stipa glareosa P.Smirn*	NE	NE	No
59	*Stipa gobica Roshev*	NE	NE	No
60	*Sympegma Regelli Bge.*	NE	NE	No
61	*Tamarix ramosissima Ldb.*	NE	NE	No
62	*Zygophyllum Potaninii Maxim.*	NE	**VU**	Very rare
63	*Zygophyllum Rosovii)*	NE	NE	No
64	*Zygophyllum xanthoxylon (Bge.) Maxim*	NE	NE	No