

Sainshand – Tsagaan Suvarga Transmission Line Project

Environmental and Social Impact Assessment Appendices

DECEMBER 2025



Sainshand – Tsagaan Suvarga Transmission Line Project

Environmental and Social Impact Assessment (ESIA) Appendices

Author	Adam Khan
Checker	Enhtulga Tumurbaatar
Reviewer	Katie Prebble
Approver	Rachael Bailey
Document Ref.	30271256
Date	DECEMBER 2025

Version Control

Version	Date	Author	Checker	Reviewer	Approver	Changes
01	July 2025	AK	ET	KP	RB	
02	December 2025	AK	ET	KP	RB	Updated following EBRD review

This report dated 15 December 2025 has been prepared for EBRD (the “Client”) in accordance with the terms and conditions of appointment dated 05 February 2025 (the “Appointment”) between the Client and **Arcadis Consulting (UK) Limited** (“Arcadis”) for the purposes specified in the Appointment. For avoidance of doubt, no other person(s) may use or rely upon this report or its contents, and Arcadis accepts no responsibility for any such use or reliance thereon by any other third party.

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Appendix A ESIA Scoping Report

Sainshand – Tsagaan Suvarga Transmission Line Project

Environmental and Social Impact Assessment
Scoping Report

01 AUGUST 2025



Author	Various
Checker	Various
Reviewer	Katie Prebble
Approver	Rachael Bailey
Document Ref.	30210663
Date	AUGUST 2025

Version Control

Version	Date	Author	Checker	Reviewer	Approver	Changes
01	19 June 2025	AK	Various	KP	RB	
02	01 August 2025	AK	Various	KP	RB	Changes following EBRD review

This report dated 01 August 2025 has been prepared for EBRD (the “Client”) in accordance with the terms and conditions of appointment dated 05 February 2025(the “Appointment”) between the Client and Arcadis Consulting (UK) Limited (“Arcadis”) for the purposes specified in the Appointment. For avoidance of doubt, no other person(s) may use or rely upon this report or its contents, and Arcadis accepts no responsibility for any such use or reliance thereon by any other third party.

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Appendices

Appendix A

ESIA Report Template

Appendix B

Stakeholder Engagement Plan Template

Appendix C

Land Acquisition and Resettlement Framework Template

Appendix D

ESMP Report Template

Appendix E

ESAP Template

Abbreviations

Abbreviation	Definition
AOI	Area of Influence
CBO	Community-Based Organisations
CES	Central Energy System
CHP	Combined Heat and Power
CITES	Convention on International Trade in Endangered Species of Fauna and Flora
CIEEM	Chartered Institute of Ecology and Environmental Management
CSO	Civil Society Organisations
DEIA	Detailed EIA
EMF	Electromagnetic fields
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESP	Environmental and Social Policy
E&S	Environmental and social
FAO	Food and Agriculture Organisation of the United Nations
FIDIC	International Federation of Consulting Engineer
GDP	Gross Domestic Product
GEIA	General EIA
GIP	Good International Practice
GW	Gigawatts
HHS	Household Surveys
IBA	Important Bird Area

ILO	International Labour Organisation
IUCN	International Union for Conservation of Nature
KIS	Key Informant Interviews
km	Kilometre
MECC	Ministry of Environment and Climate Change
MET	Ministry of Environment and Tourism
MNT	Mongolian Tugriks
MoE	Ministry of Energy
MRAM	Mineral Resource Authority of Mongolia
M&E	Monitoring and evaluation
NGO	Non-Governmental Organisation
NO ₂	Nitrogen Dioxide
NPTG	National Power Transmission Grid
NSO	National Statistical Office
NSR	Noise Sensitive Receptor
OHSS	Occupational Health and Safety
OHTL	Overhead transmission line
O&E	Operation and maintenance
PIP	Public Information Policy
PIU	Project Implementation Unit
PM	Particulate Matter
PR	Performance Requirement
RoW	Right of Way
SEA	Sustainability East Asia
SEP	Stakeholder Engagement Plan

SMEs	Small and Medium Enterprises
SNH	Scottish National Heritage
SO ₂	Sulphur Dioxide
STD	Sexually transmitted diseases
UB	Ulaanbaatar
UNESCO	United Nations Education, Scientific and Cultural Organisation
UNFCC	United Nations Framework Convention on Climate Change
USDA	United States Department of Agriculture
WH	World Health Organisation
WSCCM	Wildlife Science and Conservation Centre of Mongolia

1 Introduction and Background

1.1 Introduction

- 1.1.1 The European Bank for Reconstruction and Development (EBRD) is considering providing a sovereign loan to the Government of Mongolia to finance the construction of a 204 kilometre (km) double circuit 220 kilovolt (kV) overhead transmission line (OHTL) in Dornogovi aimag (province). The route alignment will commence with a connection to a planned substation in Sainshand (to be constructed as part of the Choir – Sainshand OHTL project) and end with a connection to an existing 220/35/22 kV substation operated by the National Power Transmission Grid (NPTG), located within a licensed mine area at the Tsagaan Suvarga mine. The 204km OHTL and substation connections are herein referred to as 'the Project'.
- 1.1.2 The EBRD have commissioned Arcadis (UK) Consulting Limited, with their sub-consultants EcoTrend LLC, to undertake an Environmental and Social Impact Assessment (ESIA) of the Project, including a critical review of available data against EBRD's 2019 Environmental and Social Policy (ESP) and Performance Requirements (PRs), identify gaps and where necessary, augment existing information to satisfy EBRD requirements. This report presents the ESIA Scoping Report.

1.2 Project Overview

- 1.2.1 The electricity generation and transmission network in Mongolia consists of the four independent energy systems, with the Project sitting within the Central Energy System (CES). The site location is shown in **Figure 1-1** overleaf. The Project is located in Dornogovi aimag. The Project starts at the new 220/110/35 kV substation in Sainshand that is being constructed as part of the Choir-Sainshand OHTL project. The Project OHTL then proceeds south-west, crossing four soums (districts) - Sainshand, Ulaanbadrakh, Saikhandulaan and Mandakh- before reaching the existing 220/35/22 kV substation at Tsagaan Suvarga. In general, the route proposed for the transmission line is sparsely populated and has desert vegetation characteristics of the Gobi desert.
- 1.2.2 Dornogovi aimag is connected to Ulaanbaatar by paved road, a part of the 4th Asian highway network. The aimag centre and soum centres have paved roads, in addition soums in the Project Area are connected either by paved roads (soums along the 4th Asian highway network) or unpaved (earth) roads. There is no direct paved access to the Project.
- 1.2.3 The Trans-Mongolian Railway connects the Trans-Siberian Railway from Ulan-Ude in Russia to Erenhot and Beijing in China through the capital Ulaanbaatar. The Mongolian section of this line runs for 1,110km. Sainshand is an important railway hub along the Trans-Mongolian Railway. There are several spur lines, including a line to Zuun-Bayan, a bagh in Sainshand soum in Dornogovi aimag. A 27km industrial purpose railway line also connects Sainshand with Altanshiree soum, Dornogovi aimag, to allow development of the Mongolian oil refinery under construction in Altanshiree soum.

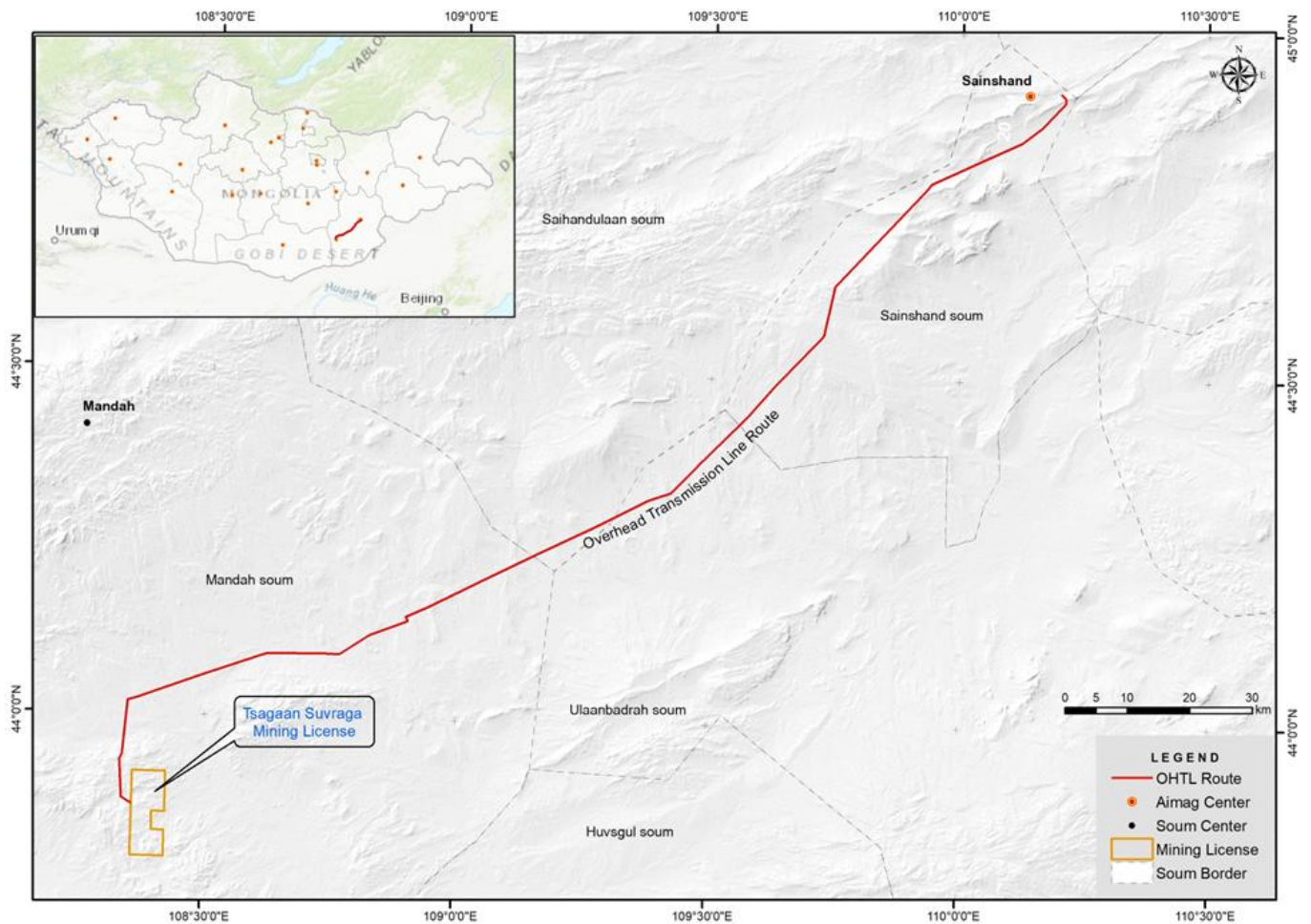


Figure 1-1 Project Location

1.3 Project Categorisation

1.3.1 The EBRD's 2019 Environmental and Social Policy (ESP) categorises projects (A, B or C) to determine the nature and level of environmental and social investigations, information disclosure and stakeholder engagement required. In line with Appendix 2 of the ESP 2019, the EBRD has assigned the Project a Category A status as the Project is a greenfield development and comprises "Construction of high voltage overhead electrical power lines". This categorisation means that a comprehensive ESIA must be prepared, and a review of associated documents must be carried out, and, in line with EBRD's Access to Information Directive 2019, as a public sector project it must be subject to public disclosure for a minimum period of 120 calendar days.

1.4 Project Implementation Entity

1.4.1 The implementing entity is the Ministry of Energy (MoE). The MoE is responsible for overseeing and managing the overall execution of the Project in accordance with EBRD's standards, financing agreements, and applicable national regulations. The MoE appointed a dedicated Project Implementation Unit (PIU) to serve as the main point of contact for coordination and communication with EBRD and consultants. The existing PIU has nine professional staff members including a project

coordinator, a civil engineer, a transmission line engineer, an electrical substation engineer, an electrical substation engineer, a procurement officer, a monitoring and evaluation (M&E) officer, a finance officer and an environmental and social (E&S) officer.

- 1.4.2 The National Power Transmission Grid (NPTG) is a state-owned power transmission utility. It is a state-owned entity responsible for the operation and maintenance of all 22 kV, 35 kV, 110 kV and 220 kV substations and overhead transmission lines in Mongolia. It will be responsible for operation of the Project.
- 1.4.3 Established in 1967, the company operates across four regional grid system and currently employs 1,307 employees, of which 52% are engineers and 31.2% are female workers. NPTG's network operates across Ulaanbaatar city, 16 aimags, and more than 300 soums and settlements. It covers approximately 1,033,000km², representing 66% of Mongolia's territory and serves 72% of the national population. NPTG is responsible for the operation and maintenance of a total OHTL network spanning 5,653.6km as of 2024. This extensive network includes¹:
- 2,294.1km of 220 kV transmission lines;
 - 3,346.1km of 110 kV lines; and
 - 13.4km of 35 kV lines.
- 1.4.4 In support of its transmission operations, the company also manages a network of 84 substations, as follows:
- 11 substations at the 220 kV level; and
 - 73 substations at the 110 kV level.

1.5 Project Requirements

- 1.5.1 The EBRD's requirements are that the ESIA and scoping are conducted in line with:
- National legislation as well as relevant EU substantive environmental standards, including (but not limited to) the pertinent requirements of the EIA Directive and Birds and Habitat Directives. When host country regulations differ from EU substantive environmental standards, the Project will be expected to meet whichever is the more stringent;
 - The EBRD's ESP and PRs 2019;
 - Public consultation and stakeholder engagement will be tailored for the Project, be meaningful and will allow for disclosure of information and public participation in decision-making (in accordance with PR10);
 - Disclosure of the ESIA in accordance with EBRD's 2019 Access to Information Policy and Directive on Access to Information;
 - The Project shall include all reasonable measures to avoid, minimise, mitigate or compensate any adverse change in environmental and social conditions and impacts on public health and safety, especially with respect to any disproportionate impacts to vulnerable people who, as a result of their gender, age, ethnicity, disability, socio-economic status and/or other personal characteristics, may be disproportionately affected by the Project; and

¹ Available at: NPTG 2024 Annual report: <https://www.transco.mn/post/2024-ony-zhiliyn-taylan>

- Relevant international conventions and protocols relating to environmental and social issues, as transposed into national legislation, as outlined in Section 3 of this report.

1.6 Purpose of the Scoping Report

- 1.6.1 ESIA is a systematic process that predicts and evaluates the impacts a project is likely to have on key aspects of the physical, biological and socioeconomic environment. Scoping is the process of determining the content and extent of the matters that should be covered in the ESIA. It is designed to ensure that ESIA is focusing on the most significant potential impacts of a project.
- 1.6.2 The objectives of this scoping phase were therefore to:
- Identify available data, data gaps, and how data gaps will be addressed during the ESIA;
 - Identify the initial Project Area and Area of Influence (Aoi);
 - Define the Project;
 - Identify applicable national legislation and international standards;
 - Identify the initial environmental and social baseline, including identification of any studies to be undertaken for the ESIA;
 - Identify an initial list of stakeholders and report on engagement activities during scoping;
 - Identify key potential environmental and social impacts to be studied as well as a justification for those impacts screened out (i.e. not requiring further assessment) during the scoping process; and
 - Identify the way forward for the next stage of the ESIA and the preparation of the ESIA Disclosure package.

1.7 Approach to Scoping

Data Reviewed

- 1.7.1 Available data for the Project was provided by the EBRD and the Ministry of Energy. These Project documents were all available in Mongolian only and comprise:
- Spring 2022 bird survey (Sustainability East Asia and Wildlife Science and Conservation Centre of Mongolia)
 - Autumn 2024 bird survey (Arcadis)
 - Design information:
 - Map of Integrated Energy System, 2021
 - Coordinates of turning points
 - Official letter regarding Grid study/Operating mode analysis review, 4 April 2021
 - Technical design of the 220kW Transmission line
 - Technical Conditions of the 220 kV Dual-Circuit Overhead Line: Tsagaan Suvarga – Sainshand, 13 April 2021
 - Route Selection Brief for Overhead Transmission Line,
 - Dornogovi Aimag – Budget for the Expansion of the 220/22 kV Tsagaan Suvarga substation and the Tsagaan Suvarga–Sainshand 220 kV Double-Circuit Overhead Transmission Line, 28 January 2022
 - Design of the Transmission line and Expansion of Tsagaan Suvarga substation.

Site Visits

1.7.2 A site reconnaissance visit was undertaken 12-17 May 2025. This was attended by the following:

- Rachael Bailey – Arcadis Environment Specialist
- Richard Anderton – Arcadis Ornithologist / Ecologist
- Enhtulga Tumurbaatar – EcoTrend Local ESIA Lead
- Tserenkhand Gurbadam – EcoTrend Social and Gender Specialist
- Nomin-Erdene – EcoTrend Ecologist
- Shirmenbaatar Tsevegjav – Choir-Sainshand OHTL PIU Electrical Substation RPA engineer
- Baatarchuluun Purevdagva – Choir-Sainshand OHTL PIU Environmental and Social Officer

1.7.3 The purpose of site reconnaissance was to familiarise the ESIA Team with key site locations to inform the scoping process; and to ensure sufficient evidence is gathered to support the exclusion of topics that do not warrant further consideration.

1.7.4 Meetings were also held with the Ministry of Energy, PIU and NPTG in Ulaanbaatar, as outlined below.

Stakeholder Meetings

1.7.5 The following meetings have taken place during the scoping period (Table 1-1). A meeting has been requested with the MoE though has not been forthcoming during the period of preparing the gap analysis.

Table 1-1 Meetings undertaken to date

Date	Activity	Attendees
27 March 2025	Kick-off meeting with EBRD	Yevgeniya Afanasenko, EBRD Viktoriya Protsenko, EBRD Zhanar Zhakeyeva, EBRD Amra Erdenebaatar, EBRD Vadim Sinitsa, EBRD Rachael Bailey, Arcadis Enhtulga Tumurbaatar, EcoTrend Tserenkhand Gurbadam, EcoTrend
04 April 2025	Kick-off meeting with the Ministry of Energy	Rachael Bailey, Arcadis Enhtulga Tumurbaatar, EcoTrend Tserenkhand Gurbadam, EcoTrend Amra Erdenebaatar, EBRD Vadim Sinitsa, EBRD Munkhtur - Senior specialist, Strategic Planning Division, Ministry of Energy

Date	Activity	Attendees
		Munkhbadral - Specialist responsible for smart grid and information technology, Ministry of Energy
29 April 2025	Progress meeting #1	Yevgeniya Afanasenko, EBRD Viktoriya Protsenko, EBRD Zhanar Zhakeyeva, EBRD Amra Erdenebaatar, EBRD Vadim Sinitsa, EBRD Katie Prebble, Arcadis Enhtulga Tumurbaatar, EcoTrend Tserenkhand Gurbadam, EcoTrend
12 May 2025	In Person meeting with Ministry of Energy and National Power Transmission Grid (NPTG)	Rachael Bailey, Arcadis Richard Anderton, Arcadis Enhtulga Tumurbaatar, EcoTrend Anhbayar Ochirbat, EcoTrend Tserenkhand Gurbadam, EcoTrend Nomin Erdene, EcoTrend Enkhtsetseg Byambaa, EcoTrend Interpreter Munkhtur - Senior specialist, Strategic Planning Division, Ministry of Energy Battseren, Ministry of Energy Shirmenbaatar Tsevegjav, Choir-Sainshand OHTL PIU Bataarchuluun Purewdagva, Choir-Sainshand OHTL PIU Dulguun Erdenebileg, Choir-Sainshand OHTL PIU
16 May 2025	Meeting with Ministry of Energy and National Power Transmission Grid (NPTG) and Project Designers	Rachael Bailey, Arcadis Richard Anderton, Arcadis Enhtulga Tumurbaatar, EcoTrend Tserenkhand Gurbadam, EcoTrend Nomin-Erdene, EcoTrend Shirmenbaatar Tsevegjav, Choir-Sainshand OHTL PIU Bataarchuluun Purewdagva, Choir-Sainshand OHTL PIU
20 May 2025	Progress meeting #2	Yevgeniya Afanasenko, EBRD Viktoriya Protsenko, EBRD Zhanar Zhakeyeva, EBRD Vadim Sinitsa, EBRD

Date	Activity	Attendees
		Katie Prebble, Arcadis Rachael Bailey, Arcadis Richard Anderton, Arcadis Enhtulga Tumurbaatar, EcoTrend Tserenkhand Gurbadam, EcoTrend
10 June 2025	Progress meeting #3	Yevgeniya Afanasenko, EBRD Viktoriya Protsenko, EBRD Zhanar Zhakeyeva, EBRD Amra Erdenebaatar, EBRD Vadim Sinitsa, EBRD Katie Prebble, Arcadis

1.8 Limitations and Assumptions

- 1.8.1 At the time of writing this report, although the detailed design has been provided from the MoE, the information in general is high-level and dated 2021. However, the PIU are supporting in the provision of responses to queries raised by the ESIA Team. No national EIA is available and EBRD are in the process of engaging a consultant to undertake the national EIA.
- 1.8.2 Due to the stage of the Project, various information related to contractor requirements such as construction camps and management plans is not yet available for review. However, some indicative information that is available has been provided by the MoE, PIU and NPTG.

1.9 ESIA Project Team

- 1.9.1 The ESIA Team is comprised of specialists from Arcadis, EcoTrend and Ocean Revive. The core ESIA Team is presented in Table 1-2. The Technical Specialists are presented in Table 1-3.

Table 1-2 ESIA Project Team

Name	Role	Company
Rachael Bailey	Project Director / Environmental Specialist	Arcadis
Katie Prebble	Project Manager / ESIA Specialist	Arcadis
Adam Khan	Project Coordinator	Arcadis
Dr Magnus Macfarlane	International Social and Gender Specialist	Ocean Revive
Amir Shah	Health and Safety Specialist	Arcadis
Sarah Winne	Climate	Arcadis

Name	Role	Company
Enhtulga Tumurbaatar	Team Leader	EcoTrend
Tserenkhand Gurbadam	Social and Gender Specialist	EcoTrend
Tuvshintugs Sukhbaatar	Ornithologist	EcoTrend

Table 1-3 Technical Specialists

Name	Role	Company
Martina Girvan	Biodiversity, Ecosystems, Natural Capital and Nature Based Solutions Expert	Arcadis
Richard Anderton	Ecology, Ornithology	Arcadis
Lisa Driscoll	Hydrology and Drainage	Arcadis
Thomas Wright	Air Quality	Arcadis
Mark Arnold	Noise and vibration	Arcadis
Jenny Wylie	Cultural Heritage	Arcadis
Charles Hutchinson	Transport	Arcadis
Bruce Lascelles	Soils	Arcadis
Ben Hilder	Landscape & Visual Impact	Arcadis
Enhtulga Tumurbaatar	Local manager	EcoTrend
Khurelsukh Dulmaa	Environmental Expert	EcoTrend
Sumjidmaa Tumurchudur	Social Expert	EcoTrend
Nomin-Erdene Battsooj	Ecology	EcoTrend
Ariunbold Jargalsaiakhan	Ecology / Ornithology	EcoTrend
Bayarsaikhan Purevjav	Botanist	EcoTrend
Munkhtsetseg	Hydrology	EcoTrend
Bilguun Bayarsaikhan	Air Quality, Noise and Vibration	EcoTrend
Ankhubayar Ochirbat	Soils and GIS	EcoTrend
Amarbileg	Cultural Heritage	EcoTrend
Enkhtsetseg Byambaa	Resettlement	EcoTrend

1.10 Structure of the Scoping Report

- 1.10.1 The project background is set out in Chapter 1. The project description in Chapter 2 provides further information about the nature of the proposed Project. Chapter 3 sets out relevant legislation. The proposed methodology for assessing the magnitude and significance of effects is set out in Chapter 4. The anticipated scope of the ESIA is set out in Chapter 5 of this report.

2 Project Description

2.1 Energy Context

2.1.1 Mongolia's energy system serves about 3.5 million people, with most of the system use is concentrated in the central region. The World Bank estimates that 100% of Mongolia's population had access to energy in 2023². The power system of Mongolia is made up of four regional electricity grids (see Figure 2-1): the Central Energy System (CES), the Western, the Eastern, and the Altai-Uliastai energy systems. The CES is the largest energy network in Mongolia, serving the primary load centre of Ulaanbaatar, the capital city, and accounting for 88.8% of the country's electricity production and sales. The operational capacity and power quality of these networks, particularly the three networks outside the CES, remain very low.

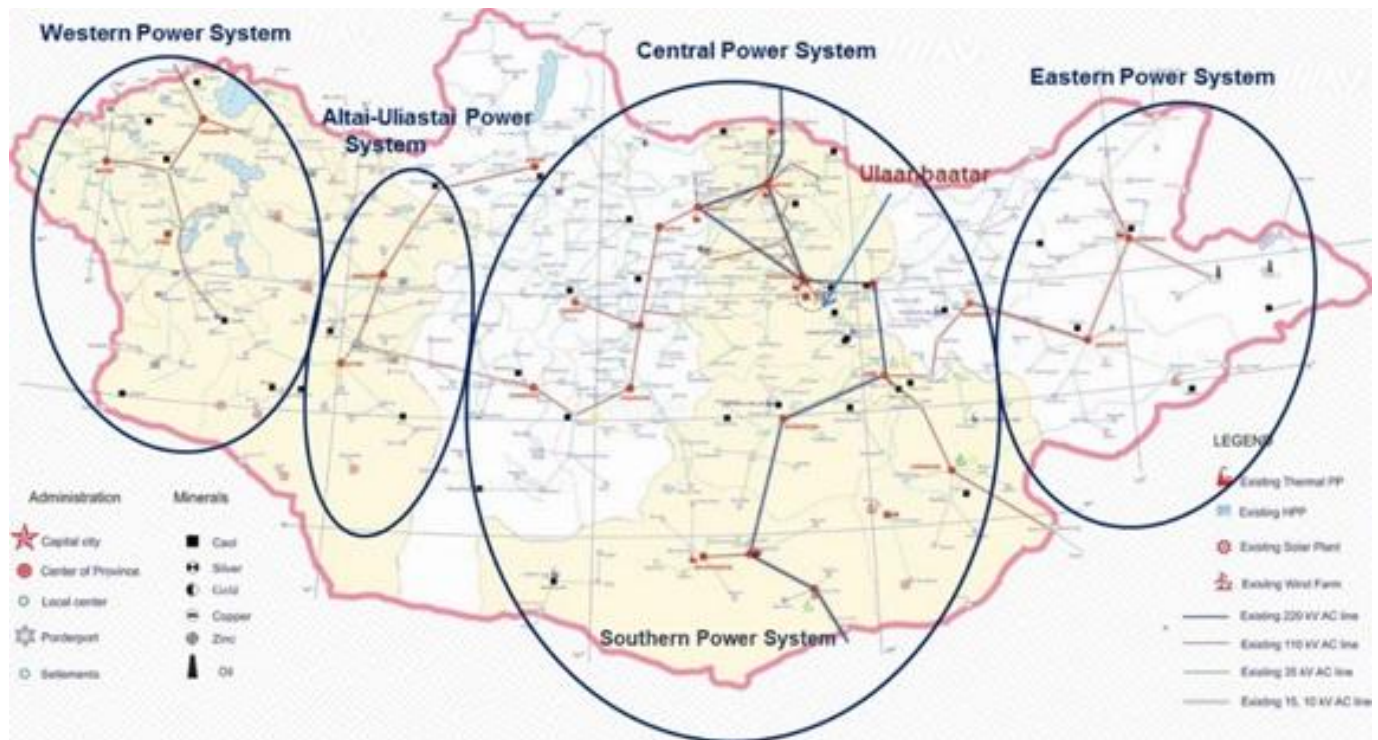


Figure 2-1 Electricity Networks and Transmission Systems in Mongolia

2.1.2 There has been an increase in electricity demand in the country following economic development over the last decade. Currently, 75.4% of the country's electricity needs are met through domestic generation, while the remaining 24.6% is covered by imports from Russia and the People's Republic of China.³ In 2024, Mongolia produced 8,754.7 million kilowatt hours (kWh) and 2,863.4 million kWh

² Available at: <https://data.worldbank.org/?locations=1W-MN>

³ Statistics on Energy Performance 2024 available at: erc.gov.mn

(24.6%) was imported⁴.

- 2.1.3 In 2024, 90.6% of domestic electricity generation came from coal-fired combined heat and power plants, and 9.4% is sourced from renewable energy⁵ such as hydropower (9% of total renewables), solar (28.2% of total renewables), and wind (62.8% of total renewables), well below estimated global average of 30% in 2023.⁶ As of 2023, Mongolia has three wind farms, nine solar plants, and several small hydropower plants. As of 2024, the installed capacity of coal-fired thermal power plants in Mongolia was 1,319 megawatts (MW), while renewable energy sources such as wind, solar, and hydropower accounted for 336.8 MW.
- 2.1.4 As outlined in Mongolia's Long-Term Development Policy: Vision 2050, Mongolia has a target to have 30% renewable energy capacity by 2030 and to reduce greenhouse gas emissions in the energy production and supply sector by 8.34 million tons by 2030, reflecting the country's commitment to transitioning to a low-carbon, green economy. Mongolia's renewable energy potential is estimated at 2,600 gigawatts (GW), including wind and solar. This is over 1000 times larger than the 1.6GW installed capacity of Mongolia's electricity system.
- 2.1.5 The 2021 New Recovery Policy, a supporting policy to enhance the implementation of Vision 2050, includes a section on energy policy, which focuses on enhancing energy production and supply reliability by developing renewable energy facilities.

⁴ ERC, Energy Sector Statistics for 2024. Available at <https://erc.gov.mn/mn/>.

⁵ ERC, Energy Sector Statistics for 2024. Available at <https://erc.gov.mn/mn/>.

⁶ Available at: [Эрчим хүчний зохицуулах хороо | Energy Regulatory Commission | STATISTICS ON ENERGY PERFORMANCE 2023](#)

- 2.1.6 Aligned with Mongolia's Vision 2050 and the New Recovery Policy, the Government plans to implement additional renewable energy projects, including the 90MW Erdeneburen Hydropower Plant, a 200MW battery storage facility, and the 315MW Eg River Hydropower Plant. Under the Upscaling Renewable Energy Sector Project with the Asian Development Bank (ADB), the 10MW Moron solar power plant was connected to the CES in September 2024. A 50MW battery storage station built in Banaguur district of Ulaanbaatar began supplying energy to the CES in December 2024. A 17.5MW solar plant is also expected to begin operation however, no further information is available on this development.
- 2.1.7 After the parliamentary election in June 2024, at the Mongolian Economic Forum 2024 Prime Minister Luvsannamsrai Oyun-Erdene announced a goal of liberalising the energy sector. The Government has established a National Committee for Energy Reform, chaired by the Deputy Prime Minister in charge of Investment and Trade, Anti-Monopoly and State procurement, to oversee this transition. The reform agenda includes liberalising the energy market, revising tariffs, and restructuring state-owned enterprises to attract private investment and improve operational efficiency.⁷ A working group has been tasked with overhauling key legislation, including the Laws on Energy, Renewable Energy, and Energy Conservation, to foster competition, decentralise energy production, and accelerate the green transition. These policy shifts align with Mongolia's Vision 2050 and the New Recovery Policy, which emphasise renewable energy development and grid reliability.

2.2 CES Electricity Generation, Transmission and Distribution Network

- 2.2.1 The Project sits within the CES. The CES is the largest system in the country covering key population and industrial areas, supplying electricity to 83.7% of the total consumers in Mongolia. The CES is run by NPTG.

Electricity Generation

- 2.2.2 In 2024, total installed capacity for power generation in the CES area was 826MW, with a gross electricity demand of around 729MW (which accounted for approximately 95% of the total load in the country). CES energy demand has increased over the years, with demand expected to increase by 78% by 2030 compared to a 2016 baseline, to meet the growing demand in the CES region. This demand increase has arisen due to the major economic development and urban population increase in the region.

⁷ Available at: <https://www.esight.mn/post/2945>

2.2.3 The NPTG and PIU have been requested to confirm the power supply (i.e. the thermal and renewable energy sources) that serve the CES. At the time of writing, updated detailed data was not available, however Figure 2-2 sets out the various sources of power within the CES.

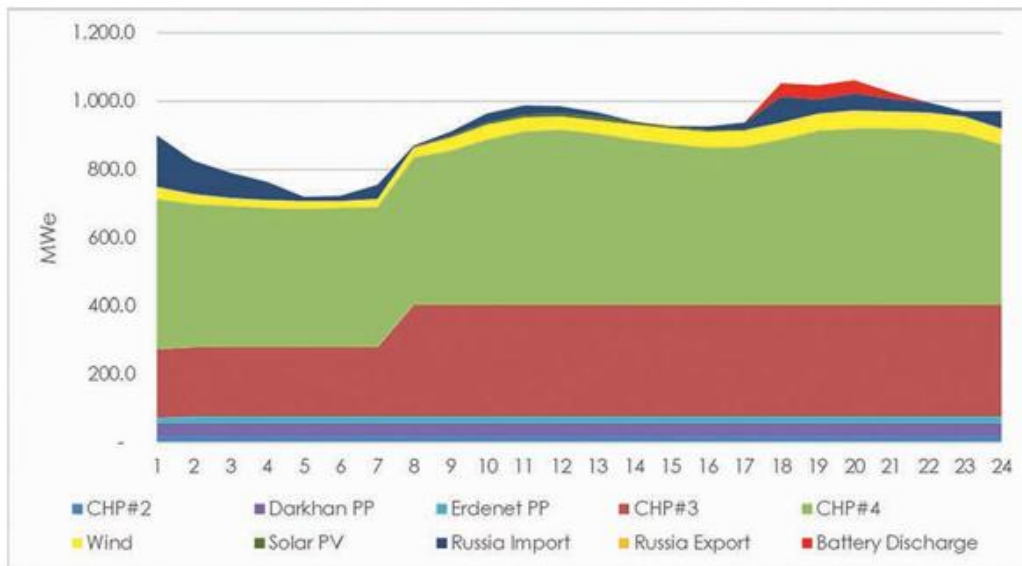


Figure 2-2 Daily Power Supply-and-Demand CES⁸

Key: CHP = combined heat and power, MWe = megawatt electric (1 million watts of electrical capacity), PP = power plant, PV = photovoltaic. Notes: 1. The data in this figure are based on a simulation for 2022. 2. The values along the horizontal axis indicate the hours during a theoretical day for which energy supply and demand were estimated.

Transmission and Distribution lines

2.2.4 The Mongolian power transmission network has two transmission voltages: 220 and 110 kV. As of 2024, there were 2,038km of 220kV and 5,764km of 110kV transmission lines and 10,678km of 35kV distribution lines.⁹ The existing and planned 220 kV grid in the CES is shown in Figure 2-3. There are also 11 220kV substations, 78 110kV substations and 306 35kV substations in the CES in 2024. NPTG operates and manages the transmission lines and substations. NPTG has five branches in 15 aimags, including the capital city and employs 1,307 people in total.

⁸ Source: Asian Development Bank. 2020. Mongolia: Energy Storage Option for Accelerating Renewable Energy Penetration. Consultant's report. Manila (TA 9569-MON). Designing a Grid-connected Battery Energy Storage System - Case Study of Mongolia, April 2023.

⁹ Эрчим хүчний зохицуулах хороо | Energy Regulatory Commission | STATISTICS ON ENERGY PERFORMANCE 2023

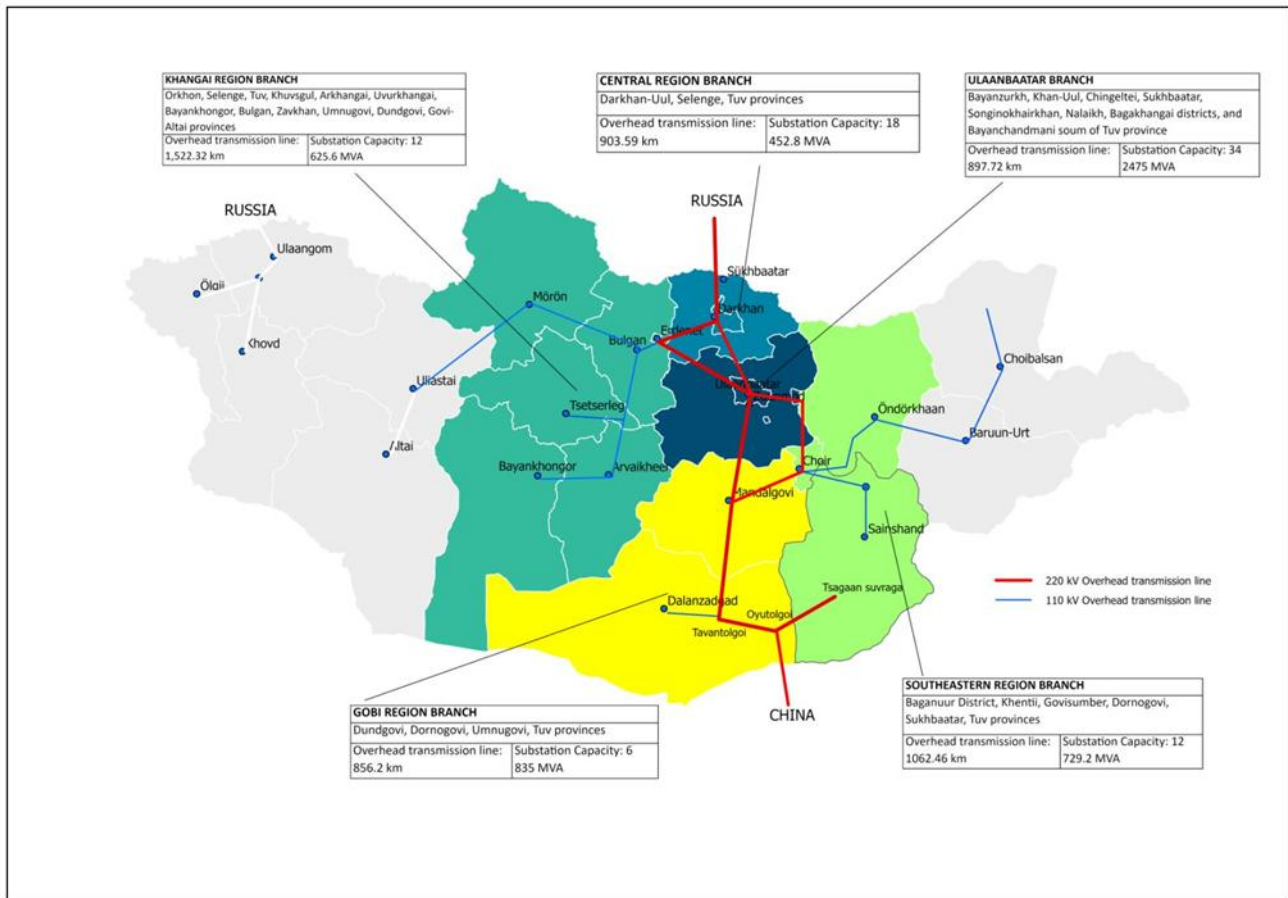


Figure 2-3 220 kV transmission lines of CES¹⁰

2.2.5 Further details of the 220 kV transmission lines are in operation in the CES have been requested.

2.2.6 In terms of electricity distribution, this is provided by State-owned and private companies across Mongolia. The Project lies within the Baganuur-Southeast Region Electricity Distribution Grid (BSRDG). Once constructed it is understood that the Project will supply electricity to the BSRDG within the broader CES transmission system in Mongolia. Further confirmation is being sought on this via the PIU. BSRDG supplies power distribution to a total of seven aimags in 57 soums covering 39,846 customers. The majority of customers are residential households with a small portion of small and medium enterprises and mines.

¹⁰ Source: <https://transco.mn/reports/report2024/index.html>

2.3 Project Need

2.3.1 Overall, the main challenges facing the Mongolian energy sector are:

- Domestic capacity shortage for generating electricity;
- Lack of investment to implement needed power generation and transmission network maintenance and expansion;
- Uncertainty in energy sector investment;
- Lower efficiency of the aging power supply infrastructure; and
- Higher loss of electricity transmission network.¹¹

2.3.2 The existing power transmission and distribution infrastructure in Mongolia is characterised by aged infrastructure, is inefficient and unreliable with major losses along transmission lines and is undergoing rehabilitation and upgrade. In 2024, the CES transmission and distribution loss accounted for 11.67%.

2.3.3 Development of the energy sector is outlined in Mongolia's Long-Term Development Policy: Vision 2050. The 2021 New Recovery Policy, a supporting policy to enhance the implementation of Vision 2050, includes a section on energy policy, which focuses on enhancing energy production and supply reliability by developing renewable energy facilities. The Project is included in the Government's Action Plan for 2024-2028 which also supports Vision 2050.

2.3.4 The Project is needed to address the following:

- **Eliminate power grid capacity shortages and ensure reliability** - The newly constructed Booroljut, Bayan, Baganuur, and Tavan Tolgoi substations, along with the ongoing Choir–Sainshand 220 kV substation project, will help eliminate power grid capacity shortages and improve reliability. These facilities will supply electricity to newly established or being built processing plants (such as the oil refinery, Sainshand Industrial Park, and coal and copper processing plants), as well as to railway and road infrastructure, and associated loading and unloading facilities across the Gobi region. The OHTLs such as this Project will provide the transmission route between these substations.
- **Ensuring Reliable Power Supply for Development Projects in the Gobi Region** - At present, the Ulaanbaatar-Baganuur-Choir line and the Choir-Sainshand line (currently in the pre-construction phase), as well as the Ulaanbaatar -Mandalgovi-Tavantolgoi-Oyu Tolgoi-Tsagaan Suvarga corridor, are each supported by 220kV transmission lines. The proposed construction of the Project's 220kV double-circuit transmission line will interconnect these two corridors, forming a circular transmission network. This closed-loop system will significantly improve the reliability and resilience of power supply to key development projects across the Gobi region.

¹¹ Ministry of Energy 2018. Energy Sector of Mongolia, Country Report.

2.4 Design Studies

- 2.4.1 The Project is set out in a detailed design report 'Detailed Engineering drawings for the 220kV double-Circuit Overhead Transmission Line Along the Sainshand–Tsagaan Suvarga Route' prepared by Master Point LLC on behalf of the Ministry of Energy in 2021.
- 2.4.2 According to the PIU and MoE, a feasibility study for the Project was not prepared.

2.5 Alternatives

- 2.5.1 The route selection was set out on the detailed design report. According to the PIU, Master Point LLC undertook a field visit between August 15–25 2021. Based on the field survey, an optimal route was selected with turning points determined through geodetic measurements. Key considerations included:
- Routing through less rugged terrain (e.g., low hills, open plains, sand dunes, ravines, springs, lakes);
 - Avoiding encroachment on mining lease areas and privately or corporately owned property; and
 - Minimising alignment along the direct axis connecting Tsagaan Suvarga to Sainshand.
- 2.5.2 To obtain agreement to the preferred route, the design team that identified the route for the MoE, MasterPoint LLC, have obtained an approval page with signatures from the following organisations: NPTG, Dornogovi Aimag, Mongolian Railways, National Emergency Management Agency, National Dispatching Center, Baganuur-South East Region Power Transmission, Land Relation, Urban Development Agency and the Dornogovi Branch of the Information & Communication Network. In line with Mongolian Government Resolution No. 97 of 18 March 2020, the NPTG will need to obtain a Decree from the relevant Governors at the aimag and soum level for official allocation of the land to the Project.
- 2.5.3 It is understood that no further data is available on route selection from the MoE/PIU.

2.6 The Project

- 2.6.1 The project comprises a 204km double circuit 220kV OHTL line, connected into a planned substation on the outskirts of Sainshand city (which is expected to be constructed as part of a separate project prior to the construction of this project) and an existing substation within the licensed mine area of Tsagaan Suvarga. The Project location is shown in Figure 2-4.
- 2.6.2 The detailed design report identifies that the route corridor will pass over the following:
- 110 kV lines: 2 times
 - 35 kV lines: 6 times
 - 10 kV lines: 3 times
 - Communication lines: 2 times

- Paved roads: 2 times
- Railways: 3 times

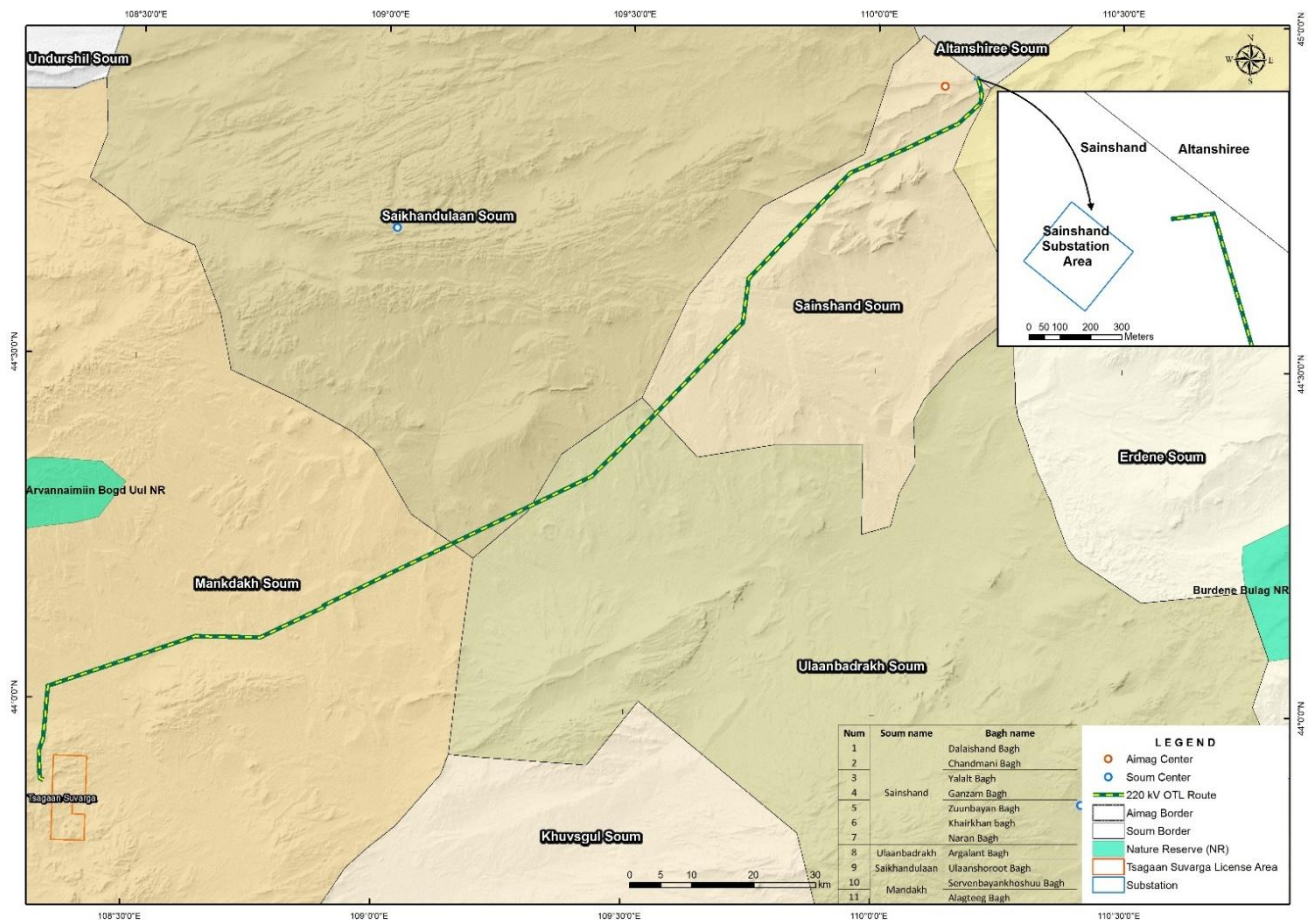


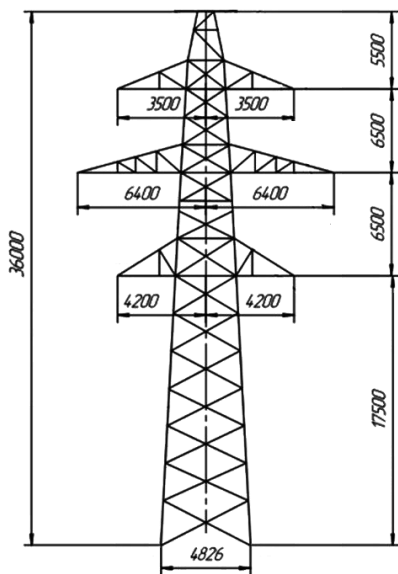
Figure 2-4 Transmission line route and administration boundary

Transmission Line

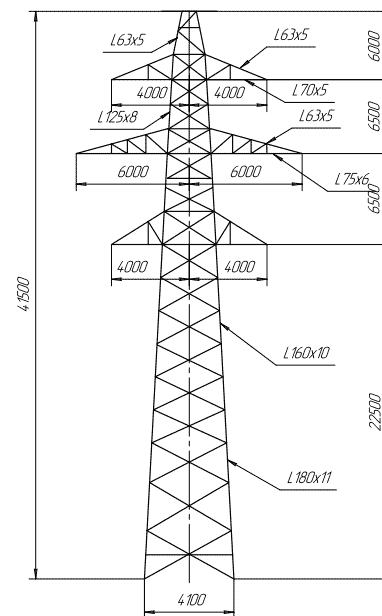
- 2.6.3 The transmission line comprises a 204 km 220 kV double circuit overhead line. Further information has been requested on the type of conductor wires, ground wires and lightning protection and system operation has been requested from the PIU. It is understood that this circuit will have no tee off connections at any point, which will help to improve transmission between the two substations.
- 2.6.4 As the OHTL route will require changes in direction and elevation, different tower types are required depending on whether the power line maintains a constant direction or a change in angle or elevation. The Project will require 690 towers, as summarised in Table 2-1 and Figure 2-6. Further information is being sought on the average height of the towers, the average distance between the towers and the average size of each tower footprint.

Table 2-1 OHTL towers

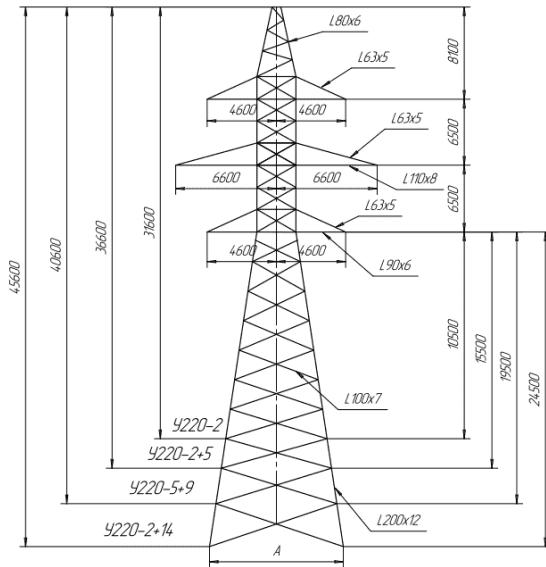
Type	Description	Quantity
PS220-2/ΠC220-2	A description of the type of tower use is being sought from the PIU.	612
PS220-2/ΠC220-6	A description of the type of tower use is being sought from the PIU.	31
U220-2/Y220-2	A description of the type of tower use is being sought from the PIU.	31
U220-2+5/Y220-2+5	A description of the type of tower use is being sought from the PIU.	7
U220-2+9/Y220-2+9	A description of the type of tower use is being sought from the PIU.	9



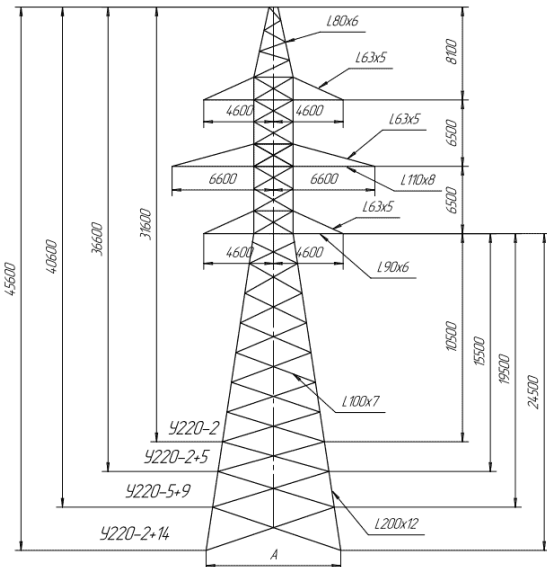
PS220-2/ΠC220-2



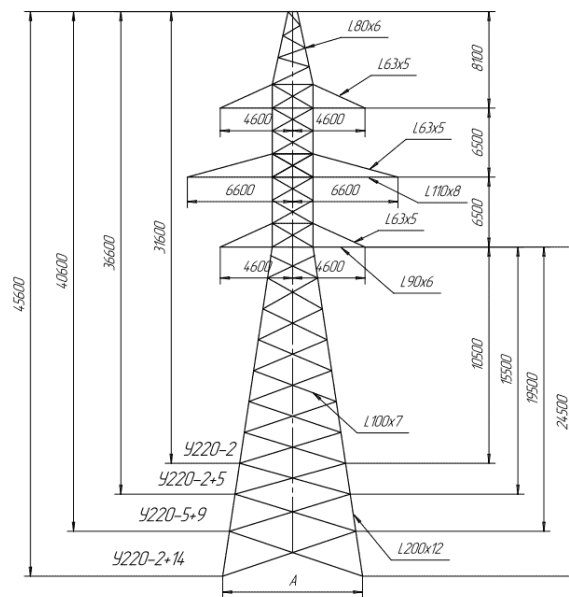
PS220-2/ΠC220-6



U220-2/Y220-2



U220-2+5Y220-2+5



U220-2+9Y220-2+9

Figure 2-5 Tension Towers

2.6.5 The towers and lines for the transmission lines will be made from steel and aluminum; with materials sourced from international companies.

- 2.6.6 A foundation with four legs will be required for each tower. Concrete foundation footings for towers and portals and concrete cable trays will be purchased from domestic producers and be transported to the project site. On average, four to six tower foundation footings can be loaded and transported by a truck trailer. The construction of the foundation should be in line with national regulation on construction (BND20-03-11 and 20- 02-11) to protect steel and reinforced concrete structures from collapse.

Sainshand Substation

- 2.6.7 The location of the planned substation that will be constructed as part of the Choir-Sainshand OHTL Project is shown in Figure 2-7. It is anticipated that the substation will be constructed before this project commences construction. As the substation was assessed within the Choir Sainshand OHTL ESIA, and no additional land take is required to connect this project to the substation, only the connection to the Sainshand substation will be assessed in the ESIA for this project.
- 2.6.8 Information from the design company has been sought on the specific types and numbers of transformers and related equipment to be installed at the substation.

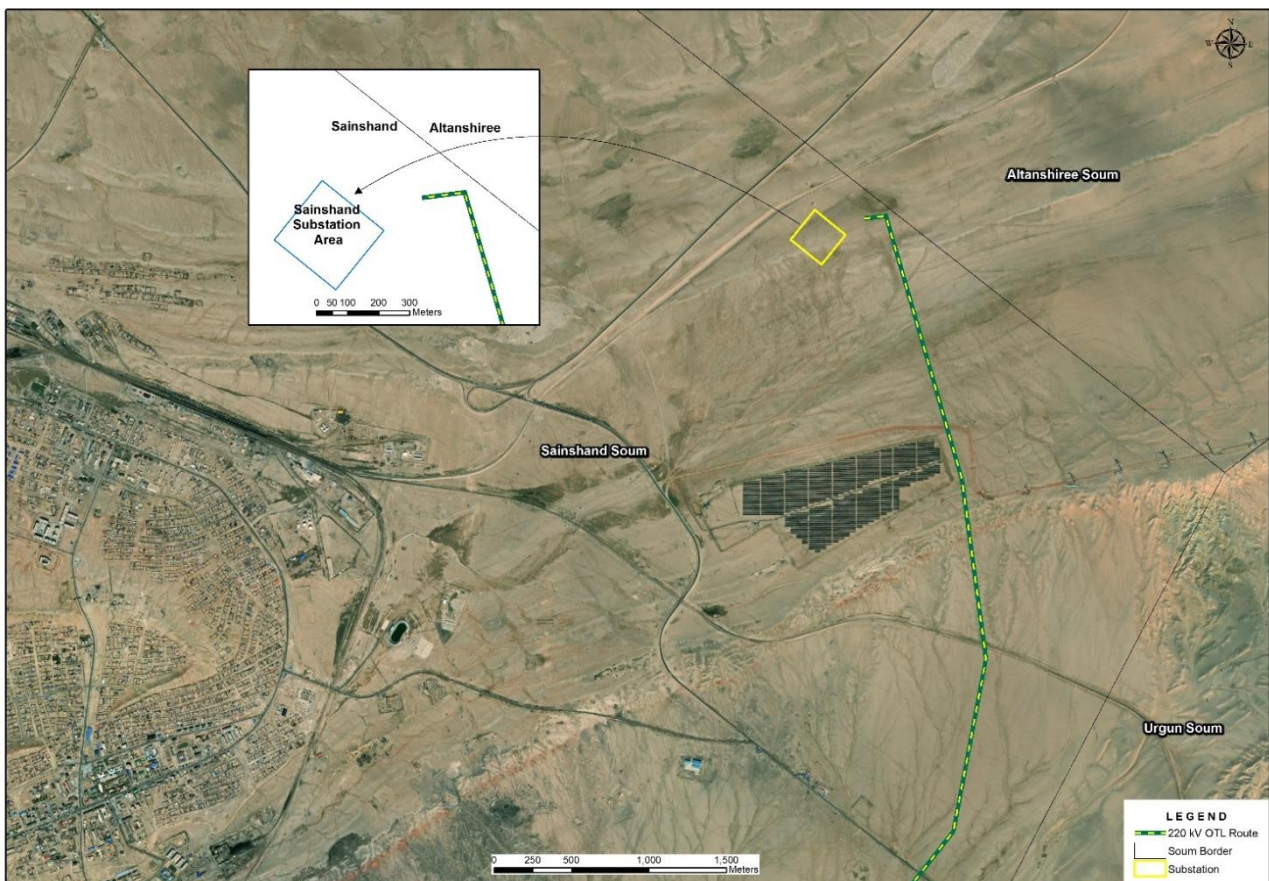


Figure 2-6 Sainshand substation location

Tsagaan Suvarga Substation

- 2.6.9 The Project will also connect to the existing Tsagaan Suvarga substation, which is located adjacent to the Tsagaan Suvarga mining license area (Figure 2-8). The substation is currently owned and operated by the NPTG, a state-owned stock company in charge of power transmission. However, it is understood that the substation is located on land owned by the mining company currently but is in the process of being transferred to state ownership under a concession agreement; further clarification has been sought on this with the mining company. There are five existing grid connections to/from the substation; the 22kV OHTL from this substation provides power to consumers in Hatanbulag soum. An area within the substation has been identified for the connection, as shown on Figure 2-9. Information from the design company has been sought on the specific types and numbers of transformers and related equipment to be installed at the substation.

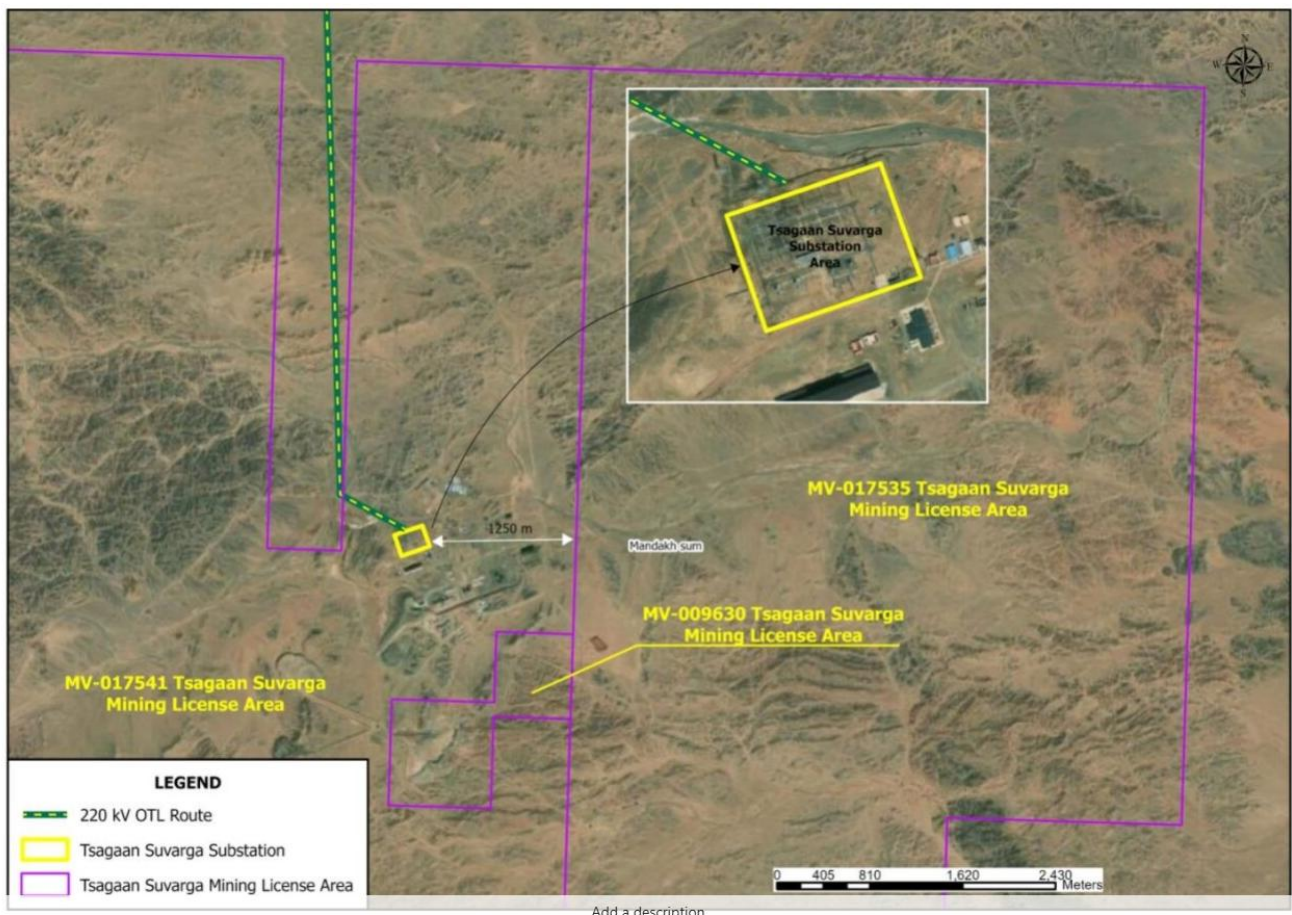


Figure 2-7 Tsagaan Suvarga substation location



Figure 2-8 Tsagaan Suvarga substation photo

Other

- 2.6.10 The construction of maintenance access roads is not required, as access can easily be provided via existing dirt roads along the proposed alignment.

Design Life

- 2.6.11 Typically, the operational life of a tower is around 80 years. The conductors, insulators and fittings on high-voltage overhead lines normally last for about 40 years, so the towers and overhead lines need to be refurbished periodically in order to maintain the network and ensure it continues supplying electricity safely and securely.

2.7 Establishment of the Right of Way

- 2.7.1 The Mongolian Government Resolution No. 97 of 18 March 2020 stipulates the establishment of protection zones or Right of Way (RoW) for transmission lines.
- 2.7.2 The Resolution sets out specific RoWs as provided in Table 2-2. The requirements for 220kV lines are highlighted in yellow. Any activities that may interrupt energy transmission are prohibited within the RoW. This includes prohibition of infrastructure development within the RoW and any activities in the RoW area will require approval from the powerline owner.
- 2.7.3 No trees and any agricultural plantation are allowed within 25m surrounding substations or any power distribution infrastructure. Owners of trees or shrubs planted or growing within the RoW shall be obliged to move or cut them, if the former may possibly cause damage to the network or obstruct inspection or maintenance of the powerlines.

Table 2-2 RoW for transmission lines in Mongolia

Powerline, kV	Unpopulated areas	Populated areas	Substation and distribution infrastructure	Forested areas and Parks
	Both sides of the outer line, m		Every direction, m	Both sides of the outer line, m
Up to 1 kV		1-1.5 m		
1- 20 kV	10 m	2 m	10 m	2 m
35 kV	15 m	4 m	15 m	3 m
110 kV	20 m	5 m	20 m	3 m
220 kV	25 m	6 m	25 m	4 m
330 -500 kV	10 m	30 m	30 m	5 m

2.8 Land Acquisition

- 2.8.1 As identified above, under law a RoW or protection zone can be set up by the NPTG. However, to secure this land, the NPTG must still obtain relevant letters from each *soum* and *aimag* to declare that the land has been provided for the Project.
- 2.8.2 The land within the route corridor is Government land. Figure 2-9 shows that the route corridor passes into one mining licence area (red in Figure 2-9) i.e. Tsagaan Suvarga and crosses two mining exploration areas (orange in Figure 2-9).
- 2.8.3 During an ESIA Team meeting with the MoE, NPTG, and PIU, it was noted that the land use for the Project s been granted; however, the certification process is still pending.



Figure 2-9 Route corridor and mining licence areas

2.9 Proposed Programme and Project Phases

2.9.1 The start date for construction is not currently known, however, it is assumed that approximately 24 months for construction with a start in 2026. The Project phases are summarised in Table 2-3.

Table 2-3 Project phases

Phase	Description
Pre-construction	<ul style="list-style-type: none"> Pre-construction survey to capture video/photo description of any sensitive receptors. Official decree to declare the land for use under the OHTL. Line route (detailed topographic and geotechnical survey) and tower location optimisation. Establishment of a RoW and implementation of a Livelihoods Restoration Plan. Clearing of access tracks - where possible, access to the site will be along the new RoW; however, it is likely that several temporary access tracks will be required along the route. Typical machinery required is a bulldozer.

Phase	Description
Construction and commissioning	<ul style="list-style-type: none"> Vegetation clearance of the substation site. Establish land entry and land exit procedures/protocols to facilitate land/site hand-over at the end of construction. Establishment of site storage areas/compounds: Site Offices, storage areas, worker accommodation, parking areas, etc. Secondary camp(s) likely to be required. Transportation of equipment and workers to site Levelling and excavation of pole and tower foundations - topsoil will be stripped from areas of excavation prior to any further excavation which may be required. The proposed pole/tower base areas will be levelled; where possible, cut soil will be used for levelling the site to design levels. Erection of towers/poles - the towers will be erected with cranes. Stringing of lines - once the towers/poles are erected, the conductors and shield wires will be strung and appropriately 'tensioned' to provide the minimum clearance between ground level and the wires. In most cases, conductors will be strung by manual labour. When oversailing properties, overhead line conductors will be strung between the towers with scaffolding. Civil works and installation of substation. Workers compound, if required. Temporary power generation, if required. Waste management - the major waste stream will be the disposal of surplus spoil from the tower sites. Other wastes will comprise general domestic waste including sanitary and food waste, organic material, small volumes of wastes arising from mobile plant, chiefly waste lubricating oil and packing materials. Testing and first operation of equipment - once the poles/towers have been erected and the lines strung, tests and measurements will be carried out to ensure that the line performs as expected. Minimum distances such as clearance between the lines and the ground level shall be checked and the lines shall be 'tensioned' as per specifications.
Operation	<ul style="list-style-type: none"> Operation and maintenance of equipment based on accepted international standards and in accordance with national legislation and practices as set out by the Mongolian Ministry of Energy. The main activities to be carried out during the operation of the Project include: operation of the substations, surveillance of the condition of the overhead lines, towers and RoW; routine, planned and emergency maintenance and repairs; and vegetation control. Provision of appropriate safety signage in accordance with national and international standards. Routine maintenance – to ensure the integrity and safety of the OHL. This will include: <ul style="list-style-type: none"> Foot patrol. Routine physical examination of the OHL and its component parts to ensure safety, security and integrity of the line. Security patrol. To check on segments of the line close to populated areas for signs of vandalism, branches of trees interfering with lines, tampering, and general security of the lines. This should ensure early detection of and rapid response to acts of vandalism and to rectify such situations as promptly as possible; and Pole/tower auditing and repairs. Annually 10% of all towers should be thoroughly examined. Detection and tightening of loose bolts on supports and

Phase	Description
	<p>hardware can reduce premature wear and indicate for replacement of worn components before failure.</p> <ul style="list-style-type: none"> Planned maintenance - scheduled maintenance programmes that should be carried out on the overhead lines in accordance with manufacturer equipment specifications or due to the need to repair equipment. Some of the activities carried out under planned maintenance will include: <ul style="list-style-type: none"> Replacement – insulation of sections of the overhead line; Treatment of rust and re-painting of tower components; Replacement of conventional bolts and nuts with anti-theft fasteners on older line sections; Rehabilitation of access roads and tracks; and Inspection and maintenance of switchgears, protection systems, etc. Emergency maintenance - activities relating to correction of unplanned events. This could include spectrum of minor faults (e.g. insulator failure) to major defects such as tower failures. Vegetation control Waste management
Decommissioning	Removal of equipment and structures.

2.10 Associated Facilities

2.10.1 The use of pre-fabricated concrete foundations eliminates the need for quarrying. For substation construction, limited quantities of sand and aggregates will be required and will be sourced from local suppliers as needed. Therefore it is considered there is unlikely to be a requirement for borrow pits or quarries. There is no requirement for a batching plant. However, this, together with their location, would be determined by the Construction Contractor.

3 Regulations and Guidelines

- 3.1.1 This section provides a preliminary identification of the policy, legal and institutional framework relevant to the Project, covering the EBRD requirements and Mongolian administrative framework and national legislation, standards and guidelines.

3.2 EBRD Performance Requirements

- 3.2.1 The Project will be required to comply with the following requirements:
- PR 1: Assessment and management of environmental and social risks and impacts;
 - PR 2: Labour and working conditions;
 - PR 3: Resource efficiency and pollution prevention and control;
 - PR 4: Health, safety and security;
 - PR 5: Land acquisition, restrictions on land use and involuntary resettlement; (no involuntary resettlement foreseen, although land acquisition and economic displacement will be considered)
 - PR 6: Biodiversity conservation and sustainable management of living natural resources;
 - PR 8: Cultural heritage;
 - PR 9: Financial intermediaries (not applicable); and
 - PR 10: Information disclosure and stakeholder engagement.
- 3.2.2 PR 7: Indigenous people is not applicable as there are no indigenous peoples in the Project area.

3.3 EU Requirements

- 3.3.1 The EBRD ESP requires the Project to meet all relevant EU substantive environmental standards. The key relevant EU Directives are set out below
- EU Directive 2011/92/EU Environmental Impact Assessment, amended in 2014 by the EIA Directive 2014/52/EU
 - EU Directive on the Conservation of Wild Birds (2009/147/EC)
 - EU Directive 2000/60/EU Water Framework Directive
 - EU Directive 2013/35/EU of the European Parliament of and of the Council of 26 June 2013 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) (20th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)
 - EU Council Recommendation (1999/519/EC)
 - EU Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on Energy Efficiency
 - Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on Public Access to Environmental Information
 - The Espoo Convention on Environmental Impact Assessment in a Transboundary Context, 1991
 - EU Framework Directive on Safety and Health at Work (89/391/EEC)

3.4 Mongolian Requirements

Policies

3.4.1 The Government of Mongolia promulgated various environmental policies in the energy sector and the following are the main documents that form the base for legislative development:

- Vision 2050, Mongolia's Long Term Development Policy, 2020
- New Recovery Policy, 2021
- Mongolian Government Action Programme, 2024-2028
- Mongolian Integrated Power System program 2007-2040

Environmental and Social Laws

3.4.2 The hierarchy of policies and legislative provisions for environmental management in Mongolia comprises the Constitution, international treaties, and environment and resource protection laws. The relevant environmental and social laws and regulations are summarised in Table 3-1.

Table 3-1 Key Laws of Mongolia relating to transmission lines and environmental and social impacts

Name of the law	Year adopted	Last year of amendment
The Constitution of Mongolia	1992	2023
Civil Code	1994	2002
Law on Environmental Protection	1995	2024
Law on Land	2002	2024
Law on Sub-Soil	1988	2023
Law on Soil protection and prevention from desertification	2012	2022
Law on Special Protected Areas	1994	2023
Law on Fauna	2012	2024
Law on Natural Plants	1995	2024
Law on Plant Health and Plant Protection	2024	-
Law on Forest	2012	2023
Law on Water	2012	2024
Law on Water Pollutant Fee	2012	2024
Law on Air	2012	2023
Law on Air Pollutant Fee	2010	2024
Law on Environmental Impact Assessment	2012	2024

Name of the law	Year adopted	Last year of amendment
Law on Waste	2017	2024
Law on Toxic and Hazardous Chemicals	2006	2024
Law on Protection of Cultural Heritage	2014	2024
Law on Culture	2021	-
Law on Land	2002	2024
The Law on Allocation of Land to Mongolian Citizens for Ownership	2002	2024
Labour Code	2021	2024
Law on Occupational Health and Safety	2008	2023
Law on Health	2011	-
Law on Hygiene	2016	2023
General Law on Social Insurance	2023	2024
Law on minimum wage	2010	-
Law on Pensions, Benefits, and Payments for Industrial Accidents and Occupational Diseases to be Issued from the Social Insurance Fund	2023	-
Law on the promotion of employment	2011	-
Law on ensuring gender equality	2011	Multiple amendments
Law on children's right	2016	-
Law on combating domestic violence	2016	-
Law on human rights of persons with disabilities	2016	-
State policy on informal employment	2006	-
Law on Land Use Fee	1997	2019
Energy Law	2001	2017
Renewable Energy Law	2007	
Law on Energy Conservation	2015	
Law on Electricity, heat and coal tariff	1995	
Government Resolution No. 97 on Rights of Way	2020	
Mongolian Law on Licensing	2001	
Minister of Environment and Green Development, Ordinance A-117 (Inclusion of social impacts in DEIA)	2014	
Minister of Environment and Green Development, Ordinance A-03 (Public consultation procedure)	2014	

Source: ESIA Preparation Team

Environmental Standards

3.4.3 Mongolian national standards applicable to the Project are listed in Table 3-2.

Table 3-2 List of Mongolian national standards (MNS) applicable to the project

#	Name of Mongolian National Standard (MNS)
1	MNS 17.5.13. 1980. Environmental Protection: Rehabilitation of eroded land, terms and definitions
2	MNS 5914:2008. Environment. Land reclamation. Terms and definitions
3	MNS 5916:2008. Environment Requirements for fertile soil removing and its temporary storage during the earth excavation
4	MNS 5918:2008. Environment. Re-vegetation of destroyed land. General technical requirements
5	MNS 4585:2016. Air quality. General technical requirements
6	MNS 4991:2000. Occupational safety and health. Requirement for method of determination of toxic substances concentration in the air of working zone
7	MNS 5885:2008. Acceptable concentration of air pollutant elements. General technical requirements
8	MNS 6063:2010. Air quality. Acceptable concentration of pollutant elements for atmospheric air in public area
9	MNS 5803:2007. Occupational safety and health. General requirements for lead content in workplace air and the workplace
10	MNS 4586:1998. Water quality. General requirements
11	MNS 3342:1982. General requirement for preventing from groundwater pollution
12	MNS ISO 5667-11:2000. Water quality. Sampling. Part 4: Guidance on sampling of groundwater
13	MNS 6148:2010. Water quality. Maximum limit of substance contaminating the ground water
14	MNS 4943:2015. Water quality. Effluent treated wastewater. General requirements
15	MNS 6230:2010. Identification of wastewater discharge point. General requirements
16	MNS 5924:2015. Pit latrine and sewage pit. Technical requirements
17	MNS 3475:2003. Plant quarantine. Terms and definitions.
19	MNS 5850:2008. Soil quality. Soil pollutants elements and substance
20	MNS 3298:1991. Soil. General requirements for sampling
21	MNS 2305:1994. Soil. Procedure for sampling, packaging, transportation and storage.
22	MNS 5546:2005. General requirements for assessment of soil erosion and degradation of vegetation cover in pasture lands.
23	MNS 3297:1991. Environment protection. Soil. The norm for sanitary condition of soil in town and residential areas
24	MNS 4643:1998. Occupational safety and operational security signs. Colour of safety signs.
25	MNS 4994:2000. Occupational safety and health. Vibration. Requirement for general safety.

#	Name of Mongolian National Standard (MNS)
26	MNS 4994:2000. General requirements for measuring vibration.
27	MNS 5029:2011. Occupational safety and health. Label and marking of toxic and hazardous chemicals
28	MNS 5079:2001. General safety requirements for loading and unloading.
29	MNS 5105:2001. Occupational safety. Industrial hygiene. Hygiene protection areas norm, general requirements.
30	MNS 5146:2002. Occupational safety. Industrial hygiene. Electric safety. Protective conductive earth, neutralling.
31	MNS 5390:2004. Occupational safety and health. Fire safety of electricity. General requirements.
32	MNS 4930:2000. Safety of machinery. General requirements.
33	MNS 4969:2000. Organization of a training. Basic rules.
34	MNS 4643:1998. Occupational safety. Color of safety signs.
35	MNS 4994:2000. Occupational safety and health. Vibration. Requirement for general safety.
36	MNS 0012.4.005:1985. Device and method for protection from noise.
37	MNS 5003:2000. General requirements for the measurements of noise.
38	MNS 5150:2002. Electric safety. General requirement.
39	MNS 5145:2002. Electric safety. Maximum voltage and maximum level of current.
40	MNS 5149:2002. Industrial hygiene. Power frequency electric fields. Permissible levels of field strength and requirements for control at workplaces.
41	MNS 5002:2000. Occupational safety and health. Noise. Requirements for general safety.
42	MNS 4931:2000. Personal protective equipment. Types and general requirements.
43	MNS 5388:2004. Hearing protection equipment (ear plug, ear muff). General technical requirements.
44	MNS 5389:2004. Eye protection equipment-Goggles.
45	MNS 5621:2006. Head protection equipment-Hard hat.
46	MNS 5622:2011. Safety gloves. General requirements.
47	MNS 5623:2006. Foot protection equipment. Safety boots.
48	MNS 5344:2011. General requirements for transportation of domestic waste.
49	MNS 5282:2003. Fire safety of petroleum products. General requirements.
50	MNS 5566:2005. Protection against fire. Fire protection instrument for building. Technical requirements.
51	MNS 4244:1994. Fire safety. General requirements.
52	MNS 3629:1983. Petroleum, petroleum product. Packaging, labelling and transportation.
53	MNS 4596:2014. Use of road signage, traffic light, protective bracket, and direction signs.
54	MNS 5645:2006. Transportation of construction materials in pieces and bulk. Classification, transportation condition. General requirements.

#	Name of Mongolian National Standard (MNS)
55	MNS 6515:2015. Passages for wild ungulates altogether highways and railways in steppe and gobi areas. General requirements.

Source: ESIA Preparation Team

National permits

3.4.4 Mongolian national permits for electricity generation, transmission and operation are as follows:

- Electricity Generation
- Electricity Transmission
- Dispatching
- Electricity Distribution
- Regulated supply of energy
- Un-regulated supply of energy
- Electricity Import and Export
- Construction of Energy facilities
- Installation, testing, adjustment, and maintenance of power transmission lines and substations

Relevant Conventions

3.4.5 Mongolia has adopted a number of international conventions with regard to environment as shown in Table 3-3.

Table 3-3 International Environmental and Social Conventions signed by Mongolia

#	Convention	Year of Accession
Environmental Conventions		
1	Convention on Biological Diversity	1993
2	UN Framework Convention on Climate Change (UNFCCC)	1994
3	Kyoto Protocol	1999
4	UN Convention to Combat Desertification	1996
5	Convention on the Protection of Wetlands of International Importance especially as Waterfowl Habitat (Ramsar)	1998
6	Vienna Convention for the Protection of the Ozone Layer	1996
7	Montreal Protocol (regulating substances that deplete the ozone layer)	1996
8	Convention on International Trade in Endangered Species of Fauna and Flora (CITES)	1996
9	Convention on the Transboundary Movement of Hazardous Waste (Basel)	1997
10	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	2001

#	Convention	Year of Accession
11	Stockholm Convention on Persistent Organic Pollutants	2004
12	Convention on the Conservation of Migratory Species of Wild Animals	1999
13	MoU concerning the Conservation of Migratory Birds of Prey in Africa and Eurasia	2008
14	Paris Climate Accord	2016
Cultural Heritage Conventions		
15	Convention for the protection of cultural property during armed conflict	1964
16	World Heritage and Natural Heritage Convention	1990
17	Convention on the prevention measures of illegal entry and release of cultural heritage, as well as prohibition of cultural heritage ownership transfer	1991
18	Convention for the Safeguarding of Intangible Cultural Heritage	2005
19	Convention for the protection and promotion of the diversity of cultural expressions	2007

Source: ESIA Team.

- 3.4.6 Although Mongolia is not a signatory, the EBRD observes the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters and the Espoo Convention on Environmental Impact Assessment in a Transboundary Context.

International Labour Organization (ILO) conventions

- 3.4.7 Mongolia has been a member of the ILO since 1968 and has ratified 20 ILO Conventions, of which 18 are in force, including all eight fundamental conventions, and one convention has been denounced. Ratified conventions are listed in Table 3-4.

Table 3-4 ILO Conventions Ratified by Mongolia

Convention Name	Ratification date by Mongolia
Freedom of association, collective bargaining, and industrial relations	
C087 – Freedom of Association and Protection of the Right to Organize Convention, 1948 (No.87)	03 June 1969
C098 – Right to Organize and Collective Bargaining Convention, 1949 (No.98)	03 June 1969
C135 – Workers' Representatives Convention, 1971 (No.135)	08 Oct 1996
Forced Labour	
C029 – Forced Labour Convention, 1930 (No.29)	15 Mar 2005
C105 – Abolition of Forced Labour Convention	15 Mar 2005
Elimination of child labor and protection of children and young persons	

Convention Name	Ratification date by Mongolia
C123 – Minimum Age (Underground Work) Convention, 1965 (No.123) Minimum age specified: 18 years,	03 Dec 1981
C138 – Minimum Age Convention, 1973 (No.138)	16 Dec 2002
C182 – Worst Forms of Child Labour Convention, 1999 (No.182)	26 Feb 2001
Equal opportunity and treatment	
C100 – Equal Remuneration Convention, 1951 (No.100)	03 Jun 1969
C111 – Discrimination (Employment and Occupation) Convention, 1958 (No.111)	03 Jun 1969
Employment policy and promotion	
C088 – Employment Service Convention, 1948 (No.88)	17 Apr 2015
C122 – Employment Policy Convention, 1964 (No.122)	24 Nov 1976
C159 – Vocational Rehabilitation and Employment (Disabled Persons) Convention, 1983 (No.159)	03 Feb 1998
C181 – Private Employment Agencies Convention, 1997 (No.181)	17 Apr 2015
Occupational safety and health	
C155 – Occupational Health and Safety Convention, 1981 (No.155)	03 Feb 1998
C176 - Safety and Health in Mines Convention, 1995 (No.176)	26 Nov 2015
Maternity protection	
C103 – Maternity Protection Convention, 1952 (No.103)	03 Jun 1969
Tripartite consultation	
C144 – Tripartite Consultation (International Labour Standards) Convention, 1976 (No.144)	10 Aug 1998

Source: ILO

Environmental Assessment Requirements

- 3.4.8 The EIA requirements of Mongolia are regulated by the Law on EIA (1998, amended 2002 and renewed again in 2012) and the purpose of the EIA law is environmental protection, the prevention of ecological imbalance, the regulation of natural resource use, the assessment of environmental impacts of projects and procedures for decision-making regarding the implementation of projects. The terms of the law apply to all new projects, as well as rehabilitation and expansion of existing industrial, service or construction activities and projects that use natural resources. The Minister of Environment and Green Development, Ordinance A-117 of 2014 covers the need for social impacts in the EIA.

- 3.4.9 The type and size of the planned activity determines whether the responsibility falls to the Ministry of Environment and Climate Change (MECC) (formerly the Ministry of Environment and Tourism (MET)), or the aimag (provincial) government-level environmental department.
- 3.4.10 There national EIA process requires the following:
- **Preparation of a Baseline Environmental Survey Report** – this is prepared by the project implementer.
 - **GEIA (screening)** – to initiate a GEIA (essentially, a decision by the regulator on what level, if any, of EIA is required), the project implementer submits to MECC (or Environmental department of corresponding aimag) the following: Finalized Project Design or an approved Feasibility Study, Baseline Environmental Survey Report, a letter from the soum governor which requests GEIA, technical details, drawings, and other information. The GEIA may lead to one of four conclusions: (i) no detailed EIA is necessary, (ii) the project may be completed pursuant to specific conditions; and (iii) a DEIA is necessary, or (iv) project cancellation. The GEIA is free and usually takes up to 14-28 working days.
 - **DEIA** – the scope is defined by the GEIA. The DEIA report must be produced by a Mongolian company which is authorised by MECC with a special license to conduct DEIA. The developer of the DEIA should submit it to the MECC (or Environmental department of corresponding aimag). An expert of MECC who was involved in conducting the GEIA will make a review of the DEIA within 18-36 working days and present it to MECC (or Environmental department of corresponding province). Based on the conclusion of the expert, MECC (or aimag government) takes a decision about approval or disapproval of the project. If the DEIA report is rejected by MECC, further guidance is provided by MET, and the report is submitted again. MECC may also provide comments on the approved report.
- 3.4.11 During pre-construction, the MoE will also need to obtain the national EIA permit for the proposed works. This includes both the delivery of a GEIA and a DEIA. The GEIA is first issued by the Ministry of Environment and Climate Change (MECC), after which the DEIA is developed based on the GEIA, reviewed, and approved.

4 Environmental and Social Impact Assessment Proposed Approach

4.1 Introduction

- 4.1.1 ESIA is a process and management technique which allows consideration of the likely environmental and social impacts of a development prior to it proceeding. This provides an opportunity to ensure that the design is optimised in an integrated manner, minimising negative environmental and social impacts and maximising positive impacts. The proposed approach to the ESIA is outlined in this section of the report.
- 4.1.2 The assessment process will cover, in an integrated manner, all relevant direct and indirect environmental and social aspects and impacts of the Project, including potential cumulative and transboundary impacts (due to migratory birds).
- 4.1.3 The ESIA will be undertaken in accordance with:
- EBRD's ESP and relevant PRs;
 - Relevant EU environmental standards;
 - Relevant Mongolian environmental and social legislation and regulations;
 - Relevant international conventions and protocols relating to environmental and social issues, as transposed into national legislation; and
 - Good International Practice (GIP).
- 4.1.4 The impact assessment for the ESIA will comprise the following main steps:
- Identifying the Project and alternatives considered;
 - Identification and description of the baseline conditions and sensitive receptors;
 - Defining the technical, temporal and spatial scope of the ESIA;
 - Identification of Project impacts and evaluation of significance of effect;
 - Development of mitigation measures;
 - Prediction of the significance of residual effects; and
 - Consideration of cumulative and transboundary impacts.
- 4.1.5 Stakeholder engagement and consultation is a critical component that cuts across all the above ESIA steps.

4.2 Approach to Project Description and Alternatives

4.2.1 The Project description will be prepared based on the detailed design report and through discussion with the Ministry of Energy and their design consultants, NPTG and the Technical Due Diligence Consultant. Key areas of consideration will include:

- Safety measures proposed in the design;
- Measures take to avoid or where that is not feasible, reduce adverse impacts;
- Location and number of design features such as towers;
- Access routes;
- Construction supply chain and workforce;
- Construction methodologies, including proposed temporary access routes; and
- Maintenance regimes.

4.2.2 We will confirm the proposed design and measures to be implemented and discuss where those measures need to be augmented to meet EBRD requirements.

4.2.3 The EIA Directive states that an EIA should include:

“...a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment”.

4.2.4 EBRD PR1 states that an ESIA should include:

“...an examination of technically and financially feasible alternatives [...], including the non-project alternatives, and document the rationale for selecting the particular course of action proposed”.

4.2.5 The ES will therefore describe the reasonable alternatives to the Proposed Development which have been considered by the Applicant, including:

- a) **the type of activity to be undertaken** - this requires a change in the nature of the proposed activity; this includes the ‘do nothing’ option i.e., the option of not implementing the activity;
- b) **the site location and layout**- alternative locations for the entire project proposal, or for components of the project proposal and the different spatial configurations of an activity on a particular site; and
- c) **the process and operational aspects of the activity** - also referred to as technological or equipment alternatives; the purpose of considering such alternatives is to include the option of achieving the same goal by using a different method or process.

4.3 Technical Scope

4.3.1 The technical scope refers to the range of topics to be addressed in the ESIA. Annex IV, Paragraph 4, of the EIA Directive 2014, provides an indication of the topic areas to be considered in the EIA as follows:

“.... a description of the factors in Article 3 (1) likely to be significantly affected by the project:

population, human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage, including the architectural and archaeological aspects, and landscape

4.3.2 Through this scoping process, the following topics have been scoped in:

- Air Quality
- Noise and Vibration
- Biodiversity, flora and fauna
- Water Environment
- Soils
- Landscape and Visual
- Cultural Heritage
- Social and Community (covering Stakeholder Engagement and Consultation, Information Disclosure, Community Health, Safety and Security)
- Land Use, Employment and Livelihoods
- Labour and Working Conditions (including the supply chain and Occupational Health and Safety (OHS))
- Climate Change
- Cumulative Effects and Interaction Between Effects

4.3.3 Waste management will be considered under the project description and impacts will be covered under OHS and Community health, safety and security.

4.4 Temporal Scope

4.4.1 The temporal scope of the ESIA has considered the effects arising from the pre-construction, construction and operation and maintenance (O&M) phases of the Project. These effects can broadly be summarised as follows:

4.4.2 Consideration will be given to those impacts (i.e. changes to the environment) associated with the Project, compared with the baseline conditions (i.e. those conditions which would exist if the development did not go ahead).

4.4.3 The baseline year for the assessment of construction impacts is the projected start year for construction which is anticipated to be 2026¹². The construction period is anticipated to be around 2 years.

4.4.4 Operational impacts will be assessed for the proposed opening year, which is anticipated to be 2028, unless stated otherwise in respect to a particular topic.

¹² Note that no specific dates have been confirmed by the MoE. Based on the current progress of the Choir–Sainshand project, the project may not start until 2027 earliest.

- 4.4.5 Expected timescales for decommissioning are so far into the future that there is insufficient certainty about the likelihood, type or scale of activities to determine the potential effects, and therefore these effects have not been considered. Any decommissioning works are unlikely to result in effects exceeding the level of effects arising during the construction phase.

4.5 Spatial Scope

- 4.5.1 The spatial scope of the ESIA is described by the geographical area potentially affected by the Project. The spatial scope for the ESIA will vary, according to the specific assessment requirements of each technical topic. The scope takes into account, as relevant:

- the project footprint i.e. the total physical area required by the Project;
- the nature of the existing baseline environment;
- the pathway for some effects that may extend beyond the boundary of the project footprint (e.g. effects on watercourses may extend some distance downstream and beyond the area defined within the project footprint);
- the area affected (positively, negatively, directly and indirectly) by the Project; and
- the geographical boundaries of the political and administrative authorities which provide planning and policy context for the project.

- 4.5.2 For ease, the following definitions will be used:

- **Project Footprint** – this refers to the total physical area required by the Project.
- **Project or Study Area** – this is the spatial area within which environmental and social data has been collected to assess the effects of the Project. The Project Area covers Dornogovi aimag in the Central Region of Mongolia.
- **Area of Influence (Aoi)** – this is the extent over which the Project impacts will be realised, which will vary per technical topic.

- 4.5.3 The spatial scale of the effect will be defined in the ESIA according to whether it is Local, Authority-wide, Regional, National or International. Definitions of the spatial scales to be used are provided in Table 4-1.

Table 4-1 Definition of Spatial Scales

Spatial extent of effects	Definitions
International	Effects extending beyond Mongolia
National (Mongolia)	Effects within Mongolia but extending beyond region
Regional	Effects within Dornogovi aimag (province)
Local	Effects confined to a local area, typically, <1km from source

- 4.5.4 **Associated facilities** are the facilities or activities that are not financed by EBRD as part of the project, but which in the view of EBRD are significant in determining the success of the project or in producing agreed project outcomes. These are new facilities or activities:
- without which the project would not be viable; and
 - would not be constructed, expanded, carried out or planned to be constructed or carried out if the project did not exist.
- 4.5.5 No associated facilities for this Project have been identified.

4.6 Determination of Baseline Conditions

- 4.6.1 The environmental and social effects from the Project will be described in the ESIA in relation to the extent of changes to the existing baseline conditions. The baseline is usually the environmental and social characteristics and conditions of the area likely to be affected that are present at the time of the assessment, or which are predicted to be the case at certain times during the project's development ('future baseline'). Baseline environmental and social conditions, including those which are predicted, will be assessed in a number of ways. This will be through the use of existing available data or through undertaking additional studies, surveys or modelling.
- 4.6.2 A receptor is an entity that may be affected by direct or indirect changes to an environmental and/or social variable. Together, the receptors and their setting comprise the baseline for each topic. Relevant receptors will be identified for each topic during the ESIA process, and an appropriate baseline will be developed for each of these topics.
- 4.6.3 The collection of baseline information is achieved through desk study, consultation and field surveys where appropriate. Some baseline data collection has already been undertaken, and where this is the case it is highlighted within the relevant sections of this Report. If further information is needed in order to inform the ESIA, this is also indicated.
- 4.6.4 The ESIA will detail the following aspects for the baseline:
- Sources of information;
 - Methodology (including that for modelling or surveys);
 - Consultation;
 - Any limitations (data availability, seasonal variation etc); and
 - The temporal and spatial extent.

4.7 Prediction of Impacts and Assessment of Effects

- 4.7.1 The purpose of impact assessment is to identify and evaluate the likely significance of the potential effects on identified receptors and resources according to defined assessment criteria, to develop and describe measures that will be taken to avoid, minimize, reduce or compensate for any potential adverse environmental effects, and to report the significance of the residual impacts that remain following mitigation. This will be undertaken in accordance with the EIA Directive 2011, as amended

2014. The ESIA Report will describe the outcome of the ESIA process, i.e. the significant effects (both positive and negative) of the Project.

- 4.7.2 An **impact** is a physical or measurable change in the environment or social situation, such as the demolition of a building, the development of land, or adverse health effects. Construction impacts are those generated by construction activities, for example noise, dust, additional lighting from night works, risk of water pollution, risks to the health and safety of construction workers and traffic/public access diversion. Operational impacts are the impacts that result from the project's existence beyond the construction phase. These include visual effects associated with the operation of the OHTL, maintenance activities and employment opportunities, generated by the Project.
- 4.7.3 An **effect** is the interaction of such an impact or change in the environment with an identified receptor (such as a human being), or to the quality of an environmental resource. The significance of an effect is assessed by looking at what the changes will be against the existing, or predicted, baseline as a result of both the construction and operation of the Project. The way that the significance of effect is determined for each topic varies, but in principle will be based on the degree of change (i.e. the magnitude of impact), along with the sensitivity of the receptor which is affected.
- 4.7.4 Assessing the likely significant effects of the Project will consider the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, reversible and irreversible, positive and negative effects of the development. Direct effects arise as a direct consequence of the Project, for example the construction of new facilities or an increase in construction traffic. Indirect effects are those which are not a direct result of the Project but occur away from the original effect or as a result of a complex pathway. Indirect effects consist of a sequence of at least two effect steps. For example, effects of traffic may indirectly affect air quality, and in turn affect people.
- 4.7.5 Potential effects will be described as either temporary or permanent, according to whether or not the effect is expected to last for an indefinite period of time and will be detailed within the ESIA. Any effects described as reversible or irreversible will refer to whether the effect could be removed if deliberate action were taken to do so. This judgement will be based on the timescale for a receptor's return to baseline condition without intervention. If the timescale for a receptor's return to baseline condition is greater than 15 years, then it should be considered irreversible and if it is less than it can be considered reversible.
- 4.7.6 With regards to the frequency and duration of an effect, the ESIA will consider whether the effect will be continual or intermittent over the identified time period. The duration of effect will be defined as:
- Very short term: Less than 2 years
 - Short term: 2 to 5 years
 - Medium term: 5 to 10 years
 - Long term: 10 to 15 years
 - Very long term: More than 15 years

- 4.7.7 A beneficial or positive effect is defined as one that is favourable or otherwise beneficial to the condition of a receptor. An adverse or negative effect is one that is unfavourable or otherwise adverse to the condition of a receptor.

Magnitude of Impact

- 4.7.8 The magnitude of impact is predicted as a deviation from the established baseline conditions, as a result of the Project. The magnitude of these impacts will be defined within each chapter in accordance with appropriate quantifiable data, available appropriate national and international standards or limits (World Health Organisation (WHO) Limits, EU Quality Standards, etc.) and professional judgement. The generic scale used is defined in Table 4-2.

Table 4-2 Description of the Magnitude of an Impact

Magnitude	Impact type	Illustrative description
High	Adverse	Loss of resource and/or quality and integrity of resource; impact extends to national or international level.
	Beneficial	Large scale or major improvement to resource quality; enhancement; impact extends to national or international level.
Medium	Adverse	Measurable change in resource quality/integrity; medium loss of key characteristics or features; impact extends to regional level.
	Beneficial	Medium benefit to or addition of key characteristics or features; impact extends to regional level.
Low	Adverse	Minor loss or detrimental alteration to one or more characteristics or features; impact extends to the local level or immediate area.
	Beneficial	Minor benefit or addition of key characteristics or features; impact extends to the local level or immediate area.
Very low / No change	N/A	No change to the current situation.

Sensitivity/Value of Receptors

- 4.7.9 The sensitive / valuable receptors considered within the ESIA, and their sensitivity to change, will be identified within the technical chapters of the ESIA Report. Sensitivity will be determined by available and appropriate quantifiable data, the consideration of existing designations and professional judgement. The categories used, unless otherwise stated in each technical chapter, will following Table 4-3. Where topic specific methodology deviates from this approach, for example as a result of using topic specific guidance, this will be set out in the assessment methodology section of the technical chapter.

Table 4-3 Description of the Sensitivity of a Receptor

Importance/ Sensitivity of Receptor	Example of importance of receptors	Example of sensitivity of receptors
Very High	An attribute with a high quality and rarity on an international, regional or national scale with little or no potential for substitution.	Sensitive area or receptor with little resilience to imposed stresses.
High	An attribute with a high quality and rarity on an international or national scale with little or no potential for substitution.	
Medium	An attribute with a medium quality or rarity on a regional scale with limited potential for substitution, or an attribute of low quality and rarity on a regional or national scale.	The receiving environment or receptor has a moderate natural resilience to imposed stresses.
Low	An attribute of low quality and rarity on a local scale (town, site) with potential for substitution locally.	The receiving environment or receptor has a high natural resilience to imposed stresses.

Determining Significance of Effects

4.7.10 Determining the classification of effects will be undertaken using professional judgements (assumptions and value systems) that underpin the attribution of significance. Each effect will be assessed against the change of magnitude and the sensitivity / value of the receptor as shown in Table 4-4.

Table 4-4 Arriving at the Significance of Effects

		Receptor/resource sensitivity/importance			
		Very high	High	Medium	Low
Magnitude of impact	High	Major	Major	Major	Moderate
	Medium	Major	Major	Moderate	Minor
	Low	Major	Moderate	Minor	Negligible
	Very Low	Moderate	Minor	Negligible	Negligible

4.7.11 The terms as used within Table 4-4 have been defined below, applying to both beneficial and adverse effects:

- **Major effect:** These effects are generally, but not exclusively, associated with sites or features of international or national importance that are likely to suffer a most damaging impact and loss of resource integrity;
- **Moderate effect:** Effects that are considered to be important but may be key in the decision-making process;
- **Minor effect:** These effects may be raised as local factors and are unlikely to be critical in the decision-making process. They are important in enhancing the subsequent design of the Project; and
- **Negligible:** No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

4.7.12 Unless otherwise stated in the relevant chapter of this ESIA, effects that are classified as Moderate or Major are considered to be significant effects. Effects classified as Minor or below are considered to be not significant.

4.8 Mitigation of Significant Negative Effects

4.8.1 The ESIA will also include details of any measures that can be practicably implemented to prevent or reduce any significant effects on the environment or social situation. The identification of any such measures will be undertaken as part of the ESIA process, and in parallel with the design process, in order to incorporate measures into the project development, wherever feasible.

4.8.2 Mitigation measures will be considered in line with the following hierarchy:

- **Avoid** - making changes to a project's design or location to avoid adverse effects on an environmental feature.
- **Minimise** - reduction of adverse effects through sensitive environmental treatments/design.
- **Restore** - measures taken during or after construction to repair/reinstate and return a site to the situation prior to occurrence of impacts.
- **Compensate/offset** - where avoidance or reduction measures are not available, it may be appropriate to provide compensatory/offsetting measures. It should be noted that compensatory measures do not eliminate the original adverse effect, they merely seek to offset it with a comparable positive one.
- **Improvement measures** - projects can have positive effects as well as negative ones, and the project preparation stage presents an opportunity to enhance these positive features through innovative design.

4.9 Identification of Residual Effects

4.9.1 The residual significance is the potential effect that remains following mitigation. Effects will be assessed following the inclusion of mitigation measures as outlined above. This more accurately describes the effects of the Project as it is anticipated and forms the basis for the development of the

stand-alone ESMP that should be followed so that impacts are satisfactorily mitigated.

4.10 Cumulative Effects

4.10.1 The EBRD PRs and the EU EIA Directive require the consideration of cumulative effects. The cumulative effects of an action or activity can be viewed as the total effects on a resource, ecosystem, or human community of that action and all other activities affecting that resource. Cumulative impacts may arise as a result of:

- Impacts of interrelationships within the same project on a single receptor; and
- Impacts on a resource, ecosystem, or human community of that action arising from the Project in combination with other existing, planned or reasonably defined developments.

4.10.2 Cumulative impacts will be assessed in the ESIA.

4.11 Transboundary Effects

4.11.1 The term transboundary refers to an effect which occurs across political boundaries. The most relevant (to the Project) transboundary effect is the potential for transboundary effects in relation to migratory birds.

4.12 Consultation and Disclosure

4.12.1 A Stakeholder Engagement Plan (SEP) will be developed for the Project, as required under PR1 and PR10 covering all stages of project preparation such as ESIA, pre-construction, construction and operation and maintenance. It will be publicly disclosed and available for questions, comments and suggestions along with the ESIA, after which it will be regularly updated throughout the life of the Project. Consultation and disclosure will occur as summarised in Section 18.

5 Proposed Content of the ESIA

5.1 Proposed Structure of the ESIA

- 5.1.1 The preliminary chapters of the ESIA will set out the background information for the Project, including the setting of the site, and the rationale for the proposed OHTL route between Sainshand and Tsagaan Suvarga. This will be followed by information on the nature of the Project, the main components of the Project and an overview of the construction process and phasing.
- 5.1.2 The ESIA will be divided into environmental and social topic chapters in order to present a complete picture for the individual subject areas. The scoping exercise has identified the relevant environmental and social topic areas and the appropriate levels of assessment.
- 5.1.3 The environmental and social topics will be assessed in a consistent format. A description of the baseline environmental and social conditions will be provided, followed by an assessment of the predicted potential impacts during both the construction and operation phases of development. The assessment of impacts will be followed by the identification of mitigation measures and then residual effects – i.e. those remaining following mitigation, will be assessed.
- 5.1.4 Finally, any monitoring that may be required will be set out. The conclusion will provide a summary of the assessment highlighting the significant aspects, both positive and negative.
- 5.1.5 In addition, the ESIA will include a summary of the relationship of the Project with planning policy and legislative requirements.
- 5.1.6 Table 5-1 indicates the proposed structure and outline content of the ESIA, and Table 5-2 the proposed content of the environmental topic chapters. An ESIA Report template is set out in Appendix A.

Table 5-1 Proposed Structure of the ESIA

Section of the ESIA	Description
Introduction	Sets the project context and introduces the proposal and the environmental and social topics assessed.
Project Description	<p>The project description will comprise sufficient detail to allow an assessment of the likely effects of the development.</p> <p>There will be some uncertainty in the detailed description of development, as this is a concept project. Any uncertainty will be clearly stated.</p> <p>Details of the measures that have been incorporated into the project for the purposes of environmental and social protection / enhancement (i.e. mitigation by design) will be highlighted in the project description.</p>

Section of the ESIA	Description
	The expected phasing and timescale of the development will be described in order to identify any potential different effects that might arise at different stages as the project progresses.
Consideration of Alternatives	The ESIA will set out the alternatives considered during the development of the concept project, including the without-development option.
Standards, Legislative and Policy Context	The relevant planning policy framework, identifying international, national and local policies, will be summarised in this section.
Approach to the ESIA	<p>This will describe the general methodology for the ESIA, including:</p> <ul style="list-style-type: none"> • general spatial or temporal scope • identification and sensitivity of receptors • identification of impacts and their magnitude • assessment of impacts and significance criteria • measures to avoid, reduce and enhance impacts • monitoring and management of subsequent effects <p>Where topic specific methodologies divert from the general methodology described, due to use of professional standards and guidance or the nature of the impacts being assessed, this will be described in the individual topic sections below.</p>
Stakeholder Engagement and Grievance Mechanism	A summary of the stakeholder engagement and feedback during the preparation of the ESIA (covering scoping and ESIA baseline data collection and impact mitigation, and consultation during disclosure, etc).
Environment and Social Topics	Sets out the baseline conditions and sensitive receptors, approach to the impact assessment and results of the assessment of each individual topic scoped into the ESIA. The proposed content of the topics is set out in Table 5-2 below.
Summary	The findings of the assessment, including the potential for significant effects, and need for mitigation and monitoring will be summarised.

Table 5-2 Proposed Content of the Topic Chapters

Topic Chapter Section	Proposed Content
Introduction	Sets the topic assessment context.
Legislative Framework, Policy and Guidance	Relevant legislation, policy and guidance will be referenced.

Topic Chapter Section	Proposed Content
Assessment Methodology	Sets out the specific assessment methodology for the topic, including identifying where this diverges from the general approach.
Baseline Conditions	Information on baseline environmental and social conditions and sensitive receptors will be gathered, collated and presented so that possible changes can be predicted and assessed.
Potential Impacts and Effects	<p>The results of the impact assessment for construction and operation of the Project will be reported in the ESIA.</p> <p>The effects of the Project, inclusive of intended/integral environmental treatments and abatements, and social enhancements, will be described and assigned significance in accordance with the defined scoring criteria.</p> <p>The 'do-nothing' approach will also be assessed. Cumulative effects and interactions between effects at the project level will be considered.</p>
Mitigation and Enhancement Measures	Mitigation measures will be identified, indicating clearly the level of commitment to, and mechanism for, their implementation. An assessment of their likely effectiveness and any further effects that they may create will also be presented.
Residual Effects	Post-mitigation "residual effects" will be described and their significance reappraised.
Monitoring and Management	Where appropriate, measures will be identified to monitor the effectiveness of the mitigation proposed, or to detect unforeseen environmental and/or social consequences. This will be particularly important if the mitigation measures regulate the development to make it acceptable.

6 Air Quality

6.1 Study Area / Area of Influence

- 6.1.1 The Study Area covers Dornogovi aimag. The AOI for Air Quality is determined based on the extent of the area where changes in pollutant concentrations or dust deposition could affect sensitive human or ecological receptors. It is considered likely that a dust risk assessment would normally be required where there are receptors sensitive to construction dust within 250m of construction activities or 50m from the route used by construction vehicles on the public highway, up to 250m from construction compounds and other secondary access points.¹³

6.2 Data Availability and Gaps

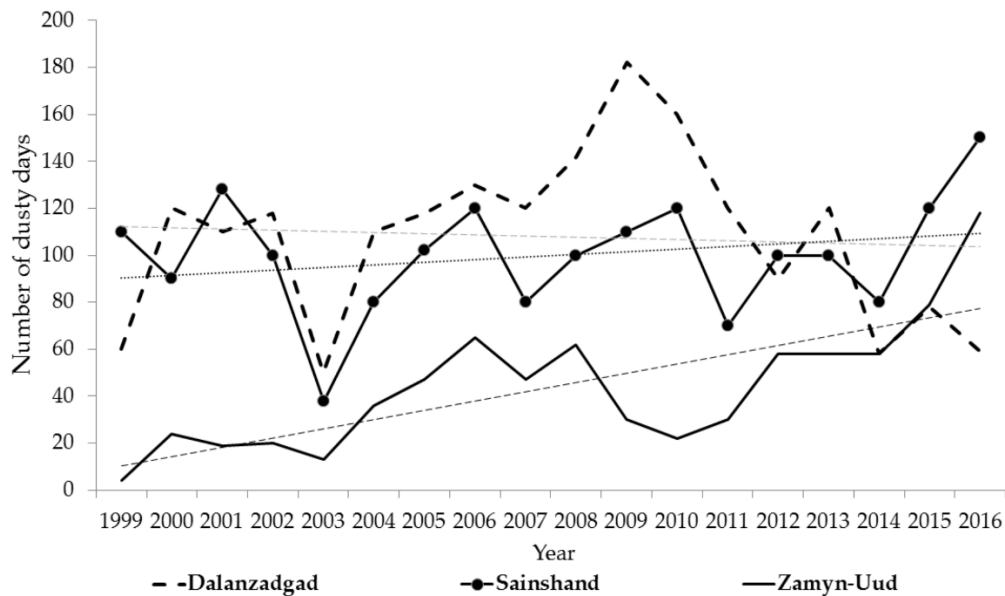
- 6.2.1 Online data is available on climatic conditions. Observational data is available from the site reconnaissance for ambient air conditions in general.
- 6.2.2 Existing air quality data for Sainshand is available from surveys undertaken as part of the Choir-Sainshand Transmission Line Project (Atkins, May 2020).
- 6.2.3 The ESIA baseline section will provide relevant information in relation to the following potential topics: dust levels and ambient air quality. The main data gaps are:
- Baseline ambient air quality at Project sensitive receptors.

6.3 Summary of Baseline Information

- 6.3.1 Air quality is impacted by natural and man-made emission sources. Natural dust storms, which affect air quality, occur frequently in Mongolia particularly across the Gobi Desert where the Project is located, which has large flat and sparsely vegetated areas. Strong dust storms significantly reduce visibility, which can negatively impact the safety of construction activities and traffic. Prolonged dust storms can also be detrimental to respiratory health.
- 6.3.2 The majority of dust storms occur in spring when humidity is low, and before the summer rains when soil moisture is low¹⁴. The Study Area lies in desert steppe across areas characterised by 31-60 and 61-90 dusty days per year in the east and west respectively as shown in

¹³ Holman *et al* (2024), Institute of Air Quality Management (IAQM) *Guidance on the assessment of dust from demolition and construction January 2024 (Version 2.2)*, Institute of Air Quality Management, London.

¹⁴ Jugder, D and Munkhjargal, S, 2016. A severe dust event over the Mongolian Gobi in 3-5 March, 2016. *The 4th Session of East Asia winter Climate Outlook Forum*, (EASCOF-IV) Ulaanbaatar, 8-9 November, 2016.



accordance with Mongolian National Standard, MNS4585?:2016, dusty days are those that exceed PM_{2.5}-50 ug/m³ and PM₁₀-100 ug/m³ as a 24 hour average. These events, in the arid and semi-arid areas of Mongolia, have increased since 1999.

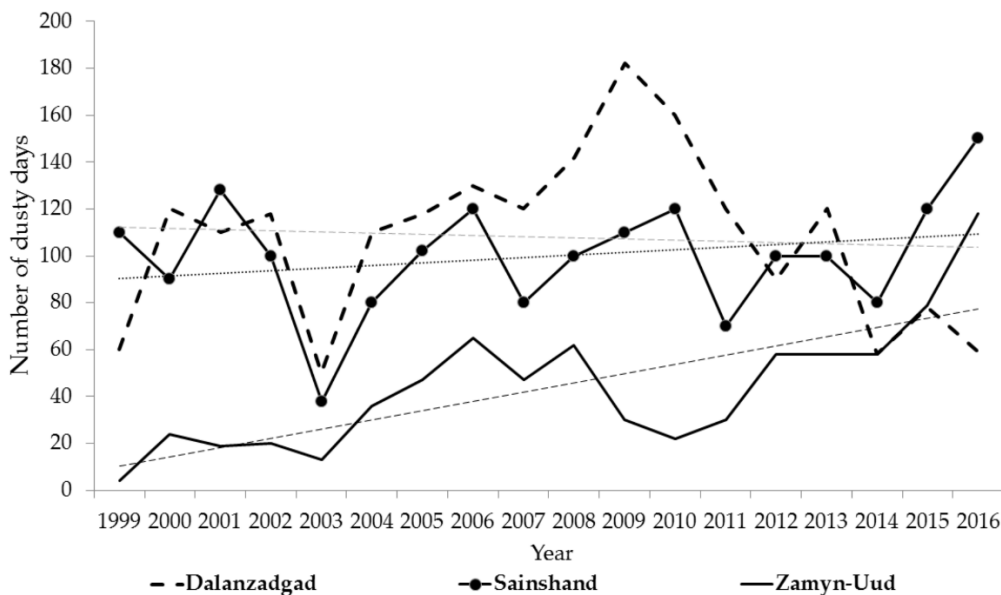


Figure 6-1 Number of dusty days at Dalanzadgad, Sainshand, and Zamyn-Uud between 1999–2016

6.3.3 Dust storm frequency is higher during March and April than in the other months in Mongolia. The monthly average concentration of PM₁₀ at Dalanzadgad, Sainshand, and Zamyn-Uud were higher in March and April between 2009–2017 (Figure 6-2). The higher dust storm frequencies and higher

concentrations of PM10 are most likely correlated.¹⁵

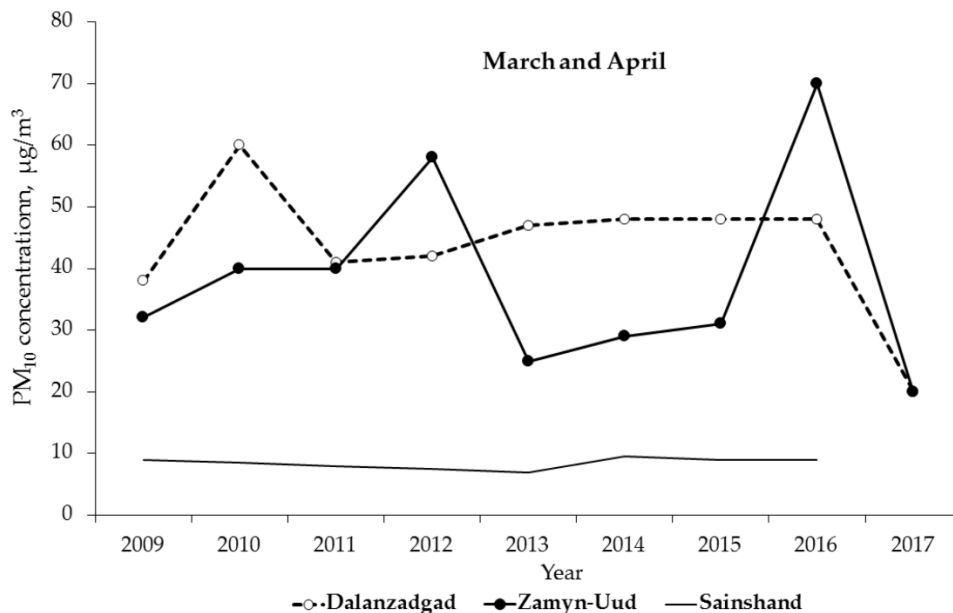


Figure 6-2 Monthly average datasets of PM10 at Dalanzadgad, Sainshand, and Zamyn-Uud in March and April between 2009–2017

6.3.4 Man-made emission sources within the Study Area are limited, but include:

- Heating (coal and other solid fuels) in the residential areas of Sainshand;
- Road and rail traffic; and
- Mining (industry in the area is very limited except mining).

6.3.5 No data on emissions from local heating sources are available. It is anticipated that emissions will be localised and most significant in winter months, concentrated in the baghs (villages) and towns of Sainshand and Tsagaan suvarga.

6.3.6 The proposed OHTL route lies in proximity to established roads in the far eastern end of its extent around Sainshand and crosses the Sainshand-Choir Highway, also known as the Asian Highway 3 (AH3), which is part of the Asian Highway Network. It is a key access route in Mongolia and links Russia and China via Ulaanbaatar. In addition to the AH3, the smaller the Sainshand-Zuunbayan Road is crossed to the south-west of Sainshand. These roads will impact on dust and exhaust emissions in the Study Area. The route itself is not served by existing paved roads. Movement of vehicles across unpaved roads will lead to resuspension of dust in arid conditions.

6.3.7 The main railway line in the area is the Trans-Mongolian Railway. This railway line is intersected by the proposed OHTL route to the south-east of Sainshand, approximately 2.6km south of the terminal substation. The railway line connecting Sainshand to Tawan Tolgoi runs through Tsagaan Suvarga.

¹⁵ Source: https://www.mdpi.com/2073-4433/10/2/69?utm_source=chatgpt.com)

The proposed OHTL route crosses this line south of Sainshand. Emissions from railways will include particulates from engines.

6.3.8 Tsagaan Suvarga mine is an open cut copper and molybdenum mine located at the western end of the proposed OHTL route.

6.3.9 The national standard MNS 4585:2016 details out the limit values for air pollutant concentrations in Mongolia. The WHO ambient air quality guidelines are also applicable to meet EBRD PRs. These are summarized in Table 6-1 below for the pollutants relevant to the construction phase of the project.

Table 6-1 Relevant Mongolian Air Quality Standards (MNS 4585:2016)¹⁶ and World Health Organisation Guidelines¹⁷

Pollutant	Averaging Period	Mongolian Standards MNS 4585:2016 (µg/m ³)	WHO guidelines 2021 (µg/m ³)
Nitrogen Dioxide (NO ₂)	20 min	200	N/A
	1 Hour	N/A	200
	24 hour	50	25
	Annual	40	10
Particulate Matter <10 µm in aerodynamic diameter (PM ₁₀)	24 hour	100	45
	Annual	50	15
Particulate Matter <2.5 µm in aerodynamic diameter (PM _{2.5})	24 Hour	50	15
	Annual	25	5
Total suspended particles	20 min	500	N/A
	24 hour	150	N/A
	Annual	100	N/A

Source: <http://agaar.mn/article-view/546>

¹⁶ Ministry of Environment and Tourism (2016) MNS 4585:2016 [Online at <http://agaar.mn/article-view/546>]

¹⁷ World Health Organisation (2021) WHO global air quality guidelines

6.3.10 There is an automatic air quality monitor located in the centre of Sainshand and is located approximately 3km to the south of Sainshand substation and the start of the OHTL route. This monitor samples a number of different pollutants and is hosted on the AQI.in website. Available recent data for each of NO₂, PM₁₀ and PM_{2.5} is summarized in Table 6-2 below. However, it is noted that measurements are not continuous at this station.

Table 6-2 Recent air quality monitoring concentrations reported in Sainshand for relevant pollutants

Pollutant	Sampling period	Average Concentration (µg/m ³)
NO ₂	01/05/2024-31/04/2025	17
PM ₁₀	01/01/2022-31/12/2022	33
	01/01/2023-31/12/2023	20
	01/01/2024-31/12/2024	35
	01/01/2025-10/06/2025	61
PM _{2.5}	01/01/2022-31/12/2022	30
	01/01/2023-31/12/2023	17
	01/01/2024-31/12/2024	21
	01/01/2025-10/06/2025	21

Source: AQI.in¹⁸

6.3.11 The data recorded in Sainshand provides an indication that the annual MNS 4585:2016 standards for NO₂, PM₁₀ and PM_{2.5} have largely been met in recent years in the vicinity of the OHTL route; however the PM₁₀ concentrations have exceeded the annual standard during 2025. The source of the data provided no indication of data capture or monitoring method so the results should be treated with a degree of caution, however the

6.4 Potential Effects

6.4.1 Potential effects in relation to air quality are summarised in the table below.

¹⁸ AQI.in webpage [online at: <https://www.aqi.in/dashboard/mongolia/dornogovi/saynshand>]

Table 6-3 Potential air quality effects

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
Construction	Human and ecological receptors	<p>Increased dust and air emissions from construction vehicles, plant and equipment. This may include movement of workers and vehicles to and from any workers camps, if used.</p> <p>Dust may also be generated from earthworks such as excavations.</p> <p>Change in ambient concentrations of gaseous emissions as a result of exhaust emissions arising from construction plant.</p> <p>As the route is predominantly located away from roads and major settlements, the main impacts are likely to be felt by herders potentially closer to the transmission line corridor as well as at works around the two substations.</p> <p>Air quality impacts will be temporary and short-term at any one site.</p>	In	Scoped in due to the dusty baseline conditions of the Project Area.
Operation	Human and ecological receptors	<p>No significant air quality impacts are expected during the operation of the transmission line. However, the use of diesel generators at the substations is being confirmed. There will be some minor increased dust and gaseous emissions from maintenance vehicles, however these will be ephemeral.</p> <p>No additional emissions are anticipated at the substation.</p> <p>No new operational thermal power is being installed as part of the project, therefore no associated increase in air emissions are anticipated.</p>	Out	No impacts on air quality as a direct result of the Project are anticipated.

6.5 Scope of Work for ESIA

6.5.1 The scope of the air quality assessment for the ESIA is summarised in the table below.

Table 6-4 Summary of proposed air quality scope

Additional secondary data collection	Field surveys proposed	Impact assessment approach
Understand local air quality policy, legislation and guidance.	A baseline air quality survey will be conducted at selected receptors along the proposed	<p>Construction</p> <p>The aim of the air quality impact assessment will be to identify the potential impacts during the construction phase on air quality and</p>

Additional secondary data collection	Field surveys proposed	Impact assessment approach
Review construction vehicle data, construction vehicle routes and programme.	<p>OHTL route. A total of six locations have been selected:</p> <ul style="list-style-type: none"> Sainshand substation Tsagaan Suvarga substation Two local protected areas (nearest point to the OHTL) (2x total) Two nearest ger and/or well (within 200m or nearest wells) <p>Monitoring is not proposed along the (potential) haul roads as any traffic generated by the project is anticipated to be less than 200 heavy duty vehicles as an annual daily average (AADT).</p> <p>Monitoring will be undertaken of the following using Portable monitor Aeroqual S500, at frequencies in accordance with MNS 4585:2016:</p> <ul style="list-style-type: none"> PM2.5-24 hours PM10-24 hours SO₂ -1 hour NO₂- 1 hour <p>Note: Whilst SO₂ is not monitored in GIP, it is required under Mongolia standards: MNS 4585:2016 specifies the permissible threshold levels for SO₂ and NO₂.</p>	<p>provide an assessment of the potential effects on human health. It will comprise a quantitative assessment of construction vehicle emissions (traffic data allowing) and a qualitative assessment of construction dust.</p> <p>As the data obtained from a single survey will not be sufficient for any monitoring or true comparison against standards, a qualitative assessment of air quality impacts will be undertaken. This will focus on air quality impacts (mainly dust) during construction.</p> <p>For the construction vehicle emissions assessments, an analysis of any traffic data and a high-level interpretation of the findings to examine the anticipated range of changes in pollutant concentrations will be undertaken and compared with World Health Organisation (WHO) air quality criteria and local legislation.</p> <p>Dust construction impacts will be assessed qualitatively following the Institute of Air Quality Management (IAQM, 2024) guidance on construction dust impacts. The assessment criteria consider both the scale and nature of the works, which are classed as small, medium or large, together with the proximity of the receptors. Thee following four types of construction activities will be assessed:</p> <ul style="list-style-type: none"> earthworks; construction; and trackout¹⁹. <p><i>Operation</i></p> <p>Not applicable.</p>

6.5.2 The following assumptions and limitations apply:

- Given the project programme, project-specific monitoring will be short term. No modelling of air quality is proposed.

¹⁹ Trackout is the transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction/demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.

7 Noise and Vibration

7.1 Study Area / Area of Influence

- 7.1.1 The Study Area covers Dornogovi aimag. The Aol is determined based on the extent of the area where changes in noise and vibration over existing ambient levels of noise and vibration could affect Noise Sensitive Receptors (NSRs). The Aol for assessing the potential construction noise impacts during the day is expected to be limited to within about 300m of proposed construction activities.

7.2 Data Availability and Gaps

- 7.2.1 Observational data is available from the site reconnaissance for ambient noise levels in general, however, no recent noise monitoring data is available for the Study Area. Noise surveys were undertaken in both 2015 and 2020 from several locations in or near to Sainshand as part of the national DEIA for the Choir-Sainshand OHTL Project. However, given the date of the data, it is not considered of use for this assessment. Noise measurements were also taken at nine locations in June 2020 as part of the Choir-Sainshand Transmission Line Project ESIA (Atkins, May 2020) and will be used in comparison with the new survey data being obtained in 2025.
- 7.2.2 The ESIA baseline section will provide relevant information in relation to the following potential topics: noise levels at identified noise sensitive receptors. The main data gaps are:
- Baseline noise levels at noise sensitive receptors.

7.3 Summary of Baseline Information

- 7.3.1 Noise can affect sensitive receptors such as homes, schools and hospitals. Furthermore, traditional ger²⁰ dwellings offer little protection from noise.
- 7.3.2 The majority of the Study Area has limited significant and sustained sources of noise. Noise sources include road and rail traffic, and mining. Other small industries and human activity may be present in Sainshand and at the Tsagaan Survurga mine which contribute to the noise baseline.
- 7.3.3 Noise measurements were taken at nine locations in June 2020 as part of the Choir-Sainshand Transmission Line Project. Of these nine locations two lie within close proximity of the proposed OHTL route, both to near to the proposed substation east of Sainshand. A 20 minute day reading was taken at both of these locations measuring 34.0 dBA and 52.7 dBA, falling below the MNS

²⁰ A Mongolian ger is a circular, domed tent-like dwelling that is portable and easily assembled and disassembled. Gers may be temporary in terms of location though may represent the only household of a herder. The structure is formed from wooden lattice and poles, tied together with rope made of horse hair. It's then covered in several layers of felt made from the hide of animals and often is covered in canvas to further protect from the elements.

4585:2016 daytime standard of 60 dBA. A single night reading was taken at one of the two locations measuring 39.5 dBA, below the MNS 4585:2016 nighttime standard of 45 dBA²¹. Overall, wind was identified as the main source of noise in the area.

7.4 Potential Effects

7.4.1 Potential effects in relation to noise and vibration are summarised in the table below.

Table 7-1 Potential noise and vibration effects

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
Construction	Local communities Flora and fauna	<p>Construction works along the OHTL route and at the substation sites is likely to generate localised noise impacts e.g., noise from machinery and vehicular traffic moving materials, equipment and workforce, as well as from any workers camps located in proximity to local villages.</p> <p>As it is anticipated that the power lines can be routed to avoid being too close to sensitive receptors when developing the detailed design, the main impacts are likely to be felt in relation to construction traffic along the main roads and access roads. Noise impacts may also occur on herders and their livestock who may be temporarily located or grazing closer to the OHTL route; as well as properties around the substations which are in more urban areas.</p> <p>Construction impacts will be short-term and temporary.</p>	<p>In for noise</p> <p>Out for vibration</p>	Scoped in as noise impacts could affect herder livestock and local communities close to access roads.
Operation	Local communities Flora and fauna	<p>A low buzzing or humming noise can emanate from overhead lines (corona effect) however this is usually related to transmission lines above 250kV.</p> <p>The operation of transformers and other electrical plant at the new substation may give rise to noise impacts at the closest noise sensitive receptors.</p>	<p>In for noise</p> <p>Out for vibration</p>	Scoped in due to the potential for operational substation noise, both at Sainshand and at Tsagaan Suvarga mine.

²¹ Atkins, Environmental and Social Impact Assessment, 2020. *Mongolia: Choir-Sainshand Transmission Line*.

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
		Increased noise from maintenance vehicles.		

7.5 Scope of Work for ESIA

7.5.1 The scope of the noise and vibration impact assessment for the ESIA is summarised in the table below.

Table 7-2 Summary of proposed noise and vibration assessment

Additional secondary data collection	Field surveys proposed	Impact assessment approach
None proposed – additional data will focus on field survey work.	<p>Noise monitoring will be undertaken at six locations considered representative of identified noise sensitive receptors, planned to be:</p> <ul style="list-style-type: none"> Sainshand substation Tsagaan Suvarga substation Two local protected areas (nearest point to the OHTL) Two nearest gers and/or wells <p>Monitoring will be undertaken for 24 hours at each location.</p> <p>All noise monitoring will be carried out using calibrated equipment with Class 2 accuracy. A REED R8070SD Data Logging Sound Level Meter and calibrator will be used.</p>	<p>Construction</p> <p>A high-level assessment of potential construction noise and vibration impacts will be undertaken in accordance with BS 5228-2:2009+A1:2014 “Code of practice for noise and vibration control on construction and open sites”. This will include potential noise impacts from construction traffic on the local traffic network.</p> <p>The assessment will require an indicative high-level construction phasing and programme. Where plant lists are available these will be used – in the absence of information, we will make assumptions based on similar projects.</p> <p>In addition to potential monitoring as part of this assignment, we will also identify the need for future monitoring to help establish baseline conditions for both construction and operational assessments.</p> <p>Operation</p> <p>The noise assessment will be guided by the methodology set out in BS4142:2014: +A1: 2019 Methods for Rating and Assessing Industrial and Commercial Sound. Where data are available, modelling will be undertaken of operational noise at the two substations. The result will be assessed against WHO/EBRD or Mongolian local guidance.</p>

7.5.2 The following assumptions and limitations apply:

- Information will be provided on the design details for the power lines and structures, substations and noise emissions from plant at the substations.
- There will be no demolition works associated with the project. Therefore demolition is scoped out the assessment.
- The potential for vibration effects will be limited to the construction activity only. Construction traffic and operational sources are not anticipated to create significant levels of vibration so are excluded from the scope.
- There will be no noise emissions from the power lines once operational. The operational assessment will therefore be confined to the consideration of effects associated with the two connecting substations.
- There are presently no significant levels of vibration in the vicinity of the proposed route and location of the substations.

8 Biodiversity, Flora and Fauna

8.1 Study Area / Area of Influence

- 8.2 As part of the desk study, designated sites within the Dornogovi aimag will be identified, with the exception of locally designated sites and habitats which will be restricted to a 5km Study Area. The desk study also considers floral and faunal species that are likely to occur within the Dornogovi aimag.
- 8.3 The Aol will vary dependent on impact pathways associated with the works and the ecological receptors, however in general, the Aol is considered to be the footprint of the Project (OHTL route and associated working areas), and habitats in the immediate vicinity (to approximately 250 - 500m) and therefore survey effort will be focused within this Aol.

8.4 Data Availability and Gaps

- 8.4.1 The following publications were consulted during scoping:
- Conservation Standards (2021) <https://www.conservationstandards.org/2021/03/01/protected-area-planning-guidance-for-mongolia/>. Accessed May 2025.
 - Ganbold, D., & Smith, C. (2019) A Field Guide to the Birds of Mongolia. John Beaufoy Publishing.
 - Grubov (1982) Keys to the Vascular Plants of Mongolia.
 - Spring Avian Survey Report for Proposed 220 Kv Overhead Power Line between Sainshand and Tsagaan Suvarga (Sustainability East Asia and Wildlife Science and Conservation Center of Mongolia, August 2022).
 - 214km double circuit 220kV overhead power line between Sainshand and Tsagaan Suvarga – Autumn Avian Surveys October and November 2024 (Arcadis, May 2024).
- 8.4.2 Data is available on internationally and nationally protected sites. Preliminary baseline data on habitats, flora and fauna is available from a reconnaissance visit in May 2025 (no detailed surveys for these were undertaken), while Spring 2022 and Autumn-Winter 2024 vantage point bird surveys provide information on migratory birds.
- 8.4.3 The ESIA baseline section will provide relevant information in relation to the following potential topics: protected sites, critical habitats, flora and fauna. The main data gaps are:
- Full details of locally protected sites at the soum level, reasons for their designation or in some cases, reasons for their declassification.
 - Detailed data on habitats, flora and faunal species along the route of the OHTL. This includes identification of critical habitats and red-listed species.
 - Although comprehensive data on migratory birds has been collected, there is a lack of data on the breeding bird community, specifically with regards to species of conservation concern.

8.6 Summary of Baseline Information

- 8.7 There are no Ramsar Convention sites or East Asian-Australasian Flyway and network sites in the Project Area. The nearest Important Bird Area (IBA) within the Study Area is the Ikh Nart Nature Reserve, approximately 120km north-west of Sainshand.
- 8.7.1 Within Dornogovi *aimag* there is one State Strictly Protected Area (SPA), one nature monument and six nature reserves:
- Small Gobi SPA – in Khatanbulag soum
 - Ergeliin Zoo Nature Reserve – in Khatanbulag soum
 - Arvan Naimiin Bogd uul – in Mandakh soum
 - Zagiin us Nature Reserve – in Mandakh soum
 - Sulkhen uul nature monument – in Mandakh soum
 - Burdene bulag – in Erdene soum
 - Ikh Nart Nature Reserve – in Airag and Dalanjargalan soums
 - Choiriin Bogd – in Dalanjargalan soum of Dornogovi aimag and Sumber soum of Govisumber aimag
- 8.7.2 There are no national sites within 10km of the proposed OHTL route. As shown in Figure 8-1, the closest are Arvan Naimiin Bogd uul, which is located appropriately 50km to the north and Sulkhent located appropriately 50km to the south-west.

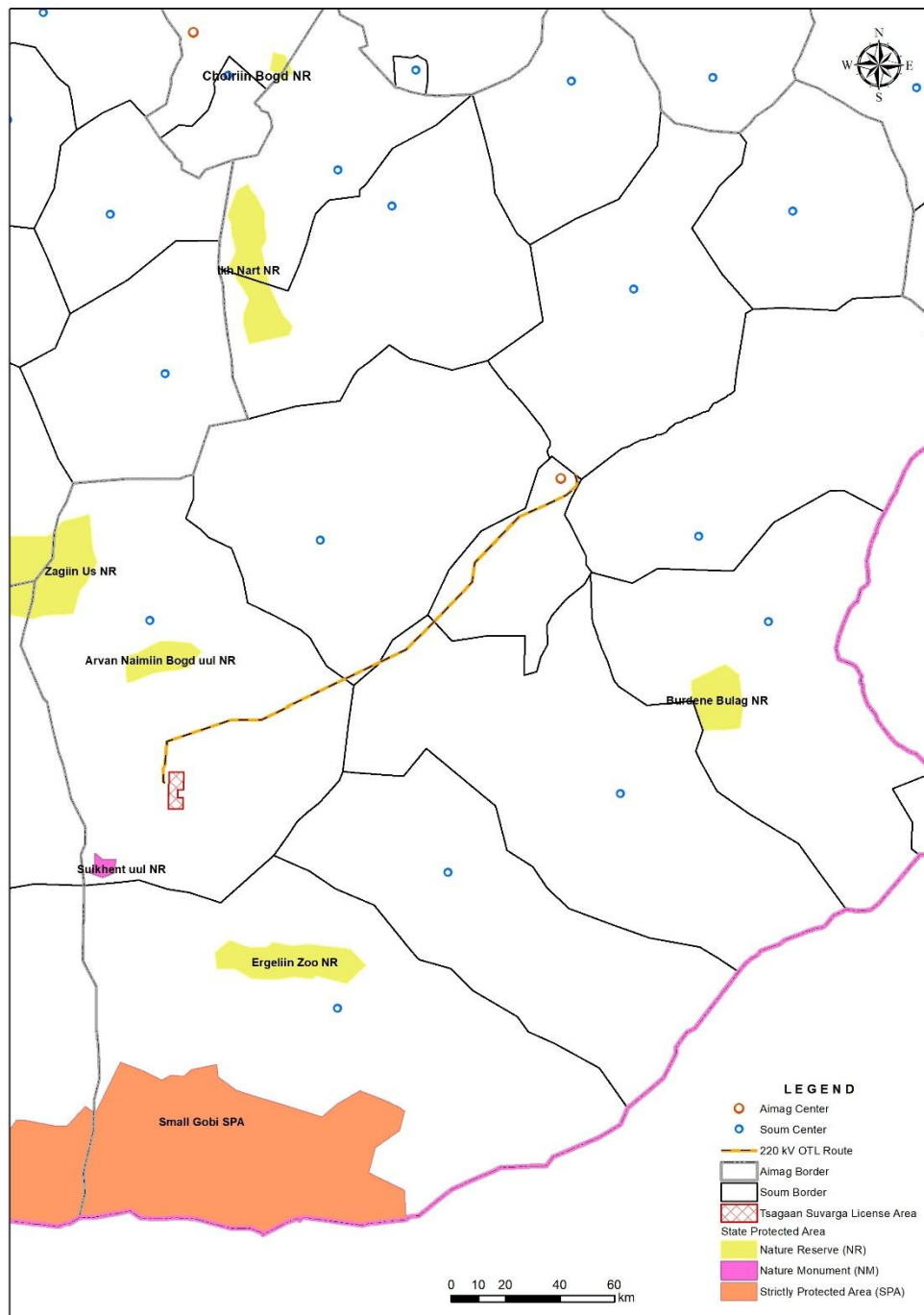


Figure 8-1 Nature Reserves, Nature Monument and Strictly Protected Area in Dornogovi aimag

8.7.3 Three locally protected areas (LPAs) were identified within 5km of the Project Area (Figure 8-2), and the OHTL passes through all these areas. These LPAs consist of:

- Zoogiin Hooloi
- Uushiin Govi

- Ganzaga Uuliin Urgutgul

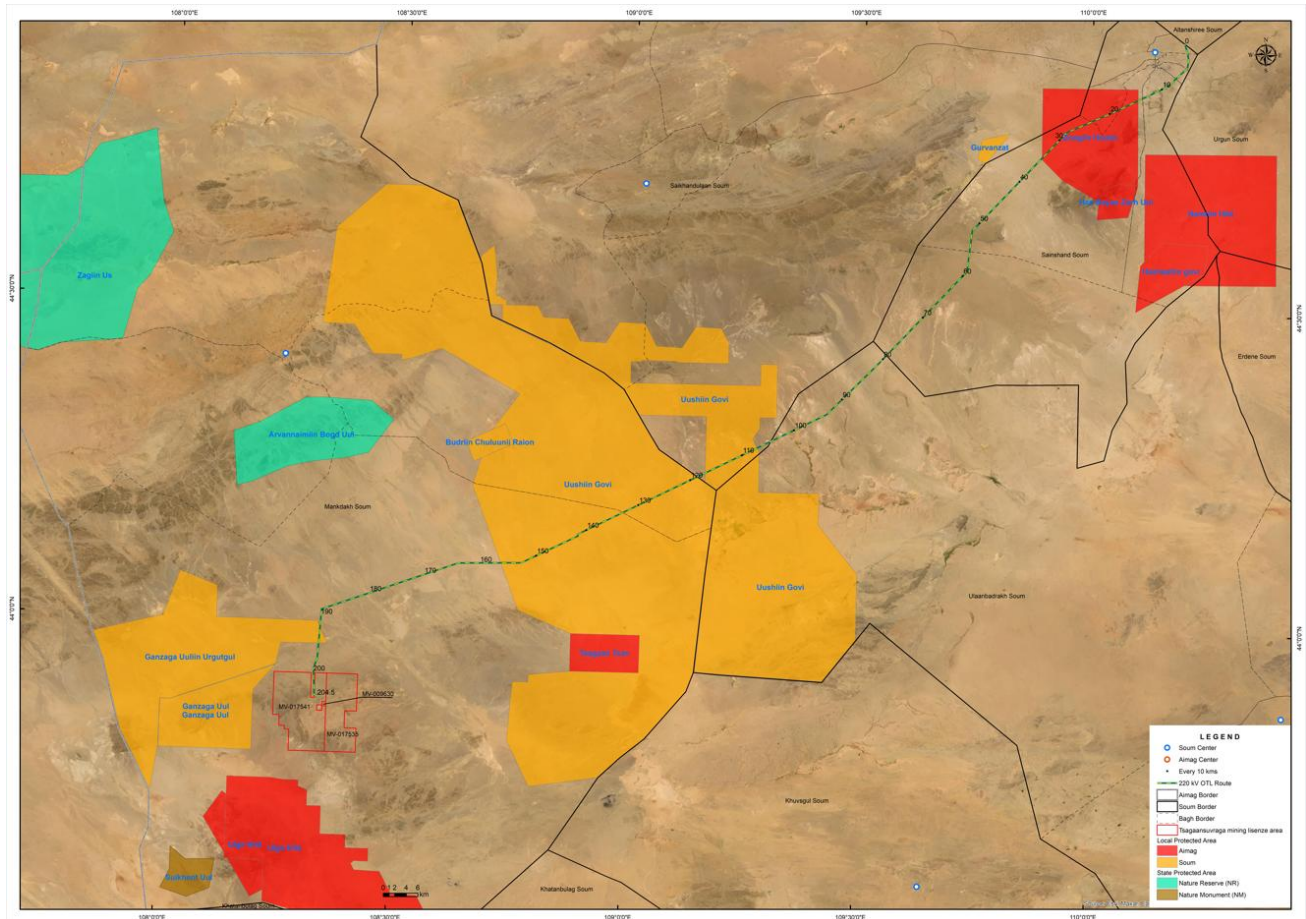


Figure 8-2 Local nature reserves crossed by the OHTL route

8.7.4 **Zoogiin Kholoi** is an LPA under provincial protection, designated by the resolution of the Dornogovi Provincial Citizens' Representative Khural (Resolution No. 5/03 dated July 30, 2014). However, the justification for its protection is not clearly stated in the resolution. According to the information on the website of the Environmental Information Center of Mongolia, this LPA was excluded from protection on July 30, 2019. Further information on this LPA and the protection exclusion is required.

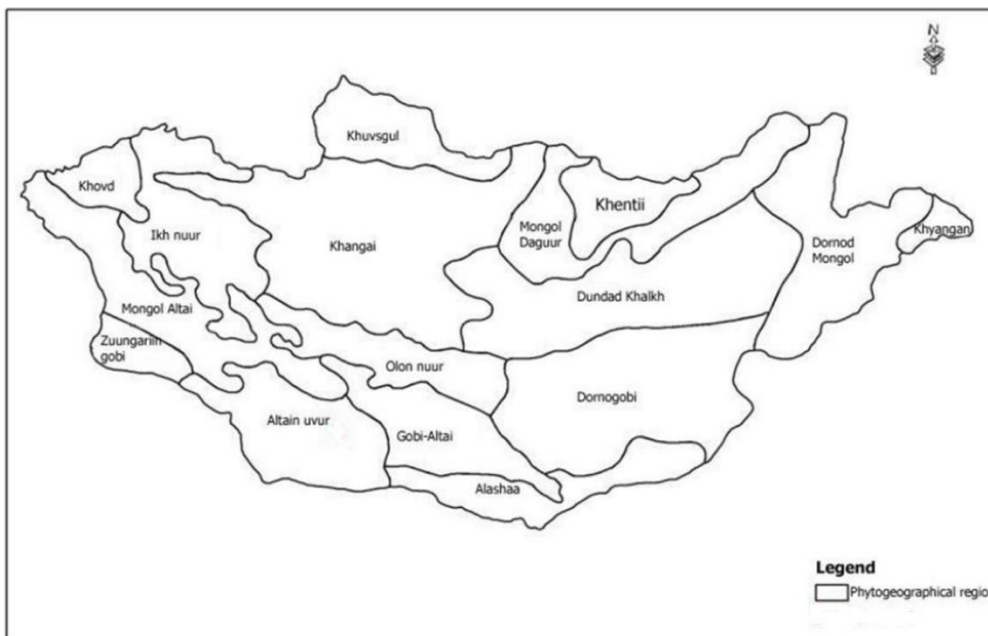
8.7.5 **Uushiin Govi LPA** was designated as a specially protected area based on the following two reasons:

- 1. This LPA is included in a priority conservation area identified in the ecoregional assessment conducted by the international organization The Nature Conservancy (TNC).
- 2. Uushiin Govi and its surrounding areas consist of moderately elevated hills and sheltered terrain, making it a suitable habitat for migratory ungulates such as the Goitered gazelle, Mongolian gazelle, and Asian wild ass. For this reason, the area was designated as protected under the resolutions of the Citizens' Representative Khurals of Khovsgol soum (Resolution #07/02, dated January 23, 2018) and Mandakh soum (Resolution #06/3, dated January 5, 2018) of Dornogovi province.

- 8.7.6 Uushiin Govi LPA covered areas within the soums of Khovsgol, Mandakh, Saikhandulaan, and Ulaanbadrakh in Dornogovi province, but parts of it have since been excluded from protection. For instance, the section in Saikhandulaan soum was excluded from protection in 2022, while the date of ending for the section in Ulaanbadrakh soum is unclear. The reasons for the exclusion from protection are also unknown. Further information on this LPA and the protection exclusion is required.
- 8.7.7 The **Ganzaga Uuliin Urgutgul LPA** was designated as a protected area based on the following key reasons:
- 1. This LPA is located within a priority conservation area identified in the ecoregional assessment conducted by the international organization The Nature Conservancy (TNC).
 - 2. The Mandah soum has also designated this Local Protected Area as a site of significant environmental and ecological importance (Resolution No. 2/10 of the Citizens' Representative Khural of Mandakh soum, Dornogovi province, dated December 10, 2016).
- 8.7.8 The special protection period for this LPA is 20 years, and it is planned to be excluded from protection in 2036.

Habitats

- 8.7.9 The OHTL is primarily situated along the arid steppe band of Mongolia, merging with desert to the south-west. The generic broad habitat classification in Mongolia (Figure 8-3) describes this habitat as the Dornogovi desert steppe. This area is characterised by dry climate with rainfall of less than 100mm annually.



8.7.10 Figure 8-3 Phytogeographical areas of Mongolia²²

²² Grubov, 1982. *Keys to the Vascular Plants of Mongolia*.

- 8.7.11 During the reconnaissance visit, notes on the broad habitats were made. Typical for this region, the primary habitat was grassland, showing a moderate percentage of bare ground due to the arid conditions. Small shrub coverage varied along the route but was generally more dominant on lower ground where old dry riverbeds and floodplains were present. Small, stunted elm trees were also rarely recorded in these areas. The grass and herb coverage generally lowered as the surveyor moved south-west along the route, with sandy dune areas also noted.
- 8.7.12 A marshy area was present south of Sainshand, situated on the western side of the southern road out of the town, which the overhead line crosses. This appeared relatively polluted at the time of survey, and further desk based aerial analysis has shown this water appears to be discharged from a wastewater facility further to the north.

Flora

- 8.7.13 During the reconnaissance visit, two rare plants were observed, namely:
- *Cynomorium songaricum*
 - *Arnebia guttata*
- 8.7.14 *Cynomorium songaricum* is listed as Rare in both the Mongolian Red Book (2014) and by Government Resolution No. 165 of 2004. Additionally, the species is listed as Vulnerable in the Mongolian Red List of Plants (2019, second edition).
- 8.7.15 It is distributed in the Great Lakes Depression, Valley of Lakes, Dornogovi, Govi-Altai, Dzungarian Gobi, Trans Altai-Gobi, and the Alashan Gobi. It lives parasitically, in large groups lined up together, at the roots of *Nitraria sibirica* (shrub) growing in sandy or sandy-loam soil. It does not grow in dry (drought) years (Mongolian Red Book, 2014, page-324).
- 8.7.16 Spotted *Arnebia* (*Arnebia guttata*) is included in the List of Endangered Plants in the Annex of the Law on Natural Plants of Mongolia, 1995. However, the species is listed as Least Concern in the Mongolian Red List of Plants (2012, first edition).
- 8.7.17 It is distributed across the Mongol-Altai (southeastern part), Great Lakes Depression, Valley Lakes, Eastern (Dornod) Gobi, Gobi-Altai, Northern Gobi of Altai, and Alashaa Gobi regions (Mongolian Red List of Plants, 2012). It is often found around dry riverbeds.
- 8.7.18 Most of the vegetation species in the region are adapted to the arid environment with the key plant species being drought tolerant. Arid steppe grassland/sandy dune floral species recorded during the reconnaissance visit included:
- *Stipa glareosa*
 - *Enneapogon borealis*
 - *Rheum nanum*
 - *Artemisia glauca*
 - *Agropyron cristatum*
 - *Allium polyrrhizum*
 - *Astragalus monophyllus*

- *Corispermum mongolicum*
- *Salsola pestifera*
- *Xanthium orientale* (marshy area)
- *Peganum nigellastrum*
- *Dontostemon crassifolius*
- *Allium mongolicum*
- *Chloris virgata*
- *Ferula Bungeana*
- *Cleistogenes squarrosa*
- *Echinops Gmelinii*
- *Heteropappus hispidus*

8.3.21 Shrub and small tree species recorded during the reconnaissance visit included:

- *Oxytropis aciphylla*
- *Eurotia ceratoides*
- *Caragana stenophylla*
- *Potaninia mongolica*
- *Kalidium gracile*
- *Zygophyllum xanthoxylum*
- *Haloxylon ammodendron*
- *Anabasis brevifolia*
- *Artemisia xerophytica*
- *Ulmus pumila*

8.7.19 Although not recorded during the reconnaissance visit, Most of the vegetation species in the region is adopted to the arid environment with the key plant species being drought tolerant shrub species such as Shrubby Ajanian (*Ajanian fruticulosa*), Anabasis (*Anabasis brevifolia*), Siberian peashrub (*Caragana leucophloea*), Narrow leaved shrub (*Caragana stenophylla*), Gobi needlegrass (*Stipa gobica*), Leek (*Allium pollyrizum*), Gray sparrow's saltbush (*Salsola passerina*), Dzungarian reaumuria (*Reaumuria soongorica*), which are adopted to the arid Gobi-desert region.

8.7.20 Most of the vegetation species in the region is adopted to the arid environment with the key plant species being drought tolerant shrub species such as Shrubby Ajanian (*Ajanian fruticulosa*), Anabasis (*Anabasis brevifolia*), Siberian peashrub (*Caragana leucophloea*), Narrow leaved shrub (*Caragana stenophylla*), Gobi needlegrass (*Stipa gobica*), Leek (*Allium pollyrizum*), Gray sparrow's saltbush (*Salsola passerina*), Dzungarian reaumuria (*Reaumuria soongorica*), which are adopted to the arid Gobi-desert region.

8.7.21 Potential rare species (as per Mongolian regulations) that could potentially be present along the transmission line OHTL route could include Potanins Beancaper (*Zygophyllum Potaninii*), Gruboviin huundii (*Spongiocarpella grubovii*), Bluebeard (*Caryopteris mongolica*), Desert cistanche (*Cistanche deserticola*), and Mongolian almond (*Amygdala mongolica*) and Spotted Arnebia (*Arnebia gutata*), which are listed as Very Rare by Mongolian regulations.

Fauna

- 8.7.22 The fauna of the Gobi region is diverse, with many widespread species typical of the Central Asian and Near Eastern deserts. According to the geographical zonation of wildlife in Mongolia, the Project Area is situated within the Eastern Gobi Range zone.

Large mammals

- 8.7.23 There have been no detailed ungulate surveys along the Project Area, however several sightings of Mongolian Gazelle (*Procapra gutturosa*) were made during the reconnaissance visit, while feral populations of the Bactrian Camel (*Camelus bactrianus*) were also present.
- 8.7.24 Additional regional large mammal species that could occur in the region include, Goitered Gazelle (*Gazella subgutturosa*), Asiatic Wild Ass (*Equus hemionus*), Red Fox (*Vulpes sp.*), Corsac Fox (*Vulpes corsac*) and Grey Wolf (*Canis lupus*). The Mongolian Gazelle, Goitered Gazelle and Asiatic Wild Ass species are listed as threatened species by the Mongolian Red list of mammals.

Small mammals

- 8.7.25 There have been no detailed survey along the Project Area, however small mammals that could occur in the region include species such as Tolai Hare (*Lepus tolai*), Marbled Polecat (*Vormella peregusna*), Steppe Polecat (*Mustela eversmanni*), Mongolian Jerboa (*Stylodipus andrewsi*), Thick-tailed Pygmy Jerboa (*Saplingotus crassicauda*), Kozlov's Pygmy Jerboa (*Salpingotus Kozlovi*), Red-cheeked Ground Squirrel (*Spermophilus erythrogenys*), Long-eared Hedgehog (*Hemiechinus auritus*), Mongolian Five-toed Jerboa (*Allactaga sibirica*), Gobi Jerboa (*Allactaga bullata*) and Long-eared Jerboa (*Euchoreutes naso*). Among the regional species, the Marbled Polecat and Long-eared Jerboa are included in the International Union for Conservation of Nature (IUCN) and Mongolian Red List as threatened species.

Bats

- 8.7.26 There have been no detailed surveys along the Project Area, however bat species that could occur in the region include Gobi Big Brown Bat (*Eptesicus gobiensis*), Whiskered bat (*Myotis mystacinus*), Grey Long-eared Bat (*Plecotus austriacus*) and Particoloured Bat (*Vespertilio murinus*). These species are of Least Concern (or 'Data Deficient') globally (IUCN) and regionally (Mongolian Red List of mammals).

Reptiles

- 8.7.27 The Mongolian Gobi-desert region provides suitable habitat for a variety of reptile species with a total of 21 species recorded, some of which are uniquely adapted to the region's warmer and arid climate. As relic species, they are often more vulnerable to environmental changes than most other vertebrates.
- 8.7.28 During the reconnaissance visit, Toad-headed Agama (*Phrynocephalus versicolor*) was recorded

regularly in sandy habitats. Regional studies²³ in south-east Mongolia indicate more than 10 species of reptiles with the common species being Toad-headed Agama (as recorded on the reconnaissance visit), Multi-ocellated Racerunner (*Eremias multiocellata*), Gobi Racerunner (*Eremias przewalskii*) and Venomous Pitviper (*Gloydius halys*). No IUCN and Mongolian Red Listed threatened reptile species are recorded in the regional studies.

Birds

8.7.29 Spring and autumn passage bird surveys have been undertaken across the Project Area. A spring bird survey was conducted in 2022 by Sustainability East Asia (SEA) and Wildlife Science and Conservation Centre of Mongolia (WSCCM) and an autumn and early winter bird survey was conducted in 2024 by Arcadis and EcoTrend. Overall, 128 bird species were recorded during the 2022 survey work and while 37 species were recorded during the 2024 survey work. The species identified across the surveys that are considered internationally and regionally threatened according to the IUCN and National (Mongolian) Red List are outlined in Table 8 1.

Table 8-1 Threatened bird species recorded in Project Area

Species	IUCN Red List Status	National Red List Status	Years Recorded
Saker Falcon	Endangered	Vulnerable	2022 & 2024
Steppe Eagle	Endangered	-	2022 & 2024
Swan Goose	Endangered	Near Threatened	2022
Common Pochard	Vulnerable	-	2022
European Turtle Dove	Vulnerable	-	2022
Ferruginous Duck	Near Threatened	Vulnerable	2022
Cineros Vulture	Near Threatened	-	2022 & 2024
Eurasian Curlew	Near Threatened	-	2022
Black-tailed Godwit	Near Threatened	-	2022
Northern Lapwing	Near Threatened		2022 & 2024
Common Crane	Least Concern	Near Threatened	2022
Saxaul Sparrow	Least Concern	Near Threatened	2022 & 2024
Mongolian Ground Jay	Least Concern	Vulnerable	2022 & 2024
Falcated Duck	Least Concern	Near Threatened	2022

²³ Professional Biological Society of Mongolia 2019. *Tavan Tolgoi Power Plant Project Biodiversity Baseline Survey*.

- 8.7.30 Potential breeding habitat for the Asian Houbara Bustard (*Chlamydotis macqueenii*) was recorded during the bird surveys, however breeding bird surveys have not yet taken place to confirm this species presence. The Asian Houbara Bustard is listed in the Red Book of Mongolia and is experiencing a decline in global population. Additionally, it is vulnerable to threats posed by high-voltage OHTLs.
- 8.7.31 During the reconnaissance visit, evidence of nesting was observed along the route, with two corvid nests on existing pylons, as well as a third at the Tsagaan Suvarga substation. A pair of small raptors, believed to be Common Kestrel (*Falco tinnunculus*) were also recorded as a possible breeder at the substation due to extensive calling and flight interaction. Several Ruddy Shelduck (*Tadorna ferruginea*) were recorded at the marshy area; this was considered suitable breeding habitat for this species, and as such were also classified as possible breeders.

Amphibians

- 8.7.32 There have been no detailed surveys along the Project Area, and few amphibians occur in the Gobi region due to the arid conditions, however a species that could occur in the region is Mongolian Toad (*Strauchbufo raddei*). This species is of Least Concern on the IUCN Red List.

Invertebrates

- 8.7.33 Over 340 species of invertebrates have been recorded in the Gobi Desert (McCarthy et al., 2022), however no detailed surveys have been undertaken along the Project Area to determine the invertebrate community in this area.

Fish

- 8.7.34 The Project Area has no permanent natural surface water to support fish or any other aquatic species.

Potential Effects

- 8.8.1 Potential effects in relation to biodiversity, flora and fauna are summarised in the table below.

Table 8-2 Potential biodiversity, flora and fauna effects

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
Construction	Terrestrial habitats and flora	Disturbance and direct loss of flora and associated habitat from: <ul style="list-style-type: none"> • Clearance / disturbance along the proposed OHTL route. • Clearance / disturbance along proposed access tracks. • Smothering (dust) from presence of construction workers and vehicles. • Unauthorized gathering of rare plants. 	In	Whilst no important or critical habitats have been classified to date, two rare plant species have been recorded and habitat is likely to be a fundamental component of the LPAs. Further species may be protected and/or some habitat may be important for species on the IUCN or Red Data Book of Mongolia and

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
				therefore this needs further investigation.
	Terrestrial fauna (mammals, reptiles and invertebrates)	Disturbance, direct and indirect loss during OHTL route clearance. Smothering (dust) from presence of construction work and vehicles. Loss from hunting. Project vehicles collision with wildlife. Avoidance of habitat by wildlife e.g. due to noise.	In	Further details on the types of fauna present, their conservation status (and importance with regards to LPA designations where applicable), distribution, and reliability on the habitats present within the Project Area will be required to assess the impact on terrestrial fauna.
	Birds	Disturbance, direct and indirect loss or harm (particularly breeding birds) during OHTL route clearance and the movement of construction vehicles, equipment and workers. Disturbance to bird communities is also likely to arise from noise and dust created during construction. Collision with work structures and new pylons being put in place.	In	Birds of conservation concern have been recorded during the spring and autumn migration surveys. Further surveys are required to determine the distribution of birds of conservation concern during the breeding season.
	Bats	No features suitable for roosting bats have been noted in the vicinity of the Project Area, however the landscape may provide foraging habitat. It is unlikely collisions with work structures or pylons will occur, however there is potential for bat collisions with overhead lines once stringing commences.	In	Further investigation is needed to determine the bat species present and the level of activity in the area by foraging bats.
	Aquatic flora and fauna	A marshy area was identified south of Sainshand. Although this is likely discharge from a wastewater facility, it still has the potential to support important aquatic flora and fauna such as amphibians. Impacts to aquatic receptors during construction could occur through pollution (oil and fuel spills or dust), direct loss during clearance or indirect loss through impacting water supply and causing drying of areas. Amphibians could also be killed by vehicles.	In	Further surveys are required to determine the aquatic flora and fauna in this marshy area. This habitat may support species on the IUCN or Red Data Book of Mongolia. Further investigation as to the permanency of this habitat is also required.
Operation	Terrestrial habitats and flora	Safe operation of the transmission line will necessitate the periodic maintenance of the right of way. Vegetation clearance during maintenance will be less intrusive than the pre-construction requirements and comprise physical clearance of the	Out	Scoped out with regard to additional studies, however GIP mitigation measures to be incorporated into the ESMP.

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
		right of way. In general, there is anticipated to be little requirement for ongoing vegetation clearance required due to the desert nature of the Project Area. In addition, habitats below existing OHTLs in the area are well established and show negligible impacts as a result of maintenance.		
	Terrestrial fauna (mammals, reptiles and invertebrates)	During operation, no impacts on mammals, reptiles or invertebrates are anticipated as no changes to access across the Project Area are anticipated, and no significant loss of available habitat is considered to occur.	Out	No impacts are anticipated.
	Birds	The presence of overhead lines has the potential to impact birds, mainly through collision and possible electrocution. This has the potential to occur particularly during the migratory and breeding season.	In	Scoped in due to potential for impacts on migratory and breeding birds, which includes birds of conservation concern.
	Bats	The presence of overhead lines has the potential to impact bats, through collision and possible electrocution during foraging and commuting flights.	In	Scoped in due to potential for impacts on foraging and commuting bats.
	Aquatic flora and fauna	Although the noted marshy area is likely a result of discharge from a wastewater facility, unsensitive siting of pylons has the potential to impact the coverage and wetness of this habitat which may support important flora or fauna.	In	No impacts are anticipated.

8.9 Scope of Work For ESIA

8.9.1 The scope of the biodiversity, flora and fauna impact assessment for the ESIA is summarised in the table below.

Table 8-3 Summary of proposed biodiversity, flora and fauna assessment

Additional secondary data collection	Field surveys proposed	Impact assessment approach
<p>Collate any additional information on LPAs within the Project Area where possible</p>	<p><u>Habitats and Flora</u></p> <p>Spring / summer surveys are proposed to determine the presence of important habitats, the status of habitats within LPAs and the presence of rare plant species. Further details are set out below 'Survey Detail'.</p> <p><u>Fauna</u></p> <p>Surveys for mammals, bats, reptiles, amphibians and invertebrates are proposed. The survey scopes for these species are set out below in 'Survey Detail'.</p> <p><u>Birds</u></p> <p>Breeding bird transects in the spring/early summer are proposed to determine the presence/absence of Asian Houbara Bustard for which potential habitat has been identified. Notable breeding bird activity will be recorded during other faunal surveys, particularly with regards to wetland birds around the marshy area.</p> <p><u>General notes</u></p> <p>All surveys will be undertaken ensuring that field data and processed results are of high quality, including figures, photos, and locations to support the impact assessment.</p> <p>During field surveys, animals will be identified through photographs, field signs, locations, population counts, habitats, and their migration routes and corridors.</p>	<p>Qualitative Biodiversity Impact Assessment for terrestrial flora and fauna broadly following, as applicable to the context, the guidance for impact assessment as set out in the Chartered Institute of Ecology and Environmental Management (CIEEM) guidance: Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester (2018).</p> <p>Impacts on flora</p> <p>The impact assessment will first seek to set out the vegetation species composition and the distribution and sensitivity of fauna along the OHTL route. This will include:</p> <ul style="list-style-type: none"> • Create a map showing the distribution of identified plant communities along the OHTL route. • Characterize the plant communities that will be impacted by the OHTL route within each habitat type. • Assess the current state of vegetation cover along the OHTL route. • Determine the presence and where relevant location of Critical Habitat along the proposed OHTL route and within the route Zone of Influence. <p>A Critical Habitat/Priority Biodiversity Features screening will also be undertaken, as per the definition and requirements of EBRD PR6 (2019), Biodiversity Conservation and Sustainable Management of Living Natural Resources. As appropriate, Critical Habitats Assessment (as set out in EBRD PR6).</p> <p>Impacts on fauna</p> <p>The desk and field surveys will be used to define distribution and sensitivity of fauna, specifically those that are:</p> <ul style="list-style-type: none"> • Likely to experience disturbance from construction activities • Likely to experience mortality from construction activities

Additional secondary data collection	Field surveys proposed	Impact assessment approach
		<ul style="list-style-type: none"> Likely to experience mortality during the operational phase of the Project (bats and birds) <p>Impacts on birds</p> <p>Attention will be paid to impacts on birds following the guidance set out in Scottish National Heritage (SNH) 2016 Guidance for Assessment and Mitigation of Impacts of Power Lines and Guyed Meteorological Masts on Birds. The operational assessment will also contain a review of cumulative ecological impacts associated with other transmission lines or linear infrastructure projects in the region.</p> <p>Mitigation will be provided for any potentially significant impacts determined following the impact assessment.</p>

Survey Details

Flora survey

8.9.2 The baseline surveys will have the following primary objectives:

- Identification of vegetation species occurrences along the proposed transmission line and associated infrastructure areas likely to be disturbed;
- Vegetation species with high conservation value such as the IUCN and regional Red Listed species or species commonly recognised by broad stakeholders;
- Presence of alien species; and
- Detailed assessment of vegetation composition and habitat condition within LPAs as well as the noted marshy area.

8.9.3 Twenty-two survey sites have been selected that are representative of the major vegetation units found within the Project Area as identified during the Scoping reconnaissance site visit. These areas are shown in Figure 8-4 below.

8.9.4 At each of the survey sites, data will be collected from 10 m x 10 m quadrats to describe baseline conditions. Data collected at each quadrat will include the following;

- Site location (including GPS coordinates using an appropriate datum);
- Photos of vegetation communities and habitats;
- Vegetation condition using the classification scheme developed by Keighery (1994);
- List of plant species;
- Plant species abundance;

- Plant coverage versus bare ground and rocks;
- Vegetation communities by dominant species;
- Biomass of 1x1 m small plot; and
- Coordinates and photos of rare and endangered plant species (IUCN and Regional Red List species, and species designated as rare by Mongolian regulations) and their abundance.

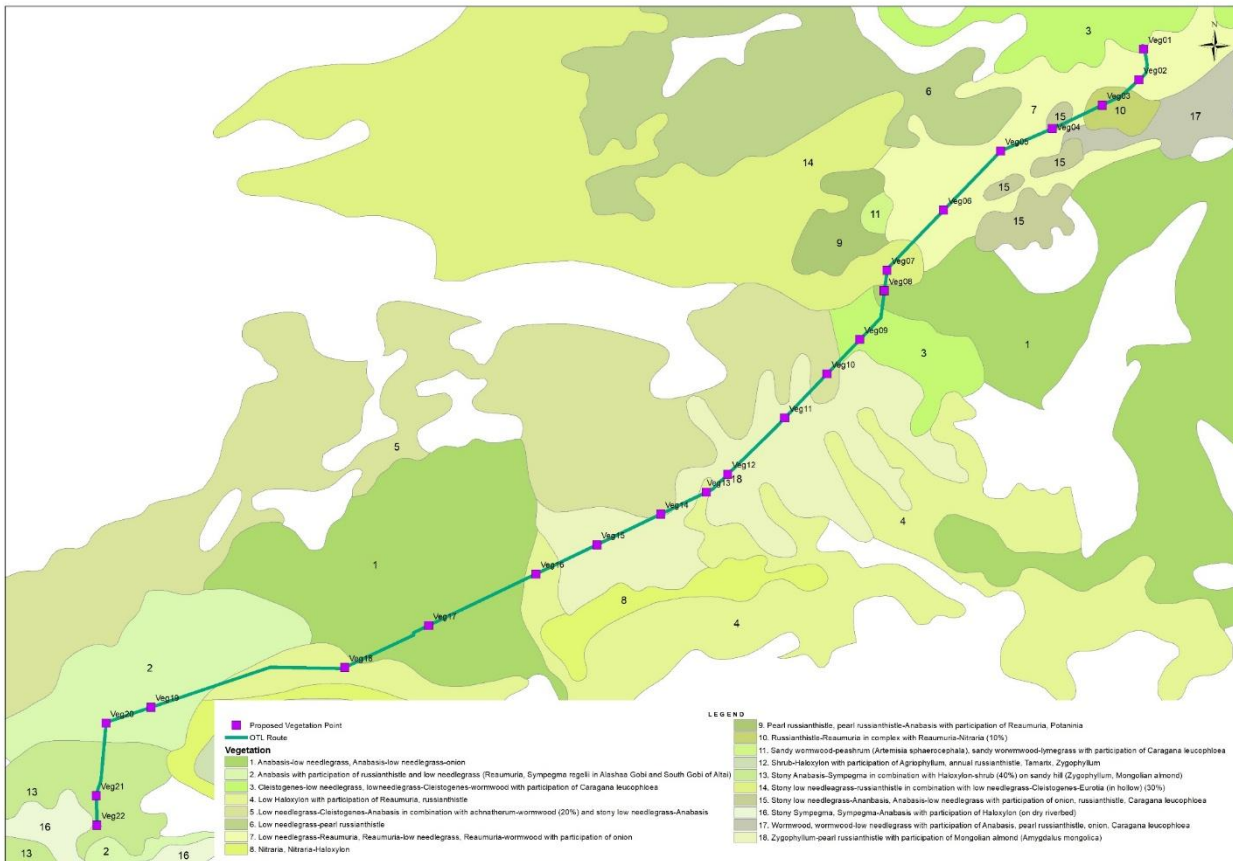


Figure 8-4 Proposed flora sampling locations

Fauna surveys

8.9.5 The baseline surveys will have the following primary objectives:

- Identification of fauna species occurrences along the proposed transmission line and associated infrastructure areas likely to be disturbed; and
- Locations and abundance of all fauna species with high conservation value such as the IUCN and regional Red Listed species or species commonly recognised by broad stakeholders to be noted.

8.9.6 The following general approach will be used for all fauna species:

- Visual observations will be undertaken by experienced biologist for all wildlife species (large and small mammals, reptiles, amphibians, invertebrates and birds) around each vegetation survey plots;

- During walks and vehicle journeys around the Project Area, any incidental wildlife observations will be recorded. This will include sightings and any traces of wildlife species such as burrows, carcasses, prints or other field signs;
- Coordinates, abundance, movement direction, and photos (if possible) of all observed wildlife species will be recorded; and
- Surveyors will request anecdotal evidence of faunal species from local community members.

8.9.7 Species specific fauna surveys will also be conducted as outlined below.

Mammals

Camera traps

8.9.8 Two camera traps will be deployed along the OHTL route. They will be deployed on Day 1 of the survey work and retrieved at the end of the survey period. The survey locations will be in remoter areas, away from herder camps, livestock movements, and other potential sources of disturbance. At least one camera trap will be set within the Uushiin Gobi LPA with the exact location to be determined on site. This LPA was originally designated on wildlife grounds as it provides suitable habitat for ungulates including Goitered gazelle, Mongolian gazelle and Asian wild ass. Protection within this LPA has ceased in some areas, and although this is unclear at the time of survey, further assessment of the mammal community in this area will be required.

Elliott trap

8.9.9 Elliott traps are an effective tool for live-capture surveys of small mammals to assess biodiversity and identify ecological features of interest along a proposed transmission line route. Up to 5 Elliott traps will be deployed at up to 5 selected representative habitat locations along the OHTL route, deployed in the evening and checked the next morning. If there are small mammals trapped, they will be documented and species identified and then released. The specific locations will be identified during the field survey, taking into account terrain features and habitat characteristics.

Pit traps

8.9.10 Pit traps combined with drift fences are effective for surveying amphibians, reptiles, invertebrates and small mammals. Pit traps will be used in conjunction with drift fences that direct animal movement towards pits and increase the likelihood of capture. A drift fence consists of flywire as barrier, running over, or in line with, the centre of a pit, linking together a number of equidistantly spaced pits. Drift fences are set at 20 to 30 cm high and buried at the base using local substrate. The base substrate should be flush with the pit opening to ensure there are no gaps that would divert fauna from the pit. Six pit fall trap survey locations will be selected along the OHTL route.

Amphibians, Reptiles and Invertebrates

8.9.11 Opportunistic survey and pit trapping (as described above) will be combined for amphibians, reptiles and invertebrates.

8.9.12 To ensure amphibians are surveyed suitably, at least one section of drift fencing with pitfall traps will

be installed in a suitable location within the vicinity of the marshy area located between towers 644 and 645, and an evening torch survey of the water will be combined where possible.

- 8.9.13 The locations above will also provide data on reptile and invertebrate communities however at least one set of pitfall traps will be installed in a more arid area for comparison. A total of six locations will be selected for pitfall trapping. Records of flying invertebrates including moths and butterflies will be made while on site, including during surveys for other faunal species.

Bats

- 8.9.14 To identify the presence / absence of bats and the level of foraging and commuting activity (if present), a sound detector will be deployed in four locations. This will include a combination of the Tsagaan Suvarga substation area, near water habitats and open arid landscapes. Mini Bat 2 Sound Meters will be used to collate data. The bat detector will be left overnight in one location and moved to a new location the following day.

Birds

- 8.9.15 Bird surveys have been conducted previously. As potential habitat for the Asian Houbara Bustard has been identified, breeding bird transects will be conducted across suitable habitat over spring/early summer to determine presence/absence during the breeding season of this species. The transects will also provide an estimate of breeding numbers if present. While conducting habitat/vegetation surveys and other faunal species along the OHTL route, breeding bird observations will be made. Particular attention will be paid to the marshy area between towers 644 and 645; an assessment as to whether any waterbirds are nesting in this area will be made. Several ruddy shelduck were observed in this area during the reconnaissance visit, however it was not established whether they were breeding.

9 Cultural Heritage

9.1 Study Area / Area of Influence

- 9.1.1 The study area covers Dornogovi aimag and the AoI includes an area of 500m either side of the OHTL route.

9.2 Data Availability and Gaps

- 9.2.1 Observational data is available from the site reconnaissance for identifiable features along the OHTL route.
- 9.2.2 The ESIA baseline section will provide relevant information in relation to the following potential topics: tangible and intangible cultural heritage features and archaeological potential along the OHTL route. This will include:
- **Archaeological sites**, defined as physical remains of ancient or historic human activity or occupation, most often including subsurface resources, and often indicated by the presence of surface artefacts or structural remains. These include ancient graves, ancient settlements, and surface ceramic scatters, among others.
 - **Monuments**, defined as above-ground structures of public interest and/or historical significance such as religious monuments, among others.
 - **Sites and items of Intangible Cultural Heritage value**, defined as sites that form part of the spiritual or cultural lives of modern populations, nomadic herding, and folk legends. Intangible Cultural Heritage refers to oral traditions, social practices, rituals, festive events, knowledge and practices concerning nature and the universe or the knowledge and skills to produce traditional crafts. These traditions, practices and beliefs make a people or region distinctive and socially cohesive. Sites with Intangible Cultural Heritage value often include the traditional forms of cultural heritage such as historic monuments, archaeological sites, and historic landscapes, but they may also include natural features.
- 9.2.3 The main data gaps are:
- Confirmation of presence of locally designated sites in the Project area
 - Archaeological field survey
 - Household survey for tangible and intangible cultural heritage sites/areas

9.3 Summary of Baseline Information

- 9.3.1 There is currently limited cultural heritage data available for the Project Area.
- 9.3.2 At a national level, Mongolia hosts six sites that are listed on the United Nations Education, Scientific and Cultural Organisation's (UNESCO) World Heritage List. None of these sites are located within Dornogovi aimag, and, therefore, close proximity to the Project Area. However, Khanbayanzurkh

Mountain falls under the UNESCO Tentative List as part of the Sacred Mountains of Mongolia. Khanbayanzurkh Mountain is located in Sainshand soum, approximately 34km southwest of Sainshand, and was declared a State Sacred Mountain in 1995. There are three wooden temples at the mountain, and it is a popular worship destination for pilgrims and tourists in Mongolia²⁴. The Mongolian section of the Great Tea Route was added to UNESCO's Tentative List in April 2025²⁵. This historically significant route connected China to Europe, running through Mongolia. Of the locations along the route listed by UNESCO the Khukh us (Khukh ders) transport station is located closest to the Project Area, approximately 30km north of Sainshand.

- 9.3.3 The Mongolian Gobi Desert is the largest dinosaur fossil reservoir in the world, particularly for Cretaceous period fossils. This is recognised by the inclusion of Cretaceous Dinosaur Fossil Sites in the Mongolian Gobi on the UNESCO's Tentative List²⁶. Dornogovi aimag includes part of the Gobi Desert, which is located c.104km to the south of the OHTL.

9.4 Potential Effects

9.4.1 Potential effects in relation to cultural heritage are summarised in the table below.

Table 9-1 Potential cultural heritage effects

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
Construction	Cultural heritage Archaeology Intangible Cultural Heritage Historic Landscapes Built Heritage, where present within 100m of the route centreline	Construction activities have the potential to cause adverse permanent physical impacts to cultural heritage assets, including buried archaeology, built heritage and historic landscape features. This could be through direct physical destruction, truncation (removal of part), or through associated impacts including ground movement and vibration. The transmission line does not pass through any currently recorded sites of cultural heritage or archaeology. During excavation for the towers and any earthworks, establishment of construction compounds, accommodation camps and material/spoil storage areas, and creation of access tracks/routes there is the potential for unidentified archaeology to be encountered.	In	Additional data will be collected at a local level and through archaeological field survey to confirm that there are no local heritage assets within the OHTL corridor or immediately adjacent it that could be affected during construction.
Operation	Cultural heritage	No significant impacts to cultural heritage assets are expected during the operation	Out	No impacts on heritage assets as a

²⁴ UNESCO. 2015. Sacred Mountains of Mongolia. Available at: <https://whc.unesco.org/fr/listesindicatives/6068/>

²⁵ UNESCO. 2025. The Mongolian section of the Great Tea Route. Available at: <https://whc.unesco.org/fr/listesindicatives/6817/>

²⁶ UNESCO. 2024. Cretaceous Dinosaur Fossil Sites in the Mongolian Gobi. Available at: <https://whc.unesco.org/en/tentativelists/5944/> <https://whc.unesco.org/fr/listesindicatives/6817/>

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
	Archaeology Intangible Cultural Heritage Historic Landscapes Built Heritage, where present within 100m of the route centreline	of the transmission line as there are no registered cultural heritage receptors that could have their setting affected.		direct result of the Project are anticipated.

9.5 Scope of Work for ESIA

9.5.1 The scope of the cultural heritage impact assessment for the ESIA is summarised in the table below.

Table 9-2 Summary of proposed cultural heritage assessment

Additional secondary data collection	Field surveys proposed	Impact assessment approach
<p>None proposed. On June 4, 2025, the Project Implementation Unit received a reference and description from the Dornogovi Aimag Department of Culture, Arts, Tourism, and Youth. This reference reviewed the Sainshand–Tsagaan Suvarga 220 kV double-circuit, 204km overhead transmission line and the expansion of the Tsagaan Suvarga substation to determine whether any historical or cultural immovable monuments are registered in the cultural heritage database near the approved route covering Sainshand, Saikhandulaan, and Mandakh soums. The review confirmed that there are currently no registered historical or cultural immovable monuments within the vicinity of the route.</p>	<p>Observations will be made during all field surveys for any potential cultural heritage features.</p> <p>Where feasible, as part of the Key Informant Interviews (KIIs) and household surveys (HHS), engaged with interviewees to:</p> <ul style="list-style-type: none"> Obtain information on the nature, location and uses and values to local communities and individuals of identified sites. Determine the nature of local traditions and activities that are practiced by and important to the communities within them relevant to the site sites and any other as yet identified sites along the proposed route. <p>Archaeological observation and monitoring during the excavation of Ground Investigation and Soil Sample/Condition trial holes/pits to record presence of any</p>	<p>A qualitative assessment of potential impacts to cultural heritage assets will be undertaken. The assessment will Identify what assets the Project will interact with and how they will be impacted. This will include engagement with the local soum leaders and local households along the route to identify local cultural heritage.</p> <p>The different types of cultural heritage features identified from cultural baseline studies will be assigned values taking account of the level of importance and protection afforded to them as derived from analysis of national legislation and international standard (notably EBRD PR8) as well as the importance placed on them by local communities. The evaluation of impacts on physical features will include both consideration of direct effects due to loss or damage (earthworks, vibration, dust etc.) changes in preservation conditions (hydrology etc.) as well as indirect effects for example on their setting or disruption to access.</p> <p>As necessary, a suite of mitigation measures will be developed based on different types of features and impacts and will be incorporated in the ESMP. This will include a cultural heritage protection schedule for the two identified sites within the proposed route (and any others identified as part of this ESIA). Opportunities for</p>

Additional secondary data collection	Field surveys proposed	Impact assessment approach
	archaeological remains or objects.	enhancement including preservation of cultural heritage will also be identified. No impacts are anticipated during operation. Therefore, no assessment of operational impacts will be undertaken.

9.5.2 The following assumptions and limitations apply:

- Data on provincial and local cultural heritage has not been consulted during the preparation of this Scoping Report.
- This Scoping Report has not been informed by any field surveys.
- It is understood that prior to construction on site, in compliance with Article 27, Clause 27.8 of the Law on Cultural Heritage Protection the MoE/NPTG will be responsible for engaging a professional organization to conduct paleontological, archaeological and ethnological surveys.

10 Landscape and Visual

10.1 Study Area / Area of Influence

10.1.1 The study area covers Dornogovi aimag and the Aol tends up to a 5km radius from the OHTL corridor as this is the distance up to which it is considered significant adverse effects upon landscape and visual receptors may occur.

10.2 Data Availability and Gaps

10.2.1 The ESIA baseline section will provide relevant information in relation to the following potential topics: landscape character and visual amenity.

10.2.2 Initial observational data regarding general landscape character and the presence of visual receptors is available from the site reconnaissance exercise in general.

10.2.3 Further information will be collected through both desk-top studies and field-survey level:

a) Desk based information

- Landscape Character Assessments at a national, regional, local or project level (if available) in order to determine the landscape characteristics that may be sensitive to the potential impacts of the Proposed Development
- Mapping of:
 - general topography,
 - other natural features,
 - settlements, and permanent camps (Gers),
 - extents of Mongolia's National Parks,
 - national recreational trails, and
 - existing infrastructure such as: railways (plus where they are on an embankment), other overhead lines, solar farms, wind farms, roads, routes.

b) Field survey collection of viewpoint photography:

- from the potential following visual receptors:
 - communities i.e. Sainshand (in particular, views from the elevated parts of the settlement looking towards the transmission line corridor) and known permanent gers camps,
 - visitors to scenic hill/mountain tops, (e.g. potentially Танктай овоо, Khan bayanzurkh mountain and Byasalgaliiin 108 aguu), and
 - visitors to shrines, temples and monasteries (e.g. potentially Khamariin Khiid Monastery, Хамарын хийд Buddhist Temple), and

- and representative views of the general landscape at regular intervals along the OHTL, as well as occasional views from the ridges of hills to the north and south of the line.

10.2.4 The main data gaps are:

- Published landscape character assessments; and
- The location of temporary/summer camps (winter camp locations have been identified).

10.3 Summary of Baseline Information

10.3.1 The Project Area is located in the Gobi region in the southeast of Mongolia. Although the majority of the Project Area is located in relatively flat plains the foothills of the Gobi-Altai mountains extend into Dornogovi aimag. The majority of the Project Area is uninhabited (see Figures below). The nearest settlement to the Proposed Development is Sainshand city, which is approximately 6km from the OHTL route.

10.3.2 Sainshand substation is located on the outskirts of Sainshand city. Tsagaan Suvarga substation is located within the Tsagaan Suvarga mining area. Existing infrastructure including overhead power lines, renewable energy plants, mining operations and railway lines occurs within the Project Area.



Figure 10-1 Gently undulating grassland and existing 35kV OHTL



Figure 10-3 Views along the OHTL route

Figure 10-2 View from planned substation location (part of Choir-Sainshand project) towards Sainshand



Figure 10-4 View of location of the second railway crossing

10.5 Potential Effects

10.5.1 The potential effects arising from the Proposed Development upon landscape character and visual amenity receptors are summarised in the table below.

Table 10-1 Potential landscape and visual effects

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
Construction	Landscape Character	Potential for temporary, short term adverse impact upon the key characteristics of sensitive areas of landscape character whilst construction activities are being undertaken in their vicinity, due to the presence of cranes, erection of towers, and occasional temporary worker camps.	Out	Given the short term nature of the likely impacts (i.e. despite the overall construction period lasting approx. two years, not all areas of the OHTL will be worked upon at once) the lack on any designated areas of landscape protection and the relatively long distance visual receptors are anticipated to be from the overhead line, the potential adverse effects on landscape character and visual amenity are anticipated to be minor in significance (and therefore non-significant, and therefore can be scoped out of the ESIA.
	Local communities, Travellers through the landscape & Visitors to scenic hill/mountain tops, shrines, temples and monasteries	Potential for temporary, short term adverse impacts on the visual amenity of a small number of residential receptors, travellers through the landscape on road and rail, and the anticipated small number visitors to scenic hill/mountain tops, shrines, temples and monasteries whilst construction activities are being undertaken in their vicinity, due to the presence of cranes, erection of towers, and occasional temporary worker camps. Given that most receptors would be located at the edges of the Project Area, significant impacts are not anticipated.	Out	
Operation	Landscape Character	Potential for permanent, long term adverse impacts on the intrinsic landscape characteristics (including tranquillity/remoteness) of the Project Area – i.e. of the foothills of the Gobi-Altai mountains and the adjacent flat plains. Given the large-scale and simple nature of this landscape, and its resultant demonstrable ability to accept well-planned linear infrastructure (i.e. existing railways, roads and renewable energy schemes) the impacts on landscape character are not anticipated to be significant.	In	Given the relatively undisturbed and open nature of the Project area, the potential for impacts upon landscape character and visual amenity will be included within the ESIA. The cumulative impacts with the Sainshand windfarm and substation, and Tsagaan Suvarga substation will be included within this.
	Local communities,	Potential for permanent, long term adverse impacts on the visual amenity of a small	In	

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
	Travellers through the landscape & Visitors to scenic hill/mountain tops, shrines, temples and monasteries	number of residential receptors, travellers through the landscape on road and rail, and the anticipated small number visitors to scenic hill/mountain tops, shrines, temples and monasteries during the operation of the proposed development given the introduction of tall new metal lattice structures in views experienced. Given that most receptors would be located at the edges of the Project Area, significant impacts are not anticipated.		

10.6 Scope of Work for ESIA

10.6.1 The scope of the landscape and visual impact assessment for the ESIA is summarised in the table below.

Table 10-2 Summary of proposed landscape and visual impact assessment

Additional secondary data collection	Field surveys proposed	Impact assessment approach
Any data on landscape character areas or the equivalent will be collected at the aimag and soum level, where available.	<p>Further mapping will be undertaken of features of the landscape such as the other existing overhead lines, roads, and railway (and their associated landform structures).</p> <p>Collection of photography that is representative of the views experienced by visual receptors.</p>	<p>An assessment of operational impacts (based on the guidance set out in the Guidelines for Landscape & Visual Impact Assessment - Version 3, 2013) that is proportionate to the scale and nature of likely effects will be undertaken. The assessment will be predominantly desk-based but utilise the photographic surveys undertaken</p> <p>The cumulative impacts with the Sainshand windfarm and substation, and Tsagaan Suvarga substation will be included within this.</p> <p>Given the temporary and short-term nature of individual areas of construction – construction phase impacts are proposed to be scoped-out of the ESIA.</p>

10.6.2 The following assumptions and limitations apply:

- Given the relatively large-scale and simplicity of the Project Area's landscape, plus the relatively long distance visual receptors are anticipated to be from the proposed overhead line the preparation of Zone of Theoretical Visibility (ZTV) plans and visualisations of the proposed development would not be undertaken.

11 Soils and Natural Hazards

11.1 Study Area / Area of Influence

- 11.1.1 The study area for the soil assessment covers the whole area of the Project boundary where soils will be disturbed during construction and operation.
- 11.2 The study area for natural hazards covers the Dornogovi aimag (province) as factors (such as flooding and dust storms) are likely to originate beyond the project boundary.

11.3 Data Availability and Gaps

- 11.3.1 Information on geology and soils within the Project boundary and on natural hazards across the Dornogovi aimag has been gathered from publicly available sources, including:
- National geological and soil maps;
 - Regional climatic information;
 - Land use; and
 - Published reports on natural hazards.
- 11.3.2 In relation to the Scoping Report, the main data gaps are:
- Site-specific information in relation to the soils within the Project boundary (including specific information on their vulnerability to erosion and/or damage when handled/reinstated);
 - Site-specific land use information; and
 - Evidence of site-specific natural hazards.
- 11.3.3 The ESIA baseline section will provide information to fill these gaps in relation to the soils and associated land use along the proposed route which will be gathered from a soil survey to be undertaken (see section 11.5). Any further information gathered in relation to natural hazards across the province which could affect the Project will also be reported in the ESIA.

11.4 Summary of Baseline Information

- 11.4.1 The geology of the Dornogovi aimag comprises a transition from passive continental margin in the north to backarc/forearc basins and finally island arc in the south. The area is mapped (Figure 11-1) as belonging to the Mongol-Okhotsk Folded Region in the north-west; the Gobi Basin comprising the central area; and the Yinshan Da and Xiao Hingganling Uplift areas to the south-east.

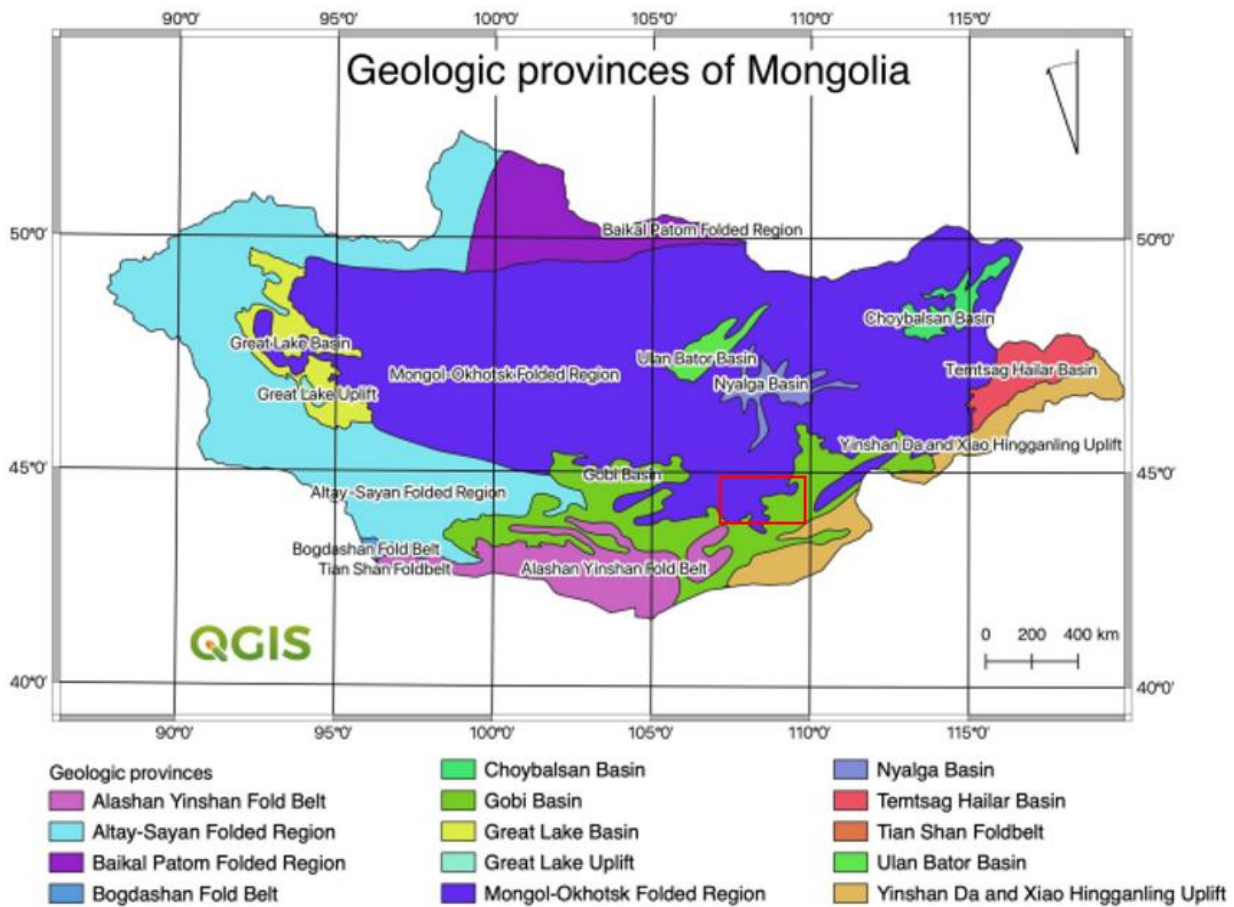


Figure 11-1. Geological provinces of Mongolia. Approximate project area is bounded within the red box. Figure from Lemenkov (2021), using data from United State Geological Survey.

11.4.2 The climate of the Dornogovi aimag province is region is described as a mid-latitude desert climate with temperatures ranging from -40 °C to 40 °C as the extremes with low levels of precipitation. Snow storms through the winter can occur and snow-melt comprises a flood risk across the area.

11.4.3 The World Reference Base for Soil Resources describes the soils present within the project boundary as predominantly Gypsisols (soils with a layer of gypsum within 100 cm of the surface), Calcic (lime-rich) Gypsisols, and Calcisols (lime-rich soils occurring in arid locations; Figure 11-2). These types of soils are called 'Desert Soils' in the Russian regional classification system and they occur in semi-arid regions where precipitation is considerably exceeded by evapotranspiration. Depending on where in the soil profile the gypsum layer is, and how high the gypsum/lime concentrations are, it is possible to use these soils for growing crops if irrigation is supplied; however these areas are more usually used for grazing.

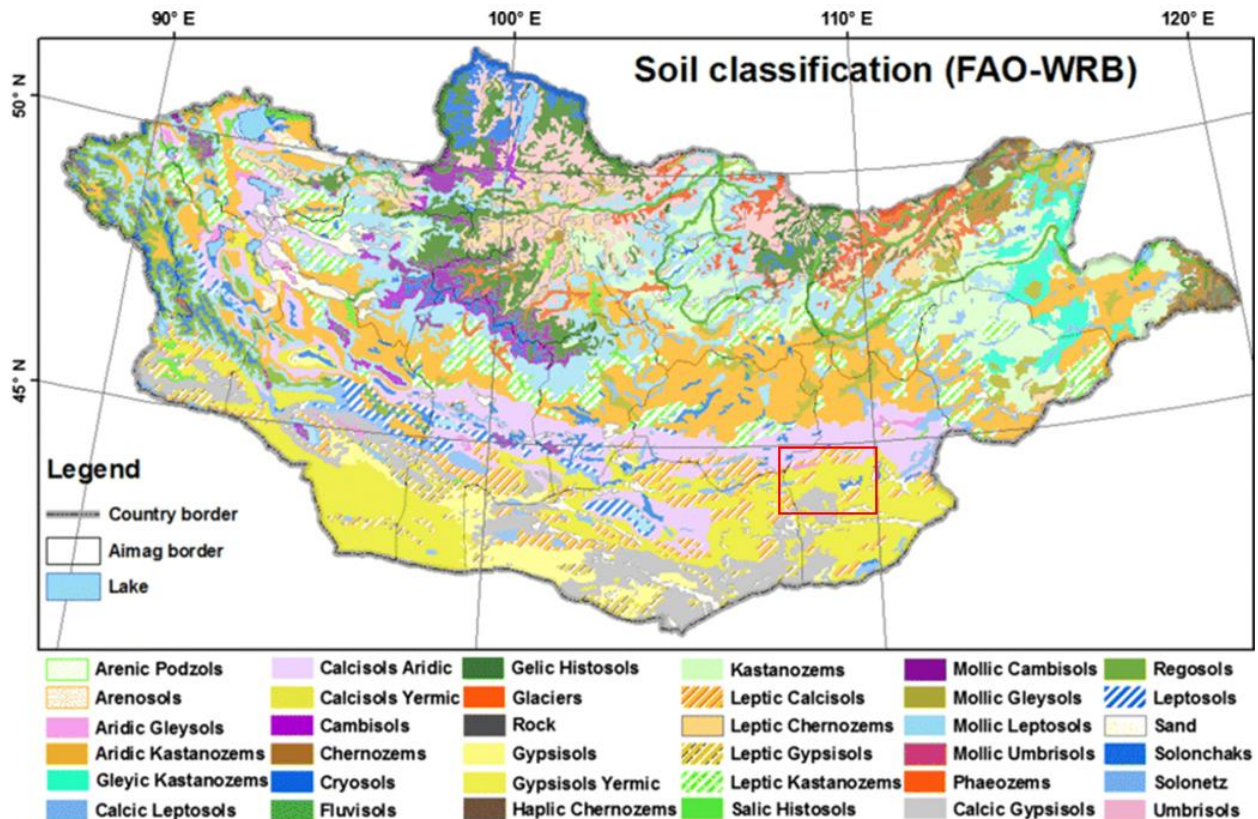


Figure 11-2 Soil Regional Map. Red box indicates approximate project area.

11.4.4 A more detailed description of the soils in the Project is provided in Figure 11-3 which shows (from north-east to south-west):

- Typical brown desert-steppe soils with stony brown desert steppe/brown desert soils (SP01 to SP05);
- SP02 is in an area of Solonchak (soil negatively affected by saline groundwater) meadow shoric;
- Typical brown steppified desert with brown desert steppe, stony and sairic (SP06 and SP07);
- Brown soils with aeolian depositis (deposits moved across the landscape by wind), weakly fixed sands (SP08);
- Typical brown steppified desert with brown aeolian deposits and brown steppified soils (SP09);
- Grey brown desert with grey brown desert solonetzic (SP10);
- Grey brown desert stony soils with sairic (SP11).

11.4.5 Figure 11-4 shows the proposed sampling points in the context of World Reference Base soil descriptions, including:

- Predominantly Gypsisols (described above);
- Some areas of Chernozems (mineral soils with high organic matter content), especially towards the south-west of the Project area;
- Potential for overlap with Solonetz and Solonchaks (mineral soils with high salt accumulation and likely degraded topsoil).

- 11.4.6 Combining information from the available sources, it is evident that the Project is located in an area of very dry, stony soils which are unlikely to be suitable for growing crops, due to their high salt content and poor structure combined with the arid climate.
- 11.4.7 These soils can have high erosion potential, especially where poorly vegetated and where snow-melt poses a risk of increased surface runoff. Available aerial photographs show clear evidence of sediment mobilisation and deposition.
- 11.4.8 Land use within the Project boundary, from aerial mapping, appears to comprise desert and scrub, assumed to be used predominantly for extensive/nomadic pastoral grazing.

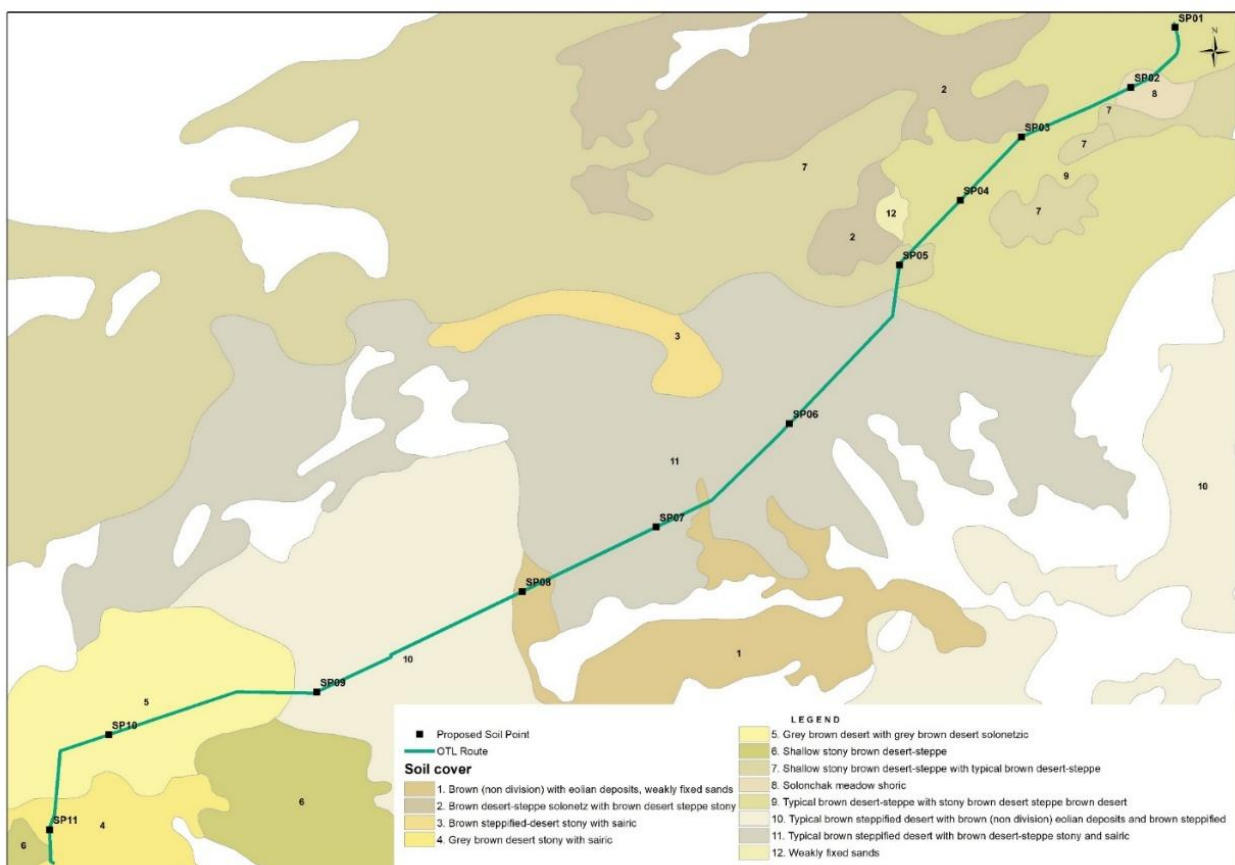


Figure 11-3 Detailed soil descriptions within the Project area



Figure 11-4 World soil groups, from World Reference Base. Mustard yellow – Chernozems; pale yellow – Gypsisols; pale pink – Solonetz; dark pink – Solonchaks.

- 11.4.9 Mongolia is vulnerable to a wide range of natural hazards, including floods, dust storms, droughts, wildfires and earthquakes. The country is in a seismically active zone, so earthquakes are possible. Mongolia's winter lasts from October to March, and temperatures can plunge below zero, leading to harsh winter conditions known as "dzud". The frequency and magnitude of natural hazards including harsh winters, drought, snowstorms and dust storms are increasing.
- 11.4.10 Dust storms are a prevalent hazard in Dornogovi, exacerbated by desertification and climate change. In March 2024, the National Agency for Meteorology and Environmental Monitoring issued warnings for strong winds and dust storms in southern Gobi provinces, including Dornogovi, with wind speeds exceeding 17m/s (61km/h). These storms pose risks to transportation, agriculture, and public health.
- 11.4.11 Dzud is a recurring winter disaster in Mongolia, characterized by extreme cold, heavy snowfall, and ice layers that trap pasture and water sources. In early 2024, dzud conditions affected Dornogovi, leading to livestock losses and threatening traditional herding livelihoods. The phenomenon is intensified by climate change and desertification.
- 11.4.12 While less frequent in Dornogovi compared to other regions, grassland fires can still occur, especially during dry periods. These fires can destroy vegetation, leading to soil erosion and increased susceptibility to dust storms. The occurrence of grassland fires and dust events may be superimposed or mutually reinforcing, leading to additional severe cascading disasters.

11.4.13 Flooding can occur, particularly during spring thaws or intense rainfall events. These floods can damage infrastructure, disrupt transportation, and affect agriculture. However, specific data on flooding events in Dornogovi is limited.

11.5 Potential Effects

11.5.1 Potential effects in relation to soils are summarised in the table below.

Table 11-1 Potential soils and natural hazards effects

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
Construction	Soil resources	<p>Soil erosion may occur from areas where soils have been stripped, stockpiled and reinstated and through the establishment of access roads on unmade surfaces. This is most likely to occur during prolonged dry, windy (wind erosion) or rainy (silt-laden runoff) periods. Soil erosion may also occur where vegetation clearance leaves soils exposed (noting that in most locations in the Project boundary there is little existing vegetation cover).</p> <p>Excavation for the tower foundations could result in damage and deterioration to soils.</p> <p>The presence of a temporary workers' camp, if required, may also result in localised soil compaction and contamination if appropriate mitigation measures are not put in place.</p> <p>Contamination of soils may occur from accidental spills of oils or chemicals as a result of use, storage or re-fuelling of construction plant and equipment in combination with poor pollution prevention and control measures. This will be addressed within the ESMP.</p>	In	Scope in due to potential construction impacts to soils through erosion, deterioration, compaction and contamination.
Operation	Soil resources	<p>Rust treatment and painting of towers, although expected to be infrequent, may cause pollution of soils.</p> <p>Pollution risk from the release of hydrocarbons and oils is also a risk at the substation sites, if adequate storage facilities are not provided.</p>	Out	No significant operational impacts are anticipated as a direct result of the Project. General measures will be included in an ESMP.

11.6 Scope of Work for ESIA

11.6.1 The scope of the soils impact assessment for the ESIA is summarised in the table below.

Table 11-2 Summary of proposed soil and natural hazards assessment

Additional secondary data collection	Field surveys proposed	Impact assessment approach
<p>A review of regional soil maps has been undertaken to identify the major soil types along the Project route and to determine suitable locations for a reconnaissance soil survey.</p>	<p>A field survey will be completed at 11 key locations along the OHTL route (to cover representative soil types based on available mapping). Soil observations will be conducted to establish a soils and land use baseline, accounting for areas mapped as showing different soil types. These will record:</p> <ul style="list-style-type: none"> Evidence of anthropogenic (such as hydrocarbon contamination or deposition of debris such as concrete or plastic) and natural land degradation (such as erosion or deposition features); Contamination or pollution likely to affect plant life in the area; Soil profile descriptions and photographs; and Soil sampling for analysis of chemical and physical characteristics <p>At each soil survey location, a soil pit will be dug to 1 m below ground level. For each soil pit the following will be undertaken:</p> <ul style="list-style-type: none"> Identify soil pit location, ensuring it is representative of the landscape. Dig pit to 1 m below ground level. Take photographs (each to include measuring scale and visible unique profile ID): 1) full profile photo; 2) photo of each horizon where visible. Record profile description (records to be collected for each horizon), to include: <ul style="list-style-type: none"> Land use Vegetation type and cover Horizon thickness Boundary (clear, distinct, gradual) Texture Structure Colour (ideally Munsell) Stones content (% , size range and type) Evidence of gleying (mottling) Presence of roots (type, abundance and size) Presence of fauna <p>Sample collection will comprise:</p> <ul style="list-style-type: none"> Collect 1 kg soil from each identified horizon in soil pits (as described above). Walk a "W" transect and collect a topsoil (top 20 cm of soil) sample every 20 paces. Collect 3 samples in a singular direction of the "W" to give 	<p>A qualitative assessment of the impacts on soils during the construction phase will be undertaken as part of the ESIA, including consideration of any contaminated land at the new substation if this is identified during the walkover site visit or the soil survey. This will be supported by the quantitative soil data obtained from the soil survey.</p> <p>No impacts during operation are anticipated and therefore no operational impacts will be assessed.</p> <p>Consideration will also be given to the potential for natural hazards to affect or be affected by the Project. Flooding is addressed under the topic 'Water'.</p>

Additional secondary data collection	Field surveys proposed	Impact assessment approach
	<p>a total of 9 samples. Place samples into a bucket and mix thoroughly before taking the 1 kg subsample for analysis.</p> <ul style="list-style-type: none"> • Samples to be sent to laboratory for analyses for: pH, CaCO₃, soil organic matter, electrical conductivity, plant available P, K and Mg and heavy metals. • Laboratory analysis for selected hydrocarbons would enable identification of contamination from oils, however this is not available locally so cannot be included in this scope. <p>Soil quality sampling and analysis will be undertaken as per the Mongolian national standards (MNS 2305:1994 Soil sampling and sample handling) as well as (where possible) internationally recognized soil classification methods as described in FAO (2006)²⁷, FAO (2007)²⁸ or USDA (1999)²⁹.</p>	

11.6.2 The following assumptions and limitations apply:

- The soil baseline will be established using large-scale regional soil maps and a reconnaissance soil survey. As such, there may be additional variance in soil types and conditions at a smaller scale that will not be identified within the assessment.

²⁷ FAO. 2006. Soil Description Guidelines. 4th edition. Rome, Italy.

²⁸ FAO. 2007. World Reference Base for Soil Resources. IUSS Working Group WRB. World Soil Resources Reports No. 103. FAO, Rome, Italy.

²⁹ USDA. 1999. Soil Taxonomy A Basic System of Soil Classification for Making and Interpreting Soil Surveys. U.S. Department of Agriculture Handbook 436.

12 Water Environment

12.1.1 The Water Environment chapter of the ESIA will consider the likely significant effects of the proposed development on the hydrology of local catchments and on groundwater resources during its construction, and operation phases, including maintenance. For the purposes of this assessment, the term 'Water Environment' includes surface water and groundwater receptors, as well as land drainage and further includes consideration of flood risk from all relevant sources of flooding.

12.2 Study Area / Area of Influence

12.2.1 The study area for the water environment assessment includes the Project footprint in addition to a 500m buffer around the footprint. This is considered an appropriate study area based on the nature of Project construction and operation activities and technical knowledge of similar schemes.

12.3 Data Availability and Gaps

12.3.1 The baseline assessment has been informed by a desk study which has drawn on the following information sources:

- Global satellite imagery.
- An initial site walkover to determine the location of water environment features.

12.3.2 The current data gaps which will be filled by undertaking further field surveys are:

- Water quality samples from the marsh area
- Location of all wells within 500m from the OHTL centreline, with photos and groundwater samples.
- Location of dry river beds.

12.4 Summary of Baseline Information

12.4.1 The Project Area is located within the Gobi desert and is extremely dry. It is understood that there are no permanent natural surface waterbodies along the proposed OHTL line, however several dry river beds were identified during the initial site walkover. Within the study area is a marsh area near Sainshand, which is assumed to be sustained by groundwater. There is also a potential waterbody near the 150 to 155km section within the Uushiin Govi protected area. From the initial site walkover it was identified that five wells (three herder wells and two with unknown use) are located within the project footprint, however this will be confirmed via the field survey.



Figure 12-1 Dry River bed



Figure 12-2 Marshy area near Sainshand

- 12.4.2 A recent paper published in Nature³⁰ outlines that the Gobi desert is experiencing an increase in summer precipitation which has resulted in numerous floods and other rainfall-related hazards. It is acknowledged that this is a general statement about the Gobi desert and may not be applicable to the study area.
- 12.4.3 Flooding is common in Dornogovi aimag during the summer months. Heavy rainfall in a single day can significantly increase the risk of flooding, potentially affecting residential areas, roads, bridges, and even causing damage to road and railway infrastructure. In 2022, several soums in Dornogovi experienced substantial rainfall, including 16.0mm in Sainshand and 13.3mm in Mandakh.



Figure 12-3 Flooding in Sainshand and damage to the railway due to flooding near Airag soum

³⁰ Nature 2023, Wenhao Dong 1,2 , Yi Ming³, Yi Deng⁴ & Zhaoyi Shen <https://www.nature.com/articles/s41467-024-48743-x>

12.5 Potential Effects

12.5.1 Potential effects in relation to water are summarised in the table below.

Table 12-1 Potential water effects

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
Construction	Drinking water wells (Groundwater resources)	<p>Construction activities will require potable water supply and non-potable water which will increase demand on local water resources.</p> <p>Construction works may cause accidental damage to well infrastructure within the construction works corridor, impacting groundwater access. This would directly impact local herders and their livestock which rely on these wells for water.</p> <p>Wastewater and communal waste generated by the Projects construction could infiltrate into the ground, alongside planned or unplanned uncontrolled discharges of dirty water to ground, impacting on groundwater quality.</p>	In	Both groundwater and surface water resources/water supply infrastructure are important in sustaining local communities, therefore any potential impacts to these receptors must be carefully managed.
	Dry and flowing watercourses	<p>Founding a tower in an unknown dry stream or lake bed may reduce the tower's structural integrity as well as impact surface water hydromorphology.</p> <p>There is potential for construction phase pollution events of ephemeral surface water features. This could occur from releases of wastewater or communal waste, uncontrolled discharges of contaminated water or spills due to the improper storage of oils/ chemicals and could negatively impact the water quality of the watercourses.</p>		
	Buildings and settlements	Vegetation and top soil stripping and earthworks/excavations for foundations, as well as construction of temporary access tracks, have the potential to increase impermeable land cover which can lead to an increase in surface water runoff. Flood risk could be increased due		

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
		to the improper storage of soils/ equipment resulting in a temporary loss of floodplain storage or impede floodplain flows.		
Operation	Drinking water wells (Groundwater resources)	During operation there is a risk of accidental spillage of oils and fuels from maintenance vehicles and activities, which could lead to risk of pollution to groundwater sources.	In	During operation, maintenance of the Project has the potential to generate pollution and impact the water quality of water resources.
	Dry and flowing watercourses	Permanent increase in areas of impermeable surfaces from the towers, could cause changes to the land drainage/runoff regime and the hydromorphology of dry and flowing watercourses. This impermeable footprint however is expected to be minor and associated effects negligible.	Out	Due to the small footprint of the overhead lines it is not expected that land drainage/ the runoff regime and the hydromorphology of watercourses would be significantly effected and so this has been scoped out of the ESIA.
	Buildings and settlements	Permanent increase in areas of impermeable surfaces from the towers, could cause changes to the land drainage/runoff regime and the hydromorphology of dry and flowing watercourses. This impermeable footprint, however is expected to be minor and associated effects negligible.	Out	

12.6 Scope of Work for ESIA

12.6.1 The scope of the water assessment for the ESIA is summarised in the table below.

Table 12-2 Summary of proposed water assessment

Additional secondary data collection	Field surveys proposed	Impact assessment approach
The National Statistics Office and local soum offices will be consulted to identify active wells in the study area.	Mapping of key water resources within the Project Area including surface water (flowing and dry) and groundwater/herder wells. Groundwater levels in herder wells closest to the OHTL route will be collected. Water quality	A qualitative assessment of the impacts of construction on ground water features, in particular confirmation of whether any herder wells will be directly affected by the OHTL, corridor will be undertaken. Additionally, a high-level quantitative assessment of baseline water quality will be

Additional secondary data collection	Field surveys proposed	Impact assessment approach
<p>Characterisation of the geology of the study area and identified groundwater wells and their usage, including any available water quality data.</p>	<p>testing will also be undertaken, both in the field and laboratory, of those wells.</p> <p>Observation, assessment and mapping of any dried river or lake beds within the Project Area.</p> <p>Although none have been observed to date, if any natural surface watercourses are identified during the site visit that is likely to be crossed by the OHTL line, a sample will be taken of the water for laboratory water quality testing.</p> <p>The marsh area will be surveyed to determine if any watercourses will flow into it, and water samples will be taken for laboratory water quality testing.</p>	<p>undertaken utilising the data collected in the field and laboratory. Note than any herder wells requiring relocation will be addressed under 'Displacement' impacts.</p> <p>During operation there is the potential for impacts on groundwater quality, therefore, this operational impact will be assessed.</p>

12.6.2 The following assumptions and limitations apply:

- Uncertainty can arise from the quality and availability of baseline data, and there may also be uncertainty linked to temporal variation in these conditions over the lifetime of the Project, for example, driven by climate change. It is also noted that the location of dry riverbeds may change over time and therefore mapping should be considered to be representative of the water environment at the time of survey. Where there is uncertainty, the assessment of the impacts on the water environment will adopt a precautionary approach, reporting on a reasonable worst case.
- Since there is no regular water quality monitoring of local water resources, any sampling which is undertaken is assumed to be representative of the baseline water quality of the water sources.

13 Social and Community

13.1 Study Area / Area of Influence

13.1.1 The study area covers Dornogovi aimag as well as the wider regional economy. The AoI includes all land within and adjacent to the footprint of the Project, the soums and associated baghs within which the Project is located, and the owners and users of land and assets affected by the Project.

13.2 Data Availability and Gaps

13.2.1 Observational data is available from the site reconnaissance in relation to local settlements, *gers* and land uses along the proposed OHTL route. Statistical data is also available from the National Statistical Office (NSO).

13.2.2 The ESIA baseline section will provide relevant information in relation to the following potential topics: administrative structure and social networks, demography and settlements, ethnicity and religion, gender and vulnerable groups, health, social infrastructure and services, local attitudes towards the project and any other relevant topics. The main data gaps are:

- Specific soum and bagh level data
- Household data of directly impacted persons or households

13.3 Summary of Baseline Information

13.3.1 The OHTL will run between Sainshand and Tsagaan Suvarga substations, crossing four soums: Sainshand (Zuunbayan, Khairkhan, Chandmani and Dalaishand baghs), Ulaanbadrakh (Argalant bagh), Saikhandulaan (Ulaanshoroot) and Mandakh (Servenbayankhoshuu bagh) before reaching the existing 220/35 kV substation at Tsagaan Suvarga, all within Dornogovi aimag.

13.3.2 Other than the substation near Sainshand city, there are no cities, towns or villages crossed by the route of the OHTL. To date, the ESIA Team has identified up to 21 winter camps within 11m of the centreline of the OHTL route, as shown in Figure 13-1.

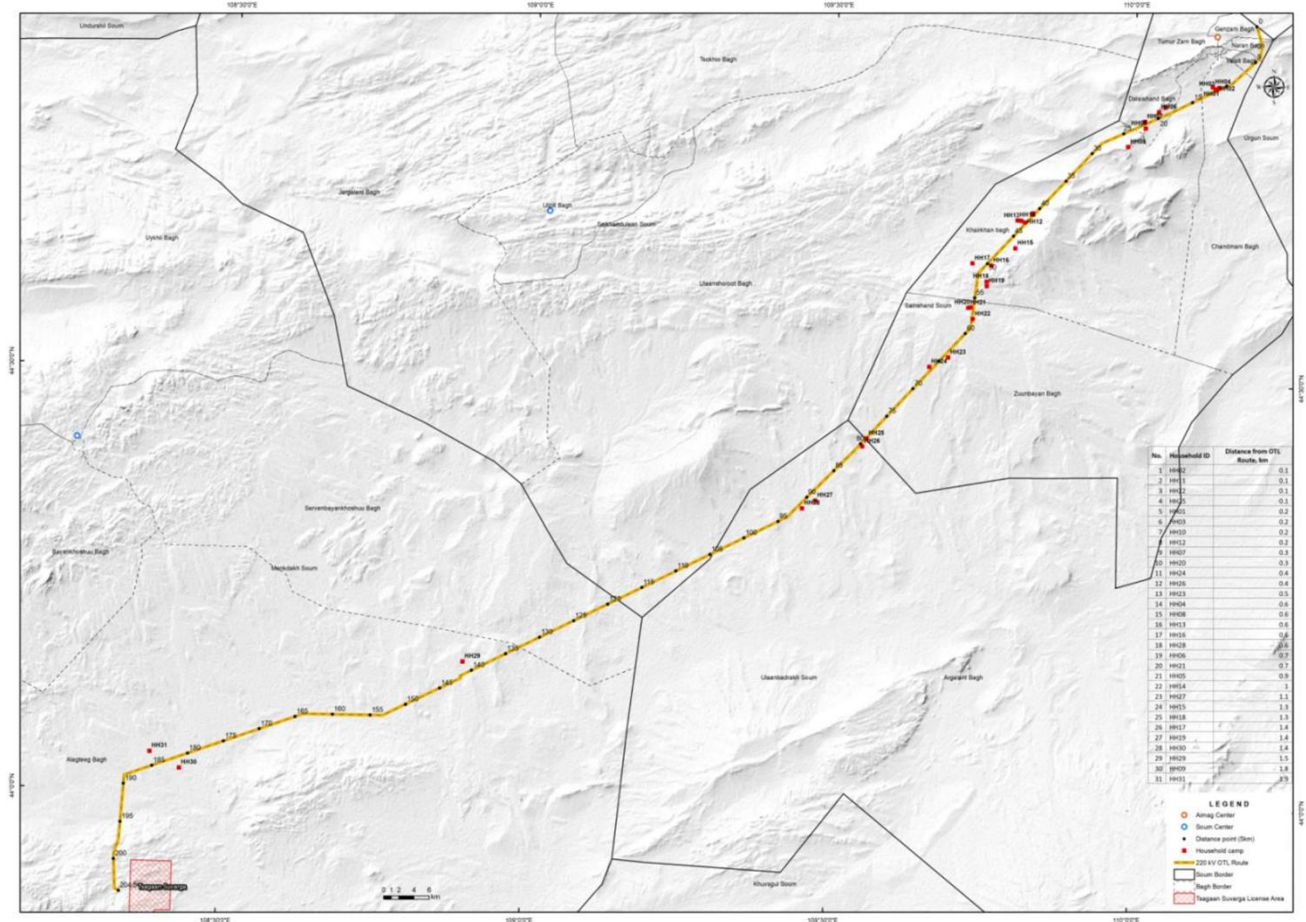


Figure 13-1 Winter camps along the OHTL route.

General Characteristics

Dornogovi aimag

13.3.3 Dornogovi aimag is situated in the south-east of Mongolia, in the central region, and covers an area of 109,500 km². The aimag centre is Sainshand city.

13.3.4 Dornogovi has a population of 71,969 (2024), and 21,801 households (2024)³¹, of which approximately 40% live in Sainshand city. Dornogovi aimag has 14 soums which are divided into 65 administrative units, called baghs. The soums are Airag, Altanshiree, Dalanjargalan, Delgerekh, Ikkhet, Zamyn-Uud, **Mandakh**, Urgun, **Sainshand**, **Saikhandulaan**, Khatanbulag, Khuvsgul, **Ulaanbadrakh**, and Erdene.

13.3.5 The aimag contains the Zamyn-Uud border point with China, which operates year-round and the Khangai border point with China, which also operates year-round.

³¹ Available at: [Статистикийн мэдээллийн нэгдсэн сан](#)

13.3.6 Mining, processing industry, animal husbandry, and tourism are the main sectors of the economy. The aimag has reserves of fluorspar, oil, bituminous coal, uranium, copper and molybdenum. The ORANO Group (former AREVA Group) has been developing a uranium exploration project in Ulaanbadrakh soum since the early 2000s. Erdenes Critical Minerals (former Monrosvetmet) state owned company's mining plant operates in Urgan, and Dalanjargalan soums and produces 30% of Mongolia's fluorspar. Since 2003, oil extraction is taking place in Zuun-Bayan village in Sainshand soum.

Sainshand soum and Sainshand City

13.3.7 Sainshand soum land area is 234,280 km². Its main economic sectors are mining, infrastructure, animal husbandry, services and trade. Sainshand soum is divided into eight baghs (Bagh #1, Bagh #2, Bagh #3, Bagh #4, Bagh #5 (Zuunbayan), Bagh #6, Bagh #7 and Bagh #8. The centre of the aimag is Sainshand city. At the end of 2024, the soum population was 28,492, comprising 21,801 households.

13.3.8 Sainshand soum has natural resources such as building materials, sand, stucco, fluorite, zeolite, lignite, petroleum oil fields.

13.3.9 The transmission line will pass through territory of Zuunbayan, Khaikhan, Chandmani and Dalaishand baghs.

13.3.10 Sainshand city, the capital of Dornogovi aimag, has a population of 28,492 (2024) and is located 463km from Ulaanbaatar to the south-east. Sainshand is a main international railway hub and the railway station of the Trans-Mongolian Railway is located in the northern part of the city.

13.3.11 Sainshand city houses a museum dedicated to the nineteenth century monastic and literary figure Danzanravjaa, a prominent leader of the Nyingma (Red Hat) school of Tibetan Buddhism.

13.3.12 A new substation is currently under construction on the outskirts of the city as part of the Choir-Sainshand transmission line project, and this Project will tie into this new substation.

Saikhandulaan soum

13.3.13 Saikhandulaan soum, with an area of 9,500 km², is located 450km from Ulaanbaatar, and 98km from Sainshand city. The soum has four baghs, namely Jargalant, Tsokhio, Ulaan Shoroot and Ulziit. By end 2024, the soum population was 1,358, comprising 460 households.

13.3.14 The main economic sector of the soum is traditional pastoral animal husbandry. Exploration work for gold, copper, silicon, and coal is underway. Seven mining companies, including Mega Era Mining LLC, Megatik Manufacturing LLC, Van Taje LLC, and Mega Era, and 24 exploration companies are operating in the soum.

Ulaanbadrakh soum

13.3.15 Ulaanbadrakh soum is located 509km from Ulaanbaatar and 117km from Sainshand city. The soum has four baghs, namely Bagh #1 (Sangiin dalai), Bagh #2 (Bayanbogd), Bagh #3 (Argalant) and Bagh

#4 (Nuden). At the end of 2024, the soum population was 1,476, comprising 533 households.

13.3.16 The main economic sector of the soum is traditional pastoral animal husbandry and mining.

Mandakh soum

13.3.17 Mandakh soum is located 454km from Ulaanbaatar and 170km from Sainshand city. The soum has five *baghs*, namely Bagh #1 (Alkhanteeg), Bagh #2 (Bayankhoshuu), Bagh #3 (Uyekhii), Bagh #4 (Serven bayankhoshuu) and Bagh #5 (Tukhum). At the end of 2024, the soum population was 1,654, comprising 511 households, all of which were located in the rural areas.

13.3.18 The main economic sector of the soum is traditional pastoral animal husbandry and mining.

13.3.19 The Tsagaan Suvarga mine is located in this soum. The proposed OHTL will tie into the existing substation located within the Tsagaan Suvarga licensed mine area.

Population characteristics

13.3.20 The broad geographic features and population density of the Project aimag and soums are summarised in Table 13-1.

Table 13-1 Size of Dornogovi aimag and soums in the Project Area and population density, 2024

Aimag/Soums	Number of baghs	Size (km ²)	Population density (Number of persons per km ²)
Total, Dornogovi aimag	64	109,500	0.7
Sainshand soum	8	28,492	12.2
Ulaanbadrakh soum	4	11,400	0.1
Saikhandulaan soum	4	9,558	0.1
Mandakh soum	5	12,6601	0.1

Source: NSO. www.1212.mn

Infrastructure

13.3.21 Infrastructure consists of railway, roads, power networks and telecommunications. The main infrastructure crossed by the OHTL route is shown in Figure 13-1.

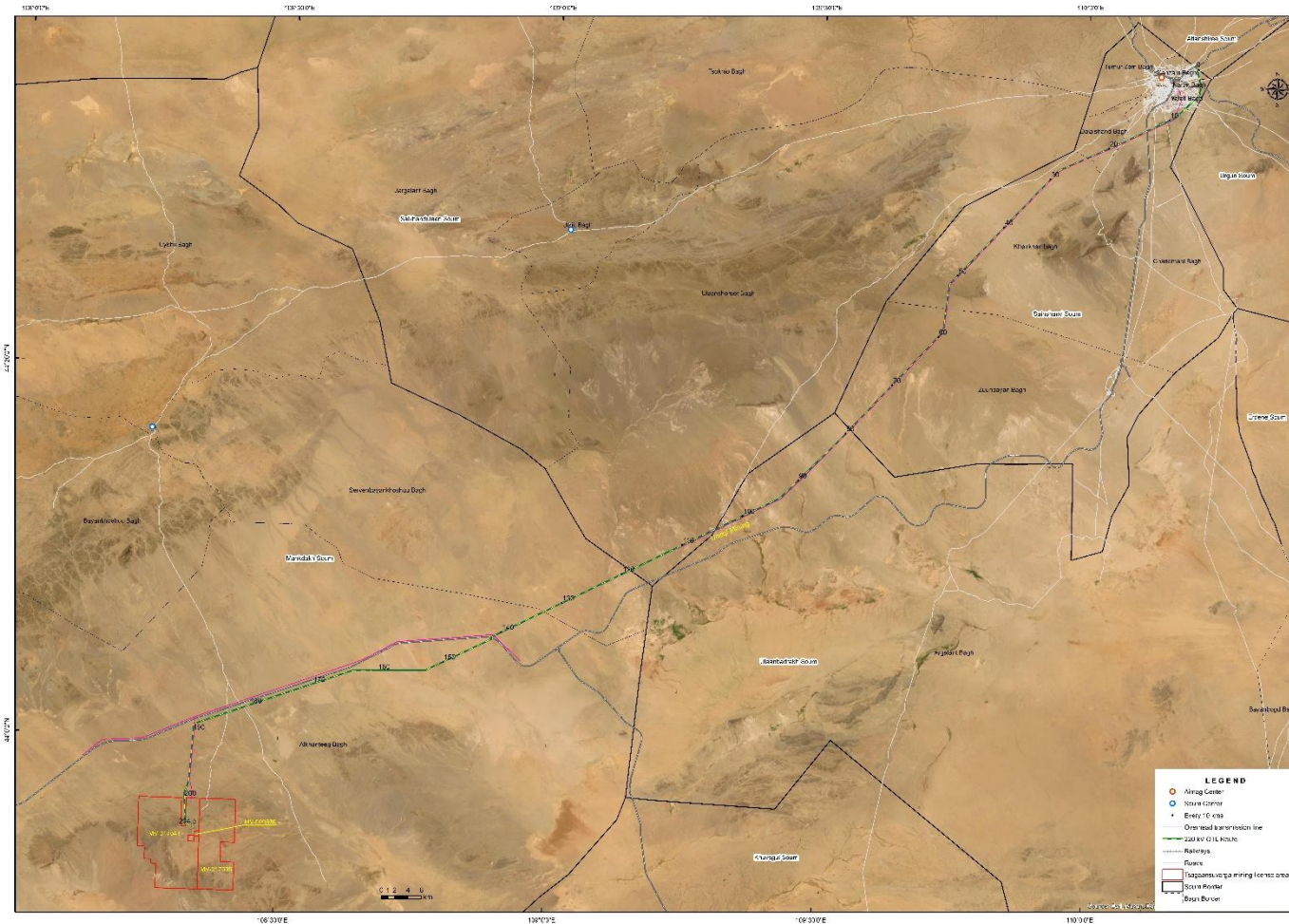


Figure 13-2 Infrastructure along the proposed OHTL route

Power Generation

13.3.22 Dornogovi aimag is connected to the CES. The aimag has a well-developed electricity grid, including the Baganuur-Sainshand 220kV electricity line, Sainshand-Zamyn Uud 110kV electricity line, and Sainshand-Zuun Bayan 35kV electricity line. An 18.3km long 110 kVt power transmission overhead line and sub-station is currently under construction to supply electricity to the oil refinery in Altanshiree soum, Dornogovi aimag. The Choir-Sainshand OHTL is due to start construction in 2026.

13.3.23 In Dornogovi aimag, several renewable energy projects are currently operational and generating electricity. These include the 15 MW Gegeen solar power plant, jointly invested in by Japan's Shigemitsu Shoji and Sharp Corporation, along with Mongolia's Erchim Teeg company; the Erdene solar power plant, with a capacity of 30 MW and commissioned last year; the 30 MW Gobi Solar Power Plant, developed by Desert Solar Power One LLC; and the 55 MW wind farm operated by Sainshand Wind Park LLC.

Roads

13.3.24 Dornogovi aimag is connected to Ulaanbaatar by paved road, a part of the 4th Asian highway network. The aimag centre and soum centres have paved roads, in addition soums in the Project Area are connected either by paved roads (soums along the 4th Asian highway network) or unpaved (earth) roads. There is no direct paved access to the Project.

Railway

13.3.25 The Trans-Mongolian Railway connects the Trans-Siberian Railway from Ulan-Ude in Russia to Erenhot (Erlin) and Beijing in China through the capital Ulaanbaatar. The Mongolian section of this line runs for 1,110km. Sainshand is an important railways hub along the Trans-Mongolian Railway. A 27km industrial purpose railway line connects Sainshand with Altanshiree soum, Dornogovi aimag, to allow development of the Mongolian oil refinery under construction in Altanshiree soum. A new export and import gateway, the 226.9km Zuunbayan-Khangai railway line has been operating since December 2024.

Telecommunication

13.3.26 Five telecommunication services providers (Mongolian telecom, Mobicom, Skytel, Unitel and G-mobile) have 66 branches in Dornogovi aimag. All services providers have a presence in Sainshand, Altanshiree and Mandal soums while four services providers have a presence in Ulaanbadrakh soum.

13.4 Potential Effects

13.4.1 Potential effects in relation to Social and Community are summarised in the table below.

Table 13-2 Potential Social and Community effects

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
Construction	Local community Vulnerable people Herder households Users of local services Local businesses	<p>The clearance of the right of way could give rise to impacts on local communities such as dust, noise, traffic impacts as well as the general risk around construction sites.</p> <p>Transportation of heavy plant and equipment and the presence of unprotected tower base excavations could pose potential safety hazards for the local population.</p> <p>The total number of construction workers from outside the areas is not currently known, however an influx of construction workers can result in rapid changes in local demographics and can result in pressure on social structures and local services, increased disturbance and pressure on natural resources as well as related inflationary pressures on living costs. If external Contractors are used, there is a risk of increased occurrence of communicable diseases, including HIV/AIDS and sexually transmitted diseases (STDs); this aimag in particular is known as a transit route for sex workers commuting to and from Mongolia to Eren city in China, however, the main paved roads are at distance from the Project route.</p> <p>Vulnerable groups may experience heightened adverse impacts compared to other groups as they are more likely to experience access restrictions during construction and be more susceptible to the effects of inflationary pressures on living costs and increased demand for finite social resources.</p>	In	Potentially significant impacts on local communities may be felt, in particular certain groups within the communities; and groups within urban areas where the works will be closer to assets.
Operation	Local community Vulnerable people Herder households	Electric overhead lines are considered a source of power frequency, electric and magnetic fields, which may have a perceived adverse health effect. Risks to the general public during operation include: EMFs (depending on nearest sensitive receptors); risk of electrocutions, fire generation from falling overhead lines and from lightening; falling and/or swinging	In	The main impacts relate to potential EMF for winter camps closest to the route. This will be reviewed in more detail during the socio-economic surveys.

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
	Users of local services Local businesses	<p>objects; falling of live electrical conductor due to mechanical failure of an insulator string or snapping of the conductor itself; and potential collapse of poles/towers.</p> <p>OHTLs can also impact wellbeing and tourism potential because of the large negative visual impact of high profile manufactured features in an otherwise largely natural landscape.</p> <p>The presence, storage and use of oils, fuels and other flammable products on the premises of substations may give rise to fire outbreaks.</p> <p>Positive impacts include the potential to increase the energy security of soums and baghs using the CES.</p>		

13.5 Scope of Work for ESIA

13.5.1 The scope of the social and community impact assessment for the ESIA is summarised in the table below.

Table 13-3 Summary of proposed Social and Community assessment

Additional secondary data collection	Field surveys proposed	Impact assessment approach
<p>Statistical data will be collected from the MoE, NSO and Health Ministry reports on the following (this will mainly national and aimag data with some data available at the soum level):</p> <ul style="list-style-type: none"> Demography and population, including birth and death rates and population growth and migration. Ethnicity Gender Hospital / health care facilities and access to them Educational facilities Data on the health of the local communities, including prevalence of Sexually transmitted diseases (STDs) 	<p>Mapping of the location of properties and land uses (where visually evident) in relation to the OHTL route.</p> <p>Key Informant Interviews (KIIs), focus group discussion (FGDs) and household surveys (HHS) will be undertaken.</p> <p>A team of four people will travel into the field; at each soum centres, a meeting will be conducted with soum officials and then the team will divide into (i) KIIs/FGDs that will be undertaken in the soum centers and (ii) HHS team that will travel along the OHTL route in that</p>	<p>A qualitative assessment will be undertaken of community health and well-being, safety and security, and impact on infrastructure and services. The majority of these risks will occur in construction and therefore the main focus will be on construction impacts (noise, dust, traffic, etc.), in particular identifying groups that could be affected disproportionately.</p> <p>During operation, the main impact relates to EMFs and general safety around the</p>

Additional secondary data collection	Field surveys proposed	Impact assessment approach
<ul style="list-style-type: none"> Labour-related human rights infringements at MoE and NPTG or related contractors (security staff abuses, forced or child labour) <p>Data will also be collected from the local soums, including the aimag/soum police, where available:</p> <ul style="list-style-type: none"> Local hospital / health care facilities and access to them Any information on potential vulnerable groups along the route corridor Social infrastructure such as police, hospital, schools Active Non-Governmental Organisations (NGOs) and Civil Society Organisations (CSO) in the Study Area 	<p>soum area to survey impacted Baghs and land owners and users.</p> <p>The KIIs will focus on the four soums (Sainshand soum, Saikhandulaan soum, Mandakh soum, Ulaanbadrakh soum), health care providers and possibly law enforcement. Those to be interviewed are:</p> <ul style="list-style-type: none"> Soum Governor/Chairperson of the soum Citizens Representatives Khural/ Head of the Governor's Office Treasury/ Head of the Governor's Office Social Welfare/Labour Officers Agriculture and SMEs Specialists Specialist in charge of labor/employment/social welfare Environmental inspector and rangers Development Policy and Planning representatives Land, Construction and Urban Development / Land Registration Officers Environment / Environment Inspector / Environment Policy Officers Health and education representatives Head of local hospitals Soum police <p>The length of interviews approximately 40 minutes to 1 hour. All meetings are planned to be conducted face-to-face.</p> <p>In addition, KIIs will be held in Ulaanbaatar with the mining company and the private rail company that are affected by/crossed by the proposed OHTL.</p> <p>Four FGDs will be held in each of the four soums. Representative groups will be organised to cover: Women, elderly, youth, micro and small businesses and</p>	<p>towers; these will be assessed as part of the impact assessment.</p>

Additional secondary data collection	Field surveys proposed	Impact assessment approach
	<p>herders who have their summer camps in the vicinity of soum centre.</p> <p>For the HHS, the team will aim to cover 100% of the 21 ger households identified within 1km either side of the OHTL centreline.</p>	

13.5.2 The following assumptions and limitations apply:

- Construction Contractors have not been appointed and information related to contractor requirements such as construction camps and management plans are not available for review. Consequently, little is known about the number, type and location of construction plant, access routes, vehicle numbers, workforce numbers, accommodation arrangements, or construction material suppliers, that might be used however, the ESIA will assume similar data to that being employed on the Choir-Sainshand Overhead Transmission Line Project currently under construction.

14 Land Use, Employment and Livelihoods

14.1 Study Area / Area of Influence

14.1.1 The study area covers Dornogovi aimag as well as the wider regional economy. The AoI includes all land within and adjacent to the footprint of the Project, the soums and associated baghs within which the Project is located, and the land users affected by the Project.

14.2 Data Availability and Gaps

14.2.1 Observational data is available from the site reconnaissance in relation to local settlements, *gers* and land uses along the proposed OHTL route. Statistical data is also available from the National Statistical Office (NSO).

14.2.2 The ESIA baseline section will provide relevant information in relation to the following potential topics: economy and economic activities, employment, income and expenditure, land uses and tenure, households and property. The main data gaps are:

- Specific soum and bagh level data
- Land use data
- Household data of potentially directly affected persons or households
- Assets within the footprint or close to the OHTL route

14.3 Summary of Baseline Information

Land use

14.3.1 Land use distribution within Dornogovi aimag is reported in Table 14-1. The majority of the route of the OHTL is pastureland used for grazing.

Table 14-1 Land use, Dornogovi aimag, 2020-2024, in thousand ha (data for 2023 not available)

	2020	2021	2022	2024
Total area	10,947.23	10,947.23	10,947.23	10,947.23
Agricultural land	10,529.64	10,529.64	10,529.64	10,271.40
Of which pasture				9,833.10
Land of cities, villages and other settlements;	168.87	168.87	168.87	219.20
Land under roads and networks	62.52	62.52	62.52	68.10

	2020	2021	2022	2024
Of which Land under roads				38.50
Land under railways				13.00
Land With Forest Resources	158.50	158.50	158.50	309.40
Land with water resources	27.70	27.70	27.70	79.20
Land for state special needs	995.87	995.87	995.87	1,001.19

Source: <https://www.eic.mn/statistics>

- 14.3.2 The soums are situated at a considerable distance from the OHTL route. To date, 21 gers/winter camps have been identified within 1km of the centreline of the route (see previous chapter). There are no settlements or buildings adjacent the two substations.
- 14.3.3 Herders typically move at least twice a year, in spring (March – May depending on weather) and at the beginning of winter (October - November). However, more significant displacements are sometimes necessary in the search of better pastures and water resources. Herder households build winter camps and use them for holding animals during winter time. Due to the need for shelter from the wind, winter camps are often located at the base of hills where water will collect and where it is possible to establish a shallow well.
- 14.3.4 During summer and autumn when pastures grow, herders transfer their gers to a location they find to have good pasture. While herders frequently return to similar areas for summer grazing, the ultimate option of summer camps depends on the weather and subsequent grazing conditions every year. The most important parameters for choosing summer camp are rangeland yields and water points. In order to protect winter camp sites, it is accepted that a summer camp and pasture should not encroach on a winter camp area.



Figure 14-1 Ger close to the OHTL alignment



Figure 14-2 Winter camp near the OHTL alignment



Figure 14-3 Grazing livestock



Figure 14-4 Grazing livestock

14.3.5 The main other land use in the Project area is mining. The mining licenses crossed by or close to the proposed route are shown in Figure 14-1. Tsagaan Suvarga mine substation marks the end of the proposed OHTL route. Tsagaan Suvarga mine started construction in 2014 and will reach full operation in 2026, and is due to operate for at least 20-25 years, based on current contracts. The first processing plant has been constructed and will be operational within 6 months and the second is still being constructed and will be operational within 18 months. It will provide 1,300 direct employment opportunities and 5,000-7,000 indirect employment opportunities. There are 140 people employed at present. The gender split is 70:30. The mine is planned to extract 341,000 tonnes per year.

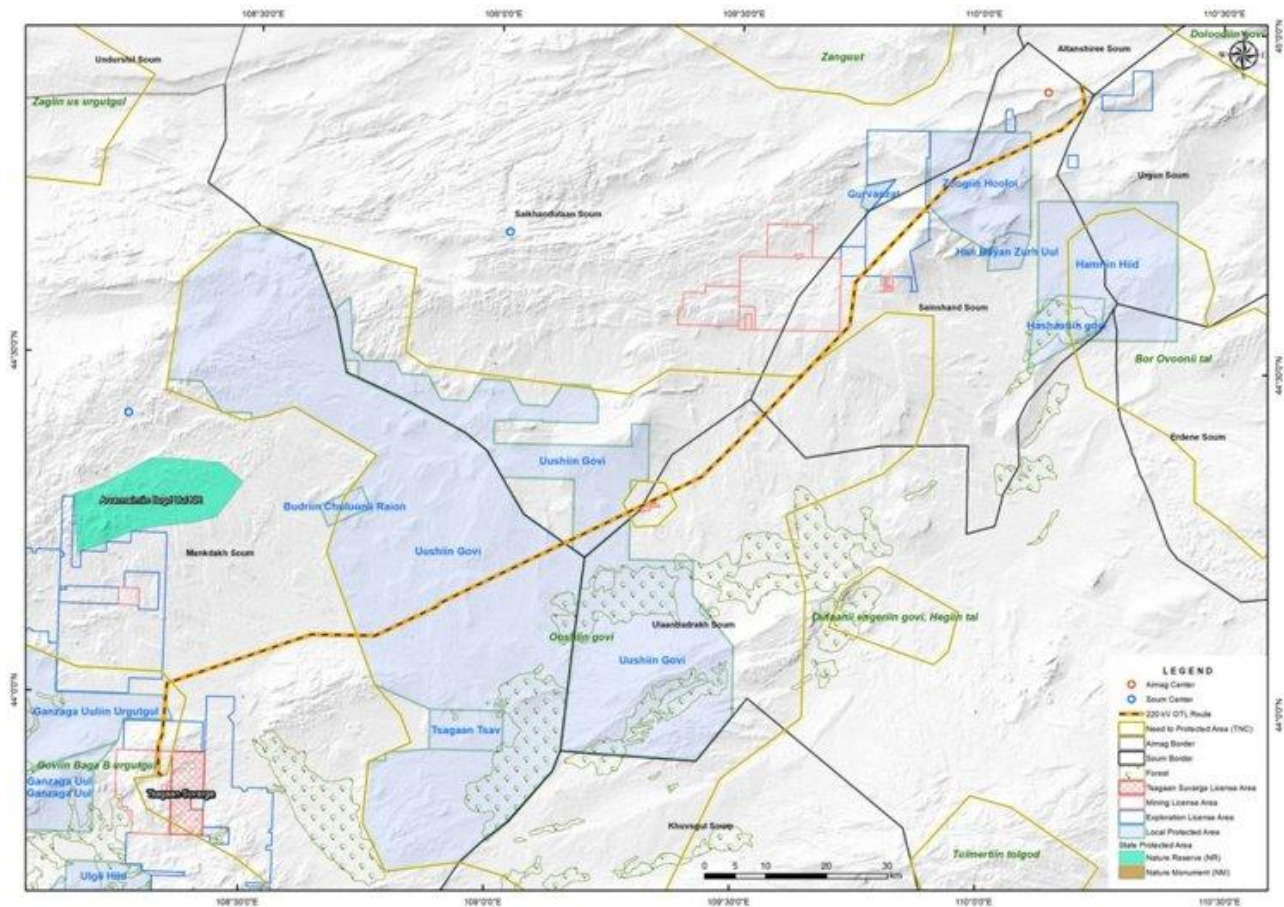


Figure 14-5 Mining licenses along the proposed OHTL route

Economy

14.3.6 In 2024, Mongolia's gross domestic product (GDP) per capita was 23,384.55 thousand MNT (6,900 USD), with that of the Central region contributing 19,559.44 thousand MNT and Dornogovi aimag 10,209.98 thousand MNT.³² Services contributed the largest share of GDP (c.50%), closely followed by mining and quarrying.

14.3.7 The main sectors contributing to Dornogovi aimag's economy are Services (75.2%), Industry and Construction (18.9%) and Agriculture (5.95%).

Employment and Livelihoods

14.3.8 In 2024, Mongolia had 1,441,091 economically active persons. There were 30,473 economically active people in Dornogovi aimag. Two-thirds of economically active persons were in urban areas, and the one-third were in rural areas.

³² Available at: [Статистикийн мэдээллийн нэгдсэн сан](#)

14.3.9 In 2024, 61.3% of the population aged 15 and over nationwide were part of the labour force, while 38.7% were outside the labour force. The composite labour underutilization rate stood at 7.8% in 2024, marking a decrease of 3.9 percentage points compared to 2020 and 0.7 percentage points compared to the previous year. Compared to the national level (61.3%) and the central region (59.1%), in 2024, the working-age population's participation in the labour market was 64.5% in Dornogovi aimag (Table 14-2). The male labour force participation rate (69.3%) was higher than the female labour force participation rate (60.1%) in the aimag.

14.3.10 In 2024, there were 85,424 people unemployed in Mongolia, of which 1,653 were unemployed in Dornogovi aimag. Overall, the unemployment rate in Dornogovi aimag (5.4%) is lower than both the central region (5.7%) and the national level (5.9%). Unemployment among young people is considered as the biggest problem throughout the country.³³ No data are available at the soum level at the time of writing.

Table 14-2 Labour status of Dornogovi aimag, 2024

	Total	Male	Female
Working-age population (15-64 years of age)	29,818	15,389	14,429
Employed	28,166	14,188	13,978
Unemployed	1,654	1,171	483
Labour force participation rate, %	64.5	69.3	60.1

Source: www.1212.mn

14.3.11 Household income is only available at a national level. The national average for 2024 was 2,547,896 MNT, for aimag centres was 2,382,617 MNT, for soum centres 2,120,284 MNT and for rural areas 2,020,997 MNT. Meanwhile, at the national level the monthly average household expenditure increased by MNT 1.1 million from MNT 1.5 million in 2020 to MNT 2.6 million in 2024.

14.3.12 As of 2024, nationally the largest components of the total income are wages (53.0%) and pensions and allowances (21.4%), and the households spent 74.4% of the total expenditure on non-food goods and services and 17.7% on food items.

14.3.13 As the group most likely to be affected by construction and potentially operation of the Project, further details are provided on herders' livelihoods. As of 2024, the number of herder households recorded nationally was 249,450,000, with 53,539,000 in the Central region and 5,534,000 in Dornogovi aimag. Sainshand had 421,000 herder households, Ulaanbadrakh had 389,000, Manduk had 388,000 and Saikhandulaan had 338,000. The majority of herder households possess solar, wind, and small electric generators, satellite antenna and televisions, and radios.³⁴ According to the 2023 livestock

³³ NSO. (2019). *Social and Economic Survey*

³⁴ NSO. Available at: www.1212.mn.

census, 83.1% of herder households have a power generator, 75.6% have a television, 66.9% have a car, 66.2% have a motorcycle, and 98.8% have a mobile phone. ³⁵

Poverty

14.3.14 Poverty in Mongolia is persistent and the poverty incidence is higher in rural areas. As of 2022, 27.1% of population were living below National Poverty Line. A significant portion of the poor reside in urban areas, with a large concentration in Ulaanbaatar.³⁶ Dornogovi aimag is relatively better off with respect to poverty compared to the national and regional levels. The share of the population whose consumption is below the poverty line in 2024 was higher in the central region (16.9) than Dornogovi aimag (16.9). Within the soums, Sainshand had the lowest count (15.9) followed by Mandakh and Saikhandulaan (both 19.2) and Ulaanbadrakh (19.4)

14.3.15 The poverty gap is the average distance below the poverty line as a proportion of the poverty line where the mean is taken over the whole population, counting the non-poor as having zero poverty gaps. As with the share of poverty, in 2024 this was lower in Dornogovi aimag (4.6) than the central region (7.8). The poverty gap was lowest in Sainshand (4.3) followed by followed by Mandakh and Saikhandulaan (both 5.2) and Ulaanbadrakh (5.3).

14.3.16 The poverty severity (the distribution of the consumption among the poor population) for 2024 also shows a similar trend, being 1.9 in Dornogovi aimag and 3.3 in the central region. Poverty severity was lowest in Sainshand (1.8) followed by followed by Mandakh and Saikhandulaan (both 2.1) and Ulaanbadrakh (2.2).³⁷

14.4 Potential Effects

14.4.1 Potential effects in relation to Land Use, Employment and Livelihoods are summarised in the table below.

Table 14-3 Potential Land Use, Employment and Livelihoods effects

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
Construction	Asset owners Herders Mining concessionaires Business owners and employees	Employment opportunities will be created during the construction phase, including civils, mechanical and electrical engineering, drivers and security guards. Total numbers are not currently known. The construction labour force may result in demand for goods and services; this may result in short term (for the period of	In	Potentially significant impacts on employment and the economy may be experienced during construction and therefore this will be addressed in the

³⁵ Dornogovi aimag Yearbook 2023.

³⁶ Available at: <https://www.adb.org/where-we-work/mongolia/poverty>

³⁷ NOW. Available at: [Статистикийн мэдээллийн нэгдсэн сан](#).

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
		<p>construction) benefits to the local economy.</p> <p>Other short-term opportunities are likely to arise from opportunities to provide goods and services to construction workers e.g. food kiosks and other shops.</p> <p>Short term, indirect economic gains may result from the sourcing and purchase of construction materials where these are locally or regionally available e.g. cement, for the construction of the overhead line and substations.</p>		ESIA.
		<p>Loss of access to land during the construction phase due to the linear nature of the works; this might temporarily affect herders in the Project Area. For the most part loss of access will be short-lived for the period of construction only.</p> <p>Mining exploration and operation licenses are located within and near the route corridor. No direct impacts on these mining concessions are envisaged however this will be verified in the ESIA.</p>	In	The Project could have negative and positive effects on land uses and therefore this is scoped into the ESIA.
		<p>No physical displacement of assets along the OHTL is anticipated. However, it is noted that there are assets near the centreline and the route itself does cross mining concession areas. Although this needs to be verified, it is anticipated that route can be micro-sited to avoid any involuntary physical displacement.</p> <p>Some limited economic displacement may arise from restrictions on access to land or assets across the OHTL corridor during construction. For the most part loss of access will be short-lived for the period of construction only. No permanent economic displacement is anticipated.</p>	In	<p>Further clarification is required in the field to verify no assets are within the RoW or the slighter wider EMF corridor.</p> <p>Temporary displacement due to access restrictions will be covered under EBRD's PR5 though impacts are considered to be minimal.</p>
Operation	Asset owners	With the overhead line, the Project will be provide additional energy capacity to the	In	Provision of improved reliability of energy

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
	Herders Mining concessionaires Business owners and employees	Project Area. The Project aimag is connected to the CES and therefore most benefits will likely be realised by future development in the Project Area. The Project will help meet the increasing electrical power demand in the Project Area, including development at Tsagaan Suvarga mine. Positive impacts include energy security, development of industries at local levels, and potential social opportunities.		supply in the CES is one of the key goals of the Project therefore this topic is scoped in.
		No changes to land use are anticipated along the RoW during operation, though the impact on mining concessions with the RoW will be verified in the ESIA. The Project will provide a reliable source of energy for the region that will support local businesses, including mining.	In	Permanent impacts on land use will be discussed under land tenure and displacement impacts. Potential impacts on herders and use of pastureland will be considered. Potential impacts on the development of the Study Area as a result of the Project will also be considered.

14.5 Scope of Work for ESIA

The scope of the Land Use, Employment and Livelihoods impact assessment for the ESIA is summarised in the table below.

Table 14-4 Summary of proposed Land Use, Employment and Livelihoods assessment

Additional secondary data collection	Field surveys proposed	Impact assessment approach
Further data collection and analysis of impact on land uses within and near the OHTL route is required.	Detailed land use mapping.	A more detailed land use map will be generated and qualitative assessment of potential impacts on land uses will be undertaken; this will focus on the construction phase when most disturbance is anticipated. This will also link into any displacement impacts, where relevant, and

Additional secondary data collection	Field surveys proposed	Impact assessment approach
<p>Information on land tenure will be collected, where available.</p>		<p>clarify land uses that could be affected, either temporarily or permanently.</p> <p>Potential impacts on the development of the Study Area as a result of increased transmission capacity will also be considered.</p>
<p>Statistical data will be collected from the NSO and Labour and Welfare Ministry, and Land Authority reports on the following (this will mainly national data with some data available at aimag levels):</p> <ul style="list-style-type: none"> • Economic sectors and contribution to the economy • Employment per sector • Unemployment and underemployment • Income, expenditure and poverty rates • Land uses e.g. Arable, livestock, mixed, etc. • Average income by sector • Average household income (and seasonal variations) • Cost of living and household expenditure • Dependency ratio • Social welfare support • Education and training levels <p>Data will also be collected from the local soums and baghs where available on the above.</p>	<p>KIIs and HHS as part of the socio-economic and stakeholder engagement surveys. Households within 1km of the centreline of the OHTL route will be specifically targeted and information about how the proposed project could displace their existing activities, land uses, property or assets will be obtained.</p>	<p>A qualitative assessment will be undertaken of the of the negative and positive impacts on the economy, at different geographic levels where data are available – aimag, soum and bagh. The assessment will also consider the extent to which sufficient generation is supplied to the network, including future connections.</p>
<p>Overview of assets within the OHTL route RoW - 25 m RoW in rural areas / 6 m in urban areas; and 25 m RoW around the substations.</p>		<p>A qualitative assessment will be undertaken of the negative and positive impacts on livelihoods. Particular attention will be paid to any vulnerable groups, such as low-income herders, that may be disproportionately affected by the Project. Impacts on livelihoods displaced by the</p>

Additional secondary data collection	Field surveys proposed	Impact assessment approach
Employment levels of affected/ displaced persons, where relevant.		Project, where relevant, will be addressed through the Land Acquisition and Resettlement Framework.

14.5.1 The following assumptions and limitations apply:

- Construction Contractors have not been appointed and information related to contractor requirements such as construction camps and management plans are not available for review. Consequently, little is known about the number, type and location of construction plant, access routes, vehicle numbers, workforce numbers, accommodation arrangements, or construction material suppliers, that might be used however, the ESIA will assume similar data to that being employed on the Choir-Sainshand Overhead Transmission Line Project currently under construction.

15 Labour and Working Conditions

15.1 Study Area / Area of Influence

15.1.1 The study area covers Dornogovi aimag as well as the wider regional economy. The AoI includes all land within and adjacent to the footprint of the Project, the soums and associated baghs within which the Project is located, and the land users affected by the Project.

15.2 Data Availability and Gaps

15.2.1 The ESIA baseline section will provide relevant information in relation to the following potential topics: employment conditions, gender, supply chain and occupational health and safety. The main data gaps are:

- Specific data on employment statistics for the Ministry of Energy
- Management systems in place at the Ministry of Energy
- Proposed supply chain for Project implementation

15.3 Summary of Information

Working conditions

15.3.1 Whilst government organisations are not permitted to have trade unions, workers can join industry trade unions such as the Federation of Mongolian Energy

Gender

15.3.2 In terms of the Global Gender Gap Index, Mongolia ranked 85th out of 146 countries in 2018.³⁸ In 2022, the National Committee on gender equality approved the cross-sectoral strategic plan for promoting gender equality in Mongolia (2022-2031)". One of the objectives of the strategic plan (Objective 1.5) aims at "*Intensifying cross-sectoral coordination and cooperation to combat gender-based violence*".

15.3.3 Reportedly around 3,000 women work in the male dominated energy sector.³⁹ As of 2021, the employment rate of women in Mongolia's construction sector was about 15.8%⁴⁰. Factors for this low rate were identified as a lack of female worker-friendly workplace conditions, stereotypes, lack of gender-sensitive human resource policies in entities, and an unwillingness of employers to hire female

³⁸ Available at: [Global Gender Gap Report 2024 | World Economic Forum](#).

³⁹ "Women's Right-2024" national conference, 5 March 2024. <https://gogo.mn/r/vxv2k>

⁴⁰ Source: "Is it only a man's world?" German Cooperation Association, 2021

workers due to their reproductive role.⁴¹

Gender-based violence

15.3.4 Aggregate statistic data on gender-based violence and harassment (GBVH) is currently unreported in Mongolia. The National Human Rights Commission of Mongolia surveyed “*Sexual Harassment Awareness, Attitudes and Prevalence in the Workplace - Public Administration*” in 2021. A total of 3,000 public administration employees participated in the survey. A total of 26.9% or a quarter of the public administration employees who participated in the survey said they had been subjected to one or more types of sexual harassment, while 6% did not want to answer. In terms of the types of sexual harassment, 23.4% were subjected to verbal sexual harassment, 15.1% to physical sexual harassment, and 12.5% to physical sexual harassment. Employees are more likely to be subjected to verbal sexual harassment in the workplace. 56% of public administration employees said they were sexually harassed by their superiors, 30% by their co-workers, 12% by employees of their co-working organizations, 2% by customers, and 0.5% by others.

Forced labour and child labour

15.3.5 In the context of Mongolian culture, forced labour is a different phenomenon than child labour, which is an integral part of traditional nomadic herding culture that involves for the boys, herding livestock, horseback riding, haymaking; and for the girls, helping with cooking and watching younger siblings. It is believed that such traditional methods provide children with the necessary skills to lead productive lives in the future. No specific data are recorded. Within the mining, construction, heavy industry, and energy sectors, child labour is prohibited by law.

Sex workers and human trafficking

15.3.6 For Trafficking in Persons (TIP), sexual exploitation and forced labour registered with the police between 2018-2020, the number of such crimes increased from 26 (2014) to 40 (2020). In addition, the number of cases reported to the police is growing annually, a positive sign that crime detection is improving. However, no crime related to the illegal acquisition of human blood, tissue and organs has been reported so far. Police-registered figures differ significantly from those of service providers, indicating that many human trafficking cases are not reported to law enforcement agencies. MGEC, an NGO that provides assistance to victims of human trafficking, for example reported it only provided assistance to three victims of trafficking in 2003, but recently reached an average of 30-40 clients per year.

Supply chain

15.3.7 From engagement with the MoE, it is understood that they do not have a supply chain management procedure in place; in Mongolia there is no national requirement for supply chain audits. The Law on Procurement of Goods, Works, and Services with State and Local Funds serves as the guiding framework for how public procurement is managed in Mongolia. It governs the entire procurement

⁴¹ Available at: Ministry of Energy, ADB, RWE, Mongolian Women Lawyers Association and MonEnregy LLC. Gender assessment of the energy sector. Research Report. Commissioned by the Ministry of Energy, 2022.

process—from initial planning and organization to contract signing, reporting, oversight, and the resolution of complaints. By clearly defining these procedures, the law ensures that the use of state and local funds is transparent, efficient, and accountable, promoting fair competition and responsible public spending. However, this law does not require supply chain management or due diligence in line with international best practice; it only regulates the tender process.

- 15.3.8 It is expected that the MoE will manage the procurement process for appointing a Construction Contractor for the Project in accordance with the EBRD's Procurement policy, using International Federation of Consulting Engineers (FIDIC) contracts. Mongolia's Procurement Law is only applied for works and services that are funded by state budget or local government budgets.
- 15.3.9 Similar to other energy projects in Mongolia, it is assumed that a Construction Contractor will be commissioned following a pre-qualification stage and then an invitation to tender will be issued. The selected Construction Contractor will be required to adhere to the technical specifications issued by the MoE as part of the tendering process, and they will confirm their adherence in a written contract.
- 15.3.10 While the Construction Contractor will be required to develop, implement and maintain a Construction ESMP, which will specify social and labour requirements, experience from the Ulaanbaatar to Darkhan road indicates that there is a lack of adherence to such plans; as well as a lack of capacity and capability to undertake and enforce monitoring from the Ministry of Energy. Key issues identified with the supply chain are likely to centre on labour and working conditions.

Occupational health and safety

- 15.3.11 The Constitution of Mongolia establishes that citizens have the right to favourable working conditions, as well as to material and financial assistance in cases such as disability and other situations specified by law. To enforce these constitutional provisions, the Labour Code and the Law on Occupational Safety and Health serve as key instruments.
- 15.3.12 Employers under Mongolian law are required to take all necessary measures to provide and maintain a safe and healthy workplace taking into account inherent risks in its particular sector and specific classes of hazards that may be present. Employees are also required to obey and observe all measures taken to ensure acceptable occupational health and safety.
- 15.3.13 Mongolian laws are inclusive of but not limited to, trade union provisions, working hours, pensions, disabilities, salaries, healthcare and discrimination. Employers must:
- inform employees of the occupational risks and preventative measures that must be taken to address said risks. The employer must take all necessary measures to prevent occupational illnesses.
 - inform employees of their legal rights and obligations and must provide the employees with the necessary training on occupational health and safety.
- 15.3.14 The employer is responsible for the provision of a safe working environment and must provide workers all the required Personal Protective Equipment (PPE), without any cost to them. The

employer must regularly inspect, and audit PPE provided, along with all other health and safety equipment, to ensure that they are in good working order.

15.3.15 There is a requirement for government organisations to spend no less than 0.5% of costs of product and services on health and safety via the State budget, including preventive measures for industrial accidents, acute poisoning and occupational disease.

15.3.16 Directors (owners) and employers of business entities and organisations must assume responsibilities to ensure labour safety, improve working conditions, implement legislation and monitor implementation of them.

15.3.17 With specific regard to construction activities, Mongolian laws require employers to prepare a health and safety plan (or equivalent) prior to the commencement of any construction activities.

15.3.18 Each business entity or organisation with more than 20 employees is required to establish and operate an Occupational Safety and Hygiene Council⁴².

15.3.19 The MoE does not currently have a department responsible for addressing OHS or an ESHS department or an ESMS. However, they do have an Inspection Department of 11 staff. The main function of this department is risk assessment, risk management, OHS, thermal technical safety control, non-compliance registration and disaster management. Government organisations do not develop their own policies, they are required to comply with relevant legislation such as the Labour Code only.

15.4 Potential Effects

15.4.1 Potential effects in relation to Labour and Working Conditions are summarised in the table below.

Table 15-1 Potential Labour and Working Conditions effects

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
Construction	Local communities Construction workforce	Differences in access to employment opportunities may lead to discrimination, harassment, and resentments. Most unskilled and skilled labour jobs are expected to be undertaken by men. However, there may be opportunities for local women to obtain jobs in catering, workers' accommodation camp (if used), service industry and administration.	In	Potentially significant impacts on labour and working conditions depending on where contractors are sourced from. Requirement to be covered by EBRD PR2.

⁴² Available at: <https://legalinfo.mn/mn/detail/11653>

Phase	Receptors	Potential Impacts	Scoped in/ out of ESIA	Justification
		Potential for maximising gender equality on the Project.		
		Construction works, such as the transportation of heavy plant and equipment and the movement of vehicles on site, the operation of machinery, as well as working at height to string cables could pose occupation health and safety hazards. Poor management of OHS could lead to accidents, injuries and illnesses among workers; mental health issues may arise due to remote or enclosed living.	In	Potentially significant impacts on OHS. Requirement to be covered by EBRD PR2.
Operation	Employees Sub-contractors	Operation of the Project falls within the existing remit of the NPTG, therefore is unlikely to result in any significant permanent impact (increase) in employment levels; however, periodic employment may be created as a result ongoing maintenance requirements.	In	Potential impacts on labour and working conditions. Requirement to be covered by EBRD PR2.
	Employees Sub-contractors	Appropriate design and ongoing maintenance will reduce the potential for any adverse occupational health and safety impacts as a result of the operation of the overhead line; as will appropriate training of all operation staff. Occupational safety and health hazards include: risk of electrocutions; fire generation from falling overhead lines and from lightening; falling and/or swinging objects; potential collapse of poles/towers; falling from heights; EMFs; and fire risk at substations.	In	Due to the potential for worker exposure to EMFs.

15.5 Scope of Work for ESIA

The scope of the Labour and Working Conditions impact assessment for the ESIA is summarised in the table below.

Table 15-2 Summary of proposed labour and working conditions assessment

Additional secondary data collection	Field surveys proposed	Impact assessment approach
<p>Collection of available statistical data:</p> <ul style="list-style-type: none"> • Number of people employed in the energy sector and male/female ratio • Review of gender policies available for the energy sector <p>Meetings with MoE to:</p> <ul style="list-style-type: none"> • Confirm the approach to labour grievances for the project • Existence of any labour local content provision by ministry or contractors • What lessons from the Choir-Sainshand transmission line project they are applying to this Project e.g. design • Intended structure for operation and maintenance of the OHTL <p>Statistical data will be collected from the National Statistics Office (NSO), Public Health Institution and Health Ministry reports on the following (this will mainly national data with some data available at aimag levels):</p> <ul style="list-style-type: none"> • Hospital / health care facilities and access to them • Data on the health of the local communities, including prevalence of STDs <p>Data will also be collected from the local soums on the above, where available.</p>	<p>No field surveys proposed.</p>	<p>A qualitative assessment will be undertaken taking into account the specific risks related to the Project. A high level review of the key likely risks will be identified through a review of lessons learned on other similar Projects in country and liaison with the MoE and NPTG.</p> <p>Given that a construction Contractor will not be in place during the ESIA programme, the majority of the requirements for OHS will be captured in the mitigation measures and included in the Environmental and Social Action Plan (ESAP).</p>

15.5.1 The following assumptions and limitations apply:

- Construction Contractors have not been appointed and information related to contractor requirements such as construction camps and management plans are not available for review. Consequently, little is known about the number, type and location of construction plant, access routes, vehicle numbers, workforce numbers, accommodation arrangements, or construction material suppliers, that might be used however, the ESIA will assume similar data to that being employed on the Choir-Sainshand Overhead Transmission Line Project currently under construction.

16 Climate Change

16.1 Study Area

16.1.1 The study area for this assessment is the Dornogovi aimag. The Area of Influence includes all land within and adjacent to the Project, including the estimated 200 km line, Sainshand town, Tsagaan Suvarga mine, and the four soums that the proposed route crosses through. The assessment also considers land use and land users, including licensed mining and exploratory areas, and areas of designated environmental protection.

16.2 Data Availability and Gaps

16.2.1 Baseline climate data has been gathered from The World Bank, including information on seasonal climate conditions, and extreme weather events such as storms, flooding, or wildfire. Additional baseline information has been gathered from NASA, the National Oceanic and Atmospheric Association, and the Association of North East Asia Regional Governments.

16.2.2 Future climate projections will be sourced from the IPCC Sixth Assessment Report sixth generation climate models (sixth Coupled Model Intercomparison Project) CMIP6 and will consider changes in annual and seasonal mean temperatures, precipitation rates, and likelihood of extreme weather events. CMIP6 model outputs are available for five Shared Socioeconomic Pathways (SSPs) which examine future greenhouse gas emissions pathways with projected future socio-economic development. They represent the most updated climate scenarios for future climate projections by the IPCC.

16.3 Summary of Baseline Information

16.3.1 Dornogovi aimag is located in southeast Mongolia within the Gobi Desert region, with some steppe land, making the area warmer and drier on average than the broader national climate. Regional surface air temperature is around 4°C warmer than the national average, a trend that continues relatively steadily throughout the year despite variable conditions. Precipitation is significantly lower in Dornogovi than the national average, most notably during the summer months when precipitation is at its highest. Table 16-1 demonstrates the regional and national baseline climate conditions for 1991-2020⁴³.

⁴³ World Bank Group, 2021. Mongolia: Climatology. Available at: https://climateknowledgeportal.worldbank.org/country/mongolia/climate-data-historical?__cf_chl_rt_tk=5gQQ6JXh86mOxgZVLPiBYM5fSPHjUMPE_.3kpKTTmo-1749035843-1.0.1.1-FOE5gF.RwsU6dDJ_otM5pfVTesMEc9GwBD8na0Wvjvs

Table 16-1 Baseline climate conditions for Dornogovi aimag compared to national climate conditions, 1991-2020

Parameter	Regional Average	National Average	Difference
Mean annual air temperature (°C)	5.26	1.09	4.17
Mean minimum winter air temperature (°C)	-19.54	-23.71	4.17
Mean maximum summer air temperature (°C)	28.71	24.23	4.48
Mean annual precipitation (mm)	188.71	227.54	38.83
Mean winter precipitation (mm)	5.44	8.72	3.28
Mean summer precipitation (mm)	127.73	148.51	20.78

16.3.2 As typical of Mongolia, Dornogovi is subject to extremely cold, dry winters and hot, wet summers. Based on data provided by the World Bank, the coldest and driest month is typically January, with an average total precipitation of 1.55 mm and mean minimum temperature of -21.88°C. In contrast, July appears to be the warmest and wettest month, with an average total precipitation of 47.14 mm and mean maximum temperature of 30.22°C. This means that there is a difference of 52.10°C between the minimum winter temperature and maximum summer temperature.

16.3.3 Figures 16-1 and 16-2 demonstrate the seasonal variation in air temperature and precipitation, respectively.

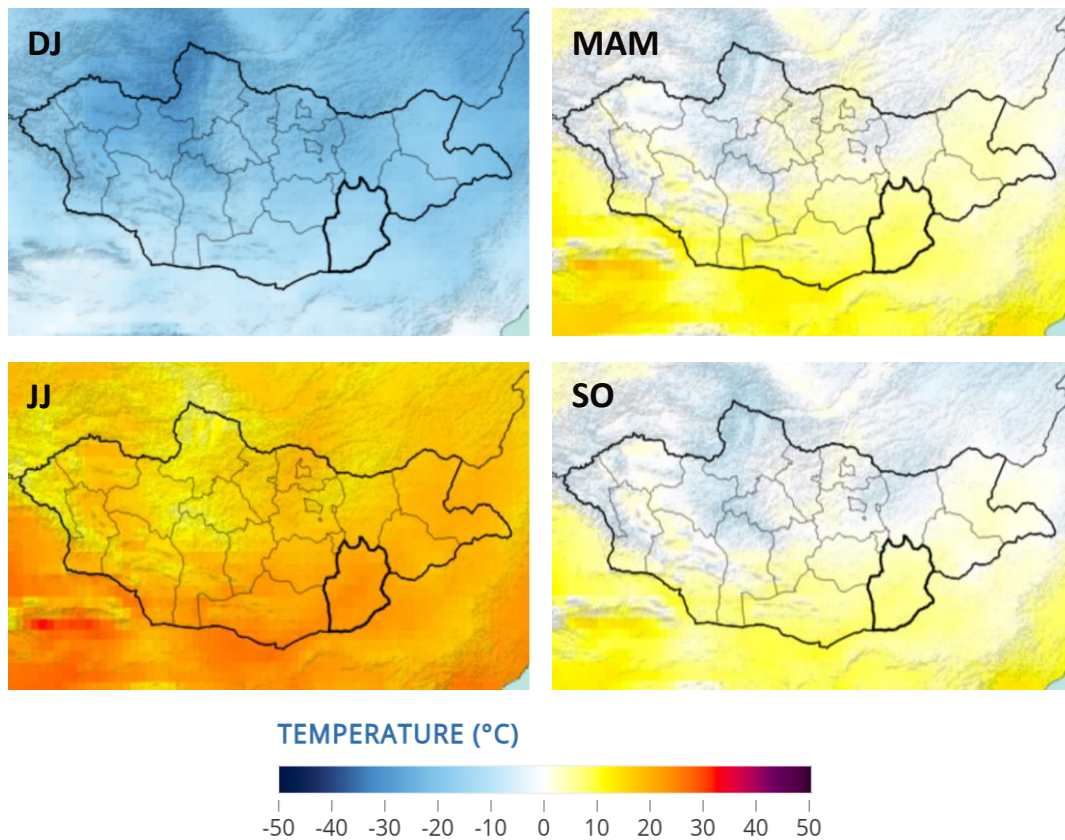


Figure 16-1 Seasonal mean surface air temperature for Dornogovi aimag, 1991-2020 (World Bank, 2021)

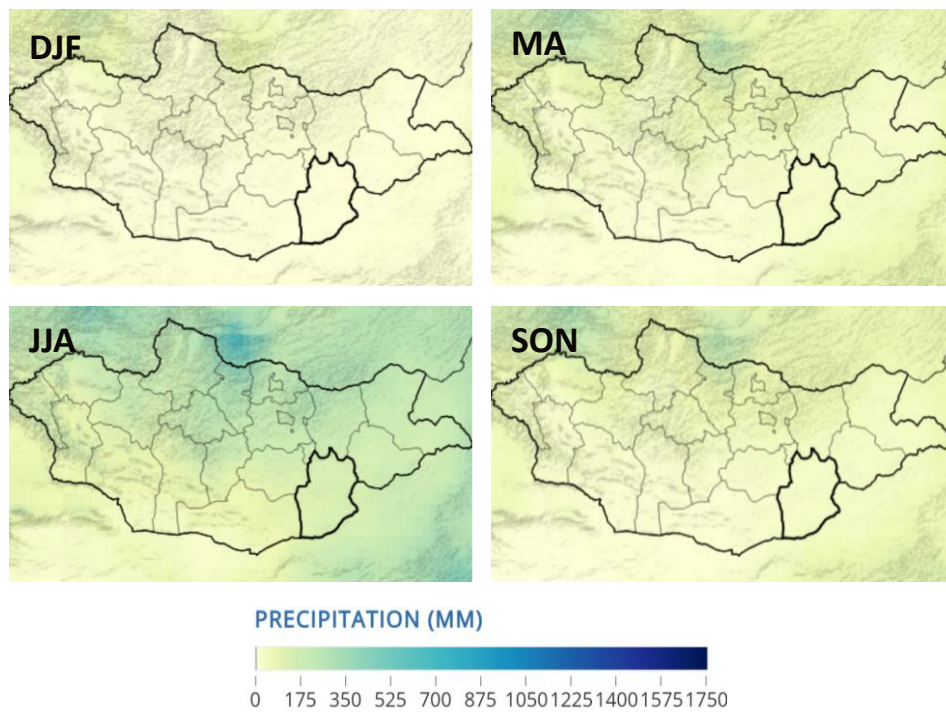


Figure 16-2 Seasonal mean precipitation for Dornogovi aimag, 1991-2020 (World Bank, 2021)

- 16.3.4 Precipitation is relatively limited across the year, even during the summer wet season. Dornogovi is subject to frequent wildfires, many of which occur within Sainshand soum. Out of five wildfire events that have been reported in the past three years, four of them occurred in Sainshand and covered a total area of 337.8 km² ⁴⁴.
- 16.3.5 Despite consistent relatively low precipitation, no drought events have been reported for Dornogovi within the baseline period⁴⁵. No instances of flooding or extreme storm events have been reported during the baseline period, though events such as snowstorms, sandstorms, drought, and extreme precipitation are reportedly common in this area⁴⁶.

16.4 Potential Environmental Effects

Construction

- 16.4.1 Climate vulnerability is determined by the Project's exposure to climate-related hazards and its sensitivity to future climate change. Table 16-2 provides an overview of the potential environmental impacts that the Project may face during the construction period.

Table 16-2 Potential climate-related impacts on the Project during construction

Receptor	Potential Impact
Construction equipment (e.g. cranes, vehicles, construction plant)	Extreme temperatures, including freezing temperatures and heatwaves, may result in equipment malfunctions or breakdown, in turn causing delays to the construction programme. Drought and low water availability may result in an increase in dust, further increasing the risk of equipment malfunction.
Building site (e.g. temporary structures)	Drought and low water availability may result in an increase in dust, resulting in damages to temporary structures and systems. Heavy precipitation may lead to flooding, particularly following prolonged dry periods. This may cause damage or restrict access to temporary structures and systems, resulting in delays to the construction programme.
Road network (e.g. access roads)	Heavy precipitation or storm damage may overwhelm or obstruct drainage assets, resulting in surface flooding restricting road access. Debris from storm events may further obstruct access points, causing delays to the construction programme.

⁴⁴ NASA, 2025. VNP14A1 v001 VIIRS/NPP Thermal Anomalies/Fire Daily L3 Global 1 km SIN Grid. Available at: <https://lpdaac.usgs.gov/products/vnp14a1v001/>

⁴⁵ National Oceanic and Atmospheric Administration, 2025. Global Precipitation Climatology Centre (GPCC) Standardized Precipitation Index (SPI). Available at: <https://www.drought.gov/data-maps-tools/global-precipitation-climatology-centre-gpcc-standardized-precipitation-index-spi>

⁴⁶ Association of North East Asia Regional Governments, 2024. Dornogovi Province. Available at: http://www.neargov.org/en/page.jsp?mnu_uid=3712&

Receptor	Potential Impact
	Extreme temperatures may impact the integrity of the road and cause it to subside or buckle as a result of freeze-thaw.
Environment (e.g. water bodies)	Heavy rainfall and surface flooding can increase sediment runoff and contamination of local waterbodies, particularly when preceded by drought or prolonged dry periods.
Human health (e.g. site workers)	Health and safety risks may be posed to construction workers as a result of extreme heat, extreme cold, wildfires, or storms. Workers may experience heat stress or injury as a result of these events.

Operation

16.4.2 Table 16-3 provides an overview of the potential environmental impacts that the Project may face during the construction period.

Table 16-3 Potential climate-related impacts on the Project during operation

Receptor	Potential Impact
Buildings and infrastructure receptors (Transmission Line and associated structures)	<p>Extreme heat may result in the overheating of infrastructure, increasing risk of fire. Conversely, extreme cold may reduce operational efficiency of infrastructure, resulting in service delays.</p> <p>Storm events may cause damage to infrastructure and associated structures due to debris and high wind speeds.</p> <p>High precipitation and flooding may damage assets. In combination with prolonged dry periods/drought, shrink-swell or subsidence may occur resulting in damage or disruption. Prolonged dry conditions/drought could reduce the availability of potable water.</p>
Infrastructure receptors (access roads and pavements)	<p>Damage or rutting to access roads may occur if materials are not sufficiently resilient to extreme temperatures, particularly the change from extreme hot to extreme cold.</p> <p>High precipitation/flooding and storms may obstruct access roads, preventing operational or maintenance workers from accessing infrastructure and thus resulting in delays.</p>
Landscape receptors	Landscape design surrounding the Project may be compromised if planting is not sufficiently resilient to extreme temperatures, drought, precipitation, or storm events. This may in turn compromise asset foundations, requiring repairs.

Receptor	Potential Impact
Human health receptors (Operational and maintenance workers)	<p>Increased thermal impacts on operational and maintenance workers as a result of extreme temperatures may lead to injury, particularly during high summer temperatures and low winter temperatures.</p> <p>Prolonged dry conditions/drought may reduce availability of potable water, increasing risk of dehydration and overheating for workers.</p>

16.5 Scope of Work for ESIA

16.5.1 The climate change assessment will follow the same structure as the other environmental disciplines.

16.5.2 No field surveys have been proposed for the climate change risk assessment.

16.5.3 The Assessment of Greenhouse Gases has been scoped out of the assessment on the basis that any increase in greenhouse gas emissions during the operation of the transmission line will be negligible in the context of regional emissions. This assumption may need to be revisited if the scope of the Project changes and includes elements which could significantly increase the operational emissions of the Project; and the team will liaise with EBRD Climate team.

16.5.4 The CCRA will evaluate the risks that climate change could pose to the Project over the construction and operational period. The approach will focus on collecting and analysing information relating to both the design of the Project and expected climate change impacts in the region that are likely to be relevant within the Project's lifespan. The methodology will include the following steps:

- Review of publicly available data to gather information on the historic and project climate in Mongolia
- Definition and review of the climate projections for the site locations of the Project;
- Review of Project design information
- Identification of climate risks to the Project components in the context of climate change
- Evaluation of the sufficiency of the planned measures to mitigate climate change risks
- Recommendations of proposed adaptation measures considering the design, operation and maintenance of the Project, to improve Project resilience.

16.5.5 The assessment will consider the following climate-related hazards:

- Increased frequency and intensity of extreme weather events such as increased precipitation and rainfall intensity,
- Increased frequency and intensity of extreme weather events such as increased temperatures and prolonged periods of hot weather.
- Increase frequency and intensity of extreme weather events such as drought.
- Extreme weather events such as windstorms.
- Extreme weather events such as cold snaps.

16.5.6 The following assumptions and limitations apply:

- Baseline and projected climate data are based on freely available information from third parties, including:
 - The World Bank
 - Association of North Earth Asia Regional Governments
 - NASA
 - National Oceanic and Atmospheric Association

17 Stakeholder Engagement

17.1 Overview

- 17.1.1 A Stakeholder Engagement Plan (SEP) will be developed for the Project, as required under PR1 and PR10. The SEP 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 of the ESIA, construction and operation.
- 17.1.2 As a Category A project, the Project must engage with stakeholders at every phase of the Project and their feedback needs to be built into the relevant project documents. The ESIA documents, including the SEP, are intended to be publicly disclosed for comments on the EBRD website and locally.
- 17.1.3 As the SEP is a 'living document', it will be developed in more detail by the Ministry of Energy and their Contractors prior to the start of construction, to reinforce both ownership and execution of the SEP in future Project stages.

17.2 Identification of Stakeholders

- 17.2.1 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. Project stakeholders have been identified following the requirements of 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).
- 17.2.2 Stakeholder identification is an on-going process, requiring regular review and updates. As part of the ESIA scoping stage, stakeholders have been identified using the above definition of the two types of stakeholders, so that engagement can be tailored to inform them and enable their views and concerns to be understood in an appropriate manner.
- 17.2.3 The stakeholder identification exercise will, as the ESIA progresses, also include 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.
- 17.2.4 The stakeholder list below should be reviewed regularly and updated throughout the Project cycle. The risk associated to each stakeholder group can also be subject to changes and will need to be reassessed from time to time. 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, insofar as it has been defined;
- 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.

17.2.5 As a minimum, the stakeholder list should be revised prior the start of the construction phase and at the start of the operation phase.

17.2.6 The preliminary stakeholder list for directly and indirectly affected stakeholders is set out in Tables 17-1 and 17-2 respectively.

Table 17-1 Directly affected stakeholders

Stakeholder category	Stakeholder sub-category	Impact / Interest / Influence
Local communities	Seasonally, sporadically resident herder households within the potential impact zones	Impact May experience nuisance impacts from the Project. Access may be restricted during construction. Gers close to or near the OHTL RoW may be impacted.
	Local communities: <ul style="list-style-type: none"> • Soums and baghs • Sainshand soum or Dornogovi aimag centre 	Impact May experience potential impacts related to environmental quality, disturbance to cultural practice and heritage (tangible and intangible), community health, safety and security during construction and operation. Provision of improved electricity supply.
Local businesses	Local business owners within the Project area of influence, including: utility and service operators crossed by the OHTL.	Impact Project may provide opportunities for increased revenue from construction and operation workforce. Provision of improved electricity supply.
Mining Authority / Mining concession holders	Concession owners/holders.	Impact Project may require land under mining concessions.
Vulnerable groups	Vulnerable individuals and groups	Impact May be disproportionately affected by the Project, for example may experience adverse health impacts more acutely than other stakeholders.
Project Proponent and Core Operations	Employees	Impact Employment, economic impacts, including on incomes, occupational and health, safety and security, procurement and supply chain requirements.
	Contractors, Suppliers, and Service Providers	

Table 17-2 Indirectly affected stakeholders

Stakeholder category	Stakeholder sub-category	Impact / Interest / Influence
National Government	Government of Mongolia	Interest Regional economic development, infrastructure development, permitting and monitoring, protection of employees and public safety. Influence Potential to influence Project approvals and timeframes.
	Regulators	Influence Provide relevant permits for the Project.
Aimag Level Government and self-governing body	Governor	Interest Regional economic development, taxes, infrastructure development.
	<i>Khural</i> Speaker	
	<i>Khural</i> Members	Influence Potential to influence Project in terms of the granting permits or other approvals, monitoring and enforcing compliance with national Law through Project life cycle.
	<i>Aimag</i> Administration Departments (Planning, Environment, Inspection, Land)	Interest Regional economic development, infrastructure development, permitting and monitoring, protection of employee and public safety. Influence Potential to influence Project approvals and timeframes.
<i>Soum</i> and <i>Bagh</i> -Level Government and self-governing body	<i>Soum</i> Governor, <i>Khural</i> Speaker and elected <i>Khural</i> Members, <i>soum</i> administration <i>Bagh</i> Governor	Interest Local economic development, infrastructure development, permitting and monitoring, protection of employee and public safety. Influence Potential to influence Project approvals and timeframes
Non-Governmental Organisations (NGOs) and Community-Based Organisations (CBOs)	Regional and National NGOs and CBOs	Interest NGOs with environmental and social concerns Influence Lobbying and advocacy

Stakeholder category	Stakeholder sub-category	Impact / Interest / Influence
Media	Social media channels (LinkedIn, Facebook and Twitter)	<p>Interest</p> <p>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.</p> <p>Influence</p> <p>Potential to influence public opinion based on content.</p>

17.3 Scoping Stage Engagement

17.3.1 Engagement during scoping has been limited to meetings with the PIU engineer, an expert of design company, focusing on initial project introductions and clarifications questions and information requests.

17.4 ESIA Stakeholder Engagement

17.4.1 During the ESIA, key informant interviews (KIIs) will be conducted with local officials at Dornogovi aimag and soum levels. This will include, as relevant, the following personnel:

- Soum Governor/Chairperson of the soum Citizens Representatives Khural/ Head of the Governor's Office
- Treasury/ Head of the Governor's Office
- Social Welfare/Labour Officers
- Agriculture and SMEs Specialists
- Specialist in charge of labor/employment/social welfare
- Environmental inspector and rangers
- Development Policy and Planning representatives
- Land, Construction and Urban Development / Land Registration Officers
- Environment / Environment Inspector / Environment Policy Officers
- Health and education representatives
- Head of local hospitals
- Soum police

17.4.2 In addition, KIIs will be held in Ulaanbaatar with the mining company and the private rail company that are affected by/crossed by the proposed OHTL.

17.5 Grievance Mechanism

17.5.1 A formal community *Grievance Mechanism* will be developed to ensure that relevant parties (Ministry of Energy/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.

- 17.5.2 Special attention will be paid to the training of designated staff involved in the management of the *Grievance Mechanism*. This *Grievance Mechanism* will cover non-employees (i.e. affected people and other relevant stakeholders such as local communities).
- 17.5.3 A separate internal grievance procedure for Project employees/workers will be provided.

18 ESIA Disclosure

18.1 ESIA Report

- 18.1.1 The outputs of the tasks identified in Section 5 will be drawn together into an ESIA Report. A draft template for the ESIA Report is provided in Appendix A. The ESIA Report will be provided in English and Mongolian and will be disclosed in line with EBRD requirements.
- 18.1.2 Comments received on the ESIA Report during disclosure will be addressed and detailed in either a Consultation Report, update or addendum to the Final ESIA Report, as agreed depending on the number and nature of the comments.

18.2 Non-Technical Summary

- 18.2.1 A concise, over-arching, standalone NTS of the ESIA will be prepared. The NTS will be written in non-technical language. The NTS will demonstrate compliance with the EBRD requirements; and provide confirmation that the documents are ready for public disclosure.

18.3 Climate Risk

- 18.3.1 A stand-alone Physical Climate Risk Assessment Report will be prepared that sets out the climate risks, vulnerability and exposure of the Project and provides potential adaptation measures to address the key risks. An outline content page for the Physical Climate Risk Assessment Report is provided in Chapter 16.

18.4 Stakeholder Engagement Plan

- 18.4.1 A SEP is being prepared as a live document as part of the ESIA. This will be updated to cover all engagement undertaken during the next stage of the ESIA, and future proposed engagement. An outline contents page for the SEP is provided in Appendix B.

18.5 Land Acquisition and Resettlement Framework

- 18.5.1 From the scoping site visit, it appears that there will be no physical relocation. Economic displacement is possible potentially due to restricted access, however for the most part would be temporary and relatively minor. The potential impacts will be reviewed during the detailed surveys.
- 18.5.2 A Land Acquisition and Resettlement Framework will be provided that identifies the process gaps between the national requirements and the requirements of PR5. This will set out the current understanding of the land acquisition or land requirements process to date, the approach to eligibility and entitlements and future actions required by the Client to meet PR5, should such a need arise. An

outline content page for the Land Acquisition and Resettlement Framework is provided in Appendix C.

18.6 Environmental and Social Management Plan

- 18.6.1 Taking into account the findings of the environmental and social assessment process and the outcomes of stakeholder engagement, a programme of actions to address the Project's environmental and social impacts, and other performance improvement measures to meet the PRs, will be prepared and presented within an ESMP.
- 18.6.2 The ESMP will provide a framework for managing (and avoiding) potential environmental and social risks and impacts for the Project. It will consist of a set of management, mitigation and monitoring measures to be taken during construction and operation and maintenance (O&M) to manage key potential environmental and social impacts. It will outline the generic approach (and control processes) to be applied for to the Project in the development and implementation of the topic and activity-specific Contractor Construction ESMP. An outline content page for the ESMP is provided in Appendix D.

18.7 Environmental and Social Action Plan

- 18.7.1 A comprehensive ESAP for the Project will be prepared to address gaps and issues identified during the impact assessment. The ESAP will identify the future actions required to comply with the EBRD PRs and other Project commitments arising, for example, from national regulatory requirements. Actions identified will be numbered, clearly defined, indicate a time frame for completion (with specific reference to those actions that must be completed before financial close if appropriate) and a responsible party specified. Further, each item will contain a description of the factors that will be used to determine when the identified action is closed/completed. An outline template is provided in Appendix E.

18.8 Programme

- 18.8.1 The Programme for the ESIA is as follows:

Action	Date	Deliverable
Baseline data gathering	May 2025	-
Initial site walkover and scoping site visit	11-17 May 2025	Site visit note
Review of available data, data gaps, prepare ESIA Scoping Report	19 June	ESIA Scoping Report
Surveys	16- 26 June	-

Action	Date	Deliverable
Impact Assessment and Report Preparation	11-18 July 2025	Draft ESIA Disclosure Package
Disclosure	August 2025 – November 2025	-
Update reports	December 2025	Consultation report / Updated ESIA Disclosure Pack

19 Summary

19.1.1 This Scoping Report provides:

- A brief overview of the Project;
- An indication of the baseline environmental and social conditions and any significant data gaps;
- An overview of the relevant legislation and guidance;
- An overview of the Project Area and Area of Influence for topics;
- An overview of the likely environmental and social issues associated with the Project;
- The proposed scope of the ESIA;
- An initial list of stakeholders and the proposed scope of stakeholder engagement; and
- The proposed scope of the other documents that will form part of the ESIA Disclosure package.

19.2 ESIA

19.2.1 Given the nature of the Project and the activities that are likely to be involved during its construction and operation, the Project has the potential to result in a number of environmental and social effects. It is proposed that the topics identified as being 'scoped in' within Table 19-1 will be assessed in the ESIA.

Table 19-1 Summary of Topics 'Scoped In' for Assessment in the ESIA

Discipline	Scoped in to ESIA		Brief overview of ESIA content
	Construction	Operation	
Air Quality	✓	x	The aim of the air quality impact assessment will be to identify the potential impacts during the construction phase on air quality and provide an assessment of the potential effects on human health.
Noise	✓	✓	<p>A high-level assessment of potential construction noise and vibration impacts will be undertaken in accordance with BS 5228-2:2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites". This will include potential noise impacts from construction traffic on the local traffic network.</p> <p>The operational noise assessment will be guided by the methodology set out in BS4142:2014: +A1: 2019 Methods for Rating and Assessing Industrial and Commercial Sound. Where data are available, modelling will be undertaken of operational noise at the two substations. The result will be assessed against WHO/EBRD or Mongolian local guidance.</p>

Discipline	Scoped in to ESIA		Brief overview of ESIA content
	Construction	Operation	
Vibration	x	x	No vibration impacts are envisaged.
Terrestrial habitats and flora	✓	x	<p>Qualitative Biodiversity Impact Assessment for terrestrial flora and fauna broadly following, as applicable to the context, the guidance for impact assessment as set out in the Chartered Institute of Ecology and Environmental Manage (CIEEM) guidance: Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester (2018).</p> <p>Impacts on flora</p> <p>The impact assessment will first seek to set out the vegetation species composition and the distribution and sensitivity of fauna along the OHTL route. This will include:</p> <ul style="list-style-type: none"> • Create a map showing the distribution of identified plant communities along the OHTL route. • Characterize the plant communities that will be impacted by the OHTL route within each habitat type. • Assess the current state of vegetation cover along the OHTL route. • Determine the presence and where relevant location of Critical Habitat along the proposed OHTL route and within the route Zone of Influence. <p>A Critical Habitat/Priority Biodiversity Features screening will also be undertaken, as per the definition and requirements of EBRD PR6 (2019), Biodiversity Conservation and Sustainable Management of Living Natural Resources. As appropriate, Critical Habitats Assessment (as set out in EBRD PR6).</p> <p>Impacts on fauna</p> <p>The desk and field surveys will be used to define distribution and sensitivity of fauna, specifically those that are:</p> <ul style="list-style-type: none"> • Likely to experience disturbance from construction activities • Likely to experience mortality from construction activities • Likely to experience mortality during the operational phase of the Project (bats and birds) <p>Impacts on birds</p>
Terrestrial fauna (mammals, reptiles and invertebrates)	✓	x	
Birds	✓	✓	
Bats	✓	✓	
Aquatic flora and fauna	✓	✓	

Discipline	Scoped in to ESIA		Brief overview of ESIA content
	Construction	Operation	
			<p>Attention will be paid to impacts on birds following the guidance set out in Scottish National Heritage (SNH) 2016 Guidance for Assessment and Mitigation of Impacts of Power Lines and Guyed Meteorological Masts on Birds. The operational assessment will also contain a review of cumulative ecological impacts associated with other transmission lines or linear infrastructure projects in the region.</p> <p>Mitigation will be provided for any potentially significant impacts determined following the impact assessment.</p>
Cultural Heritage	✓	x	<p>A qualitative assessment of potential construction impacts to cultural heritage assets will be undertaken. The assessment will identify what assets the Project will interact with and how they will be impacted.</p> <p>No operational impacts on heritage assets as a direct result of the Project are anticipated.</p>
Landscape and Visual	x	✓	<p>Given the short term nature of the likely impacts (i.e. despite the overall construction period lasting approx. two years, not all areas of the OHTL will be worked upon at once) the lack on any designated areas of landscape protection and the relatively long distance visual receptors are anticipated to be from the overhead line, the potential adverse effects on landscape character and visual amenity are anticipated to be minor in significance (and therefore non-significant, and therefore can be scoped out of the ESIA.</p> <p>Given the relatively undisturbed and open nature of the Project area, the potential for impacts upon landscape character and visual amenity will be included within the ESIA.</p> <p>The cumulative impacts with the Sainshand windfarm and substation, and Tsagaan Suvarga substation will be included within this.</p>
Soils and Natural Hazards	✓	x	<p>A qualitative assessment of the impacts on soils during the construction phase will be undertaken as part of the ESIA, including consideration of any contaminated land at the new substation if this is identified during the walkover site visit or the soil survey. This will be supported by the quantitative soil data obtained from the soil survey.</p>

Discipline	Scoped in to ESIA		Brief overview of ESIA content
	Construction	Operation	
			<p>No impacts during operation are anticipated and therefore no operational impacts will be assessed.</p> <p>Consideration will be given to the potential for natural hazards to affect or be affected by the Project. Flooding will be addressed under the topic 'Water'.</p>
Water	✓	✓ (Wells)	<p>A qualitative assessment of the impacts of construction on ground water features, in particular confirmation of whether any herder wells will be directly affected by the OHTL, corridor will be undertaken.</p> <p>Additionally, a high-level quantitative assessment of baseline water quality will be undertaken utilising the data collected in the field and laboratory. Note that any herder wells requiring relocation will be addressed under 'Displacement' impacts.</p> <p>During operation there is the potential for impacts on groundwater quality, therefore, this operational impact will be assessed.</p> <p>Due to the small footprint of the overhead lines it is not expected that land drainage/ the runoff regime and the hydromorphology of watercourses would be significantly effected and so this has been scoped out of the ESIA.</p>
Social and Community	✓	✓	<p>A qualitative assessment will be undertaken of community health and well-being, safety and security, and impact on infrastructure and services. The majority of these risks will occur in construction and therefore the main focus will be on construction impacts (noise, dust, traffic, etc.), in particular identifying groups that could be affected disproportionately.</p> <p>During operation, the main impact relates to EMFs and general safety around the towers; these will be assessed as part of the impact assessment.</p>
Land Use, Employment and Livelihoods	✓	✓	<p>A more detailed land use map will be generated and qualitative assessment of potential impacts on land uses will be undertaken; this will focus on the construction phase when most disturbance is anticipated. This will also link into any displacement impacts, where relevant, and clarify land uses that could be affected, either temporarily or permanently.</p>

Discipline	Scoped in to ESIA		Brief overview of ESIA content
	Construction	Operation	
			<p>Potential impacts on the development of the Study Area as a result of increased transmission capacity will also be considered.</p> <p>A qualitative assessment will be undertaken of the of the negative and positive impacts on the economy, at different geographic levels where data are available – aimag, soum and bagh. The assessment will also consider the extent to which sufficient generation is supplied to the network, including future connections.</p> <p>A qualitative assessment will be undertaken of the negative and positive impacts on livelihoods. Particular attention will be paid to any vulnerable groups, such as low-income herders, that may be disproportionately affected by the Project. Impacts on livelihoods displaced by the Project, where relevant, will be addressed through the Land Acquisition and Resettlement Framework.</p>
Labour and Working Conditions	✓	✓	<p>A qualitative assessment will be undertaken taking into account the specific risks related to the Project. A high level review of the key likely risks will be identified through a review of lessons learned on other similar Projects in country and liaison with the MoE and NPTG.</p> <p>Given that a construction Contractor will not be in place during the ESIA programme, the majority of the requirements for OHS will be captured in the mitigation measures and included in the Environmental and Social Action Plan (ESAP).</p>

19.3 Other Disclosure Documents

19.3.1 The following documents will be prepared alongside the ESIA Report:

- Non-Technical Summary
- Physical Climate Risk Assessment Report
- Stakeholder Engagement Plan
- Land Acquisition and Resettlement Framework
- Environmental and Social Management Plan
- Environmental and Social Action Plan
- Public Consultation Summary Report

19.4 Stakeholder Engagement

19.4.1 The following key engagement will take place:

- Key informant interviews (KIIs)
- Focus group discussions (FGDs)

19.4.2 The KIIs will focus on the four soums (Sainshand soum, Saikhandulaan soum, Mandakh soum, Ulaanbadrakh soum), health care providers and possibly law enforcement. Letters will be prepared in advance to inform the stakeholders of the proposed KIIs. Those to be interviewed are:

- Soum Governor/Chairperson of the soum Citizens Representatives Khural/ Head of the Governor's Office
- Treasury/ Head of the Governor's Office
- Social Welfare/Labour Officers
- Agriculture and SMEs Specialists
- Specialist in charge of labor/employment/social welfare
- Environmental inspector and rangers
- Development Policy and Planning representatives
- Land, Construction and Urban Development / Land Registration Officers
- Environment / Environment Inspector / Environment Policy Officers
- Health and education representatives
- Head of local hospitals
- Soum police
- Length of interviews approximately 40 minutes to 1 hour. All meetings are planned to be conducted face-to-face. See Tool 2 for interview questions.

19.4.3 In addition, KIIs will be held in Ulaanbaatar with the mining company and the private rail company that are affected by/crossed by the proposed OHTL.

19.4.4 Four FGDs will be held in each of the four soums. Representative groups will be organised to cover: Women, elderly, youth, micro and small businesses and herders who have their summer camps in the vicinity of soum centre.

19.4.5 Stakeholder will be asked their views on the best methods for engagement as the Project progresses. Additional engagement will be undertaken during disclosure of the draft ESIA documents, the approach to which will be detailed in the ESIA Report.

Appendix A

ESIA Report Template

Section	Heading
1	Introduction
2	Project Description
3	Consideration of Alternatives
4	Standards, Legislative and policy Context
5	Approach to the ESIA
6	Stakeholder Engagement
7	Air Quality
	Introduction Legislative Framework, Policy and Guidance Assessment Methodology Baseline Conditions Potential Impacts and Effects Mitigation and Enhancement Measures Residual Effects Monitoring and Management
8	Noise and Vibration
	Introduction Legislative Framework, Policy and Guidance Assessment Methodology Baseline Conditions Potential Impacts and Effects Mitigation and Enhancement Measures Residual Effects Monitoring and Management
9	Water
	Introduction Legislative Framework, Policy and Guidance Assessment Methodology Baseline Conditions

Section	Heading
	<p>Potential Impacts and Effects</p> <p>Mitigation and Enhancement Measures</p> <p>Residual Effects</p> <p>Monitoring and Management</p>
10	Soils
	<p>Introduction</p> <p>Legislative Framework, Policy and Guidance</p> <p>Assessment Methodology</p> <p>Baseline Conditions</p> <p>Potential Impacts and Effects</p> <p>Mitigation and Enhancement Measures</p> <p>Residual Effects</p> <p>Monitoring and Management</p>
11	Ecology and Biodiversity
	<p>Introduction</p> <p>Legislative Framework, Policy and Guidance</p> <p>Assessment Methodology</p> <p>Baseline Conditions</p> <p>Potential Impacts and Effects</p> <p>Mitigation and Enhancement Measures</p> <p>Residual Effects</p> <p>Monitoring and Management</p>
12	Cultural Heritage
	<p>Introduction</p> <p>Legislative Framework, Policy and Guidance</p> <p>Assessment Methodology</p> <p>Baseline Conditions</p> <p>Potential Impacts and Effects</p> <p>Mitigation and Enhancement Measures</p> <p>Residual Effects</p> <p>Monitoring and Management</p>
13	Social and Community

Section	Heading
	<p>Introduction</p> <p>Legislative Framework, Policy and Guidance</p> <p>Assessment Methodology</p> <p>Baseline Conditions</p> <p>Potential Impacts and Effects</p> <p>Mitigation and Enhancement Measures</p> <p>Residual Effects</p> <p>Monitoring and Management</p>
14	Land Use, Employment and Livelihoods
	<p>Introduction</p> <p>Legislative Framework, Policy and Guidance</p> <p>Assessment Methodology</p> <p>Baseline Conditions</p> <p>Potential Impacts and Effects</p> <p>Mitigation and Enhancement Measures</p> <p>Residual Effects</p> <p>Monitoring and Management</p>
15	Labour and Working Conditions
	<p>Introduction</p> <p>Legislative Framework, Policy and Guidance</p> <p>Assessment Methodology</p> <p>Baseline Conditions</p> <p>Potential Impacts and Effects</p> <p>Mitigation and Enhancement Measures</p> <p>Residual Effects</p> <p>Monitoring and Management</p>
16	Cumulative Effects
17	Summary

Appendix B

Stakeholder Engagement Plan Template

Section	Heading
1	Introduction
1.1	Background
1.2	Stakeholder Engagement Plan
1.3	SEP Content
1.4	Change Control
2	Project Description
2.1	Context
2.2	Proposed Works
2.3	Construction Phase
2.4	Operation Phase
3	Stakeholder Engagement and Information Disclosure Requirements
3.1	National Requirements
3.2	EBRD Requirements
3.3	Relevant European Union Directives
3.4	Gaps between National and EBRD Requirements
4	Stakeholder Identification
4.1	Approach to Stakeholder Identification
4.2	Vulnerable Groups
4.3	Stakeholder Identification and Analysis
5	Existing Stakeholder Engagement
5.1	Previous Engagement (if relevant)
5.2	ESIA Scoping Engagement
5.3	ESIA Baseline / Impact Engagement
5.4	Engagement with the Project Beneficiary
5.5	Summary of results
6	Stakeholder Engagement Programme
6.1	Potential Environmental and Social Effects
6.2	Stakeholder Consultation and Information Disclosure
7	Grievance Mechanism

8	Monitoring and Reporting
8.1	Key Performance Indicators
8.2	Key Monitoring Activities
9	Auditing and Reporting
10	Resources and Responsibilities

Appendix C

Land Acquisition and Resettlement Framework Template

Section	Heading
1	Introduction
2	Project Description
3	Legal and Policy Framework
4	Project Land Requirements and Impacts
5	Objectives, Principles and Process
6	Implementation Activities
7	Eligibility and Entitlements
8	Resettlement and Livelihood Restoration Measures
9	Disclosure of Information and Consultation
10	Grievance Mechanism
11	Organisational Arrangements

Appendix D

ESMP Report Template

Section	Heading
1	Introduction
1.1	Project Background
1.2	Objectives and Scope
1.3	Intended Users
2	Project Description
2.1	Project Location
2.2	Proposed Works / Design
2.3	Right of Way and Safety Zones
2.4	Project Phases - Construction / Operation and Maintenance
3	Roles and Responsibilities
3.1	Overview
3.2	Construction
4	Delivery Mechanism
4.1	Construction Environmental and Social Management Plan (CESMP)
4.2	Operational Environmental and Social Management Plan (OESMP)
4.3	Stakeholder Engagement Plan
4.4	Land Acquisition and Resettlement Framework
5	Environmental and Social Management System
6	Environmental and Social Impacts and Risks
6.1	Construction
6.2	Operation and Maintenance
7	Environmental and Social Management Measures
7.1	Construction

7.2	Operation and Maintenance
8	Emergency Preparedness and Response
9	Environmental Monitoring
10	Training and Awareness
11	Monitoring of Compliance, Auditing and Reporting
11.1	Requirements for Compliance Monitoring
11.2	Inspections and Internal Audits
11.3	External Audit Reporting Requirements
11.4	Accidents, Incidents and Non-Conformances
12	Implementation Schedule
Appendix A	Contractor Management
Appendix A	Relevant Legislation and Lender Requirements
Appendix A	Construction Workers' Accommodation Checklist
Appendix A	Environmental and Social Screening Guideline

Appendix E

ESAP Template

No.	Action	Environmental and Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs, Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status	Responsible Party
PR1	Assessment and Management of Environmental and Social Risks and Impacts							
PR2	Labour and Working Conditions							
PR3	Resource Efficiency and Pollution Prevention and Control							
PR4	Health, Safety and Security							
PR5	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement							
PR6	Biodiversity Conservation and Sustainable Management of Living Natural Resources							
PR7	Indigenous Peoples							
PR8	Cultural Heritage							
PR9	Financial Intermediaries (Not applicable)							

No.	Action	Environmental and Social Risks (Liability/ Benefits)	Requirement (Legislative, EBRD PR, Best Practice)	Resources, Investment Needs, Responsibility	Timetable	Target and Evaluation Criteria for Successful Implementation	Status	Responsible Party
PR10	Information Disclosure and Stakeholder Engagement							



Arcadis Consulting (UK) Limited

80 Fenchurch Street
London EC3M 4BY
United Kingdom

T: +44 (0)20 7812 2000

[arcadis.com](https://www.arcadis.com)

Appendix B Air Quality Field Work

Method

Air quality measurements were carried out at six locations selected to represent sensitive receptors potentially affected during both the construction and operational phases of the Project. Of these monitoring points, one was located within the site for building the Sainshand substation, four along the overhead transmission line, and one at the Tsagaan Suvarga substation site.

Measurements were carried out using an Aeroqual Series 500 portable monitoring device. At each location, concentrations of fine and coarse particulate matter (PM_{2.5} and PM₁₀) were continuously recorded over a 24-hour period. Additionally, nitrogen dioxide (NO₂) and sulphur dioxide (SO₂) levels were measured for one hour, with readings taken at 10-minute intervals.

The monitoring equipment was mounted on a tripod at a height of 1.5m above ground level to ensure consistency with standard ambient air sampling protocols.



Photo B-1 Installation of Air Quality Monitoring Equipment

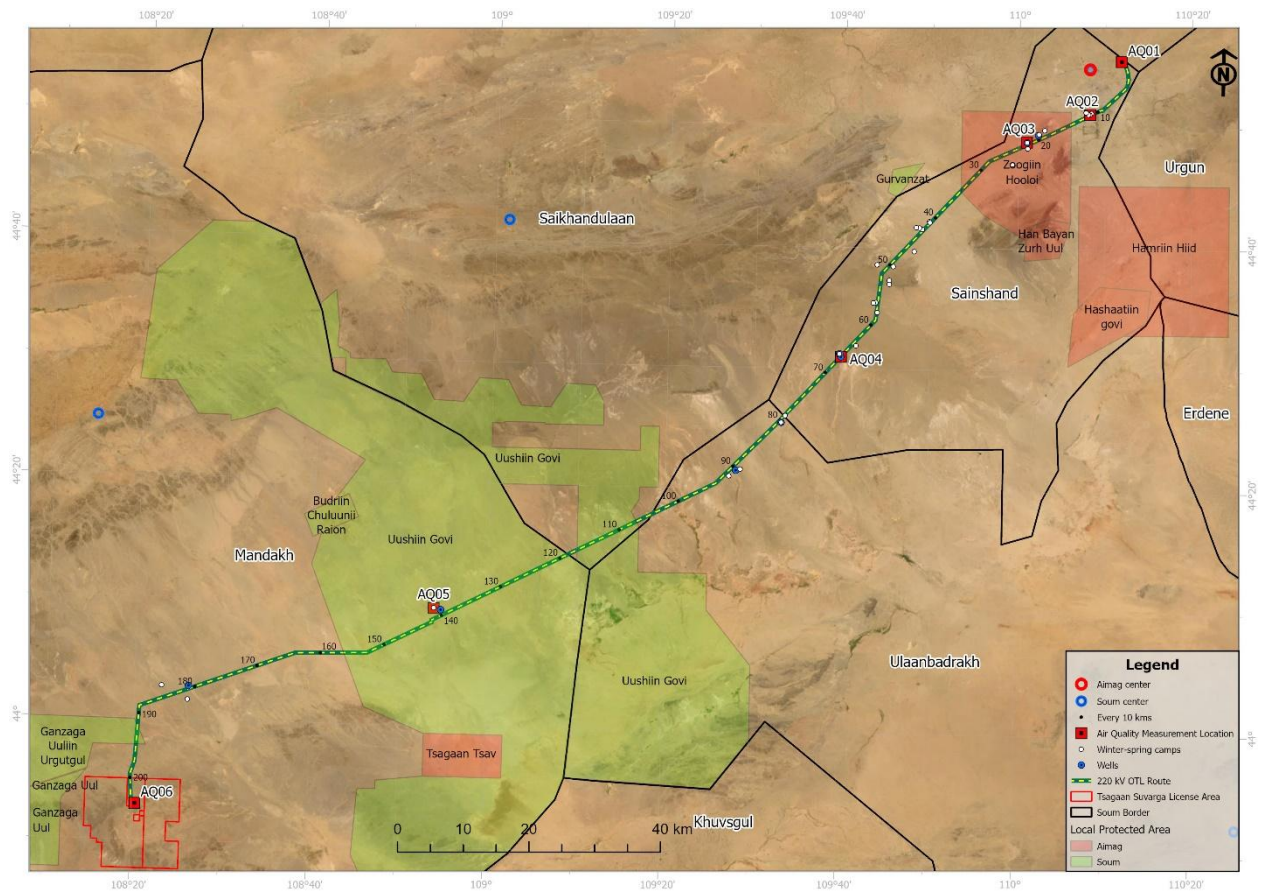


Figure B.1 Locations of Air Quality Measurement Points



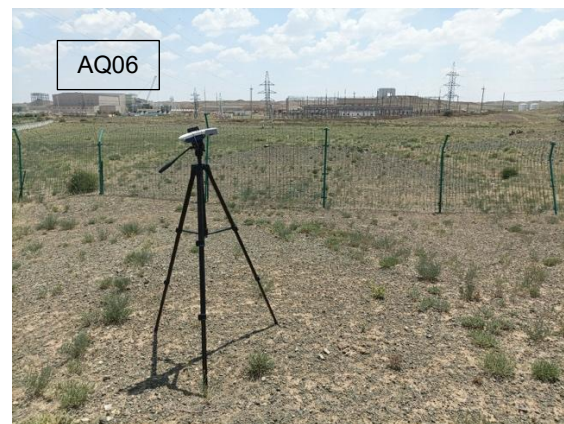


Photo B-2 Locations of Air Quality Monitoring Locations

Results

Table B-1 presents the details of the air quality monitoring locations recorded during the field survey, while their locations are showed in Figure 4-1 and Photo 4.2.

Table B.1 Air Quality Monitoring Locations' Details

Coded Name	Monitoring Period	Coordinates, Decimal degree		Elevation, m	Remark
		N	E		
Site for building the Sainshand substation					
AQ1	22-23 June 2025	44.92503°	110.19656°	1014	Site for building the Sainshand substation
Along the overhead transmission line					
AQ2	23-24 June 2025	44.85220°	110.13660°	897	Approximately 12 km from the OTL route (from Sainshand), outside a household
AQ3	24-25 June 2025	44.81330°	110.01541°	951	Approximately 22 km along the OTL route (from Sainshand), behind Jirem well
AQ4	25-26 June 2025	44.51678°	109.66416°	957	Approximately 67 km along the OTL route, to the east of Modon Shand well
AQ5	26-27 June 2025	44.16151°	108.89701°	870	Approximately 141 km along the OTL route, in front of a household
Tsagaan Suvarga substation site					
AQ6	27-28 June 2025	43.88317°	108.33966°	960	Behind the Tsagaan Suvarga substation site

At the air quality monitoring points, the 24-hour average concentrations of fine particulate matter (PM_{2.5}) were approximately 9 to 10 times lower than the maximum permissible limit specified in the Mongolian air quality standard (MNS 4585:2016), and about 3 times lower than the guideline values set by the World Health Organization (WHO, 2021).

Notably, no sulphur dioxide (SO₂) or nitrogen dioxide (NO₂) was detected at any of the monitoring sites during the observation period, as the project areas are located away from industrial zones and residential settlements.

The detailed PM_{2.5} measurement results from the field survey are presented in Table B.2.

Table B.2 Concentrations of Fine Particulate Matter (PM_{2.5}) in Air

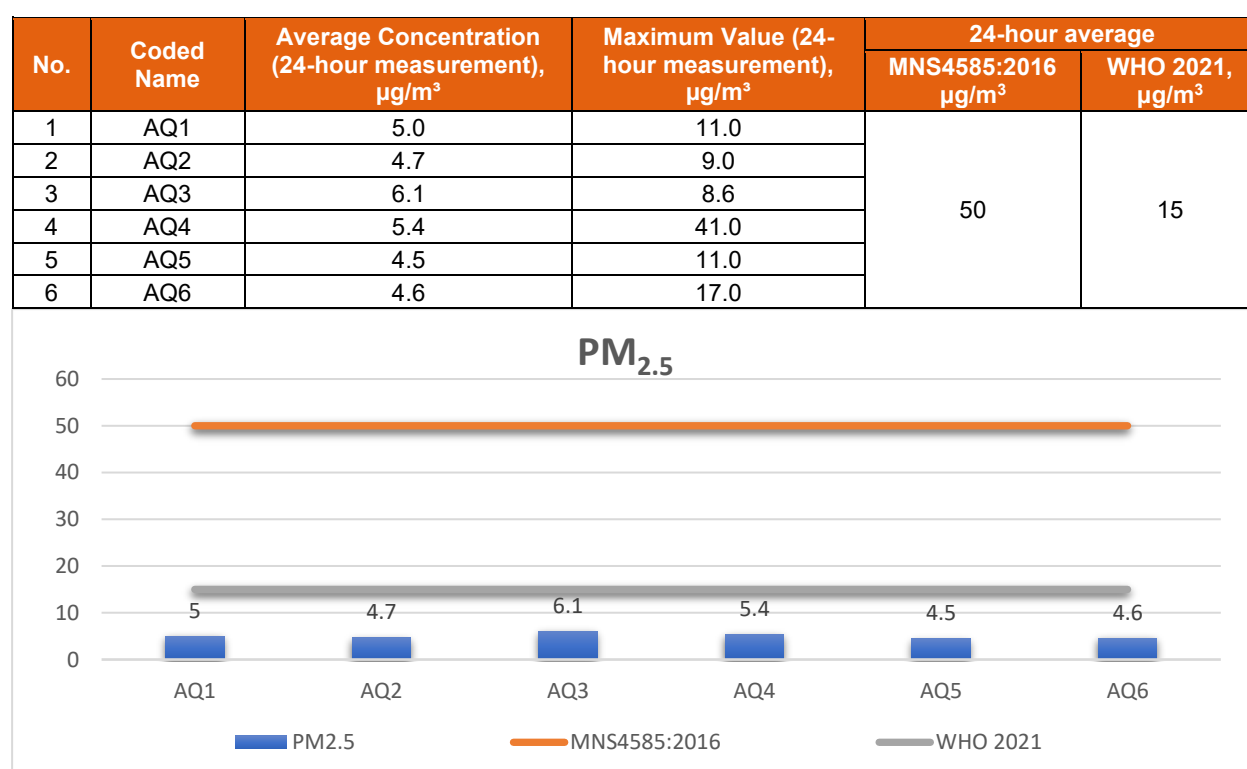


Figure B.2 PM_{2.5} Particulate Matter Concentrations at Monitoring Locations

At the air quality monitoring points, the 24-hour average concentrations of coarse particulate matter (PM₁₀) were approximately 6 to 14 times lower than the maximum permissible limits set by the Mongolian air quality standard (MNS 4585:2016), and 3 to 6 times lower than the guideline values established by the World Health Organization (WHO, 2021).

The highest measured PM₁₀ concentration remained below the Mongolian standard limit. Compared to WHO guidelines, concentrations at monitoring points AQ1 and AQ2 were lower, while points AQ3 through AQ6 showed elevated levels—ranging from 0.5 to 2 times higher than the WHO guideline values.

The detailed PM₁₀ measurement results from the field survey are presented in Table B.3.

Table B.3 Concentration of Coarse Particulate Matter (PM₁₀) in Air

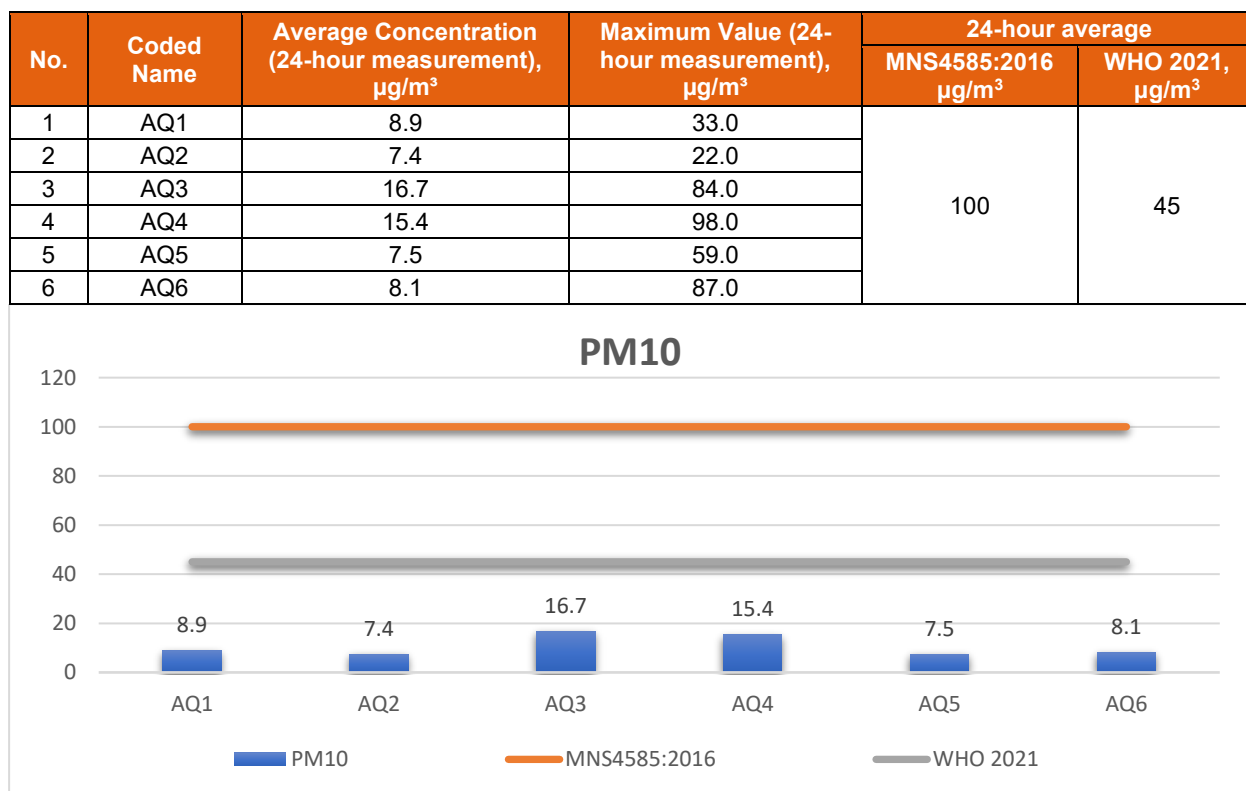


Figure B.3 PM₁₀ Particulate Matter Concentrations at Measurement Sites

At the air quality monitoring locations, nitrogen dioxide (NO₂) and sulphur dioxide (SO₂) concentrations were measured over a one-hour period. During this time, neither nitrogen dioxide nor sulphur dioxide were detected by the monitor.

Table B.4 Nitrogen Dioxide (NO₂) Concentrations at Monitoring Locations

No.	Coded Name	Average Concentration (1-hour measurement), $\mu\text{g}/\text{m}^3$	MNS 4585:2016 (20-minute average), $\mu\text{g}/\text{m}^3$	WHO 2021 (1-hour average), $\mu\text{g}/\text{m}^3$
1	AQ1	0	200	200
2	AQ2	0		
3	AQ3	0		
4	AQ4	0		
5	AQ5	0		
6	AQ6	0		

Table B.5 Sulphur Dioxide (SO₂) Concentrations at Monitoring Locations

No.	Coded Name	Average Concentration (1-hour measurement), µg/m ³	MNS 4585:2016 (20-minute average), µg/m ³	WHO 2021 (1-hour average), µg/m ³
1	AQ1	0	200	200
2	AQ2	0		
3	AQ3	0		
4	AQ4	0		
5	AQ5	0		
6	AQ6	0		

Appendix C Construction Dust Risk Assessment Methodology

There is the potential for fugitive dust emissions to occur as a result of construction phase activities associated with the Project. These have been assessed in accordance with the methodology outlined within the IAQM 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM. 2024).

Activities associated with the construction phase of the Project have been divided into four types to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

The potential for dust emissions have been assessed for each activity that is likely to take place and considered three separate dust effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and,
- The risk of health effects due to a significant increase in exposure to particulate matter less than 10 microns in diameter (PM10).

The assessment steps are detailed below.

Step 1

Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 250m of the boundary or 50m from the construction vehicle route up to 250m from the Site entrance, then the assessment proceeds to Step 2. Additionally, should ecological receptors be identified within 50m of the Site or 50m from the construction vehicle route up to 250m from the Site entrance, then the assessment also proceeds to Step 2.

Should sensitive receptors not be present within the relevant distances then negligible impacts would be expected and further assessment is not necessary.

Step 2

Step 2 assesses the risk of potential dust impacts. A site is allocated a risk category based on two factors:

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and
- The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).

The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.

Step 2A defines the potential magnitude of dust emissions through the construction phase. The relevant criteria are summarised in Table C1- 1.

Table C1- 1 - Construction Dust: Magnitude of Emissions

Magnitude	Activity	Criteria
Large	Demolition	<p>Total building volume greater than 75,000m³</p> <p>Potentially dusty construction material (e.g. concrete)</p> <p>On-site crushing and screening</p> <p>Demolition activities greater than 12m above ground level</p>
	Earthworks	<p>Total site area greater than 110,000m²</p> <p>Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size)</p> <p>More than 10 heavy earth moving vehicles active at any one time</p> <p>Formation of bunds greater than 6m in height</p>
	Construction	<p>Total building volume greater than 75,000m³</p> <p>On site concrete batching</p> <p>Sandblasting</p>
	Trackout	<p>More than 50 Heavy Duty Vehicle (HDV) trips per day</p> <p>Potentially dusty surface material (e.g. high clay content)</p> <p>Unpaved road length greater than 100m</p>
Medium	Demolition	<p>Total building volume 12,000m³ to 75,000m³</p> <p>Potentially dusty construction material</p> <p>Demolition activities 6m to 12m above ground level</p>
	Earthworks	<p>Total site area 18,000m² to 110,000m²</p> <p>Moderately dusty soil type (e.g. silt)</p> <p>5 to 10 heavy earth moving vehicles active at any one time</p> <p>Formation of bunds 3m to 6m in height</p>
	Construction	<p>Total building volume 12,000m³ to 75,000m³</p> <p>Potentially dusty construction material (e.g. concrete)</p> <p>On site concrete batching</p>
	Trackout	<p>20 to 50 HDV trips per day</p> <p>Moderately dusty surface material (e.g. high clay content)</p> <p>Unpaved road length 50m to 100m</p>
Small	Demolition	<p>Total building volume under 12,000m³</p> <p>Construction material with low potential for dust release (e.g. metal cladding or timber)</p> <p>Demolition activities less than 6m above ground level.</p> <p>Demolition activities during wetter months</p>

Magnitude	Activity	Criteria
	Earthworks	<p>Total site area less than 18,000m²</p> <p>Soil type with large grain size (e.g. sand)</p> <p>Less than 5 heavy earth moving vehicles active at any one time</p> <p>Formation of bunds less than 3m in height</p>
	Construction	<p>Total building volume less than 12,000m³</p> <p>Construction material with low potential for dust release (e.g. metal cladding or timber)</p>
	Trackout	<p>Less than 20 HDV trips per day</p> <p>Surface material with low potential for dust release</p> <p>Unpaved road length less than 50m</p>

Step 2B defines the sensitivity of the area around the development to potential dust impacts. The influencing factors are shown in Table C1- 2.

Table C1- 2 - Construction Dust: Examples of Factors Defining Sensitivity of an Area

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
High	<p>Users expect high levels of amenity</p> <p>The appearance, aesthetics or value of the property would be diminished by soiling</p> <p>People expected to be present continuously for extended periods of time</p> <p>Locations where members of the public are exposed over a time period relevant to the objective for PM₁₀. e.g. residential properties, hospitals, schools and residential care homes</p>	<p>Internationally or nationally designated site e.g. Special Area of Conservation</p>
Medium	<p>Users would expect to enjoy a reasonable level of amenity</p> <p>Aesthetics or value of their property could be diminished by soiling</p> <p>People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work</p>	<p>Nationally designated site e.g. Sites of Special Scientific Interest</p>
Low	<p>Enjoyment of amenity would not reasonably be expected</p> <p>Property would not be expected to be diminished in appearance</p> <p>Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, playing fields, farmland, footpaths, short term car park and roads</p>	<p>Locally designated site e.g. Local Nature Reserve</p>

The IAQM construction dust guidance (IAQM, 2024) also provides the following factors to consider when determining the sensitivity of an area to potential dust impacts:

- Any history of dust-generating activities in the area;
- The likelihood of concurrent dust-generating activity on nearby sites;
- Any pre-existing screening between the source and receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which works will take place;
- Any conclusions drawn from local topography;
- Duration of the potential impact, as a receptor may become more sensitive over time; and
- Any known specific receptor sensitivities which go beyond the classifications given in the document.

These factors have been considered during the undertaking of the assessment.

The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table C1- 3.

Table C1- 3 - Construction Dust: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 350
High	More than 100	High	High	Low	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

Note – only the highest level of sensitivity needs to be considered.

Table C1- 4 outlines the criteria for determining the sensitivity of the area to human health impacts.

Table C1- 4 Construction Dust: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM ₁₀ Concentration	Number of Receptors	Distance from the Source (m)				
			Less than 20	Less than 50	Less than 100	Less than 200	Less than 350
High	Greater than 32µg/m ³	More than 100	High	High	High	Medium	Low
		10 - 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32µg/m ³	More than 100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28µg/m ³	More than 100	High	Medium	Low	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	Less than 24µg/m ³	More than 100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	Greater than 32µg/m ³	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28 - 32µg/m ³	More than 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 - 28µg/m ³	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	Less than 24µg/m ³	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	-	1 or more	Low	Low	Low	Low	Low

Note – only the highest level of sensitivity needs to be considered.

Table C1- 5 outlines the criteria for determining the sensitivity of the area to ecological impacts.

Table C1- 5 Construction Dust: Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	Less than 20	Less than 50
High	Medium	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C combines the dust emission magnitude with the sensitivity of the area to determine the risk of unmitigated impacts.

Table C1- 6 outlines the risk category from demolition activities.

Table C1- 6 Construction Dust: Dust Risk Category from Demolition Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Medium
Medium	High	Medium	Low
Low	Medium	Low	Negligible

Table C1- 7 outlines the risk category from earthworks and construction activities.

Table C1- 7 Construction Dust: Dust Risk Category from Earthworks and Construction Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

Table C1- 8 outlines the risk category from trackout activities.

Table C1- 8 Construction Dust: Dust Risk Category from Trackout Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Negligible
Low	Low	Low	Negligible

Step 3

Step 3 requires the identification of site-specific mitigation measures within the guidance to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with negligible risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

Step 4

Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual impacts. For almost all construction activity, the aim should be to control effects through the use of effective mitigation. Experience shows that this is normally possible, hence the residual effect will normally be not significant.

Appendix D Noise Monitoring Field Work

Method

A 24-hour attended noise monitoring was carried out at six locations within the Project Area from 22 to 28 June 2025. One of these monitoring points (N01) was located at the site for building the Sainshand substation, four of these monitoring points (N02, N03, N04, and N05) were along the overhead transmission line, and last one (N06) was at the Tsagaan Suvarga substation site.

At each monitoring location, noise levels were continuously measured over the 24-hour period, with data logged at consecutive 10-minute intervals.

Noise monitoring was carried out using REED R8070SD Data Logging Sound Level Meter and calibrator. Calibration of the sound level meter was conducted before and after the noise monitoring. The sound level meter was positioned at 1.5m above ground with no reflecting surfaces within 3m radius. Measurements being undertaken in dry conditions when wind speed was below 5 m/s at the noise monitoring point.

Extraneous noise was excluded from the results i.e. overflying aircraft and other extraneous noise events.

During the noise monitoring period, the weather conditions were recorded 3 times a day. The weather condition included the following parameters:

- Wind speed (m/s);
- Air temperature (°C);
- Relative humidity (%);
- Air pressure (hPa); and
- Wind direction (°).

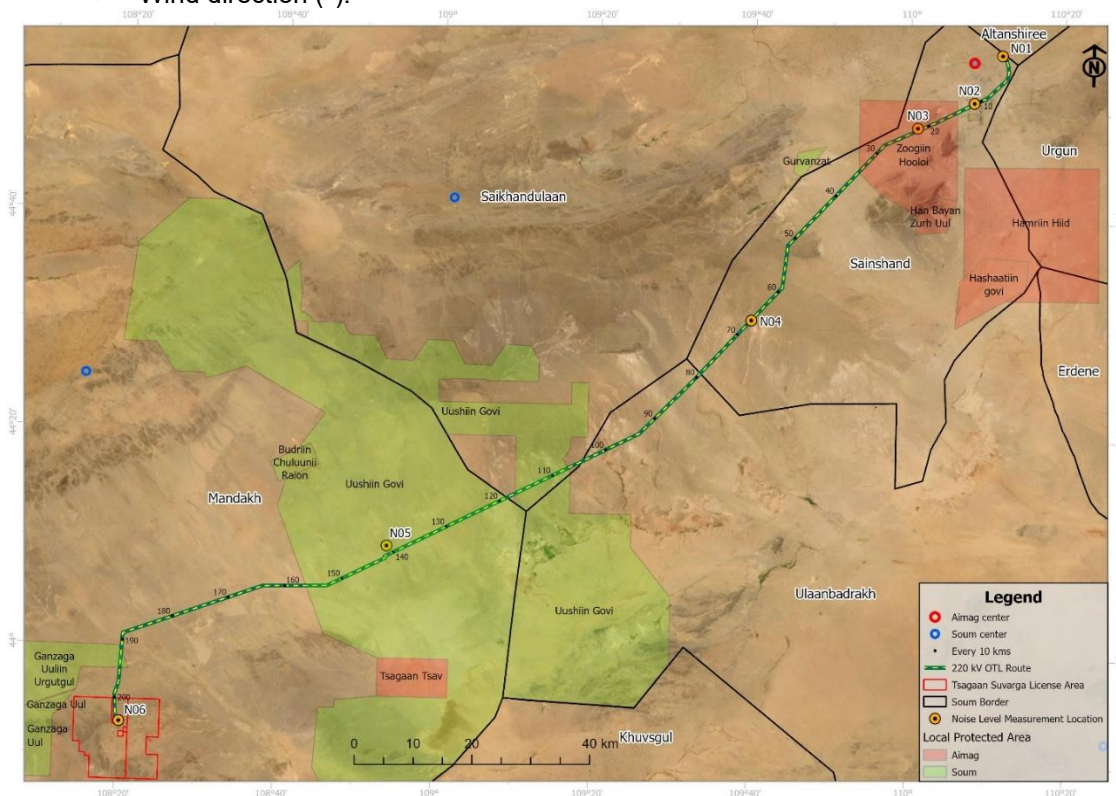


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Results

N01

At monitoring location N01, noise monitoring was conducted continuously over a 24-hour period, commencing in the afternoon of 22 June and concluding in the afternoon of 23 June 2025.



Photo D.3 Noise Monitoring at Location N01

Table D.6 Noise Monitoring Results of N01

Location	At the proposed Sainshand substation construction site					
Coordinates	44.92503°N, 110.19656°E					
Date/Time	Day time, dBA			Nighttime, dBA		
	Min	Max	Average	Min	Max	Average
6/22/2025 14:11 PM started	32.6	54.6	40.2	31.5	44.8	37.7
6/23/2025 14:11 PM ended						

Table D.7 Weather Conditions during Noise Measurement at Location N01

Date	Time	Weather conditions				
		Wind speed (m/s)	Wind directions	Air T (°C)	Humidity (%)	Air pressure (hPa)
6/22/2025	15:00	2.1	W	28.7	19.2	901
	19:00	1.6	SE	37.2	17.3	900
6/23/2025	09:00	0.9	E	26.3	20.2	901

Daytime Noise Level

Daytime noise monitoring on 22 June 2025 was conducted between 14:11 and 22:51. During this period, the maximum recorded noise level reached 54.6 dBA, while the minimum was 32.6 dBA. The average noise level for the period was 40.7 dBA, as presented in Table 1-2.

Nighttime Noise Level

Nighttime noise monitoring was conducted from 23:01 on 22 June to 06:51 on 23 June 2025. During this interval, noise levels ranged from a minimum of 31.5 dBA to a maximum of 44.8 dBA, with an average value of 37.7 dBA. The highest recorded level of 44.8 dBA is detailed in Table 1-2.

Summary of Findings

At monitoring location N01, the average daytime noise level remained below the maximum permissible threshold of 60 dBA, as defined by the national standard MNS 4585:2016. The site is situated near the proposed Sainshand substation construction area, with no notable anthropogenic noise sources nearby. Variations in noise levels were primarily attributed to meteorological conditions such as wind shifts and natural ambient sounds including birdsong. The average nighttime noise level at N01 was in close compliance with Mongolian national standard value.

N02

At monitoring location N02, continuous noise monitoring was conducted over a 24-hour period, beginning in the afternoon of 23 June and concluding in the afternoon of 24 June 2025.



Photo D.4 Noise Monitoring at N02

Table D.8 Noise Monitoring Results of N02

Location	Monitoring location N02 is situated approximately 12 kilometers from the OTL route extending from Sainshand, in close proximity to a herder household					
Coordinates	44.85220°N, 110.13660°E					
Date/Time	Day time, dBA			Nighttime, dBA		
	Min	Max	Average	Min	Max	Average
6/23/2025 14:47 PM started	34.3	57.1	41.6	31.8	45.4	37.1
6/24/2025 14:47 PM ended						

Table D.9 Weather Conditions during Noise Monitoring at Location N02

Date	Time	Weather conditions				
		Wind speed (m/s)	Wind directions	Air T (°C)	Humidity (%)	Air pressure (hPa)
6/23/2025	15:00	1.6	SE	37.2	17.3	900
	19:00	1.8	SE	34.6	16.8	900
6/24/2025	09:00	1.8	NW	26.3	19.3	902

Daytime Noise Level

Daytime noise monitoring at location N02 was conducted from 14:47 to 22:57 on 23 June 2025. During this timeframe, noise levels ranged from a minimum of 34.3 dBA to a maximum of 57.1 dBA, with an average recorded level of 41.6 dBA, as presented in Table 1-4.

Nighttime Noise Level

Nighttime noise monitoring at location N02 was carried out from 23:07 on 23 June to 06:57 on 24 June 2025. During this period, noise levels ranged from a minimum of 31.8 dBA to a maximum of 45.4 dBA, with an average recorded level of 37.1 dBA, as presented in Table 1-4.

Summary of Findings

At location N02, the average daytime noise level remained below the maximum permissible limit of 60 dBA, as specified in the national standard MNS 4585:2016. The site is situated approximately 12 kilometers along the OTL route from Sainshand, in the vicinity of a herder household.

During the monitoring period, rarely vehicle movement was observed, resulting in minor fluctuations in noise levels. However, ambient noise was primarily influenced by natural factors, such as variations in wind patterns, birdsong, and routine human activities around nearby gers and dwellings.

The average nighttime noise level at N02 was found to be in close alignment with the limits set by Mongolian national standard, indicating general compliance with regulatory thresholds.

N03

At monitoring location N03, continuous noise monitoring was conducted over a 24-hour period, commencing in the afternoon of 24 June and concluding in the afternoon of 25 June 2025.



Photo D.5 Noise Monitoring at N03

Table D.10 Noise Monitoring Results at N03

Location	Monitoring location N03 is situated approximately 22 kilometers along the OTL route from Sainshand, positioned behind Jirem well.					
Coordinate	44.81330°N, 110.01541°E					
Date/Time	Day time, dBA			Nighttime, dBA		
	Min	Max	Average	Min	Max	Average
6/24/2025 15:21 PM started	34.9	59.1	41.3	31.7	45.5	36.8
6/25/2025 15:21 PM ended						

Table D.11 Weather Conditions during Noise Monitoring at Location N03

Date	Time	Weather conditions				
		Wind speed (m/s)	Wind directions	Air T (°C)	Humidity (%)	Air pressure (hPa)
6/24/2025	19:00	0.8	NW	35.1	18.9	903
6/25/2025	09:00	0.4	SE	28.3	20.5	904
	15:00	2	NE	40.1	19.2	901

Daytime Noise Level

Daytime noise monitoring at location N03 was conducted from 15:21 to 22:51 on 24 June 2025. During this period, the maximum recorded noise level reached 59.1 dBA, while the minimum was 34.9 dBA. The average noise level for the period was 41.3 dBA, as presented in Table 1-6.

Nighttime Noise Level

Nighttime noise monitoring at location N03 was conducted from 23:01 on 24 June to 06:51 on 25 June 2025. During this period, noise levels ranged from a minimum of 31.7 dBA to a maximum of 45.5 dBA, with an average recorded level of 36.8 dBA, as presented in Table 1-6.

Summary of Findings

At location N03, the average daytime noise level remained below the maximum permissible limit of 60 dBA, in accordance with the national standard MNS 4585:2016. The site is located approximately 22 kilometers along the OTL route from Sainshand, positioned behind Jirem well.

Noise levels during the monitoring period were influenced by livestock activity and rarely vehicle movement, contributing to intermittent fluctuations. Additionally, ambient acoustic variations were primarily attributed to shifts in wind patterns and natural background sounds, such as birdsong and livestock noise. The average nighttime noise level at N03 was found to be in close compliance with the thresholds established by Mongolian national standard, indicating overall adherence to permissible limits.

N04

At monitoring location N04, continuous noise monitoring was conducted over a 24-hour period, commencing in the afternoon of 25 June and concluding in the afternoon of 26 June 2025.



Photo D.6 Noise Monitoring at N04

Table D.12 Noise Monitoring results at location N04

Location	Monitoring location N04 is situated approximately 67 kilometers from Sainshand along the OTL route, positioned to the east of Modon Shand well					
Coordinates	44.51678°N, 109.66416°E					
Date/Time	Day time, dBA			Nighttime, dBA		
	Min	Max	Average	Min	Max	Average
6/25/2025 16:15 PM started	32.7	51.2	40.3	31.4	44.8	37.4
6/26/2025 16:15 PM ended						

Table D.13 Weather Conditions during Noise Monitoring at N04

Date	Time	Weather conditions				
		Wind speed (m/s)	Wind directions	Air T (°C)	Humidity (%)	Air pressure (hPa)
	19:00	1.8	W	37.8	19	902
6/26/2025	09:00	1.2	NW	28.9	20	903
	15:00	1.6	NW	38.7	19	902

Daytime Noise Level

Daytime noise monitoring at location N04 was conducted from 16:15 to 22:55 on 25 June 2025. During this period, the recorded noise levels ranged from a minimum of 32.7 dBA to a maximum of 51.2 dBA, with an average level of 37.1 dBA, as presented in Table 1-8.

Nighttime Noise level

Nighttime noise monitoring at location N04 was conducted from 23:05 on 25 June to 06:55 on 26 June 2025. During this period, noise levels ranged from a minimum of 31.4 dBA to a maximum of 44.8 dBA, with an average recorded level of 37.4 dBA, as presented in Table 1-8.

Summary of Findings

At monitoring location N04, the average daytime noise level remained below the maximum permissible threshold of 60 dBA, in accordance with MNS 4585:2016, Mongolia's national standard for environmental noise. The site is situated approximately 67 kilometers along the OTL route from Sainshand, to the east of Modon Shand well.

Noise variations were influenced by livestock activity and rarely vehicle movement, contributing to intermittent acoustic peaks. Broader fluctuations were primarily driven by shifting wind patterns and natural ambient sounds, such as birdsong and livestock noise.

The average nighttime noise level at this location was found to be in close alignment with the limits established by national standard.

N05

At monitoring location N05, continuous noise monitoring was conducted over a 24-hour period, commencing in the evening of 26 June and concluding in the evening of 27 June 2025.



Photo D.7 Noise Monitoring at N05

Table D.14 Noise Monitoring Results at N05

Location	Monitoring location N05 is situated approximately 141 kilometers along the OTL route from Sainshand, positioned directly in front of a household					
Coordinate	44.16151°N, 108.89701°E					
Date/Time	Daytime, dBA			Nighttime, dBA		
	Min	Max	Average	Min	Max	Average
6/26/2025 17:53 PM started	30.3	47.8	40.5	29.4	44.0	35.2
6/27/2025 17:53 PM ended						

Table D.15 Weather Conditions during Noise Monitoring at N05

Date	Time	Weather conditions				Air pressure (hPa)
		Wind speed (m/s)	Wind directions	Air T (°C)	Humidity (%)	
	19:00	1.2	NW	29	20	860
6/27/2025	09:00	2.3	W	26	25	859
	15:00	1	NW	38.6	23	861

Daytime Noise Level

Daytime noise monitoring at location N05 was conducted from 17:53 to 22:55 on 26 June 2025. During this period, noise levels ranged from a minimum of 30.3 dBA to a maximum of 47.8 dBA, with an average recorded level of 40.5 dBA, as presented in Table 1-10.

Nighttime noise level

The nighttime noise monitoring covered the period from 23:03 on 26 June to 06:53 the following morning. The noise levels ranged from a minimum of 29.4 dBA to a maximum of 44.0 dBA, with an average value of 35.2 dBA (Table 1-10).

Summary of Findings

At monitoring location N05, the average daytime noise level remained below the maximum permissible limit of 60 dBA, as established by MNS 4585:2016, Mongolia's national environmental noise standard. The site is located approximately 141 kilometers along the OTL route from Sainshand, positioned directly in front of a household.

There were no significant anthropogenic noise sources observed in the vicinity. As a result, ambient noise levels were primarily influenced by natural factors, including variations in wind speed and direction.

The average nighttime noise level at N05 was found to be in close alignment with Mongolian national standard limits, indicating overall compliance with noise standards during both monitoring periods.

N06

At monitoring location N06, continuous noise monitoring was conducted over a 24-hour period, commencing in the evening of 27 June and concluding in the evening of 28 June 2025.



Photo D.8 Noise Monitoring at N06

Table D.16 Noise Monitoring Results at N06

Location	Monitoring location N06 is situated in the proximity of the Tsagaan Suvarga substation site, along the OTL route originating from Sainshand					
Coordinate	43.88317°N, 108.33966°E					
Date/Time	Day time, dBA			Nighttime, dBA		
	Min	Max	Average	Min	Max	Average
6/27/2025 19:26 PM started	35.8	55.0	45.1	36.2	48.6	43.1
6/28/2025 19:26 PM ended						

Table D.17 Weather Conditions during Noise Monitoring at N06

Date	Timestamp	Weather conditions				Air pressure (hPa)
		Wind (m/s)	speed	Wind directions	Air T (°C)	
6/27/2025	19:00	1.4		NW	36.2	863
6/28/2025	09:00	2.7		NW	27.0	861
	15:00	2.5		NW	30.0	860

Daytime Noise Level

Daytime noise monitoring at location N06 was conducted from 19:56 to 22:56 on 27 June 2025. During this period, noise levels ranged from a minimum of 35.8 dBA to a maximum of 55.0 dBA, with an average recorded level of 45.1 dBA, as presented in Table 1-12.

Nighttime Noise Level

Nighttime noise monitoring at location N06 was conducted from 23:06 on 27 June to 06:56 on 28 June 2025. During this period, noise levels ranged from a minimum of 36.2 dBA to a maximum of 48.6 dBA, with an average recorded level of 43.1 dBA, as presented in Table 1-12.

Summary of Findings

At monitoring location N06, the average daytime noise level remained below the maximum permissible threshold of 60 dBA, as defined by MNS 4585:2016, Mongolia's national environmental noise standard. The site is located behind the Tsagaan Suvarga substation, with proximity to industrial activity.

During the monitoring period, daytime noise levels were influenced by the operation of heavy machinery near the Tsagaan Suvarga mine, contributing to elevated acoustic levels at certain intervals. Despite these industrial influences, overall noise monitoring remained within acceptable limits.

The average nighttime noise level at N06 was found to be in close compliance with Mongolian national standard, indicating adherence to environmental noise standard across the full 24-hour monitoring cycle.

Appendix E Soil Survey

Survey Methodology

The survey to determine the condition of the soil cover was conducted from June 22 to 29, 2025. Using a topographic map at a scale of 1:100,000, fieldwork was carried out to create soil cross-sections and collect samples along the transmission line corridor.

Based on the soil cover survey conducted along the transmission line corridor, nine subtypes of soil cover were identified, belonging to three major soil categories. To determine the chemical and physical properties of these soils, samples were collected from the surface layers at 12 cross-section points.

In addition, soil samples were taken from the same 12 locations to analyse heavy metal content. The collected samples were submitted to the Soil Laboratory of the Institute of Geography and Geoecology at the Mongolian Academy of Sciences for chemical and physical analysis. Heavy metal concentrations were analysed separately at the ALS Group LLC's soil laboratory.

The results of the laboratory tests were evaluated against the national standard MNS 5850:2019, which defines permissible levels of heavy metals in soil.

Soil Cover Characteristics

Along the transmission line corridor, nine (9) subtypes of soil cover were identified, belonging to three major soil categories. These include:

Semi-desert brown soils:

- Sandy loam typical brown soil
- Saline marsh soil
- Gravelly thin brown soil
- Typical brown soil with sand cover

Semi-desert light brown soil:

- Stony thin light brown soil
- Sandy loam light brown soil
- Light brown soil with sand cover
- Gravelly thin light brown soil

Desert gray-brown soil:

- Typical gray-brown soil and thin gray-brown soil

The following section provides a detailed information of the morphological descriptions of soil cross-sections and laboratory analysis results conducted along transmission line corridor and the substation sites.

Semi-Desert Brown Soil

This soil type has stabilized within wide and narrow valleys located between low hills at elevations ranging from 900 to 1000 meters above sea level, along the Sainshand substation and the transmission line corridor. The area has been shaped by intermittent surface runoff, which contributes to sediment accumulation, and by wind activity, which leads to sand deposition.

Semi-desert brown soil is distributed along approximately 0 to 51 km of the transmission line route. Four representative morphological cross-sections were documented to characterize the four subtypes within this soil category, and detailed descriptions are provided in the following section.

Sandy loam typical brown soil

The morphological description of soil cross-section SS01, representing the sandy loam typical brown soil, conducted at the proposed Sainshand substation construction site, is presented as follows.



Photo **Error! No text of specified style in document.**-9 Land Surface and Soil Cross-section near Sampling Site SS01

Table E-18 Description of soil cross-section: SS01

Date:	2025-06-23
Location:	Sainshand, Dornogovi
Coordinates:	N: 44.92543° E: 110.19598°
Altitude (mASL):	1006
Land surface:	Flat terrain on the western edge of the Huurai Baziin Hyar
Surface slope:	3 degrees
Stone coverage:	30%
Soil disturbance:	Natural state
Vegetation cover:	20%

Table E-19 Soil Horizons and Morphological Characteristics

Horizon	Depth of cross-section, cm	Morphological record
Э	0-1	Loose sandy cover layer with gravel fragments
B ₁	1-12	Brown in colour, dry, granular structure, compact sandy texture. No visible stones; sparse distribution of fine plant roots. Gradual transition in colour and structure to the next layer.
B ₂	12-30	Light brown, dry, compact clay loam layer. Contains ≤30% of coarse rock fragments up to 1 cm in size. Distribution of fine plant roots is very sparse (roots

Horizon	Depth of cross-section, cm	Morphological record
		observed at depths of 3–5 cm). The transition to the next layer is gradual in both texture and colour. The boundary is uneven.
BC _{Ca}	30-60	Brownish-yellow sandy layer with fragmented rock. Moist, containing up to 80% of rock fragments ≤0.2 cm. The rock surfaces exhibit carbonate coatings and show slight effervescence when exposed to 10% hydrochloric acid.

Saline marsh soil

The morphological description of soil cross-section TL01, representing the saline marsh soil, conducted approximately 11 km south of the Sainshand soum center along the transmission line corridor in the Khulgui Usnii Govi, is presented as follows.



Photo E-10 Land Surface and Soil Cross-section near TL01 Sampling Site

Table E-20 Description of soil cross-section: TL01

Date:	2025-06-24
Location:	Sainshand soum, Dornogovi Aimag
Coordinates:	N: 44.85095° E: 110.13657°
Altitude (mASL):	894
Land surface:	Flat valley in the northwestern part of the Khulgui Usnii Govi
Surface slope:	3 degrees
Stone coverage:	0 %
Soil disturbance:	Natural state

Vegetation cover:	50 %
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Table E-21 Soil Horizons and Morphological Characteristics - TL01

Horizon	Depth of cross-section, cm	Morphological record
B	0-5	Brownish-yellow, moist, very compact clay loam layer. No rock fragments present; plant roots are visible. The transition to the next layer occurs gradually in terms of colour.
BC	5-47	Bright brown, moist, very compact clay loam layer. No rock fragments present; thick plant roots are visible.

Gravelly thin brown soil

The morphological description of soil cross-section TL02, representing the gravelly thin brown soil, conducted at a turning point approximately 28 km along the transmission line corridor, is presented as follows.



Photo E-11 Land Surface and Soil Cross-section near TL02 Sampling Site

Table E-22 Description of soil cross-section: TL02

Date:	2025-06-24
Location:	Sainshand soum, Dornogovi Aimag
Coordinates:	N: 44.78708° E: 109.94390°
Altitude (mASL):	1000
Land surface:	Inter mountain flat valley
Surface slope:	3 degrees
Stone coverage:	30 %
Soil disturbance:	Natural state
Vegetation cover:	50 %

Table E-23 Soil Horizons and Morphological Characteristics - TL02

Horizon	Depth of cross-section, cm	Morphological record
᠑	0-1	Loose sandy loam cover layer with fragmented rock.
B _{Ca}	1-6	Brown in colour, dry, compact with granular structure; clay loam texture. No rock fragments present; fine plant roots are visible. Gradual transition in both colour and structure to the next layer. Boundary is uneven.
BC _{Ca}	6-45	Light brown, compact sandy loam layer with fragmented rock. Contains more than 80% of rock fragments ≤0.5 cm in size. Rock surfaces exhibit carbonate coatings. No plant roots observed.

Typical brown soil with sand cover

The morphological description of soil cross-section TL03, representing the typical brown soil with sand cover, conducted at the northern slope of Tsagaan Tsaviin Hyar approximately 40 km along the transmission line corridor, is presented as follows.



Photo E-12 Surface and Soil Cross-section near TL03 Sampling Site

Table E-24 Description of soil cross-section: TL03

Date:	2025-06-24
Location:	Sainshand soum, Dornogovi Aimag
Coordinates:	N: 44.70485° E: 109.83598°
Altitude (mASL):	998
Land surface:	Northern slope of a low hills
Surface slope:	3 degrees
Stone coverage:	20%
Soil disturbance:	Natural state
Dominant plant species:	<i>Stipa spp.</i> , <i>Oxytropis aciphylla</i> , <i>Cleistogenes</i>
Vegetation cover:	55%

Table E-25 Soil Horizons and Morphological Characteristics – TL03

Horizon	Depth of cross-section, cm	Morphological record
Э	0-2	Loose sandy loam layer with fragmented rock
B ₁	2-13	Brown in colour, brittle granular structure, dry sandy loam texture. No rock fragments present; plant roots are fibrous and moderately developed. The transition to the next layer is sharp in both colour and structure.

Horizon	Depth of cross-section, cm	Morphological record
B ₂ Ca	13-30	Light brown, moist, highly compact clay loam layer with blocky structure. No rock fragments present; fine plant roots are visible. The transition to the next layer is gradual in both colour and structure.
BC	30-70	Brownish-yellow, moist, brittle granular sandy loam layer. No rock fragments present; fine plant roots are sparsely distributed.

Semi-desert light brown soil

This soil type has stabilized in valleys situated between low hills at elevations of approximately 850–1000 meters above sea level along the transmission line corridor. The valleys are notably dissected by dry riverbeds. Semi-desert light brown soil is distributed between approximately 51 and 165 km along the transmission line route. Six representative morphological cross-sections were documented to characterize the four subtypes within this soil category. Detailed descriptions are provided in the following section.

Stony thin light brown soil

The morphological description of soil cross-section TL04, representing the gravelly thin light brown soil, conducted at the northern slope of a hill approximately 52 km along the transmission line corridor, is presented as follows.



Photo E-13 Surface and Soil Cross-section near TL04 Sampling Site

Table E-26 Soil cross-section: TL04

Date:	2025-06-25
Location:	Sainshand soum, Dornogovi Aimag
Coordinates:	N: 44.63176° E: 109.74007°
Altitude (mASL):	990
Land surface:	Northern slope of a low hill
Surface slope:	5 degrees
Stone coverage:	50 %
Soil disturbance:	Natural State
Vegetation cover:	40 %

Table E-27 Soil Horizons and Morphological Characteristics - TL04

Horizon	Depth of cross-section, cm	Morphological record
B	0-3	Light brown, porous clay loam layer with blocky structure. Dry in texture; fine plant roots are present. Contains $\leq 10\%$ of coarse rock fragments up to 1 cm in size. The transition to the next layer is sharp in terms of structure. Boundary is uneven.
C	3-20	Weathered dark-coloured bedrock. Rock surfaces exhibit carbonate coatings.

Light brown sandy loam soil

The morphological description of soil cross-section TL05, representing the light brown sandy loam soil, conducted in a valley approximately 63 km along the transmission line corridor, is presented as follows.



Photo E-14 Surface and Soil Cross-section near TL05 Sampling Site

Table E-28 Soil cross-section: TL05

Date:	2025-06-25
Location:	Sainshand soum, Dornogovi Aimag
Coordinates:	N: 44.53861° E: 109.69241°
Altitude (mASL):	1007
Land surface:	Flat valley
Surface slope:	3 degrees
Stone coverage:	90 %
Soil disturbance:	Natural state
Vegetation cover:	20 %

Table E-29 Soil Horizons and Morphological Characteristics - TL05

Horizon	Depth of cross-section, cm	Morphological record
Θ	0-2	Loose sandy loam layer with gravel fragments
B ₁	2-7	Light brown in colour, brittle granular structure, dry sandy loam texture. Contains ≤3% of rock fragments up to 0.5 cm in size. Fine plant roots are distributed. Gradual transition in colour to the next layer.
B _{2 ca}	7-35 cm	Brown, dry sandy loam layer with brittle granular structure. No rock fragments present; fine plant roots are distributed up to 20 cm depth. The transition to the next layer is gradual in both colour and structure.
BC	35-70	Light gray, slightly moist clay loam layer. Contains ≤5% of rounded gravel fragments up to 5 cm in size. Stone surfaces exhibit carbonate coatings.

Light brown soil with sand cover

The morphological descriptions of soil cross-sections TL06 and TL08, representing light brown soil with sand cover, conducted respectively at approximately 79 km and 120 km along the transmission line corridor, are presented as follows.



Photo E-15 Land Surface and Soil Cross-section near TL06 Sampling Site

Table E-30 Soil cross-section: TL06

Date:	2025-06-26
Location:	Ulaanbadrah soum, Dornogovi Aimag
Coordinates:	N: 43.43496° E: 109.55748°
Altitude (mASL):	864
Land surface:	Flat valley
Surface slope:	3 degrees
Stone coverage:	40%
Soil disturbance:	Natural state
Vegetation cover:	30%

Table E-31 Soil Horizons and Morphological Characteristics - TL06

Horizon	Depth of cross-section, cm	Morphological record
3	0-3	Dry, loose sand cover layer.
B ₁	3-12	Light brown in colour, brittle granular structure, porous and dry sandy loam texture. No rock fragments present; fine plant roots are visible. Gradual transition in both colour and structure to the next layer.

Horizon	Depth of cross-section, cm	Morphological record
B ₂ (Ca)	12-70	Light brown, slightly moist sandy loam layer with brittle granular structure. No rock fragments present; few fine plant roots (2–3 observed). Carbonate coatings are present on particle surfaces, showing weak effervescence when exposed to 10% hydrochloric acid.



Photo E-16 Land Surface and Soil Cross-section near TL08 Sampling Site

Table E-32 Soil cross-section: TL08

Date:	2025-06-26
Location:	Mandakh soum, Dornogovi Aimag
Coordinates:	N: 44.22678° E: 109.11714°
Altitude (mASL):	849
Land surface:	Flat valley
Surface slope:	3 degrees
Stone coverage:	20%
Soil disturbance:	Natural state
Vegetation cover:	40%

Table E-33 Soil Horizons and Morphological Characteristics - TL08

Horizon	Depth of cross-section, cm	Morphological record
Э	0-2	Loose sandy loam cover layer.
B _{1 ca}	2-15	Light brown in colour, brittle granular structure, dry and porous sandy loam texture. No rock fragments present; fine plant roots are visible. Gradual structural transition to the next layer.
B _{2 ca}	15-30	Light brown, dry sandy loam layer with brittle granular structure. Contains ≤3% of rock fragments up to 2 cm in size. Stone surfaces exhibit carbonate coatings. Few fine plant roots (2–3 observed). Gradual colour transition to the next layer. Boundary is uneven.
B _c	30-70	Gray, dry sandy loam layer with granular structure. Contains ≤3% of rock fragments up to 2 cm in size. Carbonate leaching is present. No plant roots observed.

Gravelly thin light brown soil

The morphological descriptions of soil cross-sections TL07 and TL09, representing gravelly thin light brown soil, conducted respectively at approximately 102 km and 153 km along the transmission line corridor, are presented as follows.



Photo E-17 Land Surface and Soil Cross-section near TL07 Sampling Site

Table E-34 Soil cross-section: TL07

Date:	2025-06-26
Location:	Ulaanbadrah soum, Dornogovi Aimag
Coordinates:	N: 44.30694°

Altitude (mASL):	E: 109.33652° 811
Land surface:	Flat valley
Surface slope:	3 degrees
Stone coverage:	70 %
Soil disturbance:	Natural state
Vegetation cover:	20 %

Table E-35 Soil Horizons and Morphological Characteristics - TL07

Horizon	Depth of cross-section, cm	Morphological record
Θ	0-0.5	Light brown, dry sandy loam pavement layer with brittle granular structure.
B _{1 ca}	0.5-6	Light brown, dry sandy loam surface layer with brittle granular structure. Stratified with laminated sublayers, some showing carbonate coatings. Few fine plant roots (2-3 observed). Contains <30% of rock fragments smaller than 2 cm. Sharp structural transition to the next layer.
B _{2 ca}	6-12	Light brown, dry sandy loam layer with no loose structure. Contains ≤10% of rock fragments up to 1 cm. Stone surfaces exhibit carbonate coatings. Sharp transition in both colour and structure to the next layer.
BC _{ca}	12-47	Bright brown, moist, highly compact clay loam layer. No rock fragments or plant roots present. Contains carbonate granules.



Photo E-18 Surface and Soil Cross-section near TL09 Sampling Site

Table E-36 Soil cross-section: TL09

Date:	2025-06-27
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Location:	Mandakh soum, Dornogovi Aimag
Coordinates:	N: 44.09821° E: 108.77254°
Altitude (mASL):	851
Land surface:	Flat valley
Surface slope:	3 degrees
Stone coverage:	60 %
Soil disturbance:	Natural state
Vegetation cover:	40 %

Table E-37 Soil Horizons and Morphological Characteristics - TL09

Horizon	Depth of cross-section, cm	Morphological record
A _k	0-1	Light brown pavement layer with fragmented rock.
B _{1ca}	1-5	Light brown, dry sandy loam with no visible structure. Laminated bedding observed; no rock fragments. Fine plant roots are distributed. Sharp structural transition to the next layer.
B _{2 ca}	5-20	Light brown, dry clay loam layer with granular structure and low compaction. Contains ≤3% of rock fragments up to 0.5 cm. Carbonate granules present. Few fine plant roots (1–3 observed). Sharp transition in both colour and structure. Boundary is uneven.
BC	20-55	Red clay loam layer with high compaction. No rock fragments present. Carbonate granules have formed. Contains 1–2 plant roots.

Desert gray-brown soil

This soil type has stabilized across low hills and valleys at elevations of approximately 850–900 meters above sea level, along the transmission line corridor between 165 and 204.5 km. It belongs to the desert gray-brown soil category and includes two representative morphological cross-sections: one for typical gray-brown soil and another for thin gray-brown soil. Detailed descriptions of these cross-sections are presented in the following section.

Typical gray-brown soil and thin gray-brown soil

The morphological descriptions of soil cross-sections TL10 and SS02, representing typical gray-brown and thin gray-brown soils respectively, conducted at approximately 182 km along the transmission line corridor and near the Tsagaan Suvarga substation site, are presented as follows.



Photo E-19 Surface and Soil Cross-section near TL10 Sampling Site

Table E-38 Soil cross-section: TL10

Date:	2025-06-27
Location:	Mandakh soum, Dornogovi Aimag
Coordinates:	N: 43.03825° E: 108.42291°
Altitude (mASL):	910
Land surface:	Flat valley
Surface slope:	3 degrees
Stone coverage:	60 %
Soil disturbance:	Natural state
Vegetation cover:	20 %

Table E-39 Soil Horizons and Morphological Characteristics - TL10

Horizon	Depth of cross-section, cm	Morphological record
Ak	0-1	Gray-brown, porous, dry silty clay pavement layer.
B _{1ca}	1-10	Gray-brown, laminated flaky sandy loam layer with brittle granular structure. Porous and dry; fine plant roots present. Contains ≤3% of rock fragments up to 1 cm. Sharp transition in both colour and structure to the next layer. Boundary is uneven.
B _{2 ca}	10-21	Light brown, dry clay loam layer with brittle granular structure. Increased distribution of fine plant roots. Contains carbonate spots and ≤3% of rock fragments up to 3 cm. Gradual colour transition to the next layer.

Horizon	Depth of cross-section, cm	Morphological record
BC	21-50	Light gray, moist clay loam layer with granular structure. No rock fragments; very few fine plant roots. Gradual structural transition to the next layer.



Photo E-20 Land Surface and Soil Cross-section near SS02 Sampling Site

Table E-40 Soil cross-section: SS02

Date:	2025-06-28
Location:	Mandakh soum, Dornogovi Aimag
Coordinates:	N: 43.88312° E: 108.33792°
Altitude (mASL):	959
Land surface:	In the southern slope of low hills
Surface slope:	15 degrees
Stone coverage:	75 %
Soil disturbance:	Natural state
Vegetation cover:	5 %

Table E-41 Soil Horizons and Morphological Characteristics - SS02

Horizon	Depth of cross-section, cm	Morphological record
Θ	0-1	Dry, loose sandy loam layer with rock fragments ≤ 1 cm.
B ₁	1-8	Gray-brown in colour, flaky and brittle granular structure, porous and dry sandy loam texture. No rock fragments observed; few fine plant roots present. Sharp transition in colour and structure to the next layer. Boundary is uneven.

Horizon	Depth of cross-section, cm	Morphological record
B _{2 ca}	8-27	Brown, dry sandy loam layer with brittle granular structure. Contains ≤5% of rock fragments up to 0.5 cm. Few plant roots (3 observed). Sharp structural transition to the next layer.
BC	27-50	Reddish-yellow, moist clay loam layer. Contains ≤3% of rock fragments up to 2 cm. Rock surfaces exhibit carbonate coatings.

Physical and Chemical Properties of Soils

The results of laboratory analysis on the basic physical and chemical properties of 12 soil samples collected from 12 cross-section points are presented in the following section.

Physical and Chemical Properties of Soils

Based on the indicators of soil physical properties, samples TL03, TL05, and TL08 are classified as sandy soils, while the remaining samples are predominantly sandy loam in mechanical composition. Laboratory analysis of the soil samples revealed the following particle size distribution ranges:

- Sand (2–0.05 mm): 56.2% to 82.2%;
- Silt (<0.05–0.002 mm): 1.9% to 31.9%; and
- Clay (<0.002 mm): 9% to 18.9%.

The detailed laboratory results are presented in the following table.

Table E-42 Physical and Chemical Properties of Soils

No.	Sample ID	Depth, cm	Particle size distribution, % (in millimeters)			Mechanical composition
			Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	
1	TL01	0-5	56.2	31.9	11.9	Sandy loam
2	TL02	0-5	66.3	18.8	14.9	Sandy loam
3	TL03	0-13	82.2	1.9	9.9	Sand
4	TL04	0-3	62.2	14.9	18.9	Sandy loam
5	TL05	0-7	82.2	1.9	9.9	Sand
6	TL06	0-12	78.1	10.0	11.9	Sandy loam
7	TL07	0-6	66.2	19.9	13.9	Sandy loam
8	TL08	0-15	82.1	8.9	9.0	Sand
9	TL09	0-5	76.1	14.0	9.9	Sandy loam
10	TL10	0-10	78.2	7.9	13.9	Sandy loam
11	SS01	0-12	66.1	19.9	14.0	Sandy loam
12	SS02	0-8	74.1	15.9	10.0	Sandy loam

Source: Institute of Geography and Geoecology, Mongolian Academy of Sciences - Laboratory results of soil analysis, dated July 9, 2025.

Along the 220 kV transmission line corridor between Sainshand and Tsagaan Suvarga, the soil surface is predominantly covered with gravel to certain extent. Additionally, a hardened pavement layer up to 1 cm thick has formed, which serves to protect the soil from wind erosion and water runoff. The gravel cover helps regulate soil moisture by reducing evaporation and prevents excessive heating of the soil surface.

Along the transmission line corridor, the soil surface is predominantly covered with sand. In particular, sand accumulation is observed in areas where shrub vegetation has grown. These shrubs play an important role in reducing wind-driven sand movement and stabilizing the surface.

Soil Chemical Properties

Laboratory analysis of the soil samples revealed that the soils exhibit an alkaline to strongly alkaline reaction environment. Samples TL01, TL07, TL09, and SS02 are moderately carbonated; TL04, TL08, and TL10 are slightly carbonated; the remaining samples contain no detectable carbonates. Humus content ranges from 0.245% to 1.447%, indicating low organic matter levels. In terms of electrical conductivity, TL01 is highly saline, TL09 is slightly saline, and the other samples are either low in salinity or non-saline. Available nutrients in the soil are limited:

- Exchangeable phosphorus ranges from 0.25 to 0.83 mg per 100 g of soil; and
- Exchangeable potassium ranges from 5.4 to 13.7 mg per 100 g of soil.

Overall, the soils are classified as having low fertility.

Table E-43 Basic Chemical Properties of Soils

No.	Cross-section ID	Depth, cm	pH _{H2O} (1:2.5)	CaCO ₃ %	Humus %	EC _{2.5} dS/m	Exchangeable, mg/100	
							P ₂ O ₅	K ₂ O
1	TL01	0-5	9.07	3.47	1.020	13.2	0.72	12.9
2	TL02	0-5	8.76	0.00	1.447	0.259	0.83	13.7
3	TL03	0-13	8.88	0.00	0.533	0.100	0.57	11.1
4	TL04	0-3	8.99	1.40	0.881	0.157	0.69	12.5
5	TL05	0-7	8.93	0.00	0.571	0.100	0.62	11.6
6	TL06	0-12	9.00	0.00	0.544	0.074	0.54	10.9
7	TL07	0-6	9.95	4.93	0.365	0.363	0.37	8.1
8	TL08	0-15	9.21	1.52	0.251	0.110	0.30	7.6
9	TL09	0-5	8.45	4.85	0.245	1.062	0.25	5.4
10	TL10	0-10	9.16	1.49	0.425	0.140	0.75	8.4
11	SS01	0-12	8.72	0.00	1.093	0.101	0.34	12.8
12	SS02	0-8	9.49	4.13	0.252	0.170	0.44	7.5

Source: Institute of Geography and Geoecology, Mongolian Academy of Sciences - Laboratory Results of Soil Analysis, July 9, 2025

Heavy Metal Content in Soils

The soil cover along the Sainshand-Tsagaan Suvarga transmission line corridor and around the Sainshand substation construction site remains in its natural state, unaffected by human activity or technical disturbance. During field survey, surface soil samples (0-5 cm depth) were collected from 10 representative points along the transmission line and 1 point at each substation site to determine heavy metal concentrations.

Table E-44 Location information of soil heavy metal sampling points

Soil sample ID	Coordinates, WGS-84		Altitude, mASL	Location
	N	E		
SS01	44.92543°	110.19598°	1006	Undisturbed site at the Sainshand substation construction area
SS02	43.88312°	108.33792°	959	Undisturbed site near the Tsagaan Suvarga substation area

Soil sample ID	Coordinates, WGS-84		Altitude, mASL	Location
	N	E		
TL01	44.85095°	110.13656°	894	Undisturbed site at approximately 11 km along the transmission line corridor
TL02	44.78708°	109.9439°	1000	Undisturbed site at the turning point near 28 km along the corridor
TL03	44.70485°	109.83598°	998	Undisturbed site at approximately 40 km along the corridor
TL04	44.63175°	109.74007°	990	Undisturbed site at approximately 52 km along the corridor
TL05	44.53861°	109.69241°	1007	Undisturbed site at approximately 63 km along the corridor
TL06	44.43496°	109.55748°	864	Undisturbed site at approximately 79 km along the corridor
TL07	44.30694°	109.33652°	811	Undisturbed site at approximately 102 km along the corridor
TL08	44.22678°	109.11714°	849	Undisturbed site at approximately 120 km along the corridor
TL09	44.09821°	108.77254°	851	Undisturbed site at approximately 153 km along the corridor
TL10	44.03825°	108.42291°	910	Undisturbed site at approximately 182 km along the corridor

The results of laboratory analysis conducted by ALS Group LLC on the soil samples were compared against the permissible limits (PL) for sandy loam soils as defined in the MNS 5850:2019 standard (Soil Quality - Maximum Permissible Concentrations of Soil Pollutants). The consolidated data are presented in the following table.

Table E-45 Laboratory Results of Heavy Element Analysis in Soil Samples

Element	Unit	SS01	SS02	TL01	TL02	TL03	TL04	TL05	TL06	TL07	TL08	TL09	TL10	MNS 5850:2019		
														Permissible Level	Toxic Level	Hazardous Level
Ag	ppm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			
Al	%	1.83	2.38	1.28	1.92	0.98	2.13	1.16	1.1	1.31	1.06	2.57	1.86			
As	ppm	6	9	10	11	8	15	9	5	9	7	10	14	10	50	100
B	ppm	10	10	40	10	10	10	10	10	10	10	30	10	15	100	300
Ba	ppm	100	80	80	100	70	120	100	140	240	100	180	120			
Be	ppm	1.1	0.8	0.9	1.1	0.6	1.1	0.6	0.7	0.8	0.6	1	0.8			
Bi	ppm	<2	<2	<2	<2	<2	2	<2	<2	<2	<2	<2	<2			
Ca	%	0.42	4.03	1.11	0.55	0.25	0.91	0.62	0.45	2.27	1.25	4.91	2.63			
Cd	ppm	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	10	20
Co	ppm	7	17	7	7	6	13	8	7	6	7	10	11	30	500	1000
Cr	ppm	19	27	15	22	16	34	27	16	14	17	26	32	60	400	1500
Cu	ppm	13	162	11	15	9	29	16	12	11	10	24	31	60	500	1000
Fe	%	1.82	4.45	1.47	1.94	1.38	2.99	2.17	1.37	1.38	1.52	2.2	2.87			
Ga	ppm	10	10	<10	10	<10	10	<10	<10	<10	<10	10	10			
Hg	ppm	<1	<1	1	<1	1	1	1	<1	1	1	<1	<1	0.5	10	20
K	%	0.33	0.19	0.23	0.34	0.18	0.41	0.2	0.18	0.16	0.19	0.66	0.38			
La	ppm	20	20	20	20	20	20	20	20	20	20	20	20			
Mg	%	0.53	1.42	0.44	0.59	0.34	0.9	0.52	0.38	0.43	0.41	0.93	0.88			
Mn	ppm	390	794	445	366	331	632	417	537	503	354	404	500			

Element	Unit	SS01	SS02	TL01	TL02	TL03	TL04	TL05	TL06	TL07	TL08	TL09	TL10	MNS 5850:2019		
														Permissible Level	Toxic Level	Hazardous Level
Mo	ppm	<1	1	1	1	<1	1	1	<1	1	<1	1	1	5	20	50
Na	%	0.01	0.06	0.56	0.01	0.01	0.02	0.01	0.01	0.08	0.02	0.05	0.02			
Ni	ppm	12	22	11	15	13	25	19	10	8	9	19	19	150	1000	1800
P	ppm	390	730	410	370	280	770	350	310	530	350	360	420			
Pb	ppm	12	6	10	11	8	14	9	8	11	9	10	10	100	500	1200
S	%	0.02	0.01	0.43	0.03	0.02	0.02	0.01	0.01	0.02	0.01	0.45	0.02			
Sb	ppm	<2	<2	<2	<2	<2	<2	2	<2	<2	<2	<2	<2			
Sc	ppm	3	13	3	3	2	6	3	2	3	2	5	5			
Sr	ppm	51	150	109	58	32	67	33	48	118	72	249	102	800	3000	6000
Th	ppm	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20			
Ti	%	0.02	0.03	0.02	0.02	0.02	0.03	0.04	0.02	0.01	0.03	0.01	0.04			
Tl	ppm	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10			
U	ppm	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10			
V	ppm	28	141	22	33	24	53	45	31	32	34	44	61	150	600	1000
W	ppm	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10			
Zn	ppm	43	86	38	41	31	69	42	28	27	30	44	51	300	600	1000

Source: ALS LLC - Laboratory Analysis Results, July 6, 2025

Note: 1 ppm = 1 mg/kg

Evaluation of Soil Heavy Metal Concentrations Against MNS 5850:2019 Standards

The laboratory results were assessed in comparison with the permissible limits (PL) specified in the MNS 5850:2019 standard (Soil Quality - Maximum Permissible Concentrations of Soil Pollutants). The findings indicate the following exceedances:

- Arsenic (As): Samples TL02, TL04, and TL10 exceeded the PL by 1–4 mg/kg
- Boron (B): Samples TL01 and TL09 exceeded the PL by 15–25 mg/kg
- Copper (Cu): Sample SS02 exceeded the PL by 102 mg/kg
- Mercury (Hg): Samples TL01, TL03, TL04, TL05, TL07, and TL08 showed elevated levels, exceeding the PL by 0.5 mg/kg

All other heavy metal concentrations remained within the permissible limits defined by MNS 5850:2019.



Figure E-5 Concentrations of Some Heavy Metals in Soil

Conclusions

Along the route of the Project OHTL route between Sainshand and Tsagaan Suvarga, at the sites of the Sainshand and Tsagaan Suvarga substations, various soil subtypes have been identified. These include four subtypes of brown soils in semi-desert conditions, four subtypes of light brown soils in semi-desert conditions, and one subtype of gray-brown desert soil. The average thickness of the upper soil layers ranges from 3 to 15 cm. Laboratory analysis reveals humus content between 0.245% and 1.447%, mobile phosphorus ranging from 0.25 to 0.83 mg per 100 g of soil, and mobile potassium from 5.4 to 13.7 mg per 100 g of soil. These findings indicate a generally low level of soil fertility.

The physical properties of the soil consist of brittle sandy and loamy textures. Due to natural conditions and the arid climate of Mongolia's Gobi and desert regions, the soil has commonly developed hardened and compacted or pavement layers. Along the route of the Project OHTL, a hardened or pavement layer up to 1 cm thick has formed, with the surface covered in stones. This stony surface has a beneficial effect, helping to prevent erosion of the brittle, low-moisture desert soil caused by strong winds and aiding in moisture retention. Compared to clay soils, sandy soils are more vulnerable and easily degraded by natural forces, human activity, and technical interventions.

The concentrations of 35 elements in the soils were determined and compared with the Maximum Permissible Concentration (MPC) levels for 13 elements outlined in the MNS 5850:2019 standard. The results show elevated levels in several samples: arsenic (As) exceeded the standard by 1–4 mg/kg in samples TL02, TL04, and TL10; boron (B) exceeded by 15–25 mg/kg in TL01 and TL09; copper (Cu) reached 102 mg/kg in sample SS02; and mercury (Hg) exceeded by 0.5 mg/kg in samples TL01, TL03, TL04, TL05, TL07, and TL08. The concentrations of other elements did not surpass the hazardous levels specified in the standard.

Appendix F Household Survey Questionnaire

Project Household Level

Household survey (HHS) form for household representatives identified as owning, leasing or regularly using land, property and assets within project AOI, footprint, or otherwise directly impacted by the project.

Form N°: _____ Date: ____ / ____ / ____ Time: from ____ to ____

Name of Interviewer _____ Place _____

Characteristics of the resident representative

Age:	Sex (F/M):
Marital status:	Number of children: girls / boys
Ethnic group (national):	Other:
Place of origin:	
Date of moving to the locality:	

Composition of the resident's household

	1	2	3	4	5	6	7	8
Name of household members (including respondent)								
Relationship with household head								
Sex								
Age								
Educational level (1) Hasn't graduated from any institution; (2) Primary School; (3) Junior school; (4) High School; (5) Vocational School of Higher Education; (6)								

University; (7) Masters; (8) Doctorate									
Main livelihood activity, if any (1) Crop Farmer, (2) Livestock rearing (3) Crop and Livestock (4) Food processing, (3) Trader, (4) Services (5) Business (6) Student, (7) Mining, (8) Not working / Retired, (9) Unemployed, (10) Other (specify)									
Other livelihood activities if any	N° 1								
	N° 2								

Vulnerable members of the household

(Describe condition of vulnerable household members):

1.3.1 Name: _____ Sex: ____ Age: ____ Relationship to respondent: _____ Nature of vulnerability: _____

1.3.2 Name: _____ Sex: ____ Age: ____ Relationship to respondent: _____ Nature of vulnerability: _____

1.3.3 Name: _____ Sex: ____ Age: ____ Relationship to respondent: _____ Nature of vulnerability: _____

1.3.4 Name: _____ Sex: ____ Age: ____ Relationship to respondent: _____ Nature of vulnerability: _____

Note: EBRD define vulnerable persons as people who, by virtue of gender identity, ethnicity, age, disability, economic disadvantage or social status may be disproportionately impacted by projects

Property type(s) and Utilities

		Location	Tenure status of property
Property Type(s)	Summer camp		
	Winter camp		
	House		
	Other		
Sources of	Water (e.g. well, bottled etc)		
	Energy (electricity, solar, dung, portable gas, firewood etc)		
	Waste Disposal		

Summary of other household structures held and used

Total area of structures held / used in total (m2)	What are these structures used for?	Tenure status of structures

Summary of household land held or used and land holding and use

Total area of land held / used (m2) (across all plots held)	Land uses on total area of land used / held	Tenure status for area of land held or used	Summer and-or winter camps? (if so, in registered areas?)
	Proportion grazing Proportion crops Proportion other		
Herders and Grazing			
Total number of herd?			
Number of herd by type?			
Distance travelled to summer camp?			
Please add.....			

Summary of all household livelihood sources and losses

All types of livelihood source within household	Respondent's total estimated monthly income or equivalent value from all livelihood source	Respondent's estimated monthly income loss or equivalent value loss from livelihood sources because of land loss or access loss due to the project (if any)
Pastoral:		
Crop:		
Business / Trading:		
Leasing:		
Monthly child allowance:		
Bonuses for agricultural products:		
Other:		
	Total:	Total:

Summary of all household livelihood expenditures

All types of household expenditure	Respondent's total estimated monthly expenditure
Food	
Electricity, gas, other fuel	
Waste disposal	
Transport and fuel	
Education	
Health	
Other	
	Total:

Summary of household community cultural / intangible assets

GPS location / Location reference if relevant	Type and nature of the significance of an asset, resource or value that is culturally (rather than economically) important to the respondent and their life (e.g. land, monument, community centre, place of worship, cultural heritage site, graves, sacred areas, natural resource (access to fishing, communal area etc)	No. / m2 if relevant
	What cultural and spiritual intangible heritages does your community have?	

Respondents view on tangible heritage in the project area

Question	Response
What aspects/things are considered as cultural heritage to you in the Project Area?	
From whom have you found out about these things? From relatives From school or informal local training Other	
Are there any cultural heritage or memorials in the study area that you consider require protection? (where/ why)	

Question	Response
Do you have any questions about the project? (If 'yes' and you can't answer their question, record it, and tell them you will find out an answer)	
What are your expectations of the project?	
Specifically, how do you feel the project could affect you or the community's... (a) Economy and employment? (b) ...Infrastructure, including energy availability? (c) ...Land, animals or housing? (d) ...Mental and physical health? (e) ...Harmony, culture or leisure? (f) ...Visual outlook or background noise? (g) ...Authority and criminal activity?	
What do you feel will be the main positive contributions of the project?	
What are the main concerns that you or your community have about the project?	
Do you have suggestions about how these concerns can best be addressed?	
Thank you, do you have any other questions or comments?	

Appendix G Household Survey Results

Respondents profile

All households covered in the survey are located Sainshand and Saikhandulaan soum of Dornogovi aimag. Sainshand 1st bagh Dalaishand, 2nd bagh Chandmani, 5th bagh Zuunbayan and 6th bagh Kairkhan's 10 households participated in the survey. All of households are herder households.

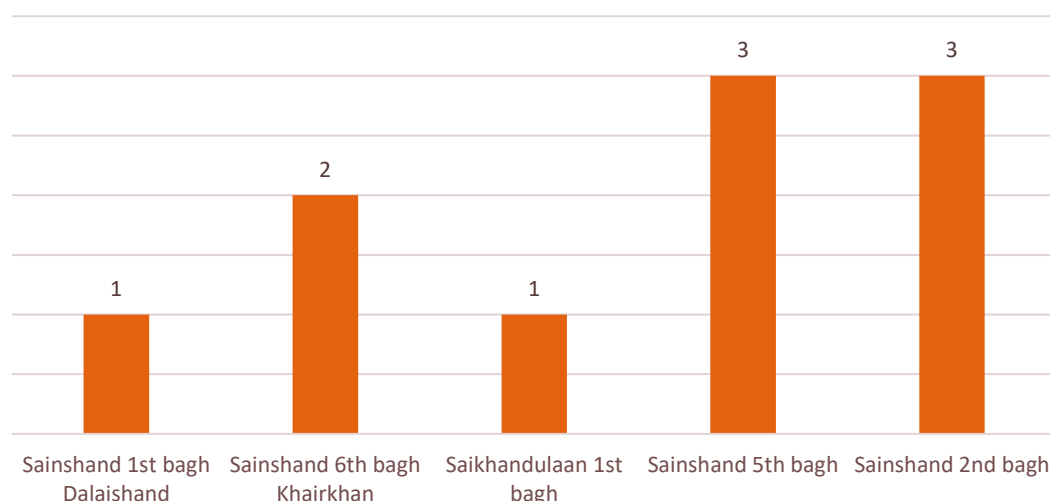


Figure G-1. Surveyed households' information, by bagh

A total of two households were migrants¹, the other eight were locals².

Table G-46 Households' migration profile

Bagh	Number of households		Total	
	Migrant	Resident	Number of households	Percentage
Sainshand 1 st bagh Dalaishand	0	1	1	10.0
Sainshand 6 th bagh Khairkhan	0	2	2	20.0
Saikhandulaan 1 st bagh	1	0	1	10.0
Sainshand 5 th bagh	1	2	3	30.0
Sainshand 2 nd bagh	0	3	3	30.0
Total	2	8	10	100.0

Half the respondents were heads of households; half of respondents were the spouse (wife/husband) of the head of the household. This means all respondents were in a position to represent their households.

Half the respondents were male, and nine respondents were above 26 years of age. The average age of survey respondents was 47 years old and most of respondents age was more than 45 years old. Three respondents were elderly, or people who are 55 and over aged people.

¹ Households which moved from other soums to these soum

² Those who are born and live in these places

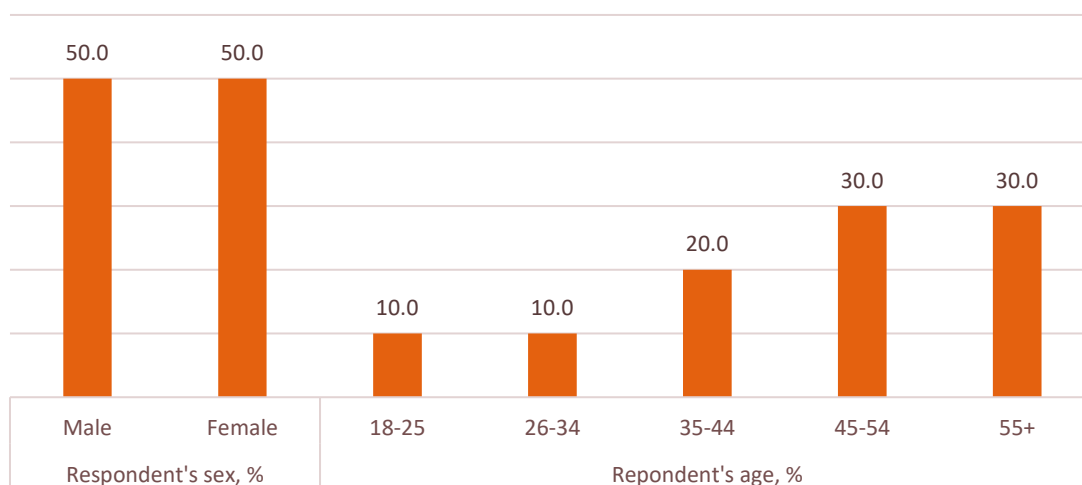


Figure G-2. Respondents' age and sex, %

Eight respondents have finished 10th or 12th grade and two have completed technical and vocational education level.

Four of the surveyed households have 3-5 members, and four have 5 or more members. On average the households have 4 members (4.2 people per household). Two of the households have vulnerable group people, all of them elderly people.

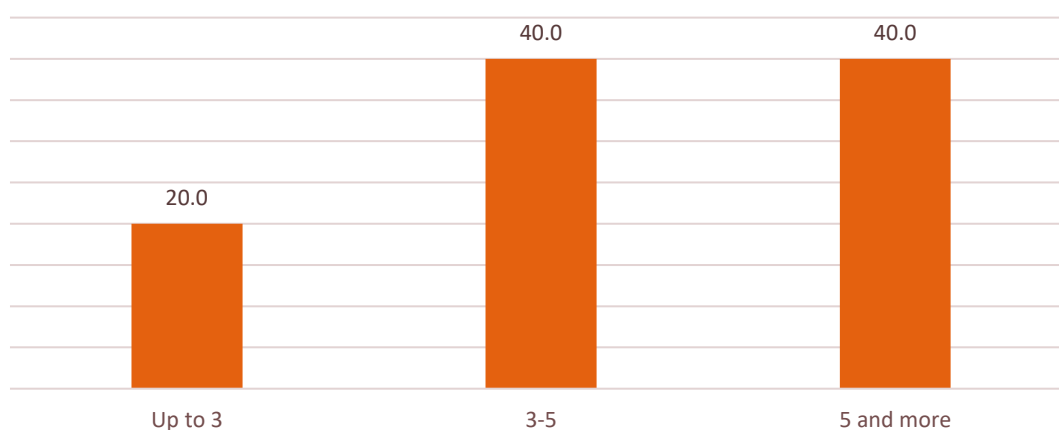


Figure G-6 The number of household members, %

The household survey determined the respondent's marital status and religion. Nine respondents were married and one was a single parent.

Three respondents are Buddhist, seven answered no religion.

All of the respondents confirmed their ethnicity is Khalkh.

Migrant households' profile: As mentioned above, two households were migrant households who came from other soums. One of the migrant people settled in Saikhandulaan soum's 1st bagh, one is Sainshand soum 5th Zuunbayan bagh. The households have been living at the current location for more than 3 years. Migrant households have on average 2-3 people.

Social condition of households

Type of housing and some social indicators

Nine of the survey respondents live in a ger, with one respondent living in a house. The respondent who lives in a house is from Sainshand 2nd Chandmani bagh.

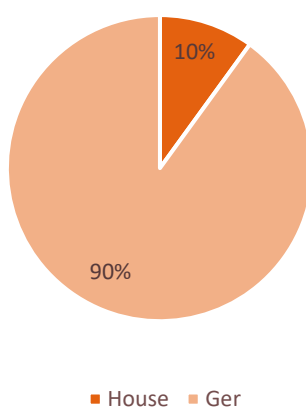


Figure G-4. Type of housing

Respondents defined distance between their winter and summer camps. The average distance between winter and summer camp is 2.3 km. Shortest is 0.5 km, and the farthest is 7 km.

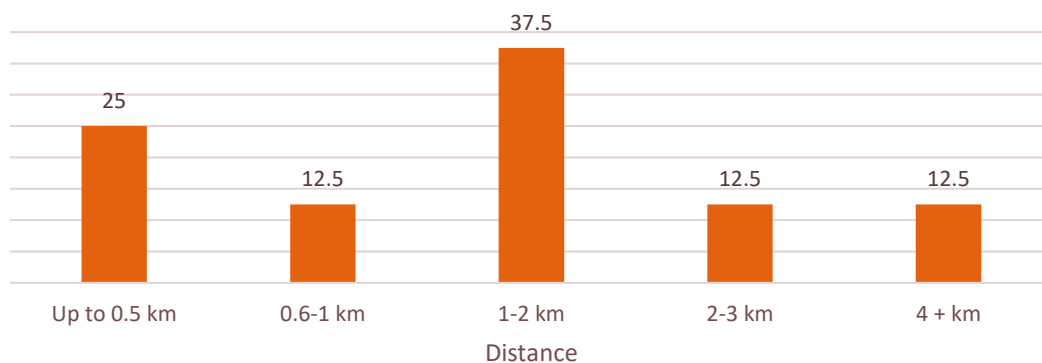


Figure G-5. Distance between winter and summer camp, %

A total of one household has no car, four households have one car and five households have more than 2 cars. A total of five households has refrigerators/freezers and five have none. All of the surveyed households have solar panels. A total of eight households has no washing machine, while six households have TV sets.

Table G-2. Social indicators of households

Some social indicators	Number of items			
	1	2	3 and more	None
Car/light vehicle, truck	4	4	1	1
Motorcycle	8	1	-	1
Refrigerator/Freezer	4	1	-	5
Washing machine	2	-	-	8
Solar panel	8	1	1	-
TV set	6	-	-	4

All of the surveyed household have livestock. They have five types of the livestock. Half of the surveyed households have up to 200 head livestock, with three households having more than 500 head livestock.

Table G-3. The number of Livestock, identified by respondents

Number of livestock	Number of households	Percent
Up to 200	5	50.0
200-500	2	20.0
500+	3	30.0
Total number of households	10	100.0

Water and electricity source

Seven households use a public well; three households use a private well for their water source. Six households do not use separate wells for drinking water and watering livestock. In other words, they use the same well for both purposes. Four households use different types of the water source their drinking and watering livestock.

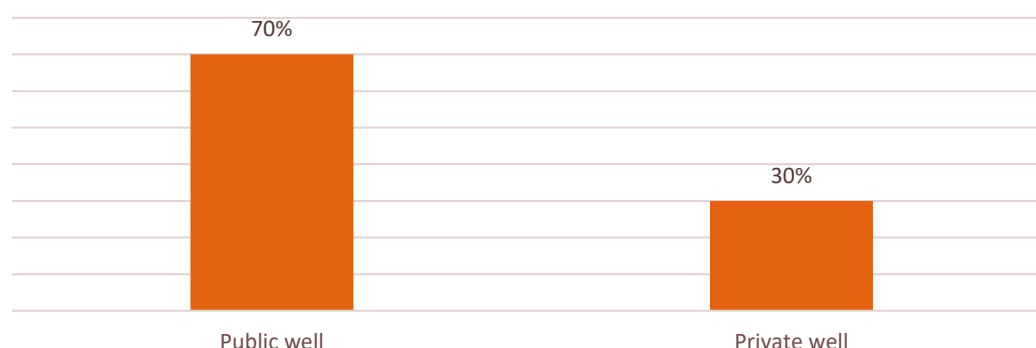


Figure G-6. Sources of water, %

According to the six respondents who use the same water source for both drinking and watering livestock, the average distance to the nearest well is 1.6 km, with the closest well located 0.1 km away and the farthest at 3 km.

Four households reported using separate water sources for drinking and for livestock watering. According to their responses, the average distance to the drinking water well is 8.2 km, with the closest well located 5 km away and the farthest at 15 km. For livestock watering, the average distance is 4.8 km, with the nearest well at 4 km and the farthest at 5 km.

Table G-4. Water source distance, km

Distance to well	Households that use the same water source, km	Households that use the different water source, km	
		Drinking	Livestock watering
Nearest	0.1	5	4.8
Farthest	3	15	4
Average	1.6	8.2	5

The household survey identified the methods of waste disposal and the locations where waste is typically discarded. Six households use proper waste disposal via the central landfill. Households dispose of their waste at the central landfill located in either the soum or aimag centre. They collect and store the waste, then typically transport and dump it once a month.

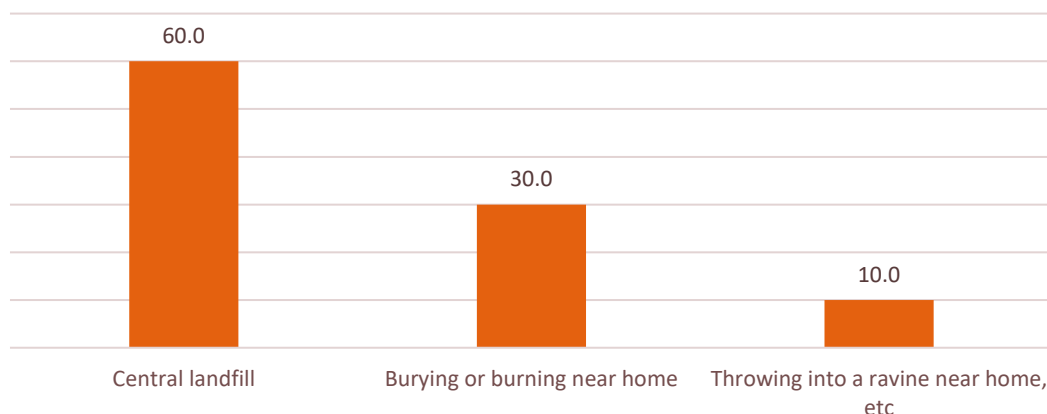


Figure G-7. Household waste disposal practices, %

All respondents reported that the transmission line would not cause any difficulties for watering their livestock.

Land use

A total of 10 surveyed households provided information on the land area they use. Collectively, they utilize 9.8 hectares for both residential living and livestock grazing.

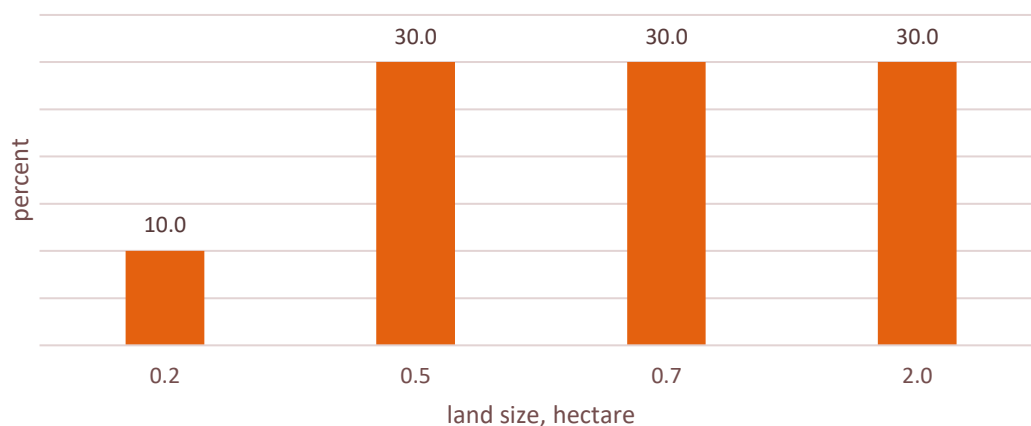


Figure G-8. Using land size of surveyed households

Among the surveyed households, four HHs have up to 0.7 hectares of land, three households have exactly 0.7 hectares, and another three households have 2.0 hectares each. Regarding land tenure status, two households own the land, seven possess it, and the remaining one household uses it without formal ownership.

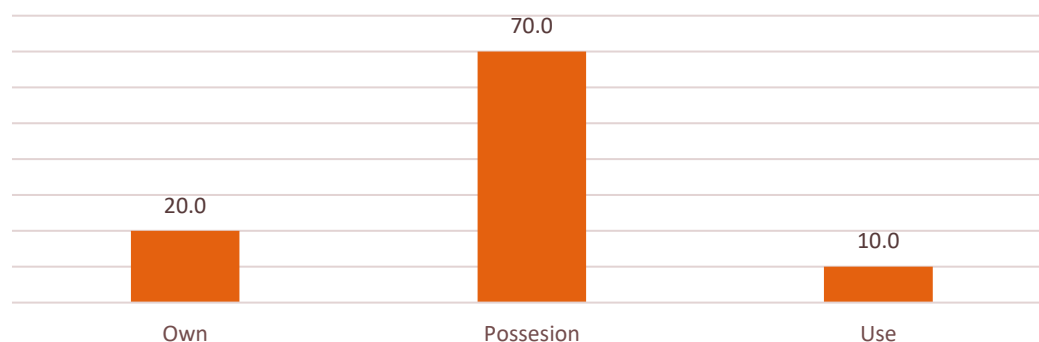


Figure G-9. Land tenure status of households, %

During the survey, we asked about the main purpose of land use around high-voltage overhead transmission lines. Eight households use this land for livestock grazing, one for residential purposes, and one for wells. All households use this area year-round.

Table G-5. Purpose and frequency of use of the land around high-voltage overhead transmission lines

Purpose of use of the land around high-voltage overhead transmission lines	Frequency	Percent
Livestock grazing	8	80.0
Living/residential	1	10.0
Well	1	10.0
Total	10	100.0

Income and expenditure status

As Figure G-10 below shows, income from sale of livestock and livestock products is the main income source for the majority of surveyed households. According to the households' answers, the second main source of household income is pension income, then welfare allowance.



Figure G-10. Household income source type, %

The majority of the respondents have two or more income sources, such as income from sale livestock and animal products, pension.

Table G-6. Household's monthly average income by source

Source type	Number of households	Average income, thousand MNT
Pension	5	863.8
Sale of livestock and livestock products	10	2007.0
Welfare allowance /child money	4	209.0
Wage/salary	1	2000.0

According to the household survey, participants reported their monthly income sources and amounts. Five households receive pension income, with an average of 863,800 MNT. Four households benefit from welfare allowances and child support, averaging 209,000 thousand MNT. All households earn income from the sale of livestock and livestock products, with an average of 2,007,000 MNT.

Four households have up to 1-2 mln. MNT monthly income. Two households have an income ranging from 2 mln MNT to 2.5 mln. MNT. Four households have monthly average income more than 2.5 mln. MNT and more.

Table G-7. Monthly average income size

	Frequency	Percent
1.0-2.0 mln MNT	4	40.0
2.0-2.5 mln MNT	2	20.0
2.5+ mln MNT	4	40.0
Total	10	100.0

According to the household survey, participants reported their monthly expenses by type and amount. The surveyed households' average monthly food cost is 460,000 MNT. Three households have electricity expenses, with an average amount of 340,000 MNT. Eight households reported transport-related costs, such as fuel oil etc., expenses, with an average of 741,300 MNT. Seven households spend an average of 285,700 MNT per month on healthcare and medical services. Additionally, four households have education-related expenses, averaging 285,700 MNT per month.

Table G-8. Household's monthly average cost by type

Cost type	Number of households	Average cost, thousand MNT
Food	10	460.0
Electricity	3	340.0
Transport	8	741.3
Education	4	262.5
Health	7	285.7
Other	4	405.0

According to the survey, two households have monthly expenses of up to 0.5 million MNT. Three households have monthly costs ranging from 0.5 to 0.99 million MNT. Two households report monthly expenses between 1.0 and 1.99 million MNT. Meanwhile, three households have average monthly expenses exceeding 2.0 million MNT.

Table G-9. Monthly average cost size

	Frequency	Percent
Up to 0.5 mln MNT	2	20.0
0.5-0.99 mln MNT	3	30.0
1.0-1.99 mln MNT	2	20.0
2.0-2.99 mln MNT	1	10.0
3.0 and more mln MNT	2	20.0
Total	10	100.0

Regarding local cultural heritage, respondents mentioned Choilin Mountain and Monastery, Khaalga Mountain, Khaalga Spring, and Khamar Monastery. Khamar Monastery is known as a significant cultural heritage in Mongolia. In addition, other natural and historical sites—including mountains, springs, and monasteries—are also considered cultural heritage by the local population. All respondents reported learning about these cultural heritage sites through oral words passed down from elders.

Main issues faced by household at soum level

The majority of respondents had the same perception about main issues they face in their daily life. The bigger problems nowadays have been identified by respondents as follows:

- health issues of household members – 33.3%
- housing conditions - 33.3%
- insufficient household income/money – 16.7%
- waste issues -16.7%

Most households reported health issues among family members and inadequate housing conditions as major challenges. Additionally, limited household income and few opportunities to earn money for daily needs were identified as significant concerns.

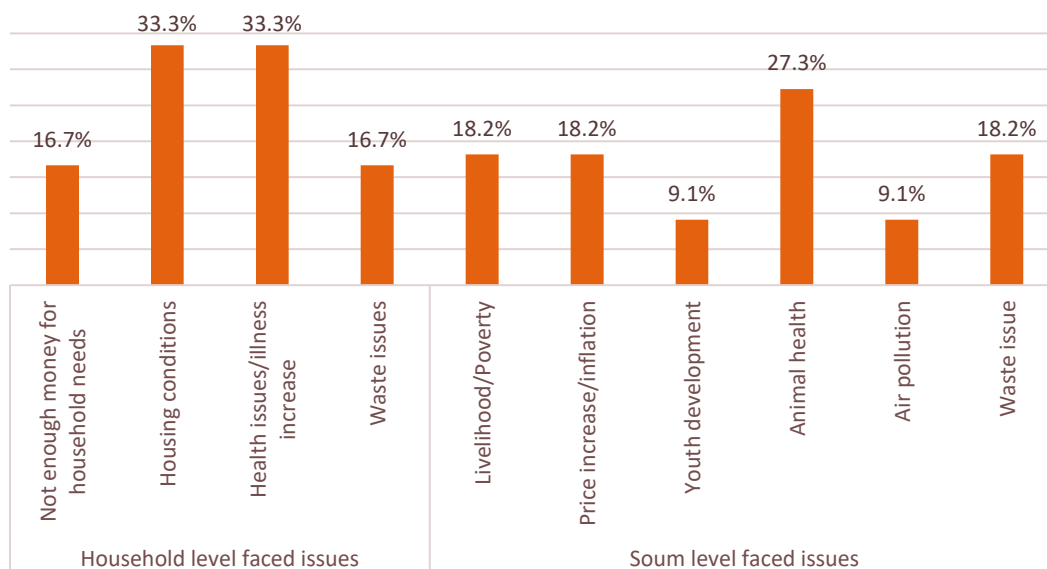


Figure G-7 Main problems facing household level and soum level

At the soum level, respondents noted the following as pressing local issues: animal health problems (27.3%), rising prices (18.2%), waste management challenges (18.2%), and low household livelihoods (18.2%).

Primary information sources

A total of four households reported having information about the project. Among those informed households, the perceived negative impact of the project was considered to be low. Respondents answered that they mostly receive information from their friends, family members, and relatives (50%), and from bagh governors (50.0%).

Project implementation impacts

The respondents were asked about their views regarding the proposed project and its potential impacts on communities, as well as development opportunities at bagh and soum levels. Respondents mentioned the following positive impacts on the local communities:

- Economic development at bagh, soum and aimag level will increase
- Possibility to develop SMEs and increase business diversity
- Social infrastructure may facilities creation and Infrastructure development will improve
- Sufficient energy possibility for local people

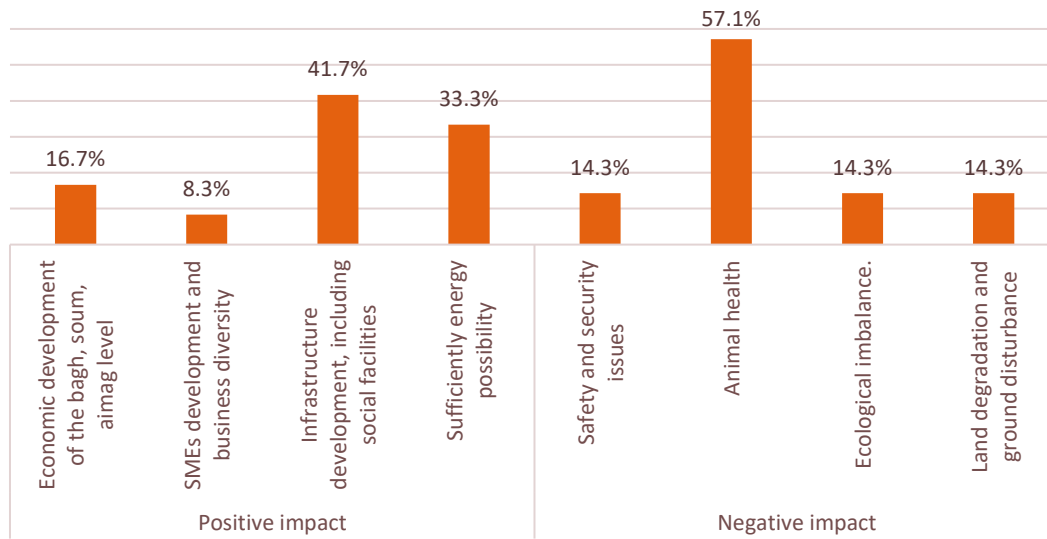


Figure G- 8 Transmission line project's positive and negative impacts

According to the respondents, the project will negatively affect livestock health (57.1%). In addition, respondents of the opinion that land degradation and will increase that is likely to affect livestock health as well as human health.

Survey participants were asked to rate the potential impacts of the proposed transmission line project on a scale from low to high. Six respondents evaluated the potential impact as low, stating that the project is unlikely to cause habitat degradation, loss of natural landscape, pollution, increased dust, soil erosion, accidents during construction, or ecological imbalance.

Respondents suggested the following in order to reduce negative impacts:

- The project should comply with laws, rules, regulations, and standards
- Comply with technological requirements
- Comply with international good experience and practice
- Take reclamation measures and better focused on environment

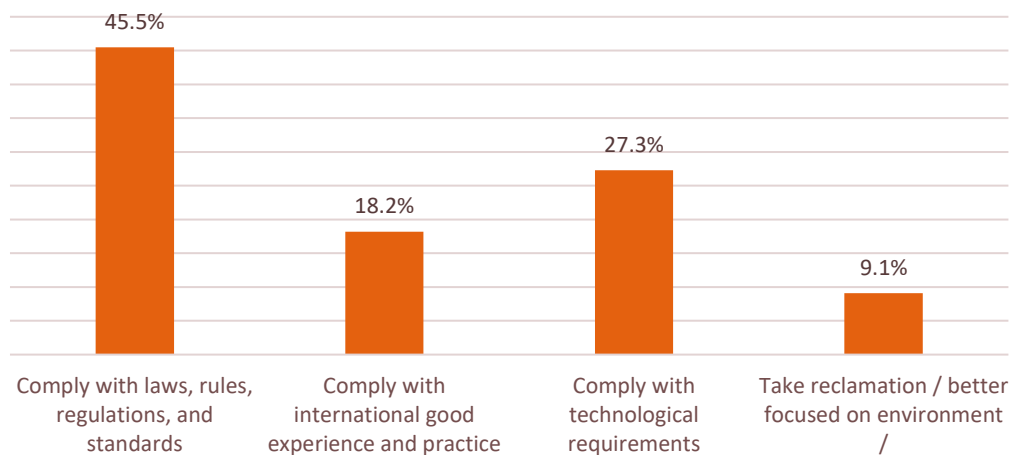


Figure G-9 Activity in order to reduce negative impacts

Five respondents shared the perception that the overhead transmission line project will benefit households, the bagh, and the soum. The other five respondents believe the project will primarily improve efficiency for the implementing company.

Appendix H Photos of Household Survey Camps and Assets



HH01 Winter camp. Sainshand soum, distance from OHTL 200m. Herder moved to Dalanjargalan soum to settle there.



HH02 Winter camp. Sainshand soum, Chandmani bagh, 100m distance from OHTL.



SCSWS01 Summer camp Sainshand soum, Chandmani bagh, distance 500m



HH03 Winter camp. Sainshand soum, Chandmani bagh. Distance 200m.



SCSWS02 Summer camp Sainshand soum, Chandmani bagh, distance 600m



HH04 Winter camp. Sainshand soum. Chandmani bagh. Distance 800m



HH05 Winter camp. 900m distance from OHTL, Sainshand soum, Dalaishand bagh.



HH06 Winter camp. Sainshand soum, Dalaishand bagh, distance – 700m.



HH07 Winter camp. Sainshand soum, Khairkhan bagh, Distance 600m.



HH07 Winter camp. Sainshand soum, Khairkhan bagh. Distance 600m.



SCSWS03 Summer camp Sainshand soum, Khairkhan bagh. Distance 200m



HH08 Winter camp. Sainshand soum, Khaikhan bagh. Distance 200m.



SCS02 Autumn camp Sainshand soum, Khairkhan bagh, 1000m distance. Empty.



HH09 Winter camp. Sainnshand soum, Khairkhan bagh, 600m distance.



HH10 Winter camp. Sainshand soum, Zuunbayan bagh. Distance 200m.



HH 11 Winter camp. Sainshand soum, Zuunbayan bagh, distance 500m.



Part of HH12 Herder's fence. Sainshand soum, Zuunbayan bagh. Distance 100m.

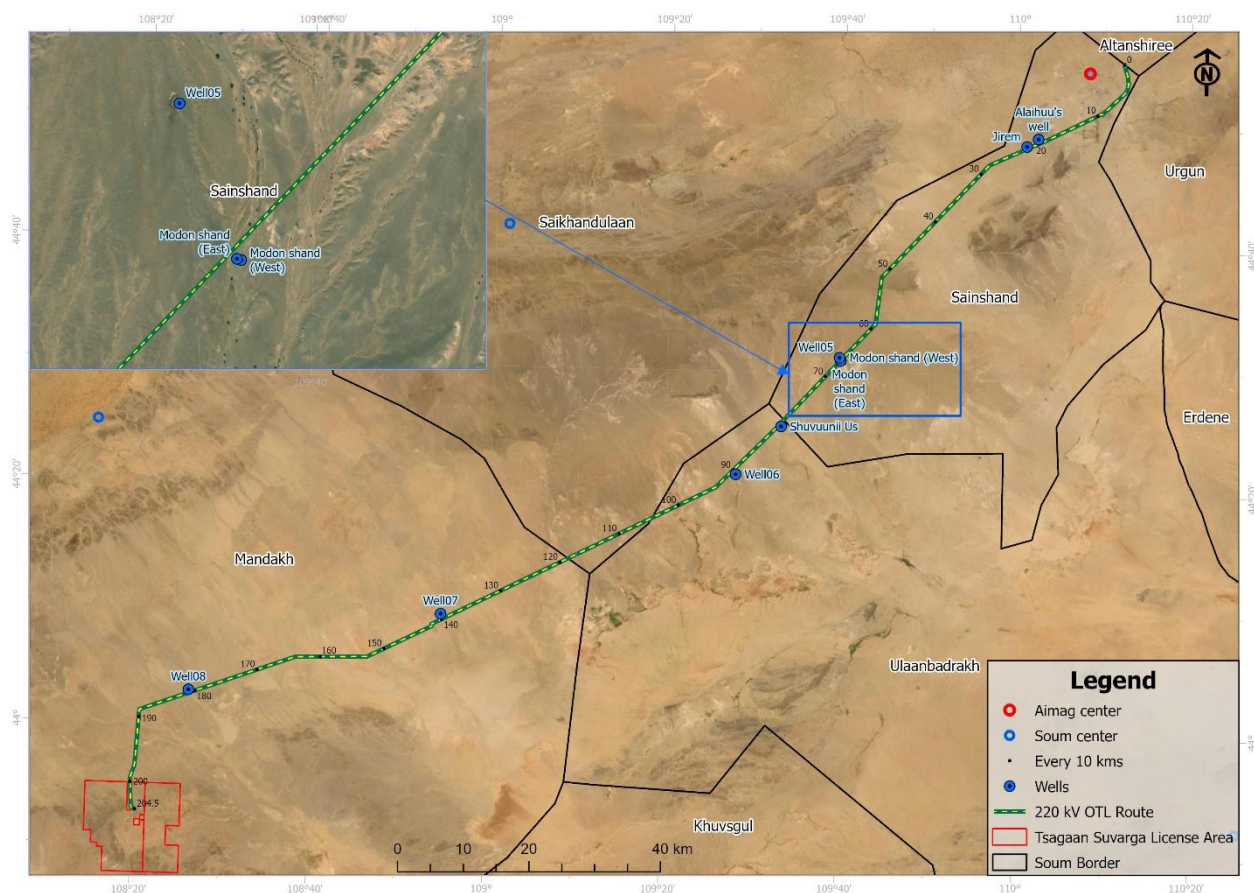


Part of HH12 winter camp and camel fence. Sainshand soum, Zuunbayan bagh, distance 100m.



SCSWS04 Summer camp distance 1100m, not interviewed. Ulaanbadrakh soum, Agralant bagh

Appendix I Photos of Wells



Location of wells along the SSTS OTL route

Table I.47 Location information of wells marked around the study area

Well #	Coordinate		Elev, m	Sample	Well type
	N	E			
Well01	44.81299	110.01580	953 m	Yes	Simple mine well - Drinking water and livestock.
Well02	44.51672	109.66397	959 m	No	Simple mine well - Drinking water and livestock.
Well03	44.51675	109.66381	960 m	Yes	Simple mine well. Use - Unknown- Site owner was not present at the time of the survey.
Well04	44.52088	109.66157	973 m	No	Drilled - Drinking water and livestock
Well05	44.425652	109.55187	842 m	Yes	Drilled Use - Unknown- Site owner was not present at the time of the survey.

Well #	Coordinate		Elev, m	Sample	Well type
	N	E			
Well06	44.35902	109.46652	825 m	No	Drilled - Use - Unknown- Site owner was not present at the time of the survey.
Well07	44.15948	108.91027	859 m	No	Drilled - Use - Unknown- Site owner was not present at the time of the survey.
Well08	44.04614	108.43514	902 m	No	Unknown- Site owner was not present at the time of the survey.
Well09	44.82330	110.03775	Unknown	No	Drilled - Use - Unknown- Site owner was not present at the time of the survey.

Well01: Simple mine well, In August 2023, residents jointly hand-dug a well. It is used year-round for drinking water and livestock needs. Oyu The water yield of the well depends on the amount of annual precipitation.



Photo I.21 Well01

Well02/03: **Used** for drinking water and for watering livestock. Drawing 3 tons of water from the well causes it to dry up, but it recovers after 12 hours. The household alternates between two wells to manage usage. Only one well shown below.



Photo I.22 Well 02/03 (2025.06.25)

Well04: As the wellhead was sealed and the owner was not present at the time of the survey, the field team made efforts to locate them and waited for a period. However, no one appeared, and as a result, no measurements or sampling could be carried out.



Photo I.23 Well04

Well05: Following prior damage, the well was rehabilitated in 2013 and has remained in continuous use since then. It serves as a reliable source of drinking water and livestock supply for several households throughout the year. Notably, the water quality has remained consistently clear, with no reported instances of turbidity.



Photo I.24 Well05

Well06: As the wellhead was sealed and the owner was not present at the time of the survey, the field team made efforts to locate them and waited for a period. However, no one appeared, and as a result, no measurements or sampling could be carried out.



Photo I.25 Well06

Well07: As the wellhead was sealed and the owner was not present at the time of the survey, the field team made efforts to locate them and waited for a period. However, no one appeared, and as a result, no measurements or sampling could be carried out.



Photo I.26 Well07

Well08: As the well shed was locked and the owner was absent at the time of the survey, the field team attempted to locate them and remained on-site for a period, particularly as several camels were observed waiting at the well for water. However, no one arrived, and therefore, no measurements or water sampling could be conducted.



Photo I.27 Well08

Well09: Due to the well being locked and inaccessible during the site visit, the field team was unable to perform sampling activities.



Photo I.28 Well09

Appendix J Climatic Conditions

Main meteorological and climatic indicators

Research Methodology

The SSTS OTL route passes through the territories of Sainshand, Ulaanbadrakh, Saikhandulaan, and Mandakh soums, and reaching the substation located next to Tsagaan Suvarga mine. The total length of the transmission line between its start and end points is approximately 204 km. The climatic description of the project area is based on long-term observational and measurement data from the meteorological stations in Sainshand and Mandakh, as well as the meteorological post in Saikhandulaan.

The Sainshand meteorological station, one of Mongolia's primary reference stations, was established in 1938. It is located at 44°54' N latitude and 110°07' E longitude, at an elevation of approximately 959 meters above sea level. The Mandakh station was established in 1973 and is situated at 44°24' N latitude and 108°14' E longitude, at an elevation of 1305 meters. The Saikhandulaan meteorological post was established in 1985 and is located at 44°38' N latitude and 109°03' E longitude, at an elevation of 1260 meters above sea level.

Since meteorological posts are operated by a single staff without shifts, observations and measurements are often interrupted. Additionally, measurements are conducted only three times per day during daylight hours, which limits the accuracy and completeness of climatic data. In contrast, meteorological stations perform eight observations per day at three-hour intervals and measure a wider range of parameters than posts. Therefore, in preparing the climatic description of the project area, data from the Sainshand and Mandakh meteorological stations in Dornogovi province were used as the primary sources, supplemented by available indicators from the Saikhandulaan meteorological post.

In conducting the study, actual observational data from the past 30 years (1995-2024) were collected from the selected meteorological stations and posts, focusing on key meteorological parameters and phenomena. Various statistical indicators such as averages, maxima, minima, and amplitudes were calculated, and relevant conclusions were drawn. To assess temporal changes in the observed phenomena and parameters, the study employed a comparative method using the World Meteorological Organization's standard climate normal (1991-2020 average) and other reference periods. For identifying long-term trends and variability in precipitation and temperature, data from the year of establishment of each station were utilized. Microsoft Excel was used for statistical calculations, while scientific software such as Origin and SigmaPlot were employed to create graphs and diagrams. For instance, the annual distribution of subsurface soil temperature was visualized using kriging interpolation techniques.

Additionally, since solar radiation measurements are conducted only at the Sainshand station, this subsection of the study was based solely on data from that station.

Survey results

Solar Radiation Regime

The solar radiation characteristics and illuminance patterns for the project area have been derived based on recorded measurement data from the "Sainshand" meteorological station. The project site is situated within one of Mongolia's most resource-rich zones for both solar and wind energy potential.

Table J-1 Solar radiation characteristics of the Sainshand station

Parameter	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Solar radiation (hours)	217.8	219.0	274.8	277.2	308.7	308.9	311.0	286.7	282.9	263.9	219.0	203.2	3173.1
Q, MJ/m ²	219.5	314.4	496.1	619.6	724.5	705.5	677.5	605.6	523.0	385.0	242.2	188.7	5701.6
S', MJ/m ²	143.0	210.0	318.0	381.0	447.0	438.0	412.0	388.0	367.0	265.0	164.0	129.0	3662.0
D, MJ/m ²	76.5	104.4	178.1	238.6	277.5	267.5	265.5	217.6	156	120	78.2	59.7	2039.6

Table J-1 presents the monthly and annual totals of sunshine duration and solar radiation characteristics measured in the vicinity of Sainshand.

Sunshine duration is largely influenced by the region's latitude, horizon obstruction, and cloud cover. In Mongolia, where 230-260 days per year are typically clear, the annual sunshine duration ranges from 2,600 to 3,300 hours, with an average of 8-9 hours of sunshine per day. During December, when the solar elevation is lowest, sunshine lasts about 5-7 hours per day, while in June, when the solar elevation is highest, it reaches 9.0-10.5 hours per day (Jambajamts, 1989). According to solar radiation observations at the Sainshand station, there are on average about 260 clear days per year, or more than 20 clear days per month. The total annual sunshine duration is 3,173.1 hours, with 269-309 hours in summer months and 203-219 hours in winter months.

Solar radiation that reaches the Earth in parallel, collimated beams from the solar photosphere and within approximately 5° of it is referred to as direct solar radiation (S) (Tsoozol & Erdenesukh, 2003). The annual total of direct solar radiation (S') on a horizontal surface in southern Mongolia, south of 45° latitude, ranges from 3,560 to 3,800 MJ/m², varying by approximately 209-250 MJ/m² per degree of latitude (Jambajamts, 1989). In the vicinity of Sainshand, the annual total of direct solar radiation on a horizontal surface is 3,662.0 MJ/m². It is lowest in winter (129.0 MJ/m² in December) and highest in May (447.0 MJ/m²), when the sun is relatively high and cloudiness and humidity are low. In contrast, although the sun is also high in June and July, increased cloud cover results in lower total radiation compared to May.

Solar radiation that has changed direction after leaving the sun is referred to as diffuse radiation (D). It plays an important role in the thermal regime near the Earth's surface (Tsoozol & Erdenesukh, 2003). At the Sainshand station, the annual total of diffuse radiation is 2,039.6 MJ/m². This value is lowest during the winter season, reaching 59.7 MJ/m² in December when cloud cover is minimal, and highest in May at 277.5 MJ/m².

The sum of direct and diffuse solar radiation received on a horizontal surface is referred to as global solar radiation (Q). At solar radiation monitoring stations, global radiation can be measured directly or calculated by summing the separately measured values of direct and diffuse radiation. During the summer season, cloud cover significantly influences the spatial distribution of global radiation, resulting in variations along latitudinal gradients (Jambajamts, 1989; Tsoozol & Erdenesukh, 2003).

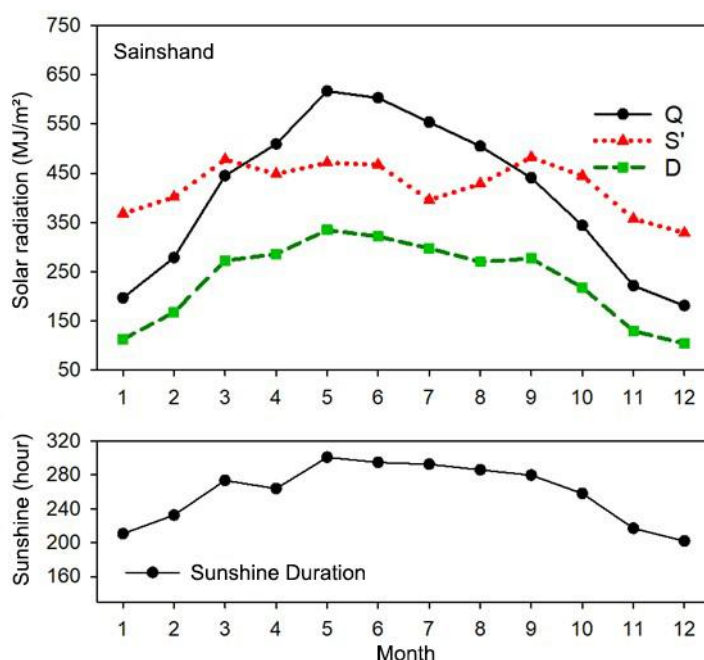


Figure J-1 Solar Radiation Indicators of the Sainshand Station

According to measurements from the Sainshand station, the annual total of global solar radiation is 5,701.6 MJ/m². Its seasonal pattern is similar to that of direct radiation, lowest during the winter months (188.7 MJ/m² in December) and highest in May (724.5 MJ/m²), when the sun is relatively high and cloudiness and humidity are minimal (See Table J-1, Figure J-1).

Cloudiness Regime

In the energy sector, particularly in solar power generation, cloudiness regime is an important parameter in addition to solar radiation. For instance, when cloud cover increases from clear to overcast conditions, electricity consumption tends to rise, which necessitates adjustments in both energy demand management and power generation load balancing.

In the project area, the number of clear days per year ranges from 78 to 125 days under total cloud cover conditions, and from 254 to 270 days under low-level cloud cover. Among the soums, Mandakh has the highest number of clear days, while Sainshand has the lowest (See Table J-2).

Table J-2 Cloudiness Indicators in the Project Area

Station or Post Name	Cloudiness Regime	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Number of Clear Days														
Sainshand	Under total cloud cover conditions	14.0	9.9	8.4	4.3	2.2	1.2	0.8	2.1	5.7	8.7	9.2	11.7	78.2
Mandakh		18.6	14.3	12.9	7.4	5.0	2.7	2.3	5.0	9.9	14.8	15.6	16.7	125.1
Saikhandulaan		15.3	11.6	9.9	5.5	5.0	2.3	2.4	5.8	8.9	12.2	12.9	14.6	106.2
Sainshand	Under low-level cloud cover conditions	29.9	26.6	26.4	22.0	17.3	10.2	8.6	12.0	20.0	25.4	26.8	29.3	254.6
Mandakh		29.5	26.0	27.3	23.9	20.8	12.7	11.8	16.1	21.7	26.7	27.0	28.6	272.1
Saikhandulaan		29.8	29.5	26.2	23.2	18.5	12.1	10.7	15.3	22.0	25.9	28.0	28.6	269.7

Station or Post Name	Cloudiness Regime	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Number of Cloudy Days														
Sainshand	Under total cloud cover conditions	0.5	0.8	1.3	2.6	4.2	5.3	4.8	3.6	2.3	1.4	1.1	1.0	29.0
Mandakh		0.1	0.4	1.1	1.9	1.9	2.7	2.8	2.1	1.2	0.7	0.4	0.5	15.9
Saikhandulaan		0.5	0.9	1.3	1.6	2.5	2.7	2.6	1.7	1.0	0.8	1.0	1.0	17.5
Sainshand	Under low-level cloud cover conditions	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.5	0.1	0.0	0.0	0.0	1.3
Mandakh		0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.4	0.2	0.0	0.0	0.0	1.3
Saikhandulaan		0.1	0.0	0.2	0.2	0.1	0.1	0.6	0.3	0.1	0.1	0.0	0.1	1.8

As for overcast days, the number ranges from 17 to 29 days per year under total cloud cover conditions, and only 1 to 2 days under low-level cloud cover. Among the soums, Sainshand records nearly twice as many overcast days as the other two soums (See Table J-2).

Air Temperature Regime

In the vicinity of the study area, the average annual air temperature norm based on the 1991-2020 climatological baseline currently adopted by the World Meteorological Organization is approximately 4.4 to 5.0°C. Table J-3 presents the 30-year average air temperature values for each soum, which range from 4.6 to 5.2°C.

To assess seasonal and monthly variations in the air temperature regime, the 1991-2020 climate norm was compared with the most recent 30-year average temperatures recorded at meteorological stations and observation posts.

Table J-3 Monthly average air temperature (in °C)

Parameters	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Sainshand station													
T_{Norm-2020}	-17.3	-11.6	-2.1	7.6	15.4	21.7	24.5	22.2	15.4	5.4	-6.3	-15.1	5.0
T₁₉₉₅₋₂₀₂₄	-17.2	-11.6	-1.6	8.0	15.4	21.9	24.7	22.2	15.6	5.6	-6.1	-14.9	5.2
T_{max}	6.8	13.4	24.4	36.4	37.0	40.0	41.8	40.7	37.4	30.3	18.3	6.2	41.8
T_{min}	-40.7	-35.8	-29.9	-22.6	-8.0	1.3	5.9	1.9	-4.5	-17.1	-31.9	-41.4	-41.4
A_{average}	8.1	10.2	11.5	12.2	11.8	10.9	9.9	9.7	10.6	10.8	8.8	7.1	10.1
A_{max}	25.2	27.7	32.4	34.1	32.1	27.7	24.6	24.3	28.3	32.4	30.1	26.5	28.8
Mandakh station													
T_{Norm-2020}	-15.3	-11.0	-2.9	6.2	13.6	19.7	22.6	20.3	13.9	4.4	-5.8	-13.3	4.4
T₁₉₉₅₋₂₀₂₄	-15.2	-10.9	-2.3	6.6	13.6	20.0	22.8	20.4	14.2	4.7	-5.7	-13.3	4.6
T_{max}	7.9	10.9	21.4	29.0	34.2	39.0	39.6	39.3	34.0	29.1	18.4	7.3	39.6
T_{min}	-34.6	-32.3	-26.0	-15.6	-8.3	-2.4	5.1	2.3	-5.7	-16.2	-28.3	-31.0	-34.6
A_{average}	7.1	8.9	10.3	10.8	11.1	10.3	9.3	9.0	9.6	9.2	7.5	6.5	9.1

Parameters	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
A_{max}	26.7	27.7	31.2	32.7	30.5	27.7	23.3	23.6	28.4	31.2	30.5	26.0	28.3
Saikhandulaan post													
T_{Norm-2020}	-15.7	-11.6	-2.8	6.8	14.3	20.5	23.0	20.7	14.4	4.8	-5.8	-13.8	4.6
T₁₉₉₅₋₂₀₂₄	-16.2	-11.2	-1.9	7.3	14.5	21.0	23.8	21.4	15.0	5.2	-6.0	-14.2	4.9
T_{max}	3.4	8.4	24.4	32.0	33.7	39.7	40.4	40.0	36.4	30.0	14.9	7.2	40.4
T_{min}	-35.5	-32.9	-25.6	-14.4	-7.6	-0.2	3.5	2.0	-17.2	-19.1	-29.0	-31.4	-35.5

As shown in Table J-3, the average monthly air temperatures over the past 30 years have exceeded long-term climatic norms by approximately 0.1°C to 0.6°C in most months. February and December showed no significant deviations, while the annual average temperature increased by 0.2°C, indicating a warming trend.

Rows 3 and 4 of Table J-3 present, for each soum, the monthly and annual values of the absolute maximum and minimum air temperatures recorded since the start of meteorological observations. The monthly average highest and lowest temperatures indicate the maximum possible range of variation in average monthly temperatures. According to the table, these averages can fluctuate from the norm by approximately ±17.0°C to ±30.2°C.

The difference between the highest and lowest temperatures observed within a day or over a year is referred to as the temperature amplitude or fluctuation. A higher amplitude indicates a more extreme or continental climate. It is important to note that night-time observations are not conducted at meteorological posts, so this indicator could not be calculated for the Saikhandulaan post. Rows 5 and 6 of Table 1-3 show the average (A_{avg}) and absolute (A_{max}) monthly and annual temperature amplitudes for each soum. The data reveal that both average and absolute amplitudes are highest during transitional seasons (spring and autumn), and relatively lower during periods of stable air masses in winter and summer.

The term monthly average temperature amplitude refers to the following calculation: for each day, the difference between the daily maximum and minimum temperatures-measured eight times per day at 3-hour intervals, is averaged to obtain the daily amplitude. The monthly average amplitude is then determined by summing the daily amplitudes for the month and dividing by the number of days in that month. In the Sainshand area, the monthly average amplitude is lowest in winter, ranging from 7.1°C to 10.2°C, and highest in spring, reaching 11.5°C to 12.2°C. The annual average amplitude is 10.1°C. In the Mandakh area, the values are slightly lower: 6.5°C to 8.9°C in winter, 10.3°C to 11.1°C in spring, and an annual average of 9.1°C (See Table 1-3).

In the project area, the absolute temperature amplitude defined as the difference between the highest and lowest temperatures recorded within a given month is relatively low in January, ranging from 25.2°C to 26.7°C. It increases significantly in spring, reaching the second-highest values in April (32.7°C to 34.1°C). During summer (July-August), the amplitude decreases to its lowest levels (23.3°C to 24.3°C), then rises again in autumn, peaking in October at 31.2°C to 32.4°C. The annual average absolute amplitude ranges from 28.3°C to 28.8°C (See Table J-3).

Figure J-2 illustrates the annual course of air temperature, which displays a symmetrical pattern between the warm and cold seasons.

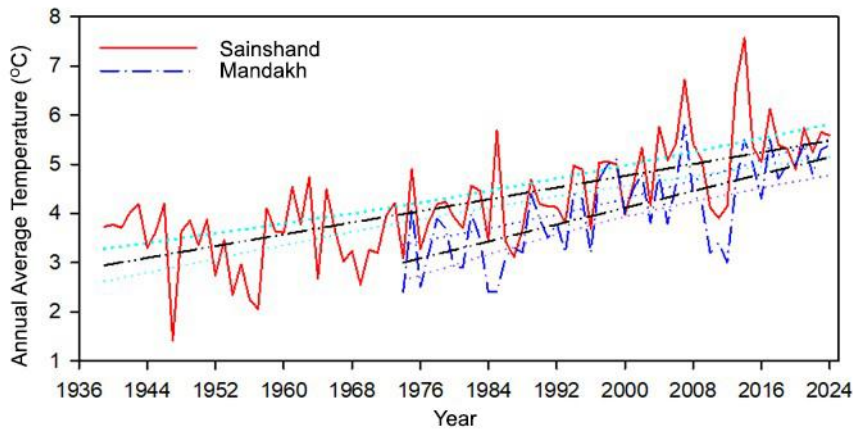


Figure J-2 Annual Trends in Air Temperature (1995-2024)

The annual air temperature amplitude in the project area ranges from 37.9°C to 41.8°C based on long-term climatic norms, and from 38.0°C to 41.9°C based on monthly average temperatures over the past 30 years. The absolute maximum and minimum temperatures reveal an even wider fluctuation of 74.2°C to 83.2°C, indicating a relatively high variation in seasonal thermal conditions throughout the year (see Table J-3 and Figure J-2). Since the start of meteorological observations in the project soums, the absolute maximum air temperatures recorded were:

- 41.8°C in Sainshand on July 26, 1999
- 39.6°C in Mandakh on July 13, 2000
- 40.4°C in Saikhandulaan (date not specified)

The absolute minimum air temperatures recorded were:

- -41.4°C in Sainshand on December 30, 1954
- -34.6°C in Mandakh on January 29, 1980
- -35.5°C in Saikhandulaan (date not specified)

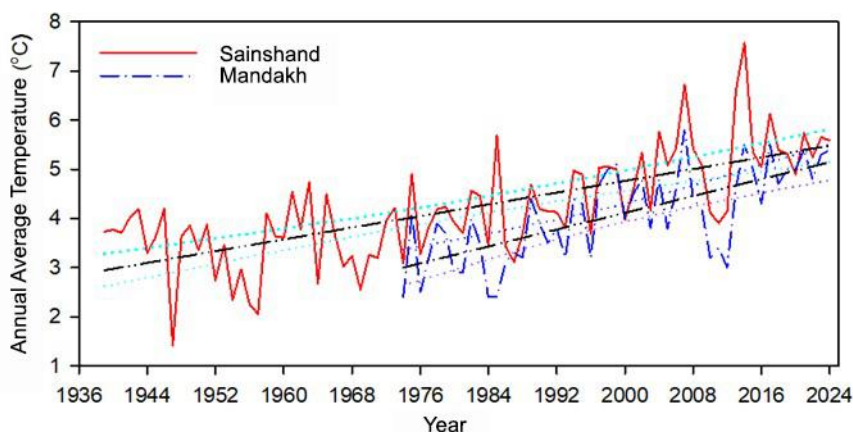


Figure J-3 Long-Term Air Temperature Trends (1939-2024)

Based on over 80 years of air temperature records at the Sainshand station, the warmest years have occurred within the past two decades. A similar pattern is observed at the Mandakh station. The years 2007, 2013, 2014, and 2017 were the warmest on record, with annual average temperatures exceeding the 1991-2020 climate norm by 1.1°C to 2.6°C. In contrast, the coldest years of the past 20 years were 2011-2013, with

temperatures 0.8°C to 1.1°C below the long-term average. In the Mandakh soum, the warmest years over the past 50 years were also 2007, 2014, and 2017, with temperatures 1.1°C to 1.4°C above the 1991-2020 norm. The coldest years since 1990 were again 2011-2013, with temperatures 1.0°C to 1.4°C below the long-term average. As shown in Figure J-3, all stations in the project area exhibit a general warming trend in annual average air temperature.

Soil Temperature Regime

The first row of Table J-4 presents the monthly and annual average soil surface temperatures for each station based on the 1991-2020 climate norm. The second row shows the monthly and annual averages for the past 30 years (hereafter referred to as the long-term average). Compared to the norm, the annual soil surface temperature has increased by 0.2°C in both Sainshand and Mandakh. During the cold season, the increase ranges from 0.1°C to 0.5°C, and during the warm season, from 0.2°C to 0.7°C.

The annual average soil surface temperature is 7.2°C in the Sainshand area and 6.4°C in Mandakh. Based on long-term averages, the coldest month is December with temperatures ranging from -15.9°C to -14.5°C, and the warmest is July with 27.5°C to 29.8°C. The absolute maximum soil surface temperature was recorded at 69°C in Sainshand (July 2010) and 70°C in Mandakh (July 2000). The absolute minimum temperature reached -40°C in both locations, observed in January 2010 and January 2021, respectively (See Table 1-4).

Rows 3 and 4 of Table 4 show the monthly and annual absolute maximum and minimum soil surface temperatures. The maximum values are positive in all months, ranging from 9.0°C to 23.0°C in winter, 60.0°C to 70.0°C in summer, and 23.0°C to 60.0°C during transitional seasons. The minimum values are negative in all months except July and August, reaching -19.0°C to -40.0°C during the cold season.

Table J-4 Monthly average ground surface temperature (°C), (1995-2024)

Parameters	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Sainshand station													
Tsoil.norm-2020	-18.4	-11.6	-0.4	10.8	19.6	26.7	29.6	26.3	17.9	6.1	-6.7	-16.3	7.0
Tsoil.1995-2024	-18.3	-11.7	0.0	11.3	19.8	27.1	29.8	26.5	18.3	6.3	-6.5	-15.9	7.2
Tsoil.max	11.0	23.0	39.0	54.0	59.0	66.0	69.0	66.0	57.0	46.0	23.0	9.0	69.0
Tsoil.min	-40.0	-36.0	-31.0	-18.0	-10.0	0.0	8.0	3.0	-6.0	-20.0	-31.0	-38.0	-40.0
Mandakh station													
Tsoil.norm-2020	-16.4	-11.3	-1.7	8.9	17.2	24.2	27.2	24.1	16.2	4.9	-6.6	-14.6	6.0
Tsoil.1995-2024	-16.3	-11.0	-1.2	9.3	17.6	24.9	27.5	24.4	16.7	5.3	-6.4	-14.5	6.4
Tsoil.max	12.0	22.0	39.0	53.0	60.0	61.0	70.0	60.0	56.0	42.0	26.0	11.0	70.0
Tsoil.min	-40.0	-34.0	-28.0	-26.0	-20.0	-2.0	6.0	1.0	-10.0	-19.0	-29.0	-34.0	-40.0

Figure J-4 illustrates the annual patterns of monthly average temperatures for air and soil surface, as well as the absolute maximum and minimum soil surface temperatures. Based on this data, the annual amplitude of soil surface temperatures in the project area ranges from 43.8°C to 48.1°C based on monthly averages, and from 109°C to 110°C based on absolute extremes indicating a high degree of seasonal temperature variability throughout the year.

During winter months and late autumn (November), the soil surface temperature (on bare ground) is 0.1°C to 1.2°C colder than the air temperature, whereas in other months—especially in summer it is 4.0°C to 5.2°C warmer than the air temperature (See Figure J-4).

Long-term trends in soil surface temperature show a slight increase during winter and spring, but a more pronounced rise of 3.0°C to 4.2°C during other seasons, suggesting a clear warming trend. Compared to the 1995-2024 average, the soil surface temperature over the past 10 years has increased by 0.7°C in Sainshand and 1.1°C in Mandakh.

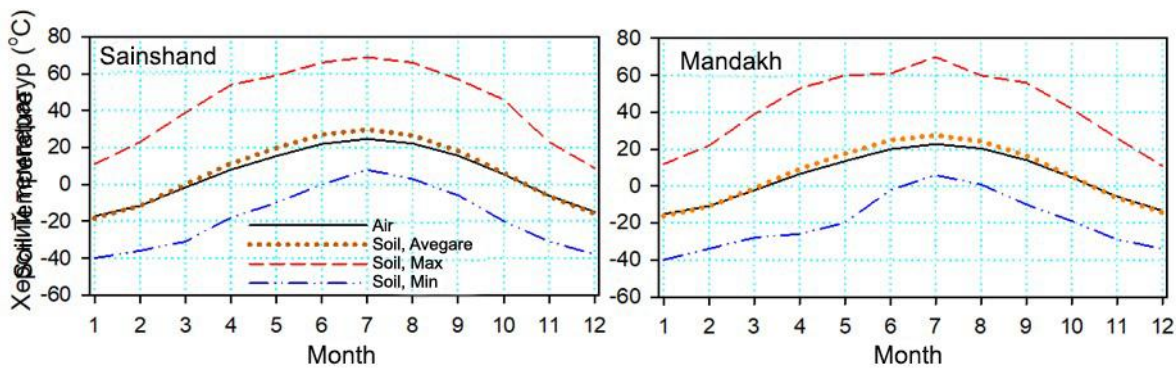


Figure J-4 Annual Variation of Soil Surface Temperature (1995-2024)

The soil temperature regime varies across regions depending not only on geographic latitude and climatic conditions, but also on soil type, structure, physical properties, thermal conductivity, heat capacity, moisture content, and topographic features such as slope and aspect. Despite these variations, the seasonal distribution of soil temperature follows a consistent pattern (Jambajamts, 1989). The figures illustrate the vertical distribution and annual cycle of soil temperature at different depths at the Sainshand meteorological station. The data show that during spring and summer, soil temperature decreases with depth, while in autumn and winter, deeper layers tend to retain more warmth compared to the surface (See Figure J-5).

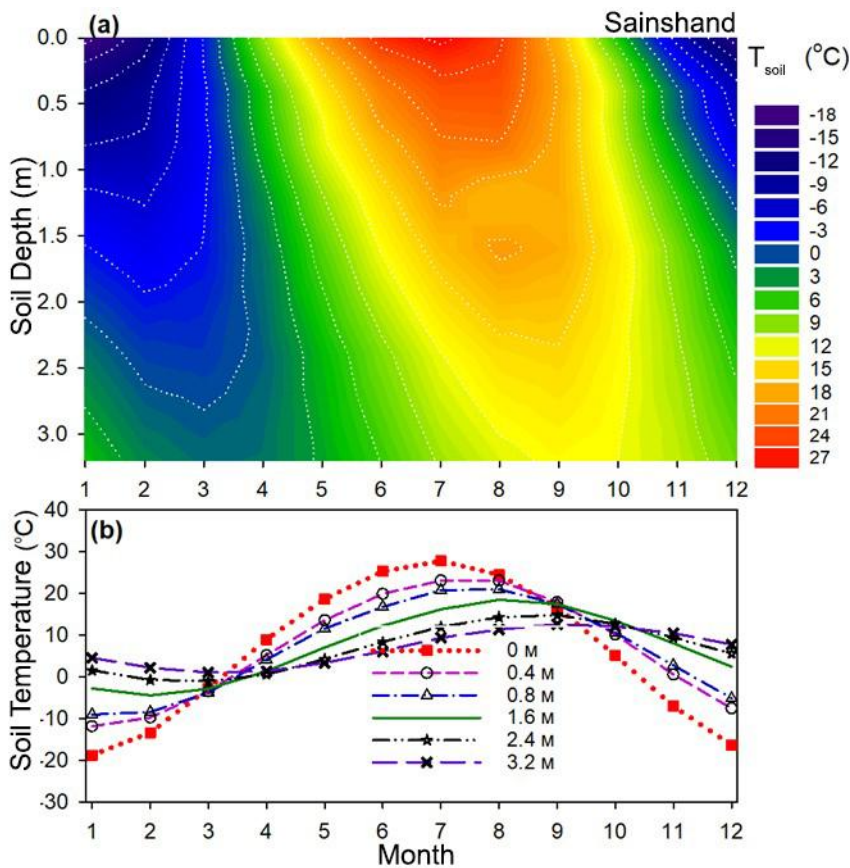


Figure J-5 Annual Variation of Subsurface Soil Temperature

The annual maximum soil temperature is observed in the upper 0-0.4 m layer during July, ranging from 23.0°C to 27.7°C. At depths of 0.6-1.2 m, the peak occurs in August (18.4°C to 22.1°C) with a one-month lag, and at 1.6-3.2 m depth, the maximum is recorded in September (12.5°C to 14.7°C) with a two-month lag. A similar lag pattern is observed for the annual minimum temperatures, with colder values appearing progressively later at greater depths.

The annual temperature amplitude also decreases with depth:

- At 0-0.2 m: 39.3°C to 46.5°C
- At 0.4 m: 34.9°C
- At 0.6 m: 32.7°C
- At 1.6 m: 22.9°C
- At 3.2 m: 11.5°C

This pattern is consistent with Fourier's Law of heat conduction, which describes the attenuation and phase shift of thermal waves with increasing depth. In the project area, the normative soil freezing depth varies by soil type as follows:

- Clay and silty soils: 1.99-2.15 m
- Loamy sands and fine sands: 2.42-2.61 m
- Coarse sands: 2.56-2.77 m
- Gravelly and coarse-textured soils: 2.85-3.07 m

Precipitation Regime

The project area receives relatively low annual precipitation. In the Sainshand region, the long-term average annual precipitation is 234.2 mm, of which approximately 94% falls during the warm season, between April and September. During the cold season, precipitation is minimal, with monthly averages ranging from 1.1 mm to 4.8 mm. The monthly distribution of total precipitation is presented in Table J-5.

Table Error! No text of specified style in document.-48 Total precipitation amount (mm)

Parameters	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Sainshand station													
P₁₉₉₁₋₂₀₂₀ /norm/	0.9	1.1	1.4	3.8	9.6	19.7	28.1	27.3	11.6	4.2	2.0	1.3	111.0
P₁₉₉₅₋₂₀₂₄	1.0	0.8	1.1	3.7	9.4	18.2	29.1	27.1	13.4	4.4	2.0	1.1	111.3
Maximum daily precipitation, mm	2.2	8.2	4.9	27.7	19.4	44.4	33	52.8	23.7	13.9	5.6	3.1	52.8
Snow depth, cm	1.4	1.0	0.7	0.4	0.0	-	-	-	-	1.6	1.6	1.3	1.2
Mandakh station													
P₁₉₉₁₋₂₀₂₀ /norm/	1.0	1.4	2.1	3.1	7.3	16.4	28.0	28.3	9.2	3.8	1.7	0.9	103.2
P₁₉₉₅₋₂₀₂₄	1.0	1.0	1.9	3.0	7.6	15.5	30.8	28.1	11.6	3.5	1.7	0.8	106.7
Maximum daily precipitation, mm	3.5	9.8	4.8	7.5	20.3	20.2	31.8	52.8	16.7	9.7	4	3.3	52.8
Snow depth, cm	1.1	0.7	0.7	0.9	2.3	-	-	-	-	2.1	1.1	0.7	1.2
Saikhandulaan post													
P₁₉₉₁₋₂₀₂₀ /norm/	0.4	1.8	1.5	3.0	9.5	19.4	32.5	29.5	10.2	3.4	1.2	1.0	113.4
P₁₉₉₅₋₂₀₂₄	0.6	1.6	1.2	2.4	9.7	18.1	34.1	36.4	17.5	3.7	2.7	0.9	128.9
Maximum daily precipitation, mm	1.0	8.6	9.4	9.9	25.1	70.4	39.5	43.2	24.5	12.0	3.2	2.3	70.4
Snow depth, cm	0.6	0.3	0.3	0.2	4.8	-	-	-	-	0.3	0.8	1.0	1.0

According to Table J-5, when comparing the monthly average precipitation over the past 30 years with the 1991-2020 climate norm, the project area shows slight increases in certain months:

- January (winter): +0.1 to +0.2 mm
- May (spring): +0.2 to +0.3 mm
- July (summer): +1.0 to +2.8 mm
- September (autumn): +1.8 to +7.3 mm

Other months show minimal change or slight decreases. Overall, precipitation change is minor in the Sainshand area, while Mandakh shows a modest increase during the warm season, and Saikhandulaan shows a more pronounced increase. The annual average precipitation has increased by 0.3 mm in Sainshand, 3.5 mm in Mandakh, and 15.5 mm in Saikhandulaan (Table J-5). These changes suggest a shift in the seasonal distribution of precipitation likely linked to climate change.

The third row of Table J-5 presents the highest daily precipitation recorded between 1991 and 2024:

- Sainshand and Mandakh: 52.8 mm
- Saikhandulaan: 70.4 mm

Snow cover in the project area is generally very thin. The fourth row of Table J-5 shows the monthly and annual average snow depth, which ranges from 1.0 to 1.2 cm annually.

Figure J-6 illustrates the long-term trend of annual precipitation in the project area since 1939, against the backdrop of Mongolia's increasing aridity. While precipitation remains highly variable, a slight upward trend is observed in Sainshand and a more noticeable increase in Mandakh. Based on the 1995-2024 data:

- The lowest annual precipitation in Sainshand occurred in 2004-2005 (30.6-46.3 mm)
- In Mandakh, the driest years were 1997, 1999, and 2005 (47.8, 54.2, and 55.3 mm respectively)
- The wettest year in Sainshand was 2024 with 243.3 mm, and in Mandakh, 1998 with 267.6 mm the highest totals recorded since the start of measurements in each soum.

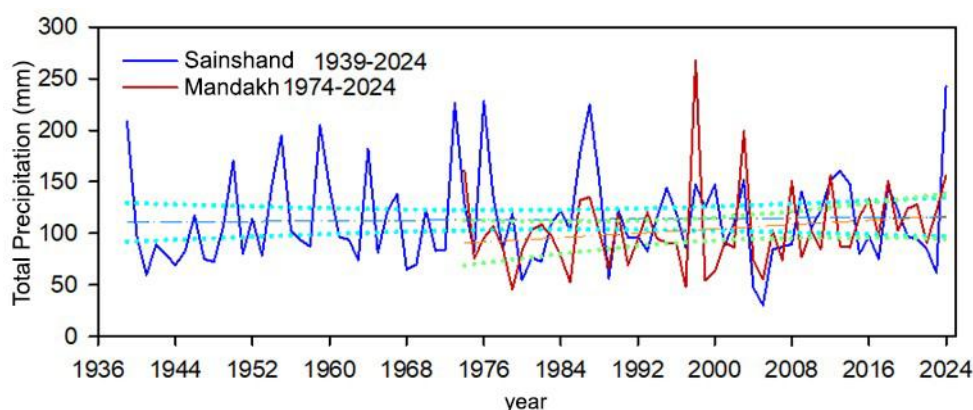


Figure J-6 Long-term trend of annual total precipitation (1995-2024)

Although annual precipitation totals between 1995 and 2024 show considerable interannual variability, a gradual increasing trend can be observed (See Figure J-6).

Table J-6 Occurrence Frequency of Precipitation-Related Phenomena

Parameter	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Sainshand station													
Number of days with thunderstorms	-	-	-	0.2 /2	0.8 /5	4.7 /9	5.9 /10	4.2 /11	2.0 /6	0.2 /3	0.1 /3	0.0 /1	17.6 /29
Number of days with hail	-	0.0 /1	-	0.1 /1	0.1 /2	0.2 /2	0.1 /1	0.1 /1	-	0.1 /2	-	-	0.7 /3
Number of days with heavy rain	-	-	-	0.1 /1	1.0 /4	3.5 /9	4.9 /10	3.7 /12	2.0 /8	0.4 /5	0.2 /4	0.1 /4	15.9 /31
Number of days with snow	3.4 /7	2.7 /5	3.0 /8	1.5 /6	0.3 /2	-	-	-	0.0 /1	1.0 /3	3.5 /11	4.0 /8	19.3 /39
Mandakh station													
Number of days with thunderstorms	-	-	-	0.1 /1	0.2 /2	1.7 /6	2.2 /6	1.7 /6	0.5 /2	0.0 /1	-	-	6.5 /13

Parameter	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Number of days with hail	-	-	-	-	0.0 /1	0.0 /1	-	0.1 /1	-	-	-	-	0.2 /1
Number of days with heavy rain	-	-	-	-	0.1 /1	0.3 /2	2.1 /8	3.0 /10	1.8 /5	0.6 /3	0.0 /1	-	8.0 /19
Number of days with snow*	2.3 /10	2.4 /7	2.8 /7	1.6 /6	0.4 /1	-	-	-	-	1.3 /5	2.5 /6	2.8 /6	16.0 /35
Saikhandulaan post													
Number of days with thunderstorms	-	-	-	0.1 /1	0.3 /2	2.0 /5	2.1 /9	1.0 /6	0.5 /3	-	-	-	5.9 /13
Number of days with hail	-	-	-	-	-	0.1 /1	-	-	-	-	-	-	0.1 /1
Number of days with heavy rain	-	-	0.1 /1	1.2 /4	3.5 /9	5.2 /8	6.6 /11	3.5 /9	3.1 /6	0.7 /3	0.1 /1	-	23.8 /36
Number of days with snow	2.1 /6	2.0 /5	2.3 /5	1.3 /5	0.4 /2	-	-	-	-	1.3 /3	2.4 /6	2.8 /9	14.3 /29

Note: *On average, snow was observed on 2.3 days, but in the snowiest year within the dataset, there were 10 snowy days.

According to Table J-6, between 1991 and the present, the project area experienced an average of 5 to 18 thunderstorm days per year, with the highest annual counts ranging from 13 to 29 days. By soum:

- Saikhandulaan recorded the fewest thunderstorms, with 5-6 days annually, and a maximum of 13 days in the most active year.
- Mandakh had 6-7 days annually, also peaking at 13 days.
- Sainshand experienced the most thunderstorm activity, with 17-18 days annually, and up to 29 days in the most active year.

Seasonally, thunderstorms were observed:

- In Saikhandulaan and Mandakh: from April to October
- In Sainshand: in all months except January to March

Compared to the 1991-2020 climatological average, the number of thunderstorm days observed over the past 15 years has increased across all soums in the project area. The average number of thunderstorm days rose by 1-2 days in Saikhandulaan and Sainshand, and by 3 days in Mandakh, which recorded the most significant increase.

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In summary, the number of days with lightning activity has notably increased in recent years. This rise can be attributed to heightened aridity, which has intensified meteorological extremes, specifically, the daily temperature amplitude, or the growing difference between daytime and nighttime temperatures. These conditions are not confined to the project area alone but are variably manifesting across most regions of Mongolia, as indicated in FNC (2024).

Hailstorms and intense downpours pose a significant risk of flash flooding, which can severely damage project infrastructure, equipment, and access roads, and may even lead to accidents. In the project area, these events are rare, occurring on average no more than once per year, with a maximum of three days observed in any given year. For instance, Sainshand recorded hail on three occasions, the highest among the soums, while Saikhandulaan experienced only two hail events between 2000 and 2020. Although historically infrequent, the recurrence of such events is expected to increase due to abrupt climate change (Table 1-6).

Since 1990, the project area has experienced an average of 8 to 16 days of heavy rainfall per year, with annual maxima ranging from 19 to 31 days. By soum:

- Mandakh recorded the fewest heavy rain days, with 8 days annually and a maximum of 19 days.
- Sainshand had the highest frequency, with 17-18 days annually and up to 31 days in the most active year.
- In Saikhandulaan, rainfall and heavy rainfall events were recorded together in the archives, making it impossible to distinguish between the two. However, the station reported 23-24 days of rainfall annually, with a maximum of 36 days.

Seasonally, heavy rainfall is most common from April to October across the region. In Sainshand, it has been observed in all months except January to March (Table 1-6).

Compared to the 1990-2019 average, the number of days with heavy rainfall has increased in most soums over the past 15 years. In Mandakh and Sainshand, the average number of heavy rain days rose by 4 to 5 days. In Saikhandulaan, where rainfall and heavy rainfall are recorded together, the total number of rainy days increased by 2 to 3 days.

In the project area, snowfall occurs on average 14 to 20 days per year, with the highest annual totals ranging from 29 to 39 days. By soum:

- Sainshand records 19-20 snowy days annually;
- Mandakh: 16-17 days; and
- Saikhandulaan: 14-15 days.

Long-term observations indicate a clear upward trend in the number of snowy days in the project area. Compared to the 1995-2024 average, the past 10 years have seen an increase of 1 to 3 snowy days per year.

In conclusion, the proportion of heavy rainfall in total summer precipitation has increased in the project area, while the share of light or steady rain, particularly drizzle has declined. This shift is attributed to climate change, which is altering the nature and intensity of meteorological phenomena.

In recent years, the region has experienced:

- More frequent and intense summer precipitation;
- Increased snowfall during winter; and
- More frequent windstorms in spring and autumn.

These changes suggest a growing trend in hazardous and extreme weather events, which may pose increasing risks to infrastructure, operations, and local communities.

Air Humidity Regime

Air humidity refers to the amount of water vapor present in the atmosphere. Although the quantity of water vapor in the air is extremely small compared to the total mass of the atmosphere, it plays a critical role in weather and climate processes. Therefore, air humidity is assessed using several indicators, the most common of which are relative humidity and absolute humidity.

Relative humidity expresses how close the air is to saturation with water vapor. It is the ratio (in %) of the actual water vapor content to the maximum amount the air can hold at a given temperature.

Absolute humidity refers to the actual amount of water vapor in a unit volume of air, expressed in grams per cubic meter (g/m^3).

Due to the absence of air humidity measurements at the Saikhandulaan observation post, the analysis of the humidity regime and its long-term changes was conducted using data from the Sainshand and Mandakh meteorological stations

The project area is characterized by an extremely dry climate. The annual average relative humidity shows considerable variability, ranging between 48% and 53%. During winter, as air temperature drops and the capacity of the atmosphere to hold water vapor decreases (due to compression), relative humidity reaches its highest levels between 58% and 70% as the air approaches saturation.

In contrast, spring is the driest season, with relative humidity dropping to its lowest values 32% to 47% as temperatures rise and the air expands, increasing its capacity to hold moisture. During the summer rainy season, relative humidity increases slightly to 39%-54%, then gradually decreases again in autumn to 43%-54% (See Table J-7).

Long-term trends in relative humidity indicate a significant decline over the past 30 years, with an observed decrease of approximately 20%, highlighting the intensifying aridity in the region.

Table J-7 Patterns of air humidity indicators

Parameter	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Sainshand station													
Absolute humidity standard, g/m^3	0.9	1.3	1.8	2.8	4.5	7.8	10.5	9.4	5.8	3.2	1.8	1.1	4.2
Absolute humidity, g/m^3	0.9	1.2	1.8	2.7	4.4	7.6	10.4	9.3	5.8	3.2	1.8	1.1	4.2
Relative humidity, %	67	58	41	32	33	39	46	47	43	45	56	64	48
Mandakh station													
Absolute humidity standard, g/m^3	1.2	1.4	2.0	3.0	4.8	8.1	11.0	9.9	6.1	3.4	2.0	1.4	4.5
Absolute humidity, g/m^3	1.1	1.4	1.9	2.9	4.7	7.9	10.9	9.7	6.1	3.4	2.0	1.3	4.4
Relative humidity, %	70	61	47	38	40	46	53	54	49	50	60	69	53

The annual average absolute humidity is between 4.2 and 4.4 g/m^3 . Although relative humidity reaches its highest values during the winter season, the actual amount of water vapor in the cold, dense air is low, only about 0.9 to 1.4 g/m^3 . In contrast, absolute humidity reaches its maximum during the summer, ranging from 7.6 to 10.9 g/m^3 . In spring, as temperatures rise and evaporation increases, absolute humidity grows from 1.8 to 4.7 g/m^3 . In autumn, as temperatures cool and evaporation decreases, it drops from 6.1 to 1.8 g/m^3 (Table J-7).

Compared to the normal absolute humidity, which is the 30-year average from 1991 to 2020, there was no change in absolute humidity from September to March in the Sainshand area, while in other months it decreased by 0.1 to 0.2 g/m³. However, the annual average absolute humidity remained unchanged. In contrast, at the Mandakh station, there was no change in February and from September to November, but in the other months, it decreased by 0.1 to 0.2 g/m³, with the annual average dropping by 0.1 g/m³ (Table J-7).

The annual pattern of absolute humidity can be explained as follows:

In spring, as temperatures begin to rise, evaporation gradually increases, and the air's capacity to hold water vapor also grows as the air expands. This, combined with increased precipitation, leads to the highest levels of absolute humidity in summer. In autumn, as temperatures cool, evaporation decreases and the air's capacity to hold water vapor diminishes. By the beginning of winter, as the cold intensifies (compressing the air), absolute humidity reaches its lowest level. In the project area, there is a noticeable trend of a significant decline in absolute humidity in the future.

Wind indicators and patterns of related phenomena

When solar radiation reaches the Earth's surface, part of it is reflected back, while the rest is absorbed by the surface and converted into thermal energy. Due to the uneven nature of the surface, different areas heat up differently, resulting in uneven distribution of air pressure. Air moves horizontally from areas of high pressure (cold) to areas of low pressure (warm), and this movement of air is called wind. Table J-8 shows the monthly average air pressure in the project area.

Table J-8 Monthly average air pressure (hPa)

Parameter	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Sainshand station													
Pressure standard - 2020	914.1	912.1	909.2	905.6	903	900.4	899.8	903.3	907.8	911.5	912.1	914	907.8
Average pressure	914.1	912.4	908.7	905.7	903.0	900.3	899.9	903.3	907.9	911.5	912.1	914.1	907.7
Maximum	917.9	915.9	913.0	911.6	906.3	903.0	902.3	905.4	911.2	915.0	915.8	918.4	918.4
Minimum	910.8	907.3	905.4	901.3	900.6	897.1	897.7	900.8	904.9	909.2	907.8	907.0	897.1
Mandakh station													
Pressure standard - 2020	871.0	869.8	868.0	866.1	864.6	862.7	862.2	865.4	869.0	871.6	870.7	871.4	867.7
Average pressure	870.9	870.0	867.6	866.2	864.6	862.5	862.3	865.4	869.1	871.6	870.6	871.5	867.7
Maximum	874.2	872.7	871.5	871.8	868.0	864.7	864.5	867.3	872.1	874.7	874.0	875.2	875.2
Minimum	866.7	865.2	862.3	862.2	862.0	859.6	860.2	862.9	866.5	868.4	866.6	864.7	859.6

According to Table J-8, based on the 1995-2024 average, the annual average air pressure is 907.7 hPa in Sainshand and decreases to 867.7 hPa in Mandakh, which is located at a higher elevation. When comparing this with the standard average air pressure for 1991-2020, the changes are minimal (Table 1-8).

The monthly trend of air pressure in the Sainshand (Mandakh) area shows that it starts from 914.1 hPa (870.9 hPa) in January and gradually decreases, reaching the lowest value in July at 899.8 hPa (862.3 hPa). After that, air pressure increases again, reaching up to 914.1 hPa (871.5 hPa) in December (Table 1-8).

The average values of maximum and minimum air pressure at Sainshand station are 918.4 hPa and 897.1 hPa, respectively, while at Mandakh station, they are 875.2 hPa and 859.6 hPa, respectively.

The project site is not only one of the regions in Mongolia with the highest solar energy potential but also among those with the greatest wind energy resources. Table J-9 presents the average normal wind speed, the monthly and annual average wind speeds, and the absolute maximum wind speed along with its average in the Sainshand area.

Table J-9 Monthly and annual average wind speed (m/s)

Parameter	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Sainshand station													
Average speed standard	3.6	4.1	4.7	5.3	5.6	4.6	4.0	3.6	3.9	4.0	3.9	3.7	4.3
Average speed	3.7	4.0	4.8	5.3	5.6	4.7	4.0	3.7	3.9	4.0	3.9	3.9	4.3
Maximum speed	25	24	34	34	31	32	34	28	26	36	28	28	36
Mandakh station													
Average speed standard	4.7	4.4	4.7	5.3	5.4	4.2	3.7	3.6	3.9	4.1	4.5	4.7	4.5
Average speed	4.8	4.4	4.9	5.4	5.6	4.5	3.9	3.9	4.0	4.2	4.6	4.9	4.6
Maximum speed	24	24	30	40	29	31	31	22	23	30	24	24	40
Saikhandulaan post													
Average speed standard	4.7	4.3	4.8	5.5	5.1	4.2	3.7	3.9	4.2	4.5	4.8	4.9	4.6
Average speed	4.7	4.4	4.9	5.5	5.4	4.5	4.1	4.1	4.2	4.4	4.8	5.1	4.7
Maximum speed	17	14	25	20	20	22	18	20	17	18	17	17	25

According to Table J-9, the average annual wind speed in the project area during 1995-2024 ranged from 4.3 to 4.7 m/s. When looking at monthly averages, wind speeds vary between 3.6-5.1 m/s in winter, 4.8-5.6 m/s in spring, 3.7-4.7 m/s in summer, and 3.9-4.8 m/s in autumn. Compared to the wind speed norm or (1991-2020 average), there has been little change in Sainshand over the past 30 years, while a slight increase has been observed in Mandakh and Saikhandulaan soums. Specifically, during the warm season, monthly averages increased by 0.1-0.3 m/s, while during the cold season, the changes were relatively stable and minimal (Table 1-9).

In the past 30 years, the absolute maximum wind speed reached 36 m/s around Sainshand and up to 40 m/s near Mandakh. At the Saikhandulaan station, where measurements are only taken during daytime, data from the last 5 years show wind speeds reaching up to 25 m/s (Table J-9, Figure J-7).

In terms of the annual wind speed pattern, two peaks occur during the spring and autumn, while two low points are observed in winter and summer. The main peak typically occurs in spring, when the air and soil are

at their driest, which coincides with the highest wind speeds. As a result, the majority of strong wind and dust storm days occur during the spring months (Figure J-7).

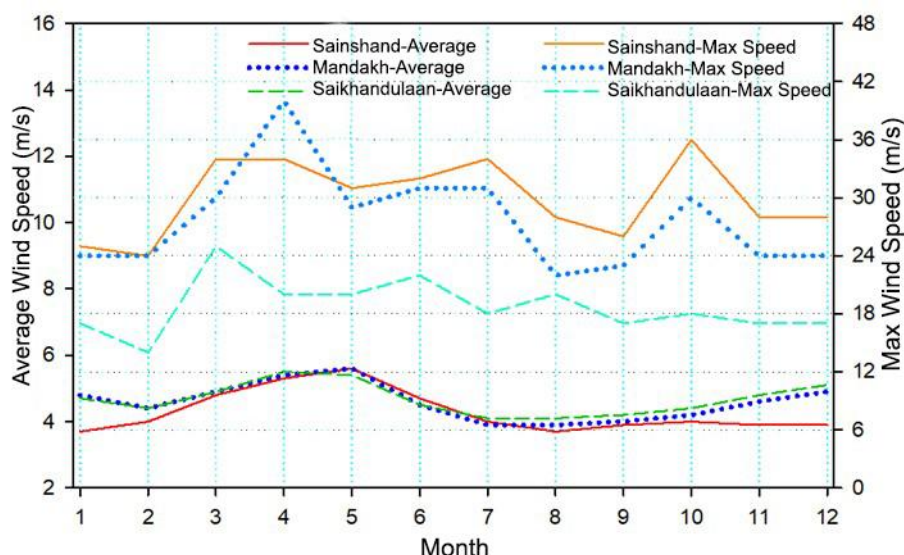


Figure J-7 Annual trend of average and maximum wind speeds (1995-2024)

Table J-10 presents a detailed breakdown of the seasonal wind direction frequency around the Sainshand area, categorized by 16 compass points.

Table J-10 Frequency of wind direction, %

Season	N	NNE	NE	ENE	E	ESE	SE	SSW	S	SSW	SW	WSW	W	WNW	NW	NNW
Sainshand station																
Winter	35.5	3.6	2.2	0.9	1.0	1.0	1.5	3.2	4.2	2.1	2.3	2.2	6.9	11.6	14.0	7.8
Spring	25.0	5.5	4.9	3.1	3.7	1.7	2.0	2.6	4.2	3.1	3.3	3.2	7.7	9.3	12.3	8.3
Summer	30.2	6.8	7.2	4.2	5.2	2.7	3.7	3.7	5.5	3.5	3.0	2.3	3.7	4.6	7.1	6.6
Autumn	31.8	4.2	3.6	2.2	2.4	1.4	2.3	3.8	6.1	3.6	3.2	2.5	6.3	8.7	11.5	6.4
Year	30.6	5.0	4.5	2.6	3.1	1.7	2.4	3.3	5.0	3.1	3.0	2.5	6.2	8.6	11.2	7.3
Mandakh station																
Winter	26.3	0.7	1.6	0.4	1.0	0.4	1.2	0.3	1.3	0.8	2.6	1.8	10.3	10.7	37.7	3.0
Spring	26.7	1.9	4.3	0.9	3.1	1.2	2.7	0.8	2.5	1.8	4.4	3.3	11.0	6.7	23.8	4.9
Summer	32.7	2.8	5.5	1.3	4.3	2.7	6.3	1.9	5.1	2.2	5.3	2.0	5.0	3.9	14.8	4.3
Autumn	31.1	1.3	2.5	0.6	2.0	1.0	2.6	0.8	3.5	2.0	5.6	3.1	10.7	6.9	23.2	3.2
Year	29.2	1.6	3.5	0.8	2.6	1.3	3.2	1.0	3.1	1.7	4.5	2.6	9.2	7.0	24.8	3.9
Saikhandulaan post																
Winter	14.2	1.2	2.5	0.7	2.7	0.3	0.8	0.1	4.0	1.4	6.1	2.2	28.7	10.9	13.8	10.3
Spring	11.9	3.9	5.1	1.9	5.4	1.0	2.0	0.6	4.9	2.0	6.2	2.3	19.5	6.1	14.2	13.0
Summer	14.6	6.3	7.1	1.9	5.4	2.3	5.2	2.6	7.9	3.9	5.2	1.4	10.8	3.9	11.1	10.6

Season	N	NNE	NE	ENE	E	ESE	SE	SSW	S	SSW	SW	WSW	W	WNW	NW	NNW
Autumn	12.3	3.5	3.5	1.0	2.5	0.7	1.8	1.3	7.7	6.1	9.6	3.1	22.2	5.9	8.9	9.9
Year	13.3	3.7	4.5	1.4	4.0	1.1	2.4	1.1	6.1	3.4	6.8	2.2	20.3	6.7	12.0	10.9

In the project area, the most frequently occurring wind direction is from the north (N), making it the dominant wind direction for the region. The average annual frequency of northerly winds is the highest at both Sainshand and Mandakh stations, with 31% and 29% respectively, classifying it as the prevailing wind direction. At the Saikhandulaan station, northerly winds account for 13%, making it the second most frequent direction. The next most common wind direction is from the northwest (NW). The average annual frequency of north-westerly winds is 25% at Mandakh and 11% at Sainshand, making it the second most dominant wind direction at both locations. At Saikhandulaan, NW winds have a 12% frequency, ranking as the third most common direction. At Saikhandulaan station, westerly winds are the most frequent, not only on an annual average (20%) but also in all seasons, ranging from 11% to 29%. At Mandakh, the third most common wind direction is westerly with a 9% frequency, while at Sainshand, the third is west-northwest (WNW) winds, also at 9% (Table J-10, Figure J-8).

Figure J-8 provides a detailed wind rose diagram showing the distribution and frequency of wind directions observed in the project area.

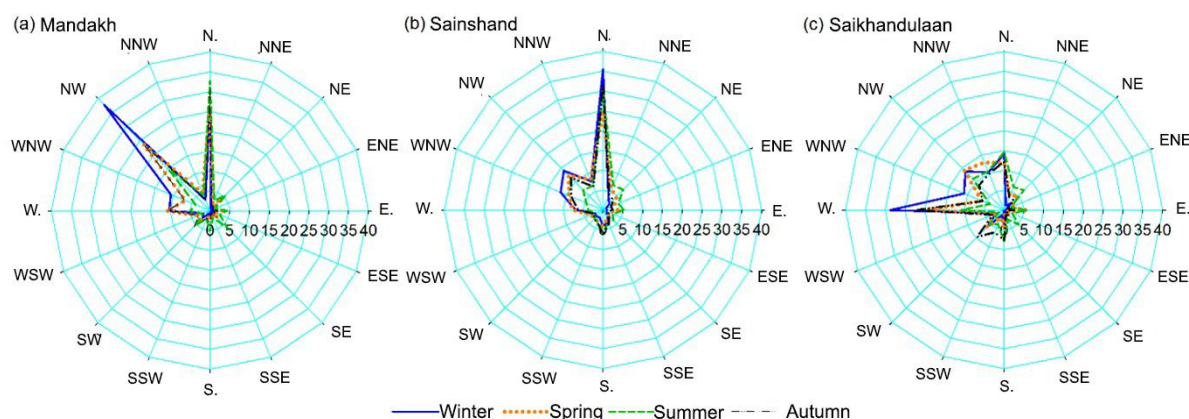


Figure J-8 Frequency of wind direction (1995-2024)

Based on the table and diagram, winds in the project area predominantly blow from directions ranging between west and north. Winds from other directions occur with relatively low frequency only about 1-7% on an annual average (Table J-10, Figure J-8).

Table J-11 presents the monthly and annual frequency of meteorological phenomena related to wind.

Table J-11 Frequency of wind-related phenomena

Phenomenon	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Sainshand station													
Number of days with snowstorms	0.9 /3	0.8 /2	1.5 /6	0.8 /4	0.4 /2	-	-	-	-	0.5 /2	1.2 /5	1.1 /6	7.0 /23
Number of days with dust storms	0.6 /2	1.4 /4	3.7 /8	7.4 /16	9.3 /17	4.1 /11	1.5 /6	1.4 /5	1.4 /6	1.1 /4	0.9 /3	0.4 /2	33 /65

Phenomenon	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Number of days with strong winds	0.9 /4	0.6 /5	2.6 /7	4.1 /11	5.4 /9	1.8 /5	0.7 /4	0.6 /3	0.9 /4	1.1 /5	0.8 /3	0.6 /2	19.8 /33
Mandakh station													
Number of days with snowstorms	0.7 /3	0.7 /3	1.4 /7	1.0 /4	0.4 /2	-	-	-	-	0.5 /2	0.6 /2	1.0 /4	6.1 /23
Number of days with dust storms	0.5 /2	0.5 /2	1.9 /6	2.9 /9	2.8 /6	0.7 /4	-	0.3 /2	0.4 /2	0.8 /4	0.8 /3	0.7 /3	11.9 /17
Number of days with strong winds	0.8 /3	0.6 /2	1.9 /5	2.3 /7	2.8 /5	0.7 /4	0.1 /1	0.3 /2	0.9 /5	1.2 /5	0.9 /3	0.8 /4	13.1 /29
Saikhandulaan post													
Number of days with snowstorms	0.2 /2	0.4 /2	0.7 /6	0.7 /5	0.3 /2	-	-	-	-	0.4 /2	0.5 /3	0.3 /2	3.4 /12
Number of days with dust storms	0.4 /3	0.6 /2	2.0 /4	2.9 /7	3.5 /8	0.9 /5	0.2 /1	0.5 /4	0.1 /1	0.7 /3	0.7 /4	0.8 /3	13.0 /28
Number of days with strong winds	-	0.3 /2	1.1 /4	1.1 /3	1.2 /4	0.3 /1	0.1 /1	0.1 /1	0.2 /2	0.5 /2	0.2 /1	0.2 /2	4.9 /11

Note: The table shows the long-term average number of days with wind-related phenomena, as well as the maximum annual frequency observed throughout the entire observation period.

In the project area, the number of days with snowstorms ranges from 3 to 7 days per year. Looking at the soums, on average there are 3-4 days per year with snowstorms in Saikhandulaan (a total of 12 days), about 6 days in Mandakh area (a total of 23 days), and 7 days in Sainshand (a total of 23 days) (see Table J-11). Looking at the long-term trend of the number of days with snowstorms, in the last 10 years it has increased by 3-4 days compared to before, and this indicator shows a tendency to continue rising gradually.

The number of days with dust storms naturally increases due to increased wind speeds during the transitional seasons. In the project area, dust storms occur 12 to 33 days per year, with 33 days in Sainshand (a total of 65 days), 11-12 days around Mandakh (a total of 17 days), and 13 days in Saikhandulaan sum (a total of 28 days) experiencing dust storms (see Table J-11). Regarding the years with the highest frequency of dust storms, that occurred 16 times in 2009, 38 times in 2018, 22 times in 2020, and 23 times in 2021. By month, 77-78% of the days with dust storms happen in the spring months. Looking at the long-term trend in the number of days with dust storms, in the last 10 years it has increased by 1-2 days compared to before, and this indicator also shows a tendency to increase further (see Table J-11). Due to rising air temperatures, a stable snow cover has not formed in recent years around the project area, which explains the increase in the frequency of dust storms during winter months. The number of days with dust storms in the project area shows a sharp increasing trend.

The third row of Table J-11 for each soum shows the number of days with strong winds observed around the project area. From this, it can be seen that approximately 5-20 days of strong wind occur annually. By soums, on average there are 19-20 days per year with strong winds in Sainshand (a total of 33 days), 13-14 days around Mandakh (a total of 29 days), and 4-5 days in Saikhandulaan area (a total of 11 days). Compared to

the average for 1995-2024, the number of days with strong winds has increased by 1-5 days over the last 10 years.

Arcadis Consulting (UK) Limited

80 Fenchurch Street
London EC3M 4BY
United Kingdom

T: +44 (0)20 7812 2000

[arcadis.com](https://www.arcadis.com)