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180MW Wind Power and Battery Energy Storage System, Tsogttsetsii soum, Mongolia

Chapter 6 Environmental & Social Baseline

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MCS and URECA

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
AADT	Annual Average Daily Traffic
[redacted]	[redacted]
AIS	Air Insulated Switchgear
ALARP	As Low As Reasonably Practicable
AoI	Area of Influence
APLIC	Avian Powerline Interaction Committee
BESS	Battery Energy Storage System
BMP	Biodiversity Management Plan
BOD	biochemical oxygen demand
CAF	Central Asian Flyway
CAQMP	Construction Air Quality Management Plan
CCRA	Climate Change Risk Assessment
CD	Community Development
CH	Critical Habitat
CHA	Critical Habitat Assessment
CIA	Cumulative Impact Assessment
CIP	Climate Impact Platform
CITES	Convention on International Trade in Endangered Species
CLO	Community Liaison Officer
CMIP6	Coupled Model Intercomparison Project Phase 6
CMS	Conservation of Migratory Species of Wild Animals

Acronyms	Description
CO	Carbon monoxide
COD	chemical oxygen demand
CR	critically endangered
CRM	Citizen's Representative Meeting
CRM	Collision Risk Model
CSMP	Cold Stress Management Plan
DEIA	Detailed Environmental Impact Assessment
DFID	International Development
DSF	Development Support Fund
E&S	Environmental and Social
EAAA	Ecologically Appropriate Area of Analysis
EAAF	East Asian-Australasian Flyway
EBRD	European Bank for Reconstruction and Development
EC	Electrical Conductivity
EEO	Extent of Occurrence
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EN	Endangered
EPC	Engineering Procurement and Construction
EPRP	Emergency Preparedness and Response Plan
ERM	ERM-Hong Kong, Limited
ESA	European Space Agency
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environment and Social Management System
ETI	Ethical Trading Initiative
FERP	Flood Emergency Response Plan
FFDI	Arthur Forest Fire Danger Index
FGD	focus group discussion
FPIC	Free, Prior and Informed Consent
GBV	Gender-based violence
GCD	Global Climate Database
GHG	Green House Gas
GIIP	good international industry practice
GIS	Geographic Information System

Acronyms	Description
GM	grievance mechanism
GPN	This Good Practice Note
GRM	Grievance Redress Mechanism
HCO	Bicarbonate
HSEQ	Health, Safety, Environment, and Quality
HSMP	Heat Stress Management Plan
HSS	Health, Safety and Security
HSSE	Health, Safety, Security and Environment
HVAC	Heating, Ventilation, and Air Conditioning
IA	Impact Assessment
IAQM	Institute of Air Quality Management
IBA	Important Bird and Biodiversity Areas
IBAT	Integrated Biodiversity Assessment Tool
IFC	International Finance Corporation
ILO	International Labour Organisation
IMAR	Inner Mongolia Autonomous Region
IPA	Important Plant Areas
ISMP	Invasive Species Management Plan
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Areas
KII	Key Informant Interview
LC	Least Concern
LiDAR	Light Detection and Ranging
LLC	Limited Liability Company
LO	Land Officer
LRP	Livelihood Restoration Plan
LVIA	Landscape & Visual Impact Assessment
MCS	Mongolian Consulting Service
MECC	Ministry of Environment and Climate Change
MNS	Mongolian National Standard
MRIA	Mongolian Renewables Industries Association
MRL	Mongolian Red List
MSDS	Material Safety Data Sheet
MW	Mega Watt
MWEA	Mongolian Wind Energy Association

Acronyms	Description
NASA	National Aeronautic Space Administration
NDC	Nationally Determined Contributions
NDC	National Dispatching Centre
NE	not evaluated
NGO	Non-governmental Organization
NH4+	Ammonium
NO2	Nitrogen dioxide
NO2-	Nitrite
NO3-	Nitrate
NOAA	Atmospheric Association
NPTG	National Power Transmission Grid Company
NPTG	National Power Transmission Grid Company
NREC	The National Renewable Energy Centre
NSR	Noise sensitive receiver
NT	Near threatened
NZE	Net Zero Energy LLC
O&M	Operation and Maintenance
OHL	Overhead Transmission Line
OHS	Occupational Health and Safety
OT	Oyu Tolgoi
PA	protected area
PAD	project affected districts
PAPs	Project Affected Persons
PI, mg/L	Phosphate
PM	Particulate matter
POP	persistent organic pollutants
PPA	Power Purchase Agreement
PPE	Personal protective equipment
PS	Performance Standards
RAP	Resettlement Action Plan
RCIA	Rapid Cumulative Impact Assessment
RCS	Real Case Scenario
RILI	rainfall-induced landslide index
RoW	Right of Way
SCADA	Supervisory Control and Data Acquisition

Acronyms	Description
SNH	Scottish Natural Heritage
SO	Social Officer
SO2	Sulphur dioxide
SO4	Sulphate
SPA	Strictly Protected Area
SRTM	Shuttle Radar Topography Mission
STE	Serrated Trailed Edge
TDS	Total Dissolved Solids
TIP	Trafficking in Persons
TL	Transmission Line
TNC	The Nature Conservancy
TOR	Terms of Reference
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States dollars
UV	Ultra-violet
VEC	Valued Environmental and Social Components
VP	Vantage Point
VU	Vulnerable
WBG	World Bank Group
WBGT	Wet Bulb Globe Temperature
WCS	Worst Case Scenario
WCS	Wildlife Conservation Society
WHO	World Health Organisation
WPF	Wind Power Farm
WPFW	West Pacific Flyway
WRI	World Resource Institute
WSDI	Warm spell duration index
WTG	Wind Turbine Generator
WWF	World Wide Fund for Nature

6. ENVIRONMENTAL & SOCIAL BASELINE

6.1 PHYSICAL ENVIRONMENT

6.1.1 INTRODUCTION

This chapter provides an overview of the environmental baseline conditions within the Project and the surrounding area of the WTG Area, OHL, and other ancillary facilities, including, topography, geology and soil quality, climate and meteorology, natural hazards, hydrology and water quality, air quality, noise, landscape and visual characteristics.

The information provided is based on a review of public information, the regulatory Detailed Environmental Impact Assessment (DEIA), as well as a review of available literature from ERM's in-house library. In addition, a site visit was undertaken in September 2024, February and May 2025 to gather environmental as well as social baseline information from local communities and governmental departments and stakeholder engagements.

The objective of this chapter is to outline the existing environmental and social conditions in the Project Study Area. This information is used to assess potential impacts caused by the Project in construction and operation phases and assist in the development of Project specific mitigation measures and/or monitoring programs to reduce and manage adverse impacts.

6.1.2 TOPOGRAPHY

The land lease area within which the Project will be located and its surrounding areas contain areas of hill ranges in the central areas with expanses of gently undulating and relatively flat land and have an altitude of 1,190 m to 1,590 m above sea level (***Figure 6-1***). The highest areas of land lease area is located within hill range near the middle of the land lease area. Along the OHL route to the southeast of land lease area towards Oyu Tolgoi mine area, the elevation lowers by about 400 m. As indicated in ***Figure 6-1,*** WTGs would be located at similar elevations (ranging from 1,437 to 1,547 m above sea level) reflecting the low hills undulating terrain.

The Gobi Desert in the southern zone of Mongolia consists of low hills and the flat valleys between them. This region is characterized by low mountains, hills of the Gobi that have been subjected to physical weathering for many years along with the plains and valleys are interspersed with temporary streams and ravines.

The unique appearance of the Mongolian Gobi and deserted areas is largely due to its elevation above sea level, its surrounding mountains, and its remoteness from the sea. Therefore, the Gobi and deserted areas of Mongolia are characterized to have extremely dry arid climate, summer precipitation regime, and high windstorms of the mainland.

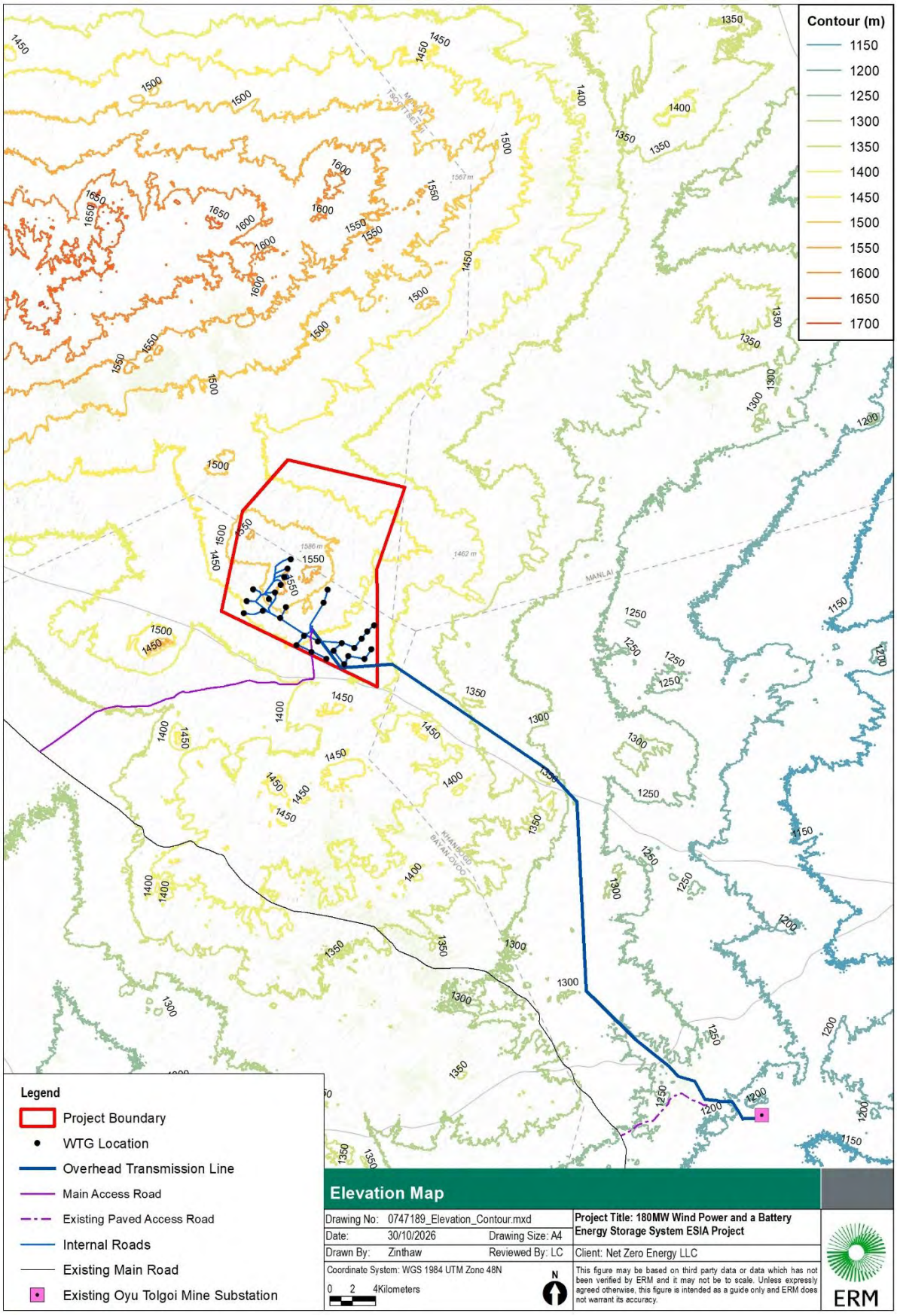
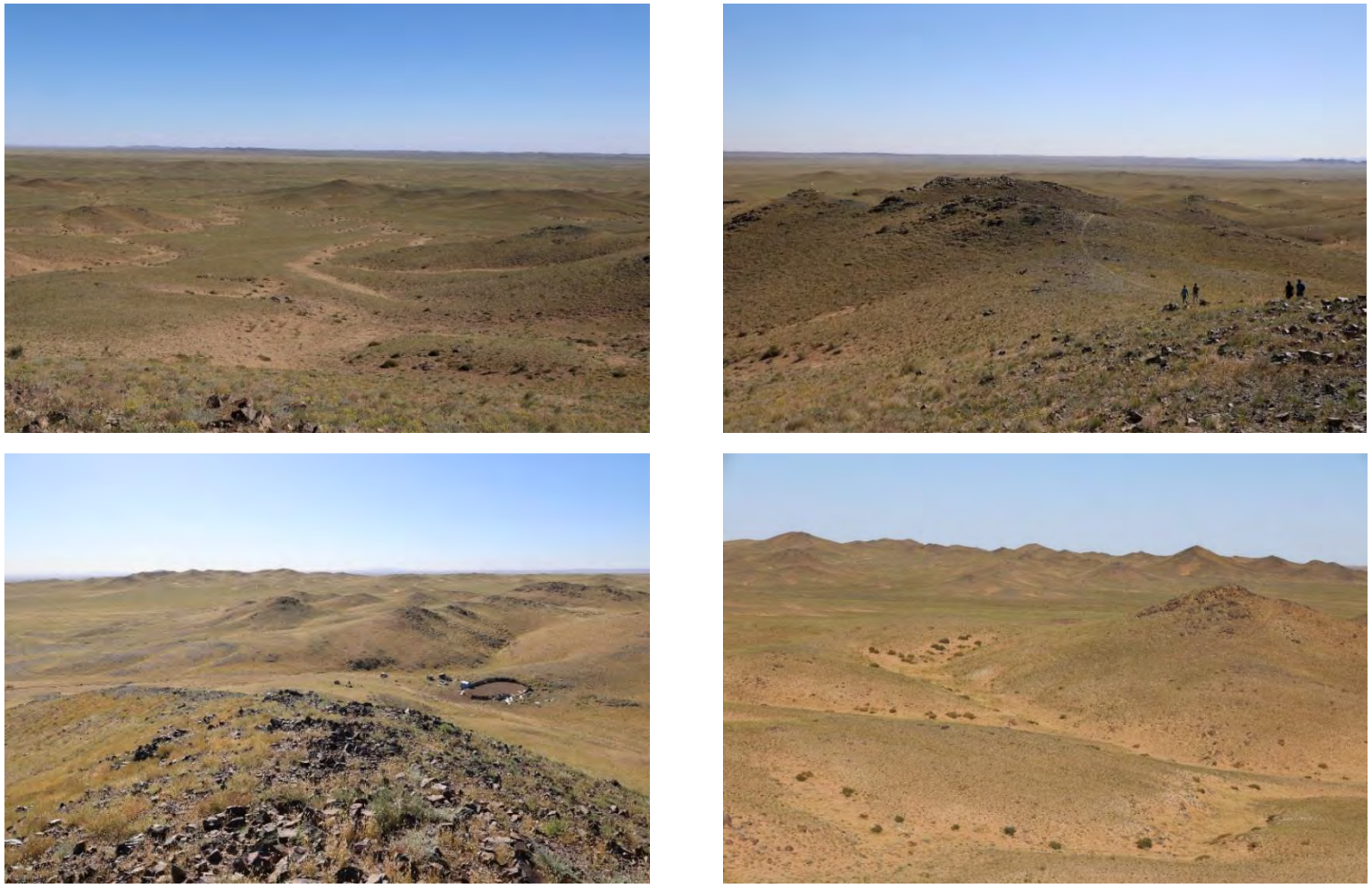


FIGURE 6-1: ELEVATION MAP OF PROJECT AREA



Source: ERM Site Visit (September 2024)

FIGURE 6-2: REPRESENTANTIVE IMAGES OF TERRAIN WITHIN THE LAND LEASE AREA

6.1.3 GEOLOGY AND SOILS

The Project is located in Umnugobi Province in southern Mongolia. Only a small proportion of Mongolian soil is arable. The majority (75 percent) of Mongolian soil is composed of semi-arid grass steppes. The soils in the region are characterised as semi-desert or arid desert which are rarely deep, with an average topsoil depth of 20 cm, and typically have thin A-horizons and limited humus and clay content[1].

The geological formations of the region are quite complex, the bedrock is composed of cretaceous conglomerate, sandstone, siltstone, as well as Neogene clay, and has a composite texture with abundant tectonic faults.

Due to the climatic conditions of the Gobi region, natural moisture is low, and it has the characteristic tendency to evaporate after rain.

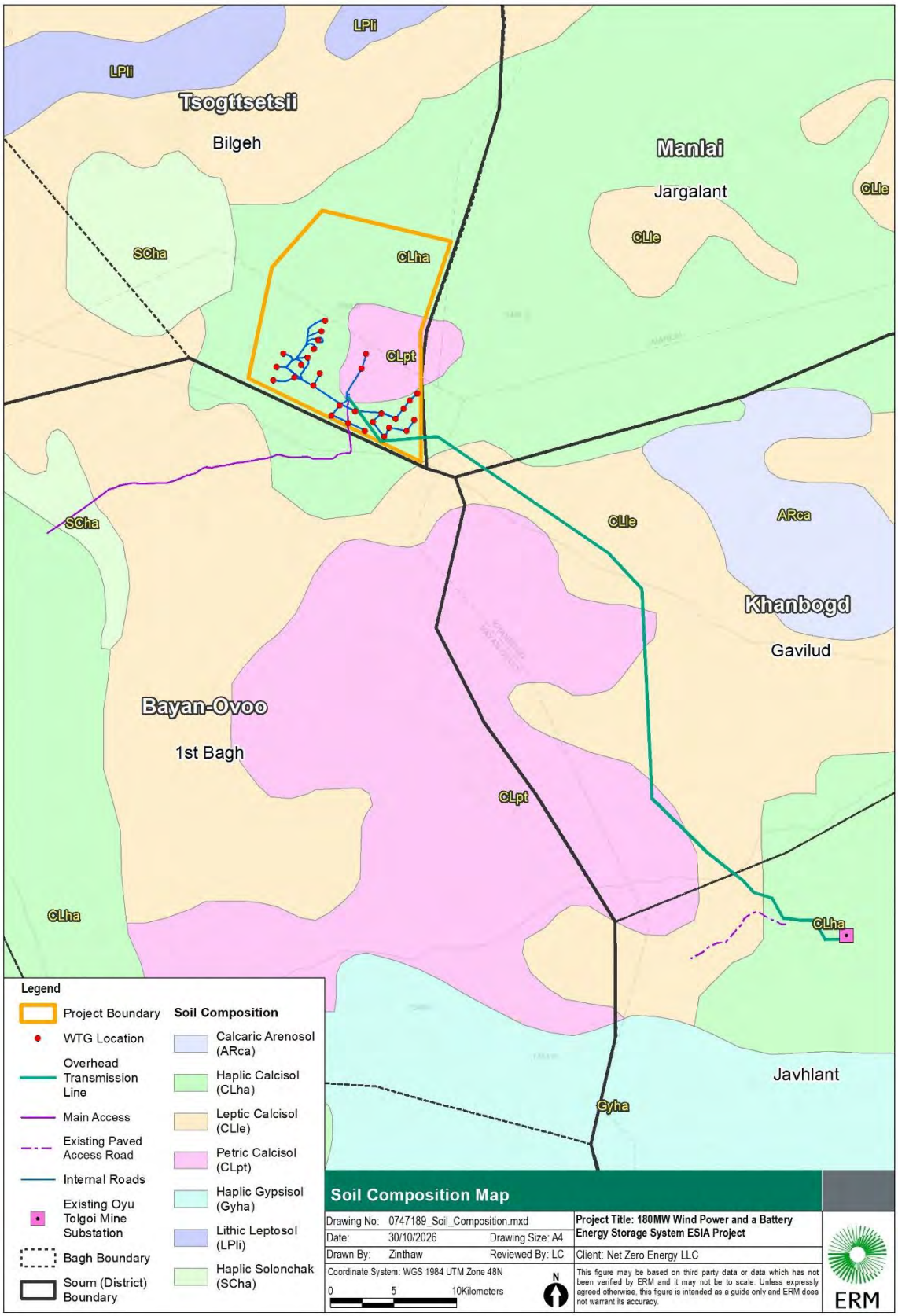
According to the soil composition map (***Figure 6-3***), the majority of Project Site is located on Calcisols type (Haplic Clacisol - *CLha*, Petric Calcisol - *CLpt* and Leptic Calcisol - *CLle*). Soil Group of the Calcisols accommodates soils in which there is substantial secondary accumulation of lime. Calcisols are common in highly calcareous parent materials and widespread in arid and semi-arid environments. Formerly used international soil names for Calcisols include 'Desert soils' and 'Takyrs'.[2]

Due to arid conditions, the region possesses soils that are poorly developed and often stony, with low soil organic matter levels (***Figure 6-4***) and low water retention capacity (generally Regosols, Leptosols, Cambisols).

Based on review of available data from 1989-2018 from Tsogttsetsi Soum meteorological station, maximum soil temperature in summer was recorded at 70°C, which occurred in July 1999, and the minimum soil temperature in winter was recorded at -40° C which occurred in January 1998. The average annual temperature of the soil surface from 1989-2018 was 5.1°C. The maximum monthly average soil surface temperature occurs in July (26.6°C), and the minimum value occurs in January (-17.6°C).

[1] EcoTrade LLC (2005), Oyu Tolgoi Project Groundwater Resource Use from the Gunii Hooloi and Galbyn Gobi Regional Aquifers, 2005

[2] Definition of Calcisols | ISRIC–World Soil Information. Available at https://www.isric.org/sites/default/files/major_soils_of_the_world/set7/cl/calcisol.pdf [Accessed September 2024]



Source: Soil Atlas of Asia, European Commission 2023.

FIGURE 6-3: SOIL COMPOSITION OF PROJECT AREA



Source: ERM Site Visit (September 2024)

FIGURE 6-4: EXAMPLE OF ROCK OUTCROP ON HILLS IN THE LAND LEASE AREA

6.1.3.1 SOIL SURVEY 2025

Survey Methodology

A field survey to determine the condition of the soil cover was conducted between April 11 to April 19, 2025. Field cover survey was carried out using 1:100,000 scale topographic map along the NZE Wind farm project area and the OHL route.

The soil cover survey identified three subtypes of semi-desert brown soils. In order to determine the chemical and physical properties of these soils, a total of 12 points were selected for profile and representation of the soil subtypes. From these, 12 profile sites were selected, and a total of 12 soil samples were taken from the top soil and delivered to the laboratory for analysis.

Soil samples were taken from six points to determine the heavy metal content in the soil. Soil samples taken during the field survey were delivered to Soil and water laboratory of the Green Lab and were analysed for chemical and physical properties of the soil, where as heavy metal content analysis was conducted at the laboratory of ALS LLC.

Based on the results of laboratory analysis, the heavy metals of the soil was compared with MNS 5850:2019[3] standard.

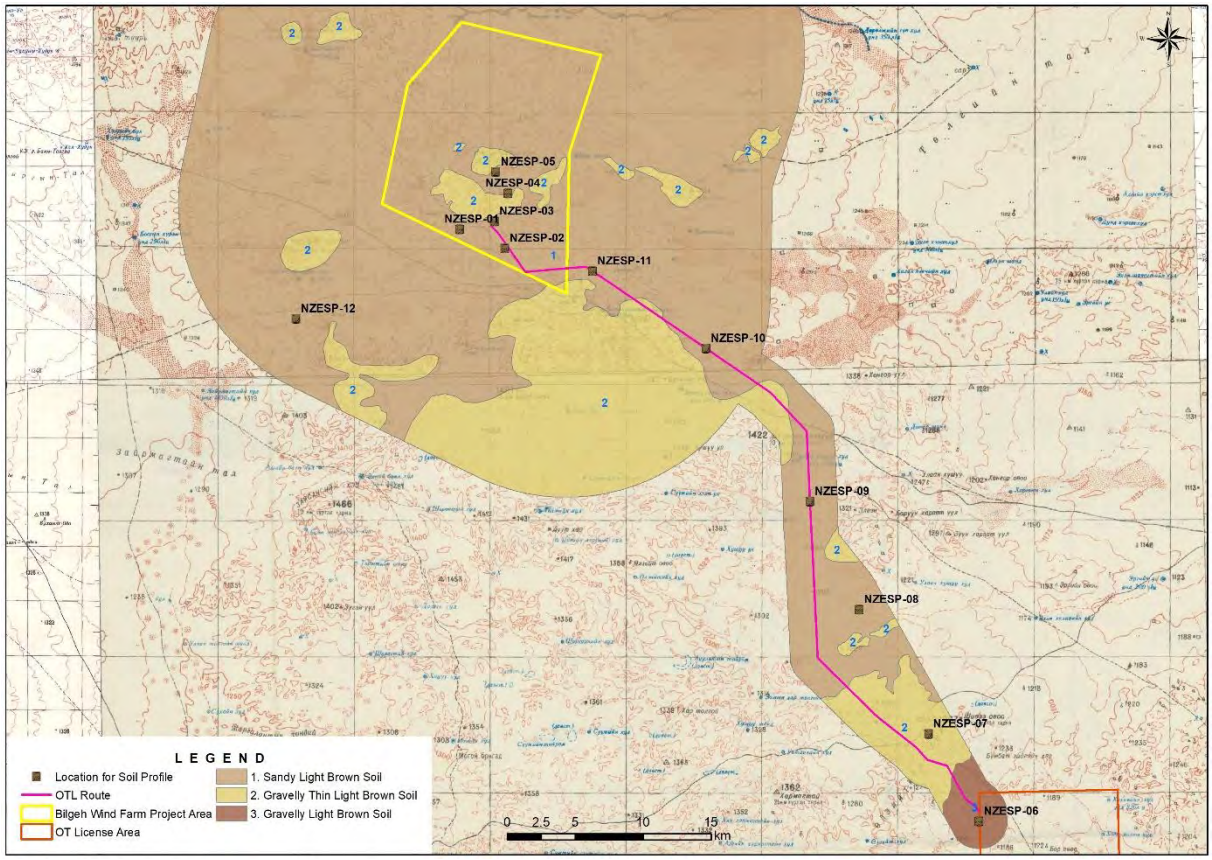
[3] MNS 5850:2019 Soil Quality. Soil pollutants permissible value

Soil cover characteristics

Along the wind farm area and OHL route three (3) subtypes soils of semi-desert brown soil types were identified.

Semi desert brown soil

- Sand hardened and gravelly light brown soil;
- Semi desert gravelly thin light brown soil; and
- Gravelly light brown soil.



Source: EcoTrend (2025)

FIGURE 6-5: DISTRIBUTION OF SOILS ALONG PROJECT SITE AND OHL ROUTE

The morphological records of the profiles made in the soil cover at the NZE wind farm project area and along the OHL route and the results of laboratory tests are detailed in the following section.

This soil is formed in most of the wind farm area and along the OHL route at an altitude of approximately 1,240 – 1,550 m, in the bottom of wide and narrow valleys between low hills. The soil layers in the area exhibit significant variability due to erosion and degradation caused by wind and rainfall. Riverbeds originating from the nearby mountains transport sediments into the valley, contributing to surface cracking and further altering the soil structure. Gravel covers approximately 60-80 percent of the surface area. The sandy light brown soil cover is represented by NZESP-01, NZESP-02, NZESP-03, NZESP-04, NZESP-05, NZESP-08, NZESP-09, NZESP-10, NZESP-11, NZESP-12 profiles.

Sandy Light brown soil

Soil profile NZESP-01

Location: Longitude: N: 43.42942° E: 106.33119°; Altitude: 1451 m.

The profile was made in the southern part of the NZE Wind Farm project area, situated in a valley of low hills within an undisturbed area.

TABLE 6-1: SOIL PROFILE NZESP-01

Soil layer, cm	Morphological description
Surface slope	4 degrees
Surface gravel	Gravel covers about 40% of the surface area.
$A_к$ 0-3	A dry surface layer with a light brown, laminated (platy) structure, and porous texture.
B_{ca1} 3-18	Light brown, moist, fragile, granular sandy loam layer. Contains ≤3% gravel (<1 cm in size) by volume. Rock fragments have carbonate coatings. Few fine vertical plant roots are present. Reacts weakly with 10% HCl. Gradual transition to the next horizon in terms of colour and structure.
B_{ca2} 18-65	Brown, moist, friable, granular sandy loam layer. Contains ≤10% rock fragments up to 3 cm in size. Carbonate coatings are observed on the surfaces of the rock fragments. Very few fine fibrous plant roots are present. Gradual transition to the next horizon based on structure.
BC 65-80	Compact sandy loam layer containing rock fragments. Carbonate veins are present. Contains ≤20% rock fragments up to 5 cm in size. Carbonate coatings are observed on the surfaces of the rock fragments. Strong effervescence with 10% HCl.



FIGURE 6-6: SOIL PROFILE NZESP-01, SURFACE

Soil profile NZESP-02

Location: Longitude: N: 43.41636° E: 106.3721°; Altitude: 1412 m.

The profile was established in the southeastern part of the NZE Wind Farm project area, located in a valley of low hills within an undisturbed region.

TABLE 6-2: SOIL PROFILE NZESP-02

Soil layer, cm	Morphological description
Surface slope	3 degrees
Surface gravel	Gravel covers about 40% of the surface area.
Э 0-0.5	Dry, loose sandy layer contain gravel sized <1 cm
AK 0.5-3	Light brown, dry surface horizon with a laminated, porous structure.
Aq 3-20	Light brown, dry sandy loam horizon with a friable granular structure. Contains rock fragments ≤0.5 cm in size, comprising up to 3% by volume. Sparse distribution of vertical plant roots. Shows moderate effervescence with 10% HCl. Gradual colour transition to the underlying horizon.
Bca 20-45	Light grey coloured, wetness, granular structure, loamy layer. No gravel present. The fine plant roots are very sparse. The texture gradually transitions in the underlying horizon.
BC 45-60	Brown, moist clayey horizon. Dense, no gravel, and root-free. Strong effervescence with 10% HCl.



FIGURE 6-7: SOIL PROFILE NZESP-02, SURFACE

Soil profile NZESP-03

Location: Longitude: N: 43.43434° E: 106.36311° Altitude: 1458 m.

The profile was developed in the southeastern portion of the NZE Wind Farm site, within a southern-oriented valley of low-relief hills, located in an area with no or minimal anthropogenic disturbance.

TABLE 6-3: SOIL PROFILE NZESP-03

Soil layer, cm	Morphological description
Surface slope	3 degrees
Surface gravel	Gravel covers about 50% of the surface area.
Э 0-0.5	Dry, loose sandy layer contain gravel sized <2 cm
A_K 0.5-3	Light brown, porous, dry surface horizon.
A_q 3-12	Light brown, moist sandy loam horizon with a friable granular structure. Contains ≤3% rock fragments ≤1 cm in size by volume. Fine plant roots are present. No carbonates observed. Gradual colour transition to the underlying horizon.
B_{ca} 12-90	Brown, moist sandy loam horizon with a friable granular structure. Contains ≤3% rock fragments up to 3 cm in size by volume. Plant roots are few up to 30 cm depth, very sparse (1–2 roots) between 30–70 cm, and absent below 70 cm. Exhibits moderate effervescence upon reaction with 10% HCl. The transition to the underlying horizon is distinct, primarily defined by structural changes.
BC 90-100	Light brown, moist, gravelly sandy loam horizon with rock fragments reach up to 5 cm in size. Carbonate coatings are observed on the surfaces of the rock fragments.

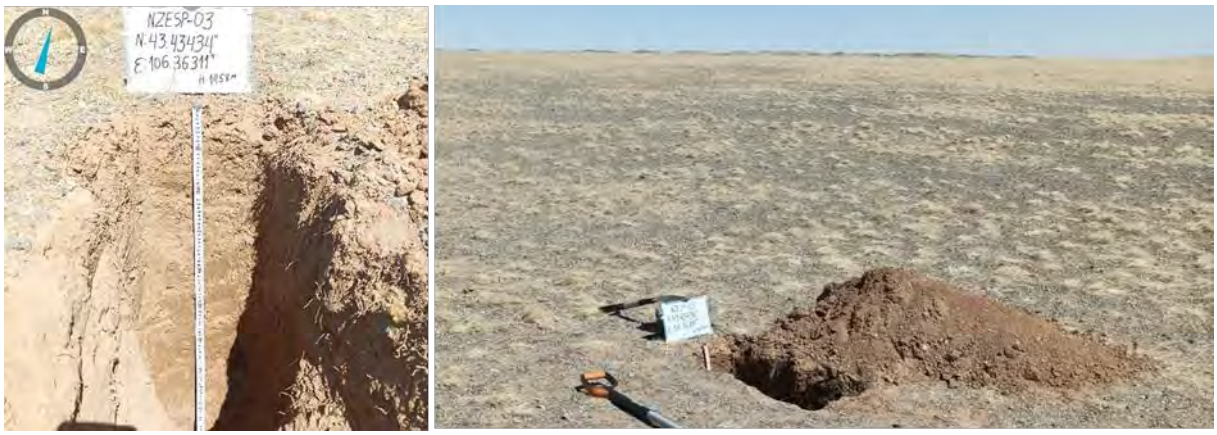


FIGURE 6-8: SOIL PROFILE NZESP-03, SURFACE

Soil profile NZESP-04

Location: Longitude: N: 43.45272° E: 106.37552° Altitude: 1470 m.

The profile was developed in the southeastern part of the NZE Wind Farm project area, situated on the northern slope of low hills within an area exhibiting no or minimal anthropegnic disturbance.

TABLE 6-4: SOIL PROFILE NZESP-04

Soil layer, cm	Morphological description
Surface slope	4 degrees
Surface gravel	Gravel covers about 40% of the surface area.
A_K 0.5-2	Light brownish, hardened layer with sandy, porous
A_q 2-10	Light brownish, moist sandy loam horizon with a low-density granular structure. Contains ≤3% rock fragments up to 0.5 cm in size by volume. Fine vertical plant roots are present. Moderate effervescence with 10% HCl. Gradual transition to the underlying horizon in both colour and structure.
B_{ca} 10-90	Brown, moist sandy loam horizon with a friable granular structure. Contains ≤3% rock fragments up to 4 cm in size by volume. Fine plant roots are very sparsely distributed up to a depth of 40 cm. Moderate effervescence with 10% HCl. Gradual transition to the underlying horizon in both colour and structure.
BC 90-100	Light grey, compact silty clay horizon with fine rock fragments. Strong effervescence with 10% HCl.



FIGURE 6-9: SOIL PROFILE NZESP-04, SURFACE

Soil profile NZESP-05

Location: Longitude: N: 43.4671° E: 106.365°; Altitude: 1507 m.

The profile was prepared in the central part of the NZE Wind Farm project area, on the southern slope of Zogdor Mountain, within an undisturbed area.

TABLE 6-5: SOIL PROFILE NZESP-05

Soil layer, cm	Morphological description
Surface slope	3 degrees
Surface gravel	Gravel covers about 50% of the surface area.
Э 0-0.5	A loose sandy loam surface layer with rock fragments.
A_q 0.5-10	Light brown, dense, dry, light silty clay horizon. Contains ≤3% rock fragments up to 1 cm in size by volume. Fine entangled plant roots are present. The transition to the underlying horizon is distinct in colour and structure.
B_{ca} 10-95	Brownish-yellow, moist sandy loam horizon with a friable granular structure. Contains ≤3% rock fragments up to 3 cm in size by volume. Carbonate coatings are present on the surfaces of the rock fragments. Fine plant roots are distributed up to 20 cm depth. Weak effervescence with 10% HCl.



FIGURE 6-10: SOIL PROFILE NZESP-05, SURFACE

Soil profile NZESP-08

Location: Longitude: N: 43.17311° E: 106.68736° Altitude: 1266 m.

The soil profile was established along the OHL route, within a flat, undisturbed area situated between low hills.

TABLE 6-6: SOIL PROFILE NZESP-08

Soil layer, cm	Morphological description
Surface slope	3 degrees
Surface gravel	Gravel covers about 60% of the surface area.
A_K 0-2	Light brown coloured, hardness layer with granular structure, porous, dry
A_q 2-20	Brown, moist sandy loam horizon with a friable granular structure. Stone-free, with few fine plant roots. No carbonates are present. Distinct transition to the underlying horizon in colour and structure.
B_{ca} 20-50	Brownish-yellow, moist, dense silty clay horizon with a granular structure. Contains ≤3% rock fragments up to 2 cm in size by volume. Carbonate spots are observed on the profile face. No plant roots are present. Moderate effervescence with 10% HCl.



FIGURE 6-11: SOIL PROFILE NZESP-08, SURFACE

Soil profile NZESP-09

Location: Longitude: N: 43.24524° E: 106.64462°; Altitude: 1231 m.

The profile was developed along the OHL corridor, situated on the eastern bank of Haya Spring in a minimally disturbed natural setting.

TABLE 6-7: SOIL PROFILE NZESP-09

Soil layer, cm	Morphological description
Surface slope	2 degrees
Surface gravel	Gravel covers about 60% of the surface area.
A_k 0-1	Light brown, hardness layer with brittle granular structure, porous
A_q 1-5	Brown, moist sandy loam horizon with a dense granular structure. Contains ≤3% rock fragments up to 0.5 cm in size by volume. No plant roots observed. Distinct transition to the underlying horizon in colour and structure.
B_{ca} 5-70	Alternating horizons of gravel layers and brown sandy loam. Weak effervescence with 10% HCl. Plant roots are sparse. Moist sandy loam horizon with a friable granular structure. Loose gravel fragments ≤1 cm in size.



FIGURE 6-12: SOIL PROFILE NZESP-09, SURFACE

Soil profile NZESP-10

Location: Longitude: N: 43.34789° E: 106.55312°; Altitude: 1338 m.

The soil profile was established along the OHL route, in the northeastern valley of Suujiin Hyar Mountain, within a minimally disturbed and representative area.

TABLE 6-8: SOIL PROFILE NZESP-10

Soil layer, cm	Morphological description
Surface slope	4 degrees
Surface gravel	Gravel covers about 60% of the surface area.
Э 0-2	Loose, dry sandy loam horizon containing rock fragments.
A_q 2-20	Brown, moist sandy loam horizon with a granular structure. Contains ≤5% rock fragments up to 1 cm in size by volume. Fine plant roots are distributed throughout. Weak effervescence with 10% HCl. Distinct transition to the underlying horizon in colour and structure.
B_{ca} 20-45	Brownish-yellow, moist, dense silty clay horizon. Contains ≤10% rock fragments up to 1 cm in size by volume. Carbonate coatings are present on the surfaces of the rock fragments. Distribution of fine plant roots decreases. Moderate effervescence with 10% HCl. Gradual structural transition to the underlying horizon.
BC 45-60	Brownish-yellow, moist, dense silty clay horizon. Contains up to 30% rock fragments ≤ 3 cm in size by volume. No plant roots are present. Strong effervescence with 10% HCl.



FIGURE 6-13: SOIL PROFILE NZESP-10, SURFACE

Soil profile NZESP-11

Location: Longitude: N: 43.40029° E: 106.45135°; Altitude: 1386 m.

The soil profile was developed along the OHL route, on the northern slope of Nuhun Buutsiin Hyar Mountain, within an undisturbed area that is representative of the surrounding landscape unit.

TABLE 6-9: SOIL PROFILE NZESP-11

Soil layer, cm	Morphological description
Surface slope	3 degrees
Surface gravel	Gravel covers about 40% of the surface area.
Э 0-1.5	Loose sandy loam horizon containing rock fragments.
A_q 1.5-20	Light brown, moist sandy loam horizon with a friable granular structure. Stone-free, with fine vertical plant roots present. No carbonates were detected. Gradual transition to the underlying horizon in colour and structure.
B 20-35	Brownish-yellow, moist, loose sandy loam horizon. Contains ≤3% rock fragments up to 0.5 cm in size by volume. Few fine plant roots are present. No carbonates were detected. Distinct structural transition to the underlying horizon.
BC 35-60	Brownish-yellow, moist, dense sandy loam horizon. Contains ≤30% rock fragments up to 4 cm in size by volume. Moderate effervescence with 10% HCl.



FIGURE 6-14: SOIL PROFILE NZESP-11, SURFACE

Soil profile NZESP-12

Location: Longitude: N: 43.37197° E: 106.18155°; Altitude: 1346 m.

A soil profile was established along the access road, located 10.5 km southwest of the NZE Wind Farm project site, within an undisturbed area in the southern valley of Ikh Luus Mountain.

TABLE 6-10: SOIL PROFILE NZESP-12

Soil layer, cm	Morphological description
Surface slope	2 degrees
Surface gravel	Gravel covers about 60% of the surface area.
$A_к$ 0-2	Light brown, porous, dry surface horizon.
A_q 2-20	Light brown, moist sandy loam horizon with a friable granular structure. Stone-free, with plant roots present. Weak effervescence with 10% HCl. Gradual transition to the underlying horizon in colour and structure.
B_{ca} 20-35	Brown, moist sandy loam horizon with a friable granular structure. Stone-free, with few fine plant roots. Moderate effervescence with 10% HCl. Gradual transition to the underlying horizon in colour and structure.
BC 35-60	Brownish-yellow, dense silty clay horizon. Stone-free, with no plant roots. Strong effervescence with 10% HCl.



FIGURE 6-15: SOIL PROFILE NZESP-12, SURFACE

Gravelly, Thin Light Brown Soil

The gravelly, shallow, light brown soil characteristics of the semi-desert valleys are primarily developed on the slopes and top of rocky hills. These soils are highly susceptible to erosion, driven by both wind and water. The dark surface coloration of the surrounding mountains reflects the area's underlying geology and dominant rock types. The NZESP-07 soil profile was developed to represent this specific soil type and its associated landscape features.

Soil profile NZESP-07

Location: Longitude: 106.74759°, Latitude: 43.09001°; Altitude: 1243 m.

The soil profile was developed along the OHL route, on the northern slope of Ulziitiin Hyar Mountain, positioned on a low-lying hillside with gentle relief.

TABLE 6-11: SOIL PROFILE NZESP-07

Soil layer, cm	Morphological description
Surface slope	20 degrees
Surface gravel	80% of the surface is covered in gravel
A_k 0-0.5	Light brown, porous, dry surface horizon with thin platy layers.
A_q 0.5-5	Light brown, dry sandy loam horizon with a friable granular structure. Contains up to 30% rock fragments ≤4 cm in size. Rock surfaces show carbonate coatings, and plant roots are present. Clear structural transition to the underlying horizon. Boundary is irregular.
C 5-30	Weathered dark-coloured rock fragments.



FIGURE 6-16: SOIL PROFILE NZESP-07, SURFACE

Gravelly Light Brown Soil

Semi-desert, gravelly, light brown soils have developed on flat valley bottoms located between low hills. The surface is prone to erosion from intermittent runoff and is dissected by seasonal streams and shallow ravines. These soils have formed from deluvial-proluvial sediments, with gravel covering approximately 70–80% of the surface area. Soil profile NZESP-06 was established to represent this characteristic soil type and landscape setting.

Soil profile KHBSP-06

Location: Longitude: 106.79158°, Latitude: 43.03148°; Altitude: 1186 m.

A profile was developed along the OHL route, located west of the Oyu Tolgoi mining license area, on the southern slope of a low hill within a geologically undisturbed area.

TABLE 6-12: SOIL PROFILE NZESP-06

Soil layer, cm	Morphological description
Surface slope	4 degrees
Surface gravel	80% of the surface is covered in gravel
A_K 0-2	Light brown, porous sandy loam horizon containing rock fragments.
A_q 2-12	Light brown, dry sandy loam horizon with a friable granular structure. Contains up to 20% rock fragments ≤ 2 cm in size by volume. Few fine plant roots present. Moderate effervescence with 10% HCl. Rock surfaces show carbonate coatings. Clear transition to the underlying horizon in colour and structure.
B_{ca} 12-35	Brown, moist, dense friable granular sandy loam horizon. Contains up to 40% rock fragments ≤ 4 cm in size by volume. Fine plant roots are sparse up to 20 cm depth. Gradual structural transition to the underlying horizon. Boundary is irregular.
C 35-60	Poorly rounded rock fragments with carbonate coatings on the rock surfaces.



FIGURE 6-17: SOIL PROFILE NZESP-06, SURFACE

Soils physical and chemical characteristics

This section presents a summary of the basic physical and chemical properties of twelve (12) soil samples collected from twelve distinct soil profiles during the field survey. The summary includes key parameters such as soil texture, structure, pH, electrical conductivity, organic matter content, and major nutrient levels.

Soil's physical characteristics

Based on the physical characterization of the soil samples, all samples exhibit a loamy sand texture. Laboratory particle size analysis reveals that the sand fraction (1.0–0.05 mm) constitutes between 65.8% and 82.2% of the soil mass, the silt fraction (0.05–0.001 mm) ranges from 14.2% to 26.6%, and the clay fraction (<0.001 mm) varies between 3.6% and 8.0%.

TABLE 6-13: PHYSICAL CHARACTERISTICS OF SOILS

No.	Sample number	Depth, cm	Particle size %, mm						
			1.0-0.25	0.25-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001	<0.01
1	NZESP-01	0-18	32.0	44.6	4.4	1.3	9.7	8.0	19.0
2	NZESP-02	0-20	25.3	52.2	6.7	2.1	7.0	6.3	15.9
3	NZESP-03	0-12	35.0	39.2	9.5	2.7	6.9	6.7	16.3
4	NZESP-04	0-10	38.3	40.3	7.0	2.4	6.8	5.2	14.4
5	NZESP-05	0-10	38.6	39.7	7.1	1.8	7.5	5.3	14.6
6	NZESP-06	0-12	40.2	34.9	7.0	1.3	9.8	6.7	17.8
7	NZESP-07	0-5	16.6	49.2	16.1	3.7	6.8	7.5	18.0
8	NZESP-08	0-20	30.2	48.0	7.8	1.7	7.3	5.0	14.0
9	NZESP-09	0-5	42.2	37.5	6.6	1.3	7.5	4.9	13.7
10	NZESP-10	0-20	32.0	50.2	6.5	1.0	6.7	3.6	11.3
11	NZESP-11	0-20	20.4	53.9	10.9	1.3	7.4	6.1	14.8
12	NZESP-12	0-20	30.7	42.4	8.5	2.2	8.7	7.5	18.4

Source: Results of "Green Lab" Soil and water laboratory analysis, 2025-05-04

The soil cover along the NZE Wind Farm project area and the OHL route is mostly gravelly, sandy loam. Hardened layers up to 0.5-3 cm thick are formed on the surface of the soil and partially perform a function of protecting the soil from wind and water runoff. The gravel covering the surface reduces the evaporation of soil moisture and regulates the water-moisture regime.

Chemical characteristics of soils

The soils within the NZE Wind Farm project area and along the OHL route are characterized as weakly alkaline and reactive. Sample NZESP-11 does not contain detectable carbonates, while samples NZESP-06 and NZE-12 exhibit moderate carbonate content; the remaining samples are slightly calcareous. Organic matter content is low across the surveyed samples, as

indicated by limited humus presence. Electrical conductivity values are also low, suggesting minimal salinity.

Available nutrient levels are generally low. Mobile phosphorus concentrations range from 0.4 to 2.5 mg per 100 g of soil, while mobile potassium levels are between 10 and 20 mg per 100 g of soil, indicating slight availability. Exchangeable base cations are present in modest amounts, with calcium (Ca) ranging from 7.7 to 16.8 mg per 100 g and magnesium (Mg) from 0.8 to 5.4 mg per 100 g of soil. These values reflect a generally low soil fertility status across the study area.

TABLE 6-14: BASIC CHEMICAL PROPERTIES OF SOIL COVER

No.	Sample number	Depth, cm	pH	Salt, %	EC	$CaCO_3$ %	Humus %	Exchangeable bases, mg-eq/100g		Nutrients mg/100 g	
								Ca	Mg	P_2O_5	K_2O
1	NZESP-01	0-18	9.12	0.03	0.066	0.99	0.50	9.7	2.6	0.7	13
2	NZESP-02	0-20	9.16	0.03	0.066	1.15	0.47	10.3	3.8	0.6	17
3	NZESP-03	0-12	9.10	0.04	0.077	0.66	0.58	9.9	4.4	0.4	20
4	NZESP-04	0-10	9.16	0.01	0.014	0.94	0.45	13.3	2.6	0.4	10
5	NZESP-05	0-10	9.23	0.03	0.052	0.66	0.51	11.2	4.0	0.7	10
6	NZESP-06	0-12	9.45	0.04	0.074	2.14	0.51	11.3	0.8	1.2	15
7	NZESP-07	0-5	9.11	0.04	0.076	1.32	0.46	10.1	5.4	0.7	17
8	NZESP-08	0-20	9.83	0.05	0.092	1.32	0.41	11.8	4.2	1.1	10
9	NZESP-09	0-5	10.60	2.65	5.280	0.99	0.40	5.8	1.0	2.5	17
10	NZESP-10	0-20	9.38	0.05	0.103	1.15	0.61	7.7	3.6	0.7	14
11	NZESP-11	0-20	9.18	0.03	0.059	0.00	0.49	16.8	0.8	1	14
12	NZESP-12	0-20	9.45	0.04	0.075	3.29	0.53	13.6	5.4	1.3	14

Status of a soil cover degradation

The soil cover across the NZE Wind Farm project area and along the OHL route remains in its natural state, with no evident disturbance or degradation from anthropogenic or technical activities.

To assess the concentration of heavy metals in the surface layer, soil samples were collected during the field survey from the top 0–5 cm at five locations within the wind farm project area and at one location along the OHL route.

TABLE 6-15: SOIL SAMPLE LOCATIONS FOR HEAVY METALS ANALYSIS

Sample number	Coordinates (WGS84)		Elevation, m	Location
	N	E		
NZESP-01	43.42942°	106.33119°	1451 m	South side of the wind farm area
NZESP-02	43.41636°	106.37210°	1412 m	Southeast side of the wind farm area
NZESP-03	43.43434°	106.36311°	1458 m	Southeast side of the wind farm area
NZESP-04	43.45272°	106.37552°	1470 m	East side of the wind farm area
NZESP-05	43.46710°	106.36500°	1507 m	Centre side of the wind farm area
NZESP-06	43.03148°	106.79158°	1186 m	Along the OHL route, west of the Oyu Tolgoi mining license area

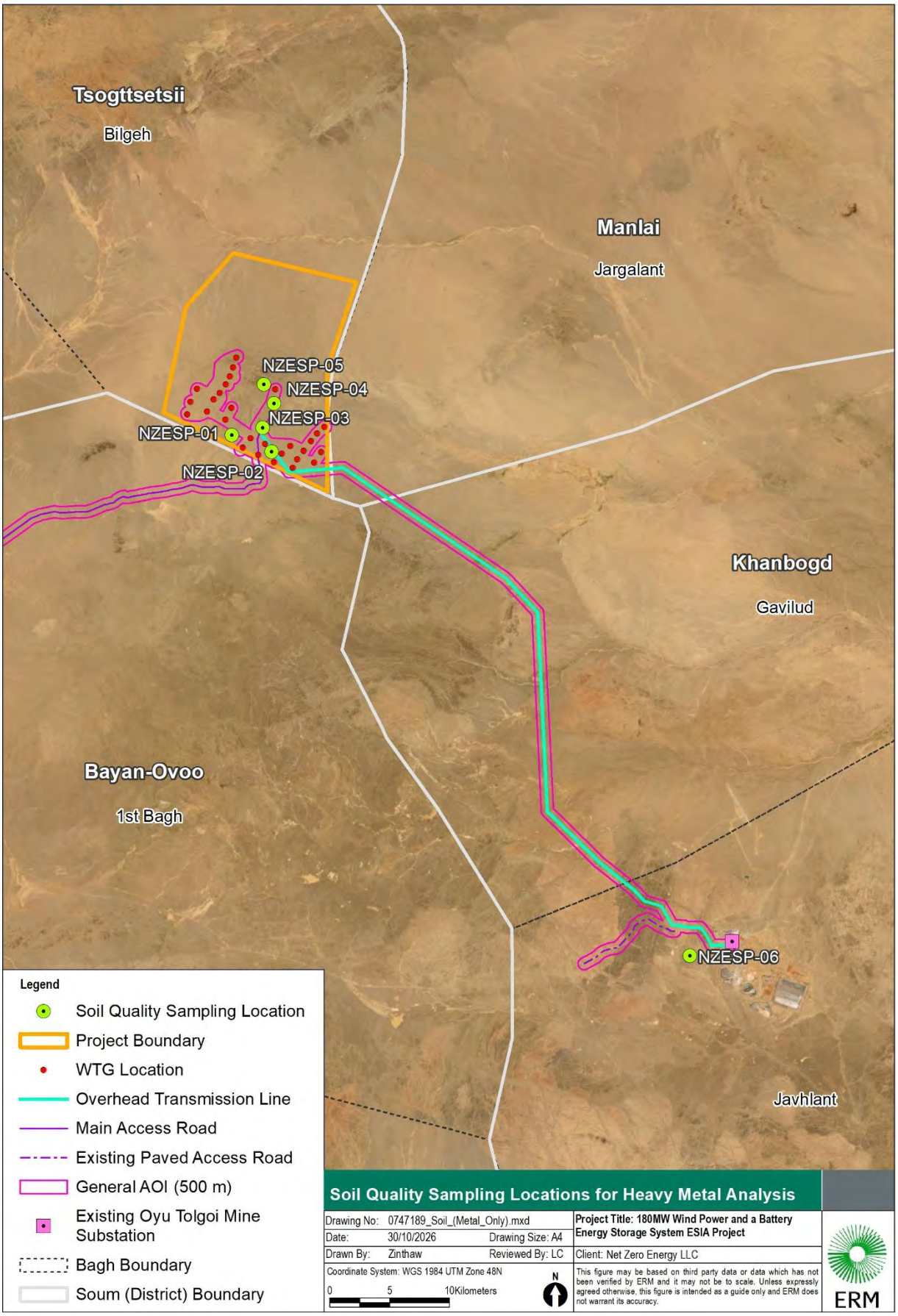


FIGURE 6-18: SOIL SAMPLING LOCATIONS FOR HEAVY METAL ANALYSIS

Laboratory Analysis and Regulatory Comparison

The soil samples collected were analysed by the accredited laboratory of "ALS Group" LLC. The analytical results were compared against the precautionary threshold values for sandy soils as specified in the Mongolian national standard MNS 5850:2019 (Soil Quality – Maximum Permissible Levels of Soil Contaminants and Elements). A summary of the comparison between measured concentrations and the standard's precautionary limits is presented in the table below.

TABLE 6-16: TEST RESULTS FOR HEAVY METALS IN SOIL

Element	Unit	NZESP-01	NZESP-02	NZESP-03	NZESP-04	NZESP-05	NZESP-06	MNS 5850:2019		
								Precaution Value	Trigger Value	Action value
Ag	ppm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-
Al	%	1.69	1.47	1.52	1.43	1.71	1.89	-	-	-
As	ppm	11	9	9	8	8	12	10	50	100
B	ppm	10	10	10	10	10	10	15	100	300
Ba	ppm	100	90	80	90	90	100	-	-	-
Be	ppm	0.7	0.6	0.6	0.6	0.7	0.7	-	-	-
Bi	ppm	<2	<2	<2	<2	<2	<2	-	-	-
Ca	%	1.37	1.92	0.61	1.26	0.78	1.92	-	-	-
Cd	ppm	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	10	20
Co	ppm	10	9	9	8	10	11	30	500	1000
Cr	ppm	27	24	26	25	28	32	60	400	1500
Cu	ppm	24	24	29	21	26	41	60	500	1000
Fe	%	2.64	2.41	2.5	2.38	2.67	3.05	-	-	-
Ga	ppm	<10	<10	<10	<10	<10	10	-	-	-
Hg	ppm	<1	1	<1	1	1	<1	0.5	10	20
K	%	0.31	0.27	0.29	0.24	0.3	0.31	-	-	-
La	ppm	10	10	10	10	10	20	-	-	-
Mg	%	0.77	0.69	0.73	0.66	0.78	1	-	-	-
Mn	ppm	449	397	459	371	462	576	-	-	-

Element	Unit	NZESP-01	NZESP-02	NZESP-03	NZESP-04	NZESP-05	NZESP-06	MNS 5850:2019		
								Precaution Value	Trigger Value	Action value
Mo	ppm	<1	<1	<1	<1	<1	1	5	20	50
Na	%	0.01	0.01	0.01	0.01	0.01	0.02	-	-	-
Ni	ppm	19	18	20	16	21	22	150	1000	1800
P	ppm	270	270	380	300	290	670	-	-	-
Pb	ppm	12	10	14	9	12	12	100	500	1200
S	%	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-
Sb	ppm	<2	3	<2	<2	<2	<2	-	-	-
Sc	ppm	4	4	4	4	4	5	-	-	-
Sr	ppm	55	57	43	58	50	93	800	3000	6000
Th	ppm	<20	<20	<20	<20	<20	<20	-	-	-
Ti	%	0.06	0.06	0.07	0.06	0.06	0.09	-	-	-
Tl	ppm	<10	<10	<10	<10	<10	<10	-	-	-
U	ppm	<10	<10	<10	<10	<10	<10	-	-	-
V	ppm	58	55	54	53	55	65	150	600	1000
W	ppm	<10	<10	<10	<10	<10	<10	-	-	-
Zn	ppm	51	45	51	45	52	62	300	600	1000

Source: ALS LLC laboratory test results, 2025-05-06

The results of the laboratory analysis were evaluated against the precautionary threshold values outlined in MNS 5850:2019 (Soil Quality – Maximum Permissible Levels of Soil Contaminants and Elements). The comparison indicated that the arsenic (As) concentrations in soil samples from profiles NZESP-02 and NZESP-12 ranged from 11 to 12 mg/kg, slightly exceeding the precautionary limit of 10 mg/kg by 1–2 mg/kg. Concentrations of all other analysed elements were within the permissible limits established by the standard.

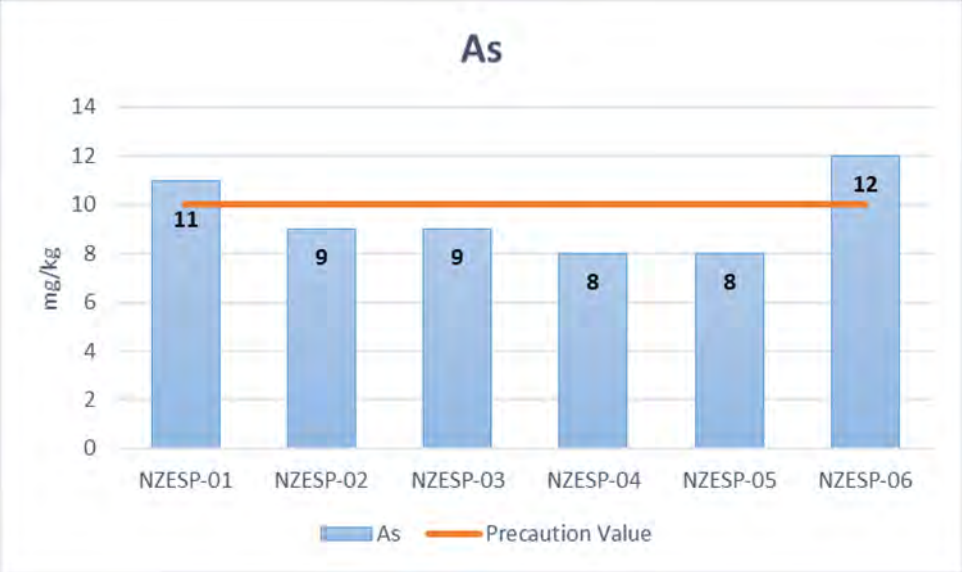


FIGURE 6-19: ARSENIC (AS) CONCENTRATION IN SOIL SAMPLES

Conclusion

The following conclusions can be made based on field survey findings and laboratory analysis.

Soil Types and Distribution

Three subtypes of semi-desert light brown soils are distributed throughout the NZE Wind Farm project area and along the OHL route. These soils are characteristic of arid and semi-arid regions and reflect the natural conditions of the Mongolian Gobi. The average thickness of the topsoil layer ranges from 5 to 20 cm.

Soil Fertility and Chemical Properties

Based on laboratory analysis, the soils in the project area exhibit the following chemical characteristics:

- Humus content: 0.41% to 0.61%;
- Mobile phosphorus: 0.4 to 2.5 mg per 100 g of soil;
- Mobile potassium: 10 to 20 mg per 100 g of soil or less;
- Exchangeable calcium (Ca): 7.7 to 16.8 mg per 100 g of soil;
- Exchangeable magnesium (Mg): 0.8 to 5.4 mg per 100 g of soil; and
- These values indicate a generally low level of soil fertility across the study area.

Physical Soil Properties

The dominant soil texture is sandy loam, with a weakly aggregated and fragile particle structure. Due to the region's arid climate and harsh environmental conditions, surface soils in

the Gobi region often develop natural hardened layers. These crusts, typically 0.5 to 3 cm thick and often gravel-covered, serve to minimize moisture loss, reduce overheating, and protect underlying soils from wind erosion.

While these hardened layers provide beneficial surface stability, sandy soils remain highly susceptible to degradation from both natural processes (e.g., wind erosion) and anthropogenic activities (e.g., construction, vehicular traffic), particularly when compared to more cohesive clay-rich soils.

Concentration of Heavy Metals in Soils

Laboratory analysis of heavy metals revealed that arsenic (As) concentrations in soil samples from sites NZESP-02 and NZESP-12 were measured at 11–12 mg/kg, slightly exceeding the precautionary threshold of 10 mg/kg defined in the MNS 5850:2019 standard (Soil Quality – Maximum Permissible Levels of Soil Contaminants and Elements). All other elements analysed were within the permissible limits established by the same standard.

6.1.4 CLIMATE AND METEOROLOGY

The weather and climate of the Project is characteristic of Mongolia's dry, continental interior climate and extreme temperatures during the short hot summers and long cold winters. The temperature during the coldest winter months between November and February usually range between about -8°C and -40°C, and from December through to February there is some limited snow cover with an average depth of three (3) cm.

During the spring months from March to May, temperatures are higher, but there is less precipitation and humidity. Spring seasons can exhibit rapid changes in the weather and temperatures range from between -1°C and +22°C.

Rainfall is limited, with a significant excess of evaporation over rainfall, meaning that the region tends to be extremely dry with very little permanent surface water. Mongolia's annual precipitation rarely exceeds 400 mm and is typically much lower in the south and central desert and steppe regions. In the Gobi Desert, annual rainfall may be only 40 mm. Nationally, an estimated 85% of precipitation falls between April and September.[4] Based on review of available data from 1989-2018 from Tsogttsetsi Soum meteorological station, average total annual precipitation of the region is 161.2 mm ranging from about 20 mm to about 380 mm.

Autumn in Gobi region is warmer than in other parts of Mongolia and lasts from September through to mid-November. Temperatures range between -3°C to -16°C, and rainfall decreases while air pressure increases.

Based on review of available data from 1989-2021 from Tsogttsetsi Soum meteorological station, which is the closest to the project site, the absolute minimum air temperature was recorded at -38.0°C in March 1996, and the absolute maximum temperature of 38.3°C occurred in July 1999. The average annual air temperature of Tsogtsetsii sum between 1989 and 2021 was 4.3°C. The average temperature of the coldest January of the year was -15.5 °C, and the average temperature of the hottest July was 22.8 °C. From 1989-2021, average monthly wind speeds range over the course of a year from 3.5 in January to 6.1 m/s in May.

[4] World Bank Climate Change Knowledge Portal | Mongolia Country Profile. Available at https://climateknowledgeportal.worldbank.org/country/mongolia/climate-data-historical [accessed September 2024]

The prevailing wind direction is generally from the west or northwest in winter, spring and autumn. In summer, prevailing winds are generally from the north.

The following figures (***Figure 6-20***, ***Figure 6-21*** and ***Figure 6-22***) are extracted by public sources of weather data.[5]

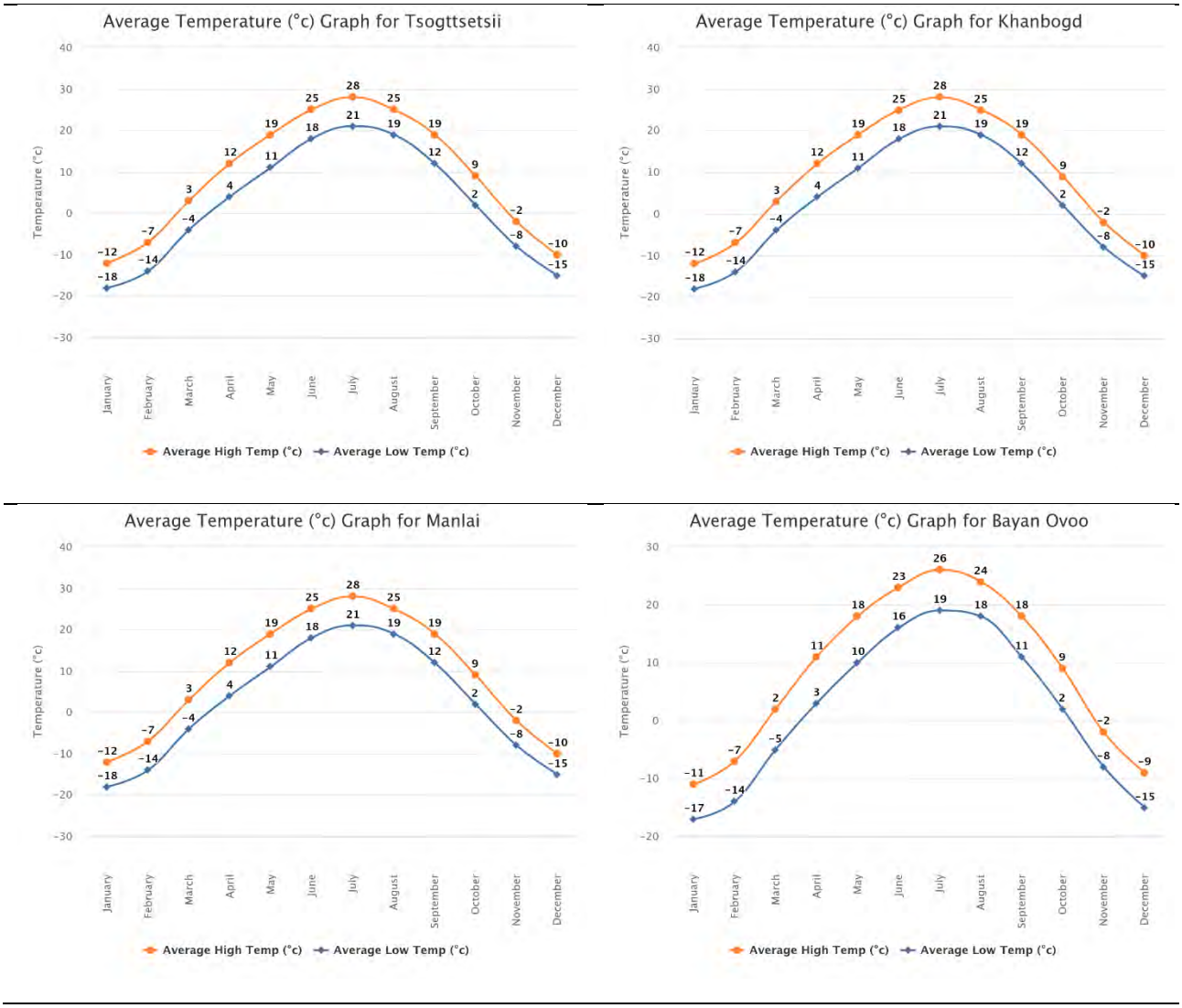


FIGURE 6-20: AVERAGE TEMPERATURE FOR TSOGTTSETSII, KHANBOGD, MANLAI AND BAYAN OVOO (2023)

[5] World Weather Online. Available at https://www.worldweatheronline.com/khanbogd-weather-averages/omnogovi/mn.aspx [accessed August 2024]

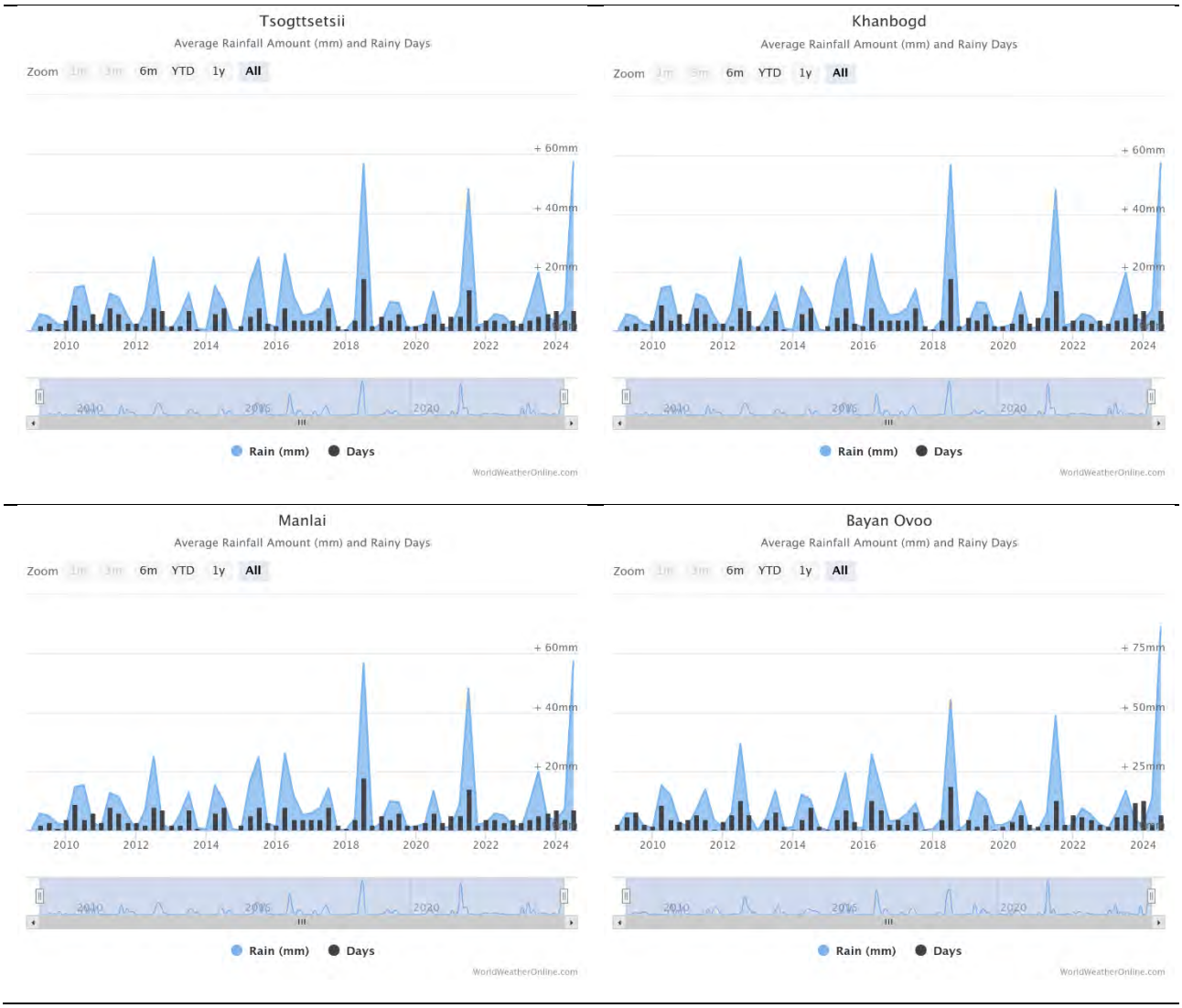


FIGURE 6-21: AVERAGE RAINFALL AMOUNT AND RAINY DAYS IN TSOGTTSETSII, KHANBOGD, MANLAI AND BAYAN OVOO (2010-2024)

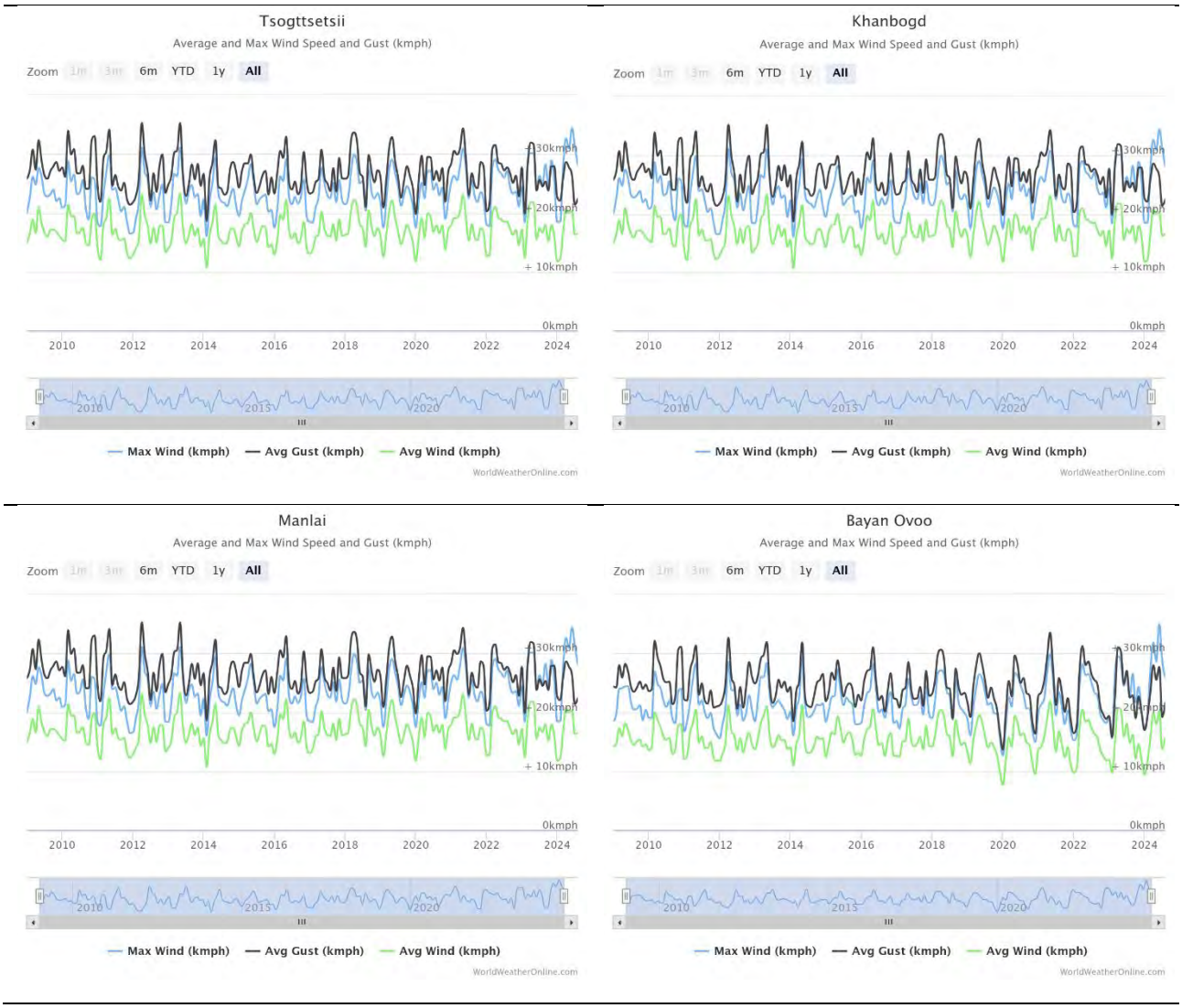


FIGURE 6-22: AVERAGE AND MAX WIND SPEED AND GUST IN TSOGTTSETSII, KHANBOGD, MANLAI AND BAYAN OVOO (2010- 2024)

6.1.5 NATURAL HAZARDS

6.1.5.1 DUST STORMS

Dust storms are most frequent during spring, between March and May, with 61% of dust storms occurring in Mongolia. It is reported 65.5-91.0% of dust storms occur during daytime due to the heating of the ground surface, and 9.0-34.5% occur at night. The average dust storm lasts around 3.1 to 6.0 hours, although the storms tend to last longer when they occur more frequently.[6] The average dust storm duration at Khanbogd meteorological station is 4.1 hours for a dust storm and 3.0 hours for drifting dust.[7] Large scale dust storms can affect the air quality over substantial portions of Mongolia for days at a time, with the number of dusty days (which are the sum of days with dust storms and drifting dust), reaching between 61 and 127 days in the Gobi desert and semi-desert area. Dust storms during spring time are

[6] Korea Meteorological Administration – Asian Dust | World Atlas | Mongolia. Available at https://www.kma.go.kr/eng/weather/asiandust/mongolia.jsp [accessed September 2024]
[7] Oyu Tolgoi LCC, 2019

sometimes severe enough to warrant the temporary shutdown of operations and prevention of air travel.

6.1.5.2 DROUGHT

Periods of low rainfall are common in Mongolia, and the Gobi region is known to have high inter-annual variability of precipitation and episodic droughts[8]. Such droughts in the Gobi region have occurred for over 19-month long periods and have directly impacted the lives of herders, as the drying up of surface and near-surface water sources have resultantly caused the decline of forage resources for livestock. Droughts impact herder's livelihood security and weaken livestock to be less equipped to cope with the extreme cold.



Source: View Mongolia Travel (2024)

FIGURE 6-23: LOCATION OF GOBI DESERT REGION

Climate change is reported to have worsened the potential hazards associated with drought, as the mean surface air temperature has increased by 2.07°C, between 1940 and 2013, which is almost 2.5 times higher than the world average of 0.85°C. This has reportedly an impact of decreased pasture production by 20-30% in the past 40 years, including a decrease in forest areas, lake areas and volume of freshwater springs, including the ground water.

6.1.5.3 DZUD

"Dzud" refers to short, rapid warming that occurs during the winter season, which leads to a rapid melting of snow. The melted snow creates sheet of ice on the ground surface as the ground is still frozen, which makes it impossible for animals to graze. As a result, significant numbers of livestock die.[9] The Gobi and southern aimags are vulnerable due to combined summer drought and harsh winter conditions. In 2010, Mongolia was hit by a *dzud* in which temperatures dropped rapidly below -30°C and blanketed 90% of the country in heavy snow. This particular *dzud* caused the loss of approximately 8.8 million animals as they either froze

[8] Begzsuren, S., Ellis, J.E., Ojima, D.S. Coughenour, M.B. & T. Chuluun. 2004. Livestock responses to droughts and severe winter weather in the Gobi Three Beauty National Park, Mongolia. Journal of Arid Environments 59: 785-796.

[9] Amendment to Oyu Tolgoi Copper-Gold Deposit Mining and Processing Project | Detailed Environmental Impact Assessment Report (2016) prepared by ECO TRADE LLC. Available at https://admin.ot.mn/wp-content/uploads/ot/content/reports/Environment/emp/Amendment_DEIA_on_OT-mining_and_processing-2016_eng.pdf [accessed September 2024]

to death or could not graze[10]. Another severe *dzud* happened in 2018, which killed 700,000 heads of livestock.[11]

6.1.5.4 FLASH FLOODS

During summer days, weather conditions may create intensive rain in short period of time. During these events, Quaternary loosened sediments are dissolved and washed away with the rainfall water producing thus a flash flood, and potentially destroying communication lines, affecting some villages and infrastructure.

The region has previously experienced such events, but are only limited to the summer months, i.e., mainly July and August. Flash floods due to heavy rains occurred across the country including in Umnugobi Province in July 2021. In the Umnugobi Province, the flash floods resulted in incidences of damage and loss of gers/houses and some severe damage to roads[12]. Another example were floods in 2018 that resulted in ingress of water into some buildings and flood-induced landslides affecting roads at the border port at Gashuun Suhait (Mongolia- China border).

6.1.5.5 EARTHQUAKES

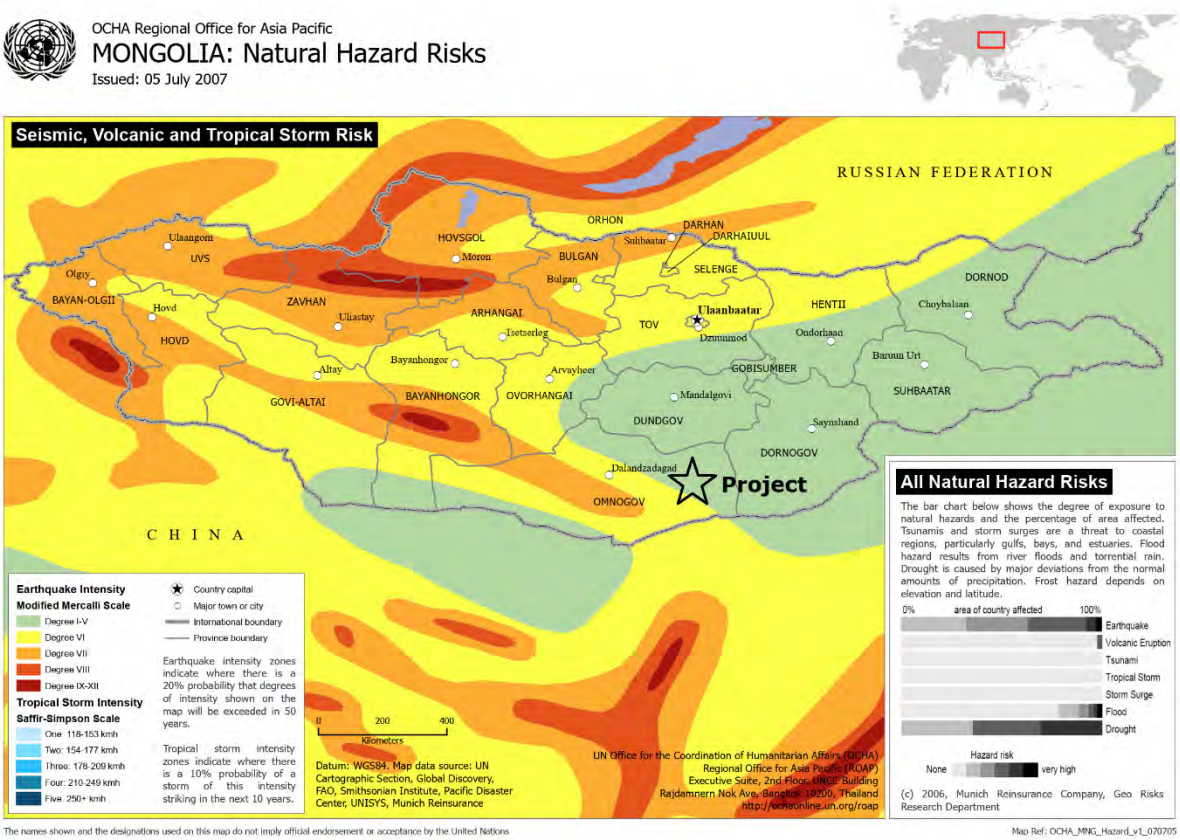
Mongolia has experienced four (4) magnitude eight (8) earthquakes during the last century. The highest risks had historically been in the far southern (including Umnugobi Province), northern, and western areas of the country. Smaller magnitude earthquakes occur very frequently, with more than 200 earthquakes of magnitude above 3.5 in every year.[13]

The most recent devastating earthquake with significant reported damage in Omnogovi was the major 1957 Gobi-Altay earthquake. This was a massive event (magnitude 7.8-8.1) that caused extensive surface faulting and the destruction of nearby towns in the region, although casualties were reported low due to the sparse population at the time. More recently, there have been frequent moderate earthquakes (e.g., magnitude 5.1 in April 2024, magnitude 5.4 in August 2011) in Omnogovi, but none have been reported as widespread severe damage.

However, the eastern part of the region where the Project is situated has low to medium earthquake risks (Degrees I to V and VI), as measured in the Modified Mercalli Intensity (MMI) scale according to the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) Natural Hazard Risk map. The MMI scale ranges from Degrees I to V, indicating slight but noticeable intensity at most part of the Project, while Degree VI at a smaller southern section of the OHL only signifies a shift where the effects become alarming to most people, potentially resulting in minor structural damage.

[10] International Federation of Red Cross and Red Crescent Societies (2011) Final Report: Mongolia: Severe Winter. 28 February 2011
[11] United Nations Office for Disaster Risk Reduction. 2019. Disaster Risk Reduction in Mongolia | Status Report.
[12] International Federation of Red Cross and Red Crescent Societies. 2021 Emergency Plan of Action, Mongolia Flash Floods. Available at: https://reliefweb.int/report/mongolia/mongolia-flash-floods-dref-operation-n-mdrmn015-final-report

[13] Country Report: Mongolia. Asian Disaster Reduction Centre: Visiting Researcher Program (FY2022). Available at https://www.adrc.asia/countryreport/MNG/2022/Mongolia_CR_FY2022.pdf

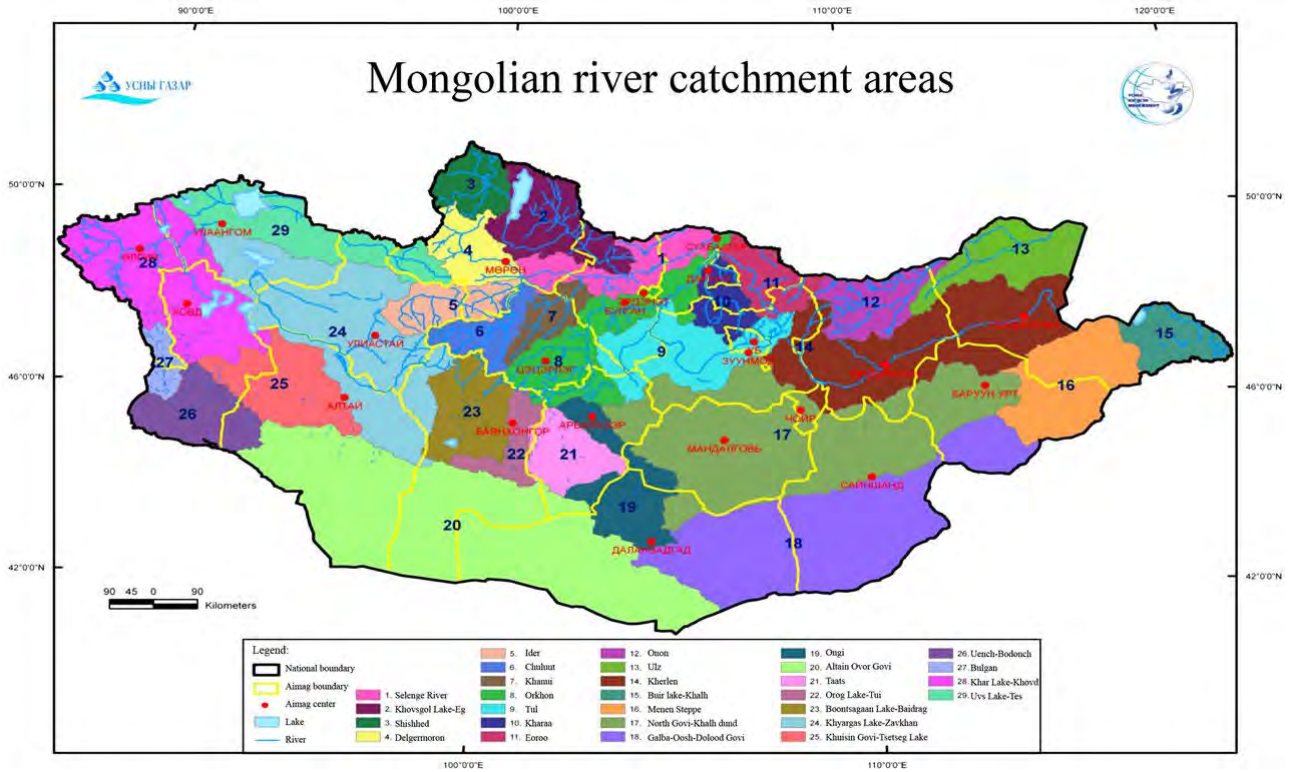


Source: UN OCHA for Asia Pacific (2007)

FIGURE 6-24: NATURAL HAZARD RISKS (EARTHQUAKE) IN MONGOLIA

6.1.6 HYDROLOGY

Hydrologically, the Project is located in the Central Asian Internal Drainage Basin. Considering the Mongolian drainage basins, the Project Site is located in the Galba-Oosh-Dolood-Gobi basin. The river basins in the region have temporary or ephemeral runoff and are dry most of the year (***Figure 6-26***). The project site is situated in a semi-arid steppe region characterized by the absence of permanent rivers. However, the landscape contains numerous dry riverbeds and flat depressions that remain dry for most of the year. Following intense or prolonged rainfall, temporary runoff occurs along these riverbeds, carrying sand and silt. During such events, water tends to accumulate in the depressions, often damaging roads and impeding vehicle movement.



Source: WA, "Mongolian River Catchment Area," Ministry of Nature, Environment and Tourism, Ulaanbaatar city, 2009.

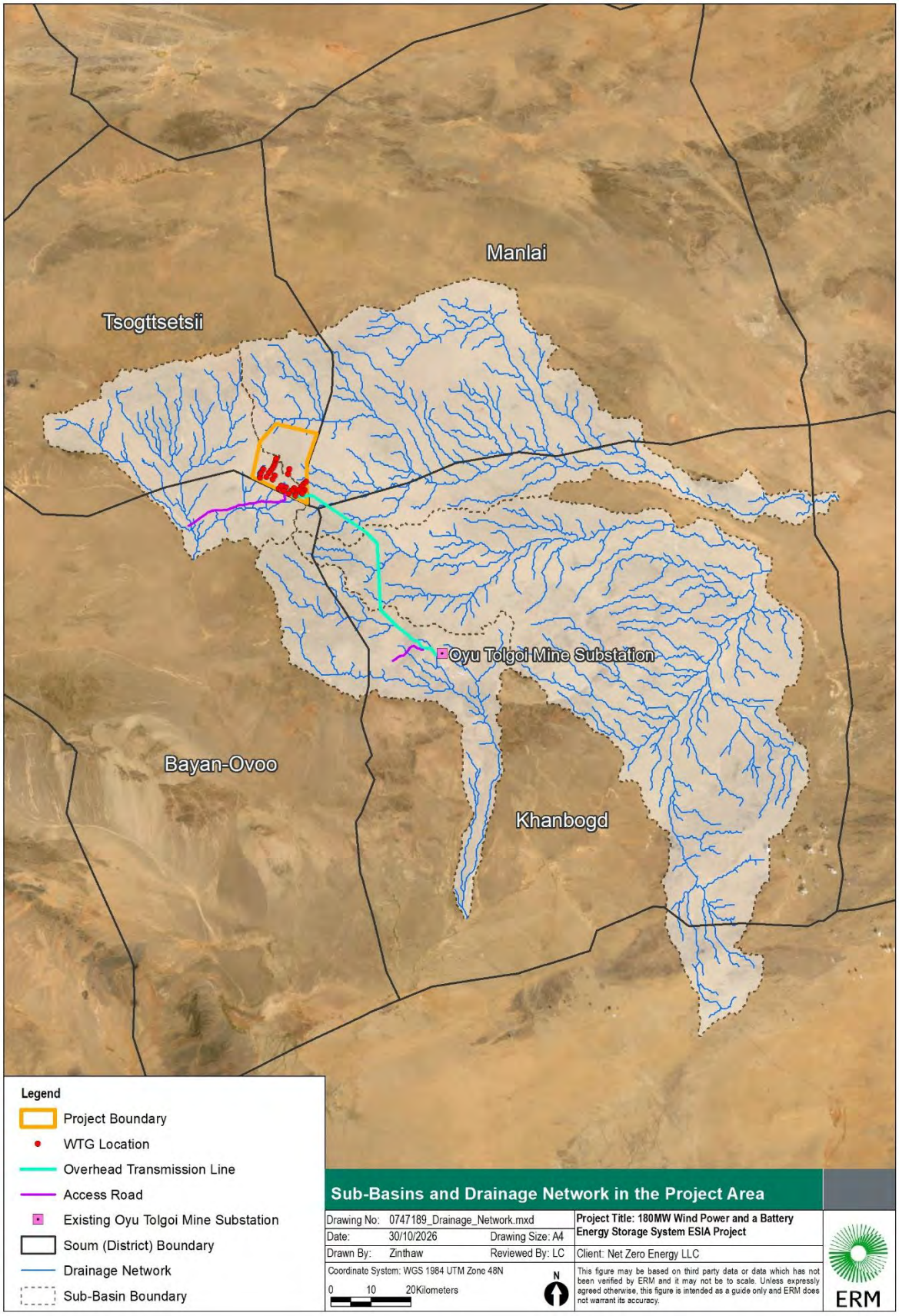
FIGURE 6-25: RIVER CATCHMENT AREAS OF MONGOLIA





Source: ERM Site Visit (September 2024)

FIGURE 6-26: EXAMPLE OF DRY WATERCOURSES IN THE LAND LEASE AREA



Source: HydroSHEDS's HydroBASINS (Level 7) and HydroRIVERS (2024)

FIGURE 6-27: SUB-BASINS AND DRAINAGE NETWORK IN THE PROJECT AREA

6.1.7 GROUNDWATER AVAILABILITY

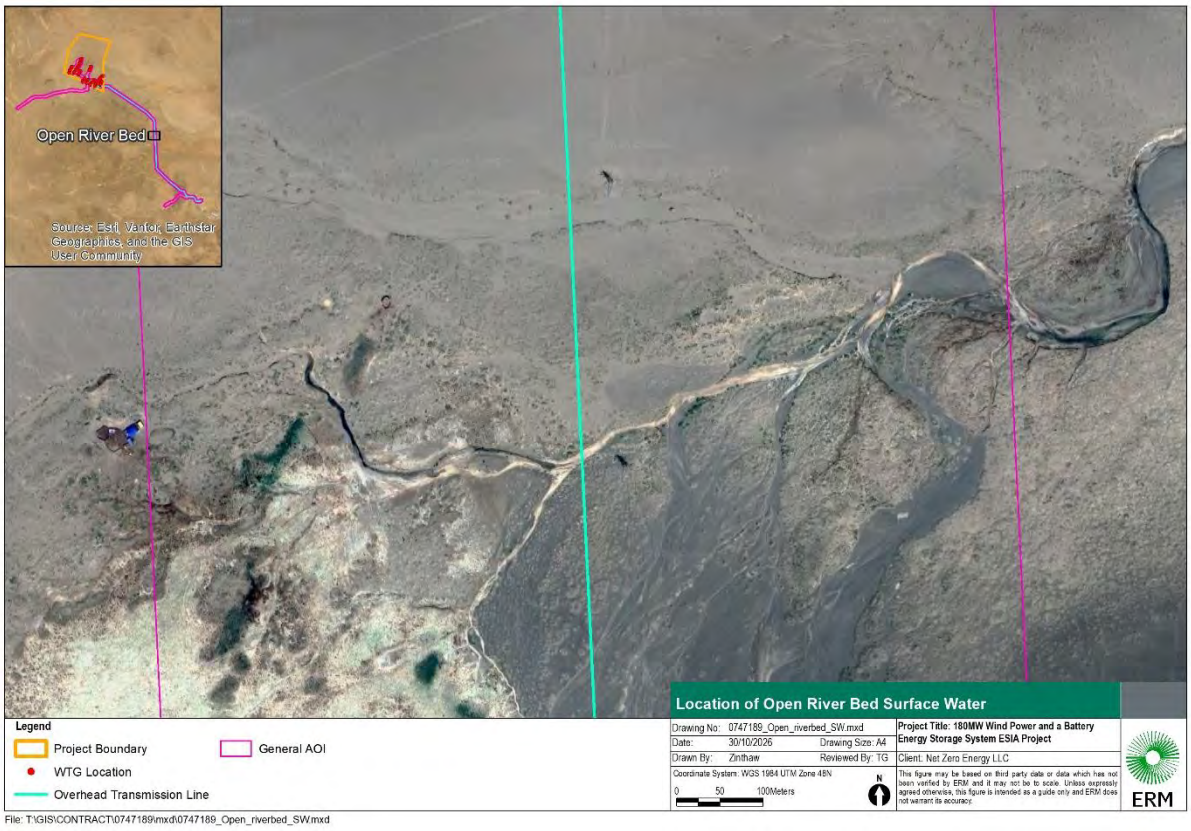
According to Oyu Tolgoi Mine's Independent Environmental and Social Consultant Compliance Monitoring Report (May 2024), water supply in the South Gobi Region is almost exclusively from groundwater sources with water for livestock and municipal use taken from traditional, shallow and deep wells from aquifers that are recharged by rain and snow. In contrast, water supply to meet requirements for mining and processing at the Oyu Tolgoi mine is sourced from the deeper geologically isolated Gunii Hooloi aquifer that contains saline fossil water with a number of borehole wells located north of Khanbogd and thus far from the Project Site.

The 2018 Baseline Study of Umnugovi Aimag, conducted by the National Statistics Office of Mongolia with Oyu Tolgoi LLC, has also reported on studied groundwater deposits within the Omnogobi Province[14]. They reported the conditions and distribution patterns of groundwater deposit are closely related to the geological formations of the Southern gobi region and the depressive relief with irrigated aquifers provide significant water accumulation over hundreds and thousands of kilometres of underground water and feed other aquifers and layers. Among the described water deposits, it was reported the Zairmagtai aquifer in Bayan-Ovoo Soum near the Tavan Tolgoi coal mine has water reserves of 29 L/s usable for the mine. The Zairmagtai aquifer was also previously described in the World Bank's 2010 Groundwater Assessment of the Southern Gobi Region[15] as a quaternary gravel with sand and clay type aquifer with production rate of 1,322 m^3/day for the mine (equivalent of 15 L/s) based on hydrogeological exploration studies. A further review by NZE of available well data for other three wells in the surrounding region (up to about 70 km away) of the Project Site found these are used to yield 1.5 to 2.5 L/s with wells reaching between 40 to 100 m passing through different aquifer zones within the geological strata.

6.1.8 SURFACE WATER AND GROUNDWATER QUALITY

During scoping visit, no standing water or flowing surface water features were observed at the WTG Area. Survey team observed surface water in an open riverbed within the Gurvan gavluud Har deliin tologod Local Protected Area. The location of the observed surface water is less than 100 m from the TL alignment (***Figure 6-28***).

[14] National Statistics Office of Mongolia with Oyu Tolgoi LLC (2018) Baseline Study of Umnugovi Aimag Report 2018, Changes in the environmental indicators of Umnugovi 2008-2018
[15] Available at https://documents1.worldbank.org/curated/en/734471468323712803/pdf/627890REPLACEM07018020110Box361493B.pdf



Source: Google Earth Imagery: June 2024

FIGURE 6-28: LOCATION OF OPEN RIVER BED SURFACE WATER

In the Gobi region, local herders depend on shallow wells or shallow aquifer that replenish from the surface runoff flow through dry riverbeds. Thus, herders tend to dug wells within or in the close proximity of dry riverbeds. Local government also make investment into engineered wells.

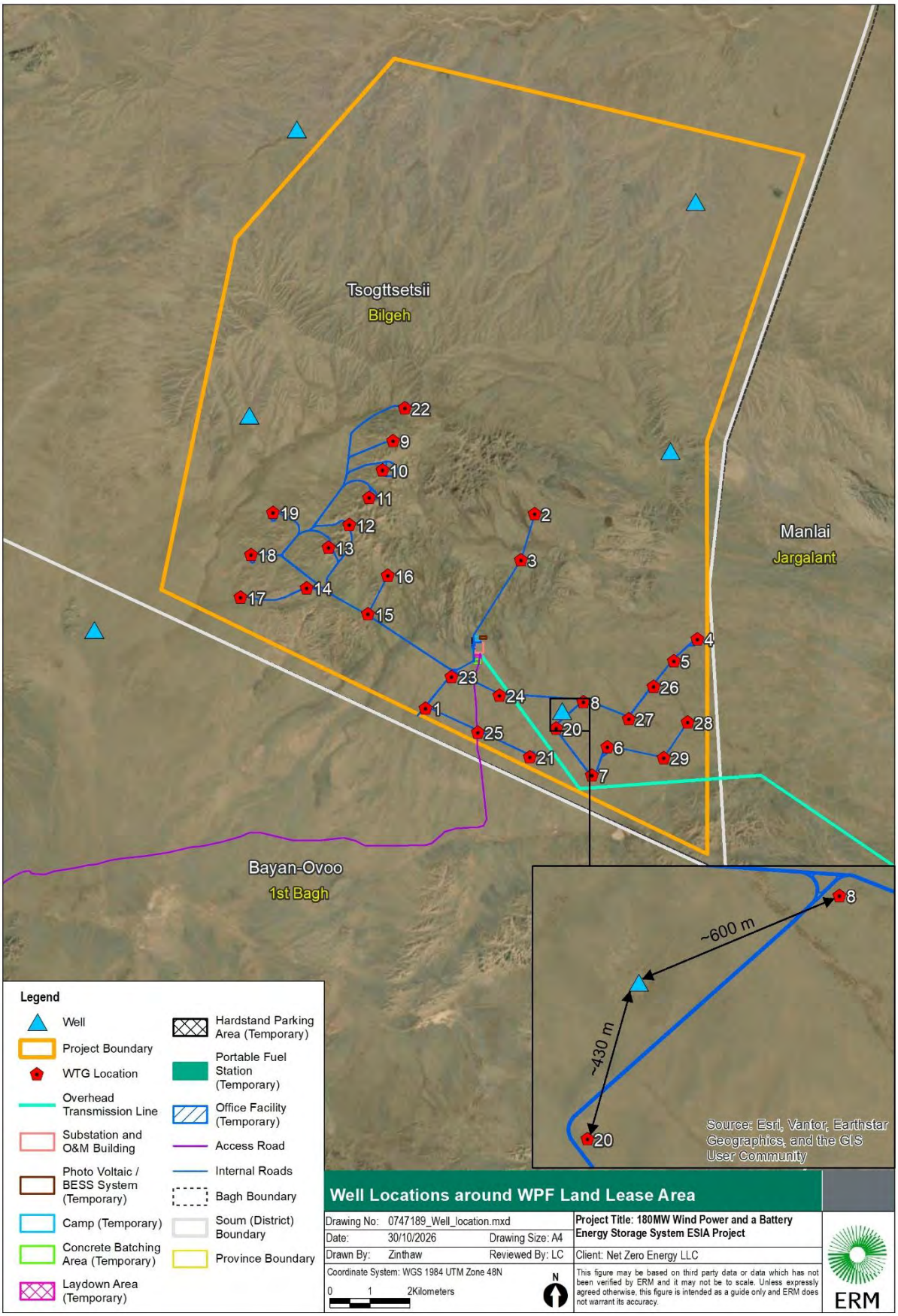
According to Oyu Tolgoi Mine's Independent Environmental and Social Consultant Compliance Monitoring Report (May 2024), water supply in the South Gobi Region is almost exclusively from groundwater sources with water for livestock and municipal use taken from traditional, shallow and deep wells from aquifers that are recharged by rain and snow. In contrast, water supply to meet requirements for mining and processing at the Oyu Tolgoi mine is sourced from the deeper geologically isolated Gunii Hooloi aquifer that contains saline fossil water with a number of borehole wells located north of Khanbogd and thus far from the Project Site.

Wells serve as a water source for local herders. Within the Wind Power Farm (WPF) land lease area, four (4) wells are identified to occur. Outside of the WPF land lease area, two (2) wells are identified (***Figure 6-30***). It was observed access to some wells required the door to be unlocked (***Figure 6-29***).



Source: ERM Site Visit (September 2024)

FIGURE 6-29: WELLS IN THE LAND LEASE AREA OBSERVED DURING SCOPING VISIT IN SEPTEMBER 2024



Source: ERM Site Visit (September 2024 and February 2025)

FIGURE 6-30: WELL LOCATIONS

6.1.8.1 SURFACE WATER SURVEY 2025

This section outlines the water characteristics of the NZE Wind Farm project area and its surroundings and along the OHL route, based on data collected during the field survey conducted from April 9 to April 23, 2025. Hydrologically, the study area is part of the Central Asian internal drainage basin. According to the classification of surface water basins in Mongolia, it falls within the Galba-Uush-Doloodiin Govi River Basin.

Survey Methodology

During the field survey, dry riverbeds were identified and their conditions documented through photographic records and descriptive notes. Along the OHL route, the current state of intersecting dry streambeds was similarly recorded using photographs and written observations.

Surface water sampling was conducted using specially designated polyethylene bottles with capacities of one (1) litter and 100 millilitres. Prior to sample collection, each bottle was rinsed three times with the source water to minimize contamination. The bottles were then completely filled—ensuring no air remained inside—and tightly sealed to prevent exposure to air during transportation. All samples were stored and transported in a cool, lightproof container to preserve their integrity until laboratory analysis.

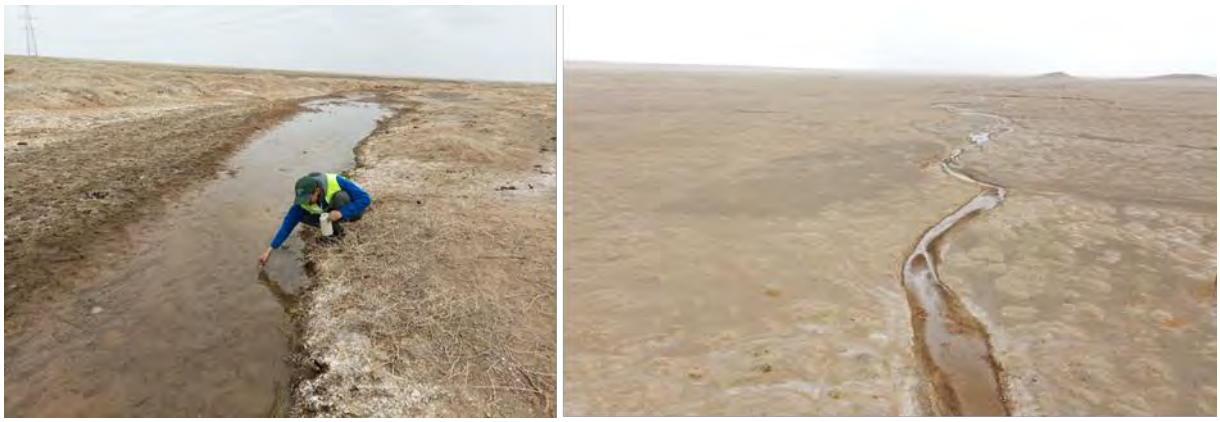


FIGURE 6-31: KHAYA SPRING WATER SAMPLING

The general water quality analysis of surface water samples was conducted at the Water Analysis Laboratory of the Institute of Geography and Geoecology under the Mongolian Academy of Sciences, while heavy metal content analysis was carried out at the ALS Group LLC laboratory.

Surface Water Features Surrounding the Study Area

There are no permanent rivers in the vicinity of the Project. However, numerous dry riverbeds are present, which typically carry intermittent flow following precipitation events in the low mountainous terrain. During the field survey, a total of nine dry riverbeds were identified, two within the wind farm area and seven along the OHL route. Additionally, a surface water sample was collected from Khaya Spring, located along the OHL route in Gaviluud bagh, Khanbogd soum.

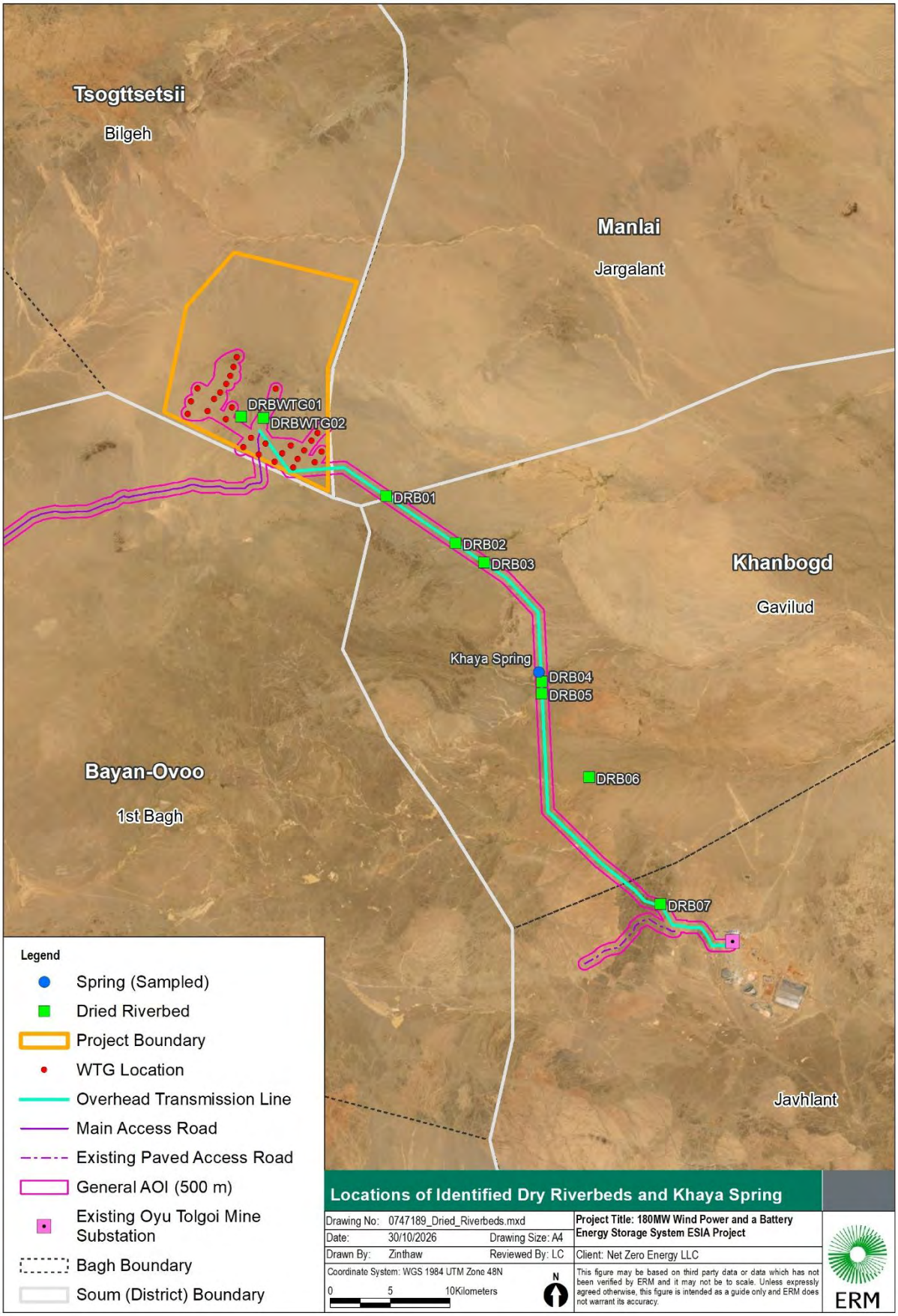


FIGURE 6-32: LOCATIONS OF IDENTIFIED DRY RIVERBEDS AND KHAYA SPRING

The following section provides detailed information on the dry riverbeds and surface water occurrences documented during the field survey.

Recorded Dry Riverbeds

The following table provides a summary of the dry riverbeds recorded during the field survey.

TABLE 6-17: DRY RIVERBEDS RECORDED WITHIN OR ALONG THE PROJECT AREA

No.	Dry Riverbed Number	Coordinates, UTM Zone 48		Elevation (m)	Notes
		N	E		
Wind farm area					
1	DRBWTG01	43.44135	106.36341	1462	Width: 14 Depth: Left bank 1.2m, Right bank 0.4 m Bottom sediment: Sandy sediment-70%; Stone-30% Crossing direction of the OHL: from north-east to south-west
2	DRBWTG02	43.2449	106.64455	1256	Width: 9 Depth: Left bank 0.1m, Right bank 0.1 m Bottom sediment: Sandy sedinent-90%, Stone-10% Crossing direction of the OHL route: from northwest to southeast
Along the OHL route					
3	DRB01	43.38098	106.4888	1349	Width: 14 Depth: 1.2 Bottom sediment: Sandy sediment-70%, Stones-30% Crossing direction of the OHL route: from north-east to south-west
4	DRB02	43.34489	106.5592	1319	Width: 18 Depth: Left bank 1m, Right bank 0.2 m Bottom sediment: Sandy sediment-90%, Stone-10% Crossing direction of the OHL route: from southwest to northeast
5	DRB03	43.32965	106.58787	1304	Width: 95 Depth: Left bank 1.4m, Right bank 0.2 m Bottom sediment: Sandy sediment-60%, Stones-40% Crossing direction of the OHL route: from southwest to northeast
6	DRB04	43.23961	106.64472	1257	Width: 160 Depth: Left bank 1.4m, Right bank 0.2 m Bottom sediment: Sandy sediment-60%, Stones-40% Crossing direction of the OHL route: from southwest to northeast

No.	Dry Riverbed Number	Coordinates, UTM Zone 48		Elevation (m)	Notes
		N	E		
7	DRB05	43.23042	106.64464	1256	Width: 15 Depth: Left bank 0.2m, Right bank 4 m Bottom sediment: Sandy sediment-70%, Stone-30% Crossing direction of the OHL route: from southwest to northeast
8	DRB06	43.16704	106.69183	1235	Width: 11 Depth: Left bank 0.2m, Right bank 0.2 m Bottom sediment: Sandy sediment-80%, Stone-20% Crossing direction of the OHL route: from southwest to northeast
9	DRB07	43.07058	106.76212	1204	Width: 30 Depth: Left bank 0.2m, Right bank 0.5 m Bottom sediment: Sandy sediment-40%, Stone-60% Crossing direction of the OHL route: from west to east



FIGURE 6-33: DRY RIVERBED DRB01



FIGURE 6-34: DRY RIVERBED DRB02



FIGURE 6-35: DRY RIVERBED DRB03



FIGURE 6-36: DRY RIVERBED DRB04



FIGURE 6-37: DRY RIVERBED DRB05



FIGURE 6-38: DRY RIVERBED DRB06



FIGURE 6-39: DRY RIVERBED DRB07

Khaya Spring

During the field survey, water sample was collected from Khaya Spring, located along the OHL route within Gaviluud bagh, Khanbogd soum. Khaya Spring lies approximately four (4) km south of the centre of Gaviluud bagh. Its flow direction is from southwest to northeast, gradually seeping into the ground as it moves toward Munkh Ovoo Mountain.

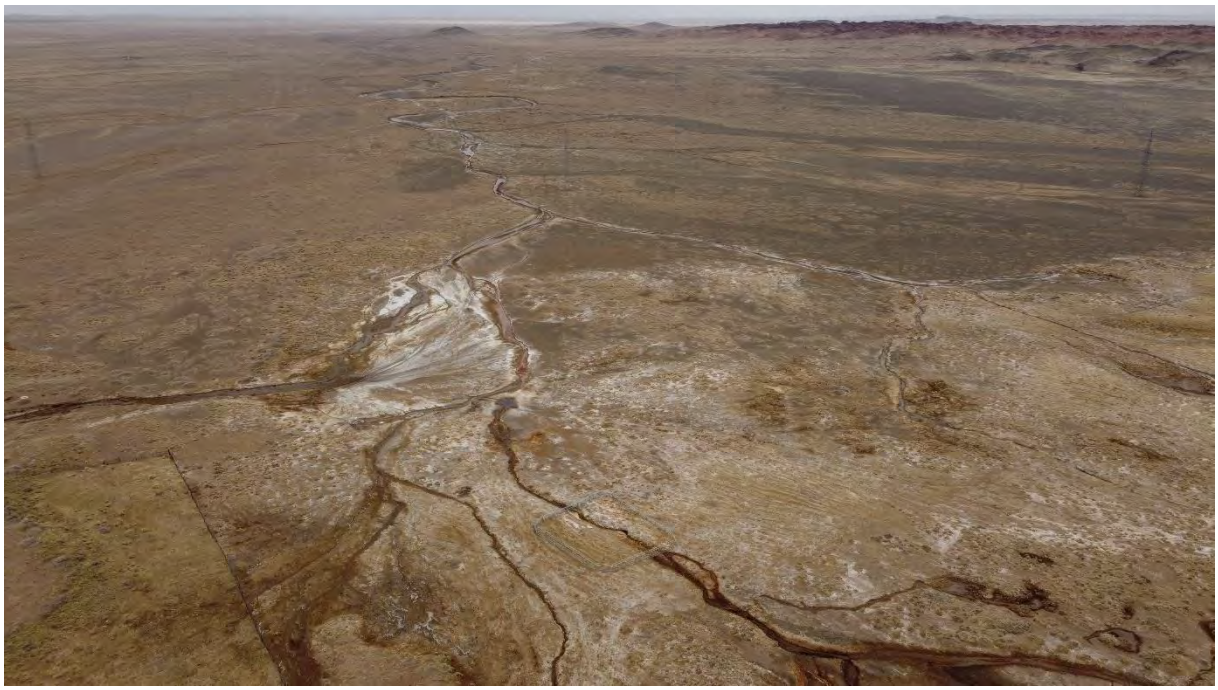


FIGURE 6-40: KHAYA SPRING FLOWS NORTHEAST TOWARD MUNKH OVOO (NORTHEAST)

Results of Water Quality Analysis

Based on the field survey, the results of laboratory analysis assessing heavy metal concentrations and general water quality parameters in the sample collected from Khaya Spring are presented in the following section. The results are compared against the applicable national standards MNS 6148:2010 (Water quality. Maximum limit of substance contaminating the ground water) and MNS 0900:2018 (Environment. Health protection. Safety. Drinking water. Hygienically requirements, assessment of the quality and safety).

A summary of the general water quality parameters for the Khaya Spring sample is provided in the table below.

TABLE 6-18: RESULTS OF GENERAL WATER QUALITY ANALYSIS

No.	Analysed Parameters	Khaya Spring	MNS 6148:2010	MNS 0900:2018
1	Cl^-, mg/L	366.7	350	350
2	SO_4^{--}, mg/L	440.0	500	500
3	NO_2^-, mg/L	0.05	1	1
4	NO_3^-, mg/L	14.0	50	50
5	CO_3^{--}, mg/L	72.0	-	-
6	HCO_3^-, mg/L	347.7	-	-
7	Total Anions, mg/L	1240.5	-	-
8	$Na^+ + K^+$	356.0	-	-
9	Ca^{++}, mg/L	47.1	-	100
10	Mg^{++}, mg/L	25.8	-	30

No.	Analysed Parameters	Khaya Spring	MNS 6148:2010	MNS 0900:2018
11	NH_4^+, mg/L	0.9	3	1.5
12	Fe^{++}, mg/L	0.0	-	-
13	Fe^{+++}, mg/L	0.0	-	-
14	Total Cations	609.8	-	-
15	TDS, mg/L	1850.2	-	-
16	Total Hardness mEq/L	4.47	-	-
17	pH	9.02	6.5-8.5	6.5-8.5
18	EC, µS/cm	2780	-	1
19	PI, mg/L	1.28	-	-
20	TDS, mg/L	1668	-	-
21	Total Phosphorus, mg/L	<0.5	-	-

Source: Water Quality Analysis Results from the Water Analysis Laboratory of the Institute of Geography and Geoecology, Mongolian Academy of Sciences, 2025-04-25

According to laboratory analysis, the water from Khaya Spring is chemically classified as chloride-sulfate type, sodium group, Type 1. In terms of quality, it is saline and soft, with magnesium ions predominating among the hardness components, and exhibits noticeable turbidity. When compared to the standard "Drinking water. Hygienic assessment of the quality and safety MNS 0900:2018", the total mineralization exceeds the Class III threshold by 1.4 times, and the sulfate ion concentration is 2.2 times higher than the permissible limit.

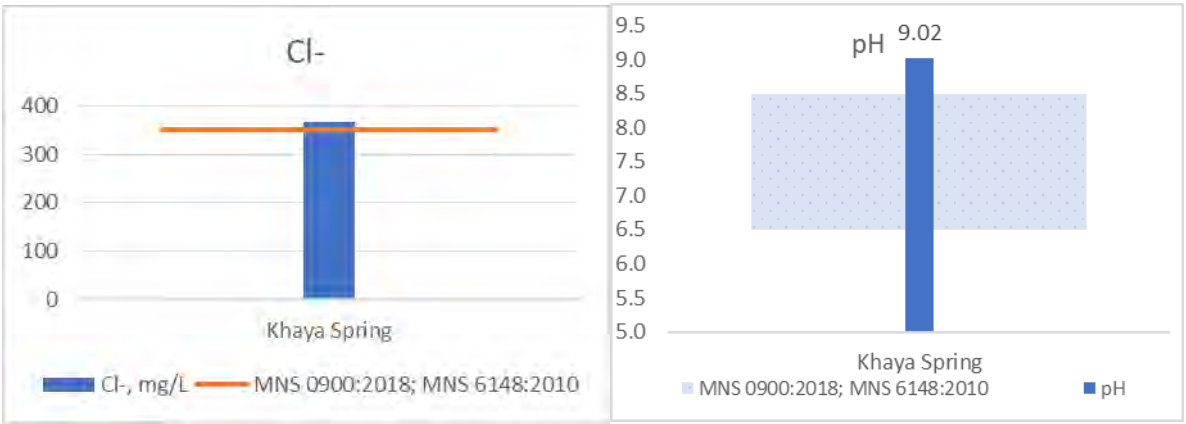


FIGURE 6-41: CHLORIDE (CL^-) CONCENTRATION AND PH LEVEL IN THE WATER SAMPLE FROM KHAYA SPRING

The following table presents the laboratory results for heavy metal concentrations in the water sample collected from Khaya Spring.

TABLE 6-19: CONCENTRATION OF HEAVY METALS IN KHAYA SPRING WATER SAMPLE

#	Elements	Unit	Khaya Spring	MNS 0900:2018
1	Ag	mg/L	<0.004	0.1
2	Al	mg/L	0.06	0.5

#	Elements	Unit	Khaya Spring	MNS 0900:2018
3	As	mg/L	<0.01	0.01
4	B	mg/L	1.1	2.4
5	Ba	mg/L	0.02	0.7
6	Bi	mg/L	<0.2	-
7	Ca	mg/L	46.7	100
8	Cd	mg/L	<0.01	-
9	Co	mg/L	<0.01	-
10	Cr	mg/L	<0.01	0.05
11	Cu	mg/L	0.01	2
12	Fe	mg/L	0.02	0.3
13	Hg	mg/L	<0.02	0.001
14	K	mg/L	9.3	-
15	La	mg/L	<0.05	-
16	Li	mg/L	<0.1	-
17	Mg	mg/L	25.8	30
18	Mn	mg/L	<0.01	0.1
19	Mo	mg/L	0.05	0.07
20	Na	mg/L	520	200
21	Ni	mg/L	<0.01	-
22	P	mg/L	<0.5	-
23	Pb	mg/L	<0.02	0.01
24	S	mg/L	151.0	-
25	Sb	mg/L	<0.04	-
26	Sc	mg/L	<0.02	-
27	Si	mg/L	1.3	-
28	Sn	mg/L	<0.1	-
29	Sr	mg/L	0.77	2
30	Ta	mg/L	<0.1	-
31	Ti	mg/L	<0.01	-
32	Tl	mg/L	<0.1	-
33	V	mg/L	0.02	-
34	W	mg/L	<0.5	-
35	Y	mg/L	<0.01	-
36	Zn	mg/L	0.01	5
37	Zr	mg/L	<0.1	-

Laboratory analysis of heavy metals in Khaya Spring water sample revealed Sodium (Na) concentration of 520 mg/L, which exceeds the limit specified in the MNS 0900:2018 standard (200 mg/L) by 320 mg/L. Concentrations of all other analysed heavy metals were within the permissible limits specified in the MNS 0900:2018 standard.

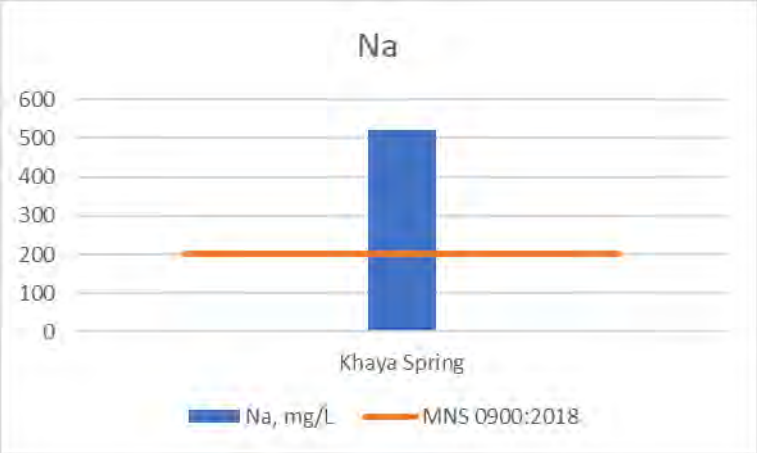


FIGURE 6-42: SODIUM (NA) CONCENTRATION IN KHAYA SPRING WATER SAMPLE

Conclusion

During the field survey, a total of nine dry riverbeds were identified - two within the wind farm area and seven along the OHL route. These riverbeds vary in width from 9 to 160 meters and typically contain sandy sediments interspersed with gravel and rocks. In the event of heavy rainfall, these features present a flood risk. Flooding may damage infrastructure, disrupt vehicle access, cause livestock losses, and pose threats to human health and safety. As such, these natural hazards should be carefully considered in the design and construction phases of project infrastructure.

Additionally, a water sample was collected from Khaya Spring, located along the OHL route in Gaviluud bagh of Khanbogd soum, and subsequently analysed in accredited laboratories. The chemical composition of the spring water was classified as chloride-sulfate type, sodium group, Type I. In terms of quality, the water was found to be slightly saline, moderately soft, with magnesium ions dominating the hardness components, and turbid in appearance. Heavy metal analysis revealed a sodium (Na) concentration of 520 mg/L, exceeding the permissible limit of 200 mg/L set by the MNS 0900:2018 standard by 320 mg/L. No other heavy metals were found to exceed the thresholds specified in the same standard.

In Mongolia’s desert and semi-desert regions, spring flow is strongly influenced by annual precipitation. Khaya Spring flows from southwest to northeast, in the direction of Munkh Ovoo, and gradually seeps into the ground along its course. During the field survey conducted in spring 2025, the spring’s flow was observed to be relatively high. This may be partially attributed to significant autumn precipitation in the preceding year, which likely recharged the surrounding dry streambeds and increased groundwater contribution to the spring.

6.1.8.2 GROUNDWATER SURVEY 2025

This section presents an overview of groundwater sources utilized by local herder communities, based on field surveys conducted from April 11 to April 22, 2025. The study area

remains relatively under-researched in terms of its hydrogeological framework. In addition, this section details the results of groundwater quality analyses from wells located within the NZE Wind Farm project area and along the OHL route.

Survey Methodology

Samples were collected and measurements were conducted from groundwater sources (wells) in the vicinity of the study area. For sampling, specially designated polyethylene containers with capacities of one (1) litter and 100 grams were used. Prior to sampling, each container was rinsed three times with the water to be sampled. The containers were then completely filled with the sample water, ensuring no air remained, and tightly sealed. This procedure minimizes external interference caused by agitation during transportation. The samples were stored and transported in a cool, light-proof container to prevent exposure to sunlight.



FIGURE 6-43: GROUNDWATER SAMPLING AND FIELD MEASUREMENTS

Water samples collected from groundwater points were subjected to general water quality analysis at the Water Analysis Laboratory of the Institute of Geography and Geoecology under the Mongolian Academy of Sciences. Additionally, the concentrations of heavy metals in the water were analysed at the laboratory of ALS Group LLC. The report was prepared based on the results obtained from these analyses.

Results of Water Quality Analysis from Wells

During the field survey, a total of seven wells were recorded: six wells around the NZE Wind Farm site and one well along the OHL route. Water samples were collected from four of these wells. Information on the wells recorded during the field survey is presented in ***Table 6-20***.

TABLE 6-20: DETAILS OF WELLS RECORDED DURING THE FIELD SURVEY

No.	Well Name	Well Type	Coordinates (WGS84)		Depth, m			Sample Collected
			N	E	Water Level	Water Layer Thickness	Total Depth	
Vicinity of the NZE Wind Farm Project Site, Bilgeh Bagh, Tsogt-Tsetsii Soum								
1	Khar Toirom	Deep borehole well	43.41846	106.3844	Locked			No
2	Baruun Khargana	Deep borehole well	43.48427	106.2898	Sealed			Yes
3	Sain Shand	Dug well	43.47427	106.4164	Sealed			No
4	Gün Shand	Engineered Well	43.53276	106.4284	2.2	1	3.2	Yes
5	Mukhar Ereg	Engineered Well	43.55182	106.3126	7.8	3.2	11	Yes
Vicinity of the NZE Wind Farm Project Site, Mogoit Bagh, Bayan-Ovoo Soum								
6	Khukh Tolgoi	Deep Borehole Well	43.4385	106.2402	Sealed			Yes
Along the OHL Route in Gavilud Bagh, Khanbogd soum								
7	Khaya	Engineered Well	43.24559	106.6408	Frozen			No

The locations of the wells recorded during the field survey are shown in the following ***Figure 6-***.

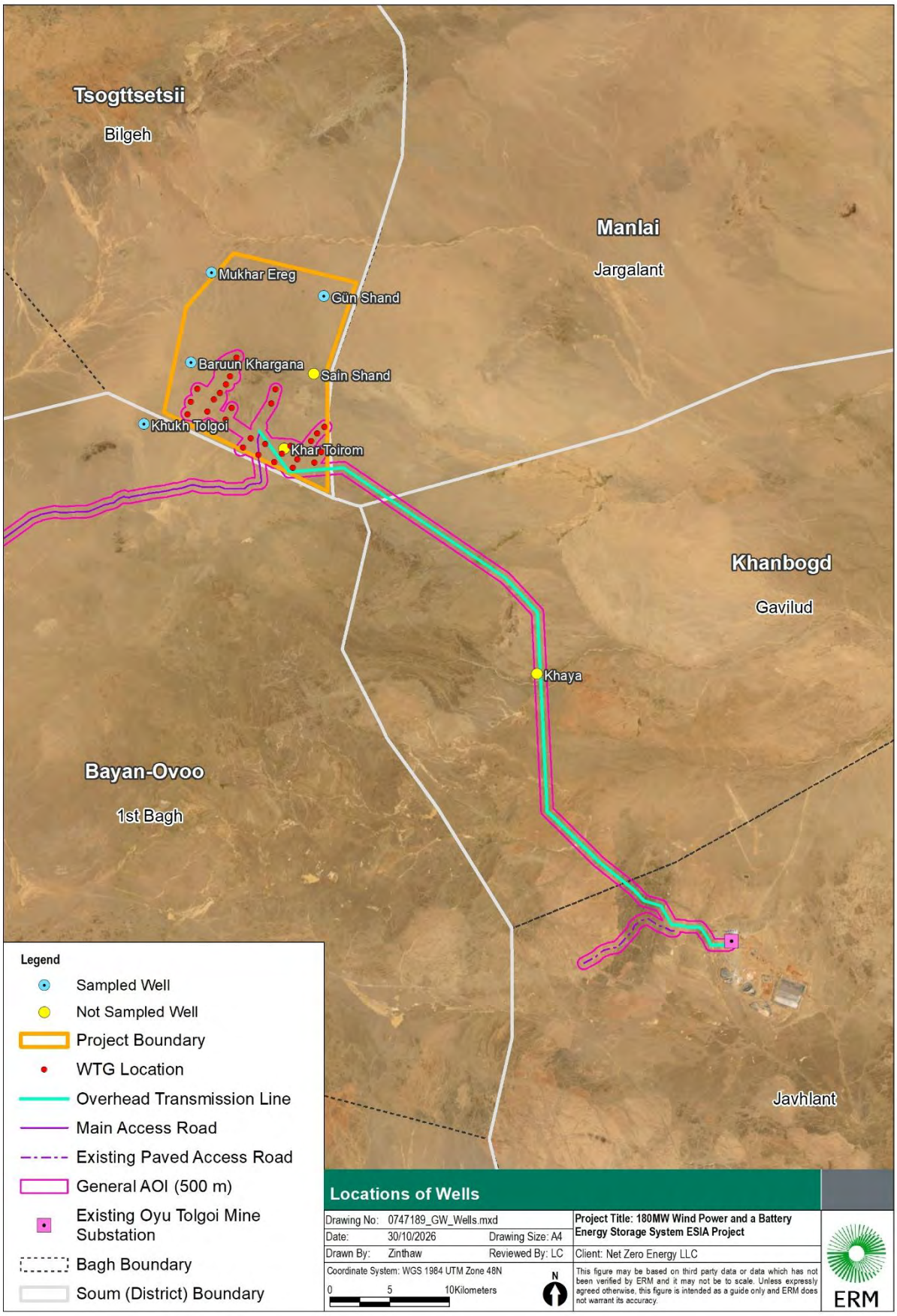


FIGURE 6-44: LOCATIONS OF WELLS



FIGURE 6-45: KHAR TOIROM WELL



FIGURE 6-46: BARUUN KHARGANA WELL



FIGURE 6-47: SAIN SHAND WELL



FIGURE 6-48: GÜN SHAND WELL



FIGURE 6-49: MUKHAR EREG WELL



FIGURE 6-50: KHUKH TOLGOI WELL



FIGURE 6-51: KHAYA WELL

During the field survey, four water samples were taken, and the results of laboratory analysis for the concentration of heavy metals and general water indicators were compared with MNS 6148:2010[16] and MNS 0900:2018[17] standards in the following section.

The results of laboratory analysis for general water parameters in the well water samples are shown in the table below.

TABLE 6-21: RESULTS OF GENERAL WATER QUALITY ANALYSIS

No.	Analysed Parameters	Well Names				MNS 6148:2010	MNS 0900:2018
		Khukh Tolgoi	Gün Shand	Mukhar Ereg	Baruun Khargana		
1	Cl^-, mg/L	186.7	62.1	17.0	120.7	350	350
2	SO_4^{--}, mg/L	230.0	68.0	12.0	90.0	500	500
3	NO_2^-, mg/L	0.0	0.0	0.0	0.0	1	1
4	NO_3^-, mg/L	48.0	58.0	52.0	42.0	50	50
5	CO_3^{--}, mg/L	6.0	24.0	12.0	12.0	-	-
6	HCO_3^-, mg/L	170.8	250.1	268.4	256.2	-	-
7	Total Anions, mg/L	641.5	462.2	361.4	520.9	-	-
8	$Na^+ + K^+$	247.8	194.8	122.5	191.4	-	-
9	Ca^{++}, mg/L	40.1	9.2	14.8	31.7	-	100
10	Mg^{++}, mg/L	12.8	0.9	3.6	7.9	-	30
11	NH_4^+, mg/L	0.0	0.0	0.0	0.0	3	1.5
12	Fe^{++}, mg/L	0.0	0.0	0.0	0.0	-	-
13	Fe^{+++}, mg/L	0.0	0.05	0.05	0.0	-	-
14	Total Cations	300.7	204.9	141.0	231.0	-	-

[16] MNS 6148:2010 Water quality. Maximum limit of substance contaminating the ground water.
[17] MNS 0900:2018 Environment. Health protection. Safety. Drinking water. Hygienically assessment of the quality and safety

No.	Analysed Parameters	Well Names				MNS 6148:2010	MNS 0900:2018
		Khukh Tolgoi	Gün Shand	Mukhar Ereg	Baruun Khargana		
15	TDS, mg/L	942.2	667.1	502.5	751.9	-	-
16	Total Hardness mEq/L	3.05	0.53	1.04	2.23	-	-
17	pH	7.97	8.45	8.10	8.12	6.5-8.5	6.5-8.5
18	EC, µS/cm	1424	868	596	1041	-	1
19	PI, mg/L	4.64	1.92	1.44	7.36	-	-
20	TDS, mg/L	854	522	358	625	-	-
21	Total Phosphorus, mg/L	<0.5	<0.5	<0.5	<0.5	-	-

Source: Water Quality Analysis Results from the Water Analysis Laboratory of the Institute of Geography and Geoecology, Mongolian Academy of Sciences, 2025-04-25

According to the laboratory analysis, the water from the **Khukh Tolgoi well** is classified as chloride-sulfate type, sodium group, Type II water. In terms of quality, it is slightly saline and moderately soft. Among the key parameters analysed, the concentration of sodium ions exceeds the limit specified in the standard "Drinking water. Hygienically assessment of the quality and safety MNS 0900:2018"; however, the level of mineralization complies with the standard.

The water from the **Gün Shand well** is classified as hydrocarbonate type, sodium group, Type I water based on its chemical composition. In terms of quality, it is slightly saline, very soft, and shows signs of organic contamination. The main chemical parameters analysed meet the requirements of the standard "Drinking water. Hygienically assessment of the quality and safety MNS 0900:2018"; however, the concentration of nitrate ions exceeds the limit specified in the standard.

The water from the **Mukhar Ereg well** is classified as hydrocarbonate type, sodium group, Type I water based on its chemical composition. In terms of quality, it is slightly saline, very soft, and exhibits signs of organic contamination. The main chemical parameters analysed comply with the requirements of the standard "Drinking water. Hygienically assessment of the quality and safety MNS 0900:2018"; however, the nitrate ion concentration exceeds the limit specified in the standard.

The water from the **Baruun Hargana well** is classified as hydrocarbonate-chloride type, sodium group, Type I water based on its chemical composition. In terms of quality, it is slightly saline, soft, and turbid. The main chemical parameters analysed comply with the requirements of the standard "Drinking water. Hygienically assessment of the quality and safety MNS 0900:2018"; however, the turbidity level exceeds the standard limit.

Laboratory analysis of water samples from the wells revealed that the nitrate (NO_3) concentrations in the samples from the Gün Shand and Mukhar Ereg wells exceeded the limits specified in the MNS 6148:2010 and MNS 0900:2018 standards by 2–8 mg/L. The graph below compares the nitrate concentrations in the water samples with the maximum permissible limits set by the MNS 6148:2010 and MNS 0900:2018 standards.

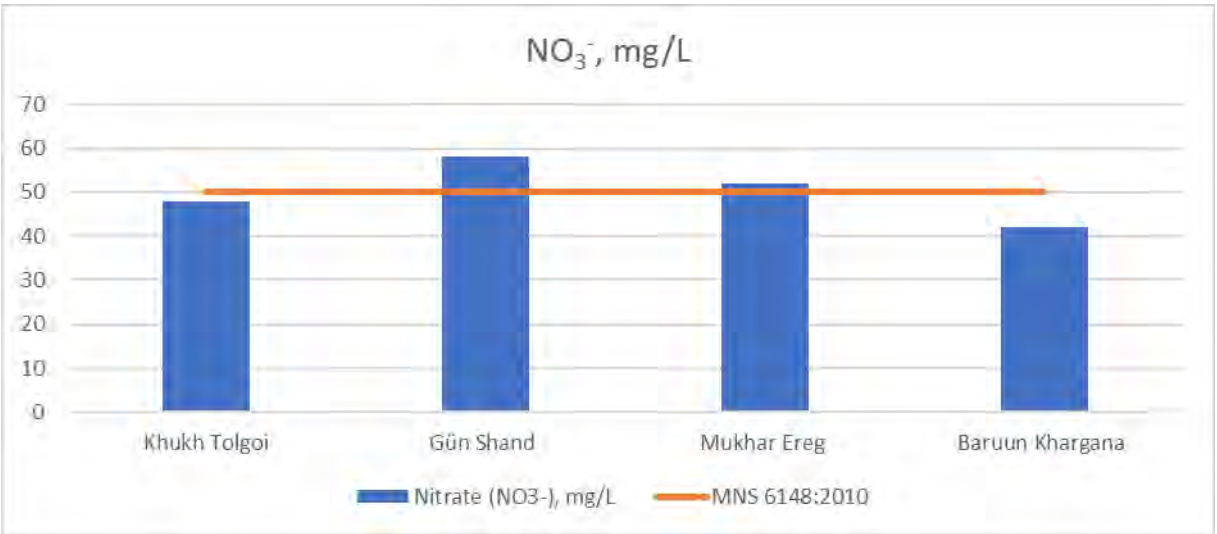


FIGURE 6-52: NITRATE CONCENTRATION

Heavy metal concentrations were analysed in water samples collected from four wells during the field survey. The results of the laboratory analysis are presented in the following table.

TABLE 6-22: CONCENTRATION OF HEAVY METALS IN WELL WATER SAMPLES, MG/L

No.	Elements	Khukh Tolgoi	Gün Shand	Mukhar Ereg	Baruun Khargana	MNS 0900:2018
1	Ag	<0.004	<0.004	<0.004	<0.004	0.1
2	Al	<0.01	0.03	0.02	<0.01	0.5
3	As	0.01	0.02	<0.01	<0.01	0.01
4	B	0.7	0.4	0.3	0.6	2.4
5	Ba	0.01	0.01	0.04	0.01	0.7
6	Bi	<0.2	<0.2	<0.2	<0.2	-
7	Ca	40.0	9.1	14.7	40.0	100
8	Cd	<0.01	<0.01	<0.01	<0.01	-
9	Co	<0.01	<0.01	<0.01	<0.01	-
10	Cr	<0.01	<0.01	<0.01	<0.01	0.05
11	Cu	<0.01	<0.01	<0.01	<0.01	2
12	Fe	<0.01	<0.01	<0.01	<0.01	0.3
13	Hg	<0.02	<0.02	<0.02	<0.02	0.001
14	K	0.6	<0.5	1.5	0.7	-
15	La	<0.05	<0.05	<0.05	<0.05	-
16	Li	<0.1	<0.1	<0.1	<0.1	-
17	Mg	12.7	0.8	3.6	7.7	30
18	Mn	<0.01	<0.01	<0.01	<0.01	0.1
19	Mo	0.01	0.01	<0.01	0.02	0.07

No.	Elements	Khukh Tolgoi	Gün Shand	Mukhar Ereg	Baruun Khargana	MNS 0900:2018
20	Na	247	193.5	119	188	200
21	Ni	0.01	<0.01	<0.01	<0.01	-
22	P	<0.5	<0.5	<0.5	<0.5	-
23	Pb	<0.02	<0.02	<0.02	<0.02	0.01
24	S	81.6	24.3	11.8	35.0	-
25	Sb	<0.04	<0.04	<0.04	<0.04	-
26	Sc	<0.02	<0.02	<0.02	<0.02	-
27	Si	1.5	1.3	1.5	1.9	-
28	Sn	<0.1	<0.1	<0.1	<0.1	-
29	Sr	0.81	0.10	0.24	0.46	2
30	Ta	<0.1	<0.1	<0.1	<0.1	-
31	Ti	<0.01	<0.01	<0.01	<0.01	-
32	Tl	<0.1	<0.1	<0.1	<0.1	-
33	V	0.02	0.01	0.02	<0.01	-
34	W	<0.5	<0.5	<0.5	<0.5	-
35	Y	<0.01	<0.01	<0.01	<0.01	-
36	Zn	<0.01	<0.01	<0.01	<0.01	5
37	Zr	<0.1	<0.1	<0.1	<0.1	-

Source: Results of laboratory analysis by ALS LLC on 2025-05-06

Based on the laboratory analysis to determine the concentration of heavy metals in the water samples from the wells, the arsenic (As) content in the water sample from Gün Shand well exceeded the limit specified in MNS 0900:2018 standard (0.01 mg/l) by 0.01 mg/l. The results for the water sample from Khukh Tolgoi well showed that the sodium (Na) content was 47 mg/l higher than the limit specified in the aforementioned standard. For other heavy elements, the content did not exceed the limits specified in MNS 0900:2018 standard. The following figure shows the sodium content in the well water compared to the permissible content in drinking water standards.



FIGURE 6-53: SODIUM CONCENTRATION

Conclusion

During the field survey, a total of seven (7) wells were documented, with six (6) wells located in vicinity of wind farm area and one (1) well along the OHL. In terms of construction, there were three (3) deep borehole wells, three (3) engineered wells, and one (1) dug well. These wells are utilized by herders living nearby for drinking, household purposes, and watering their livestock.

During the field survey, water samples were taken from four wells. One well was locked, one well was sealed, and the water in one well was frozen, so no water sample was taken. General water indicators and heavy metals were tested in relevant laboratories.

The hydrochemical analysis of groundwater samples collected from well located within the NZE Wind Farm site and along the OHL route has revealed variability in water quality parameters. Of particular note, nitrate concentrations in the Gün Shand and Mukhar Ereg wells exceed the permissible limits set for drinking water, representing a potential risk to human health. In addition, arsenic levels in the Gün Shand well was found to be above established regulatory thresholds.

The observed occurrence of exceedances in the collected groundwater samples is similar to findings of previous studies in the South Gobi region with elevated arsenic concentrations at some wells previously reported as a potential concern in the wider region [18].

6.1.9 AIR QUALITY

The dry climate, seasonal strong winds, and fine desert soils of the south Gobi provide conditions favourable for significant dust generation. The nature of soils and dry climatic conditions in the Project Site is such that disturbed soils have the potential to create significant levels of fine airborne dust.[19] Based on review of latest satellite imageries, it is understood that

[18] Tuinhof, A. and Buyanhisnig, N. (2010). Groundwater Assessment of the Southern Gobi Region. Mongolia Discussion Papers, East Asia and Pacific Sustainable Development Department. Washington, D.C.: World Bank.
[19] Oyu Tolgoi Mine Project ESIA (2012)

Oyu Tolgoi Mine (an open pit gold and copper mine), which commenced production in 2013[20], is the only large-scale industrial activity area that may involve emissions to ambient air and noise near to the Project. The OHL will connect to Oyu Tolgoi mine's central substation.

About 60 km northwest of the Project Site, Tsogttsetsii is host to the Tavan Tolgoi mine, which is Mongolia's largest open cast coal mine. ERM observed visible dust above the coal mine indicating coal mining operations are a potential source of localised air quality impact, however given its remote location and distance in relation to the Project Site, this is not discussed further.

As discussed in ***Section 6.1.5.1***, naturally occurring dust storms, which are most prevalent in spring, can also result in reduction in air quality in the region.

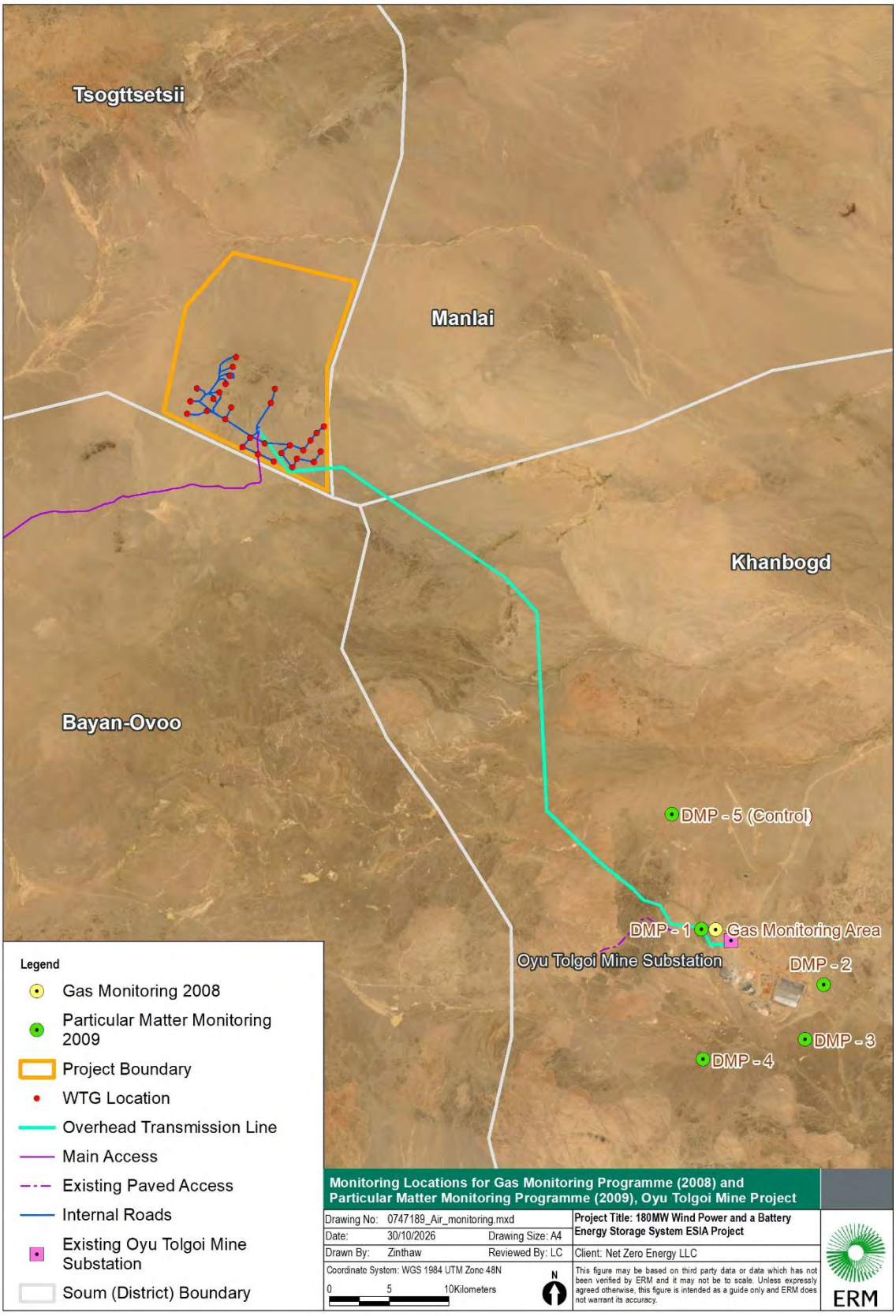
6.1.9.1 BASELINE AIR QUALITY INFORMATION FROM OYU TOLGOI MINE PROJECT ESIA (2012)

SO_2, CO and NO_2

The Oyu Tolgoi mine commenced mining operations in 2013. Baseline assessments of the ambient air quality of the Oyu Tolgoi Project Area were initially carried out in July 2002. A further programme of regional gas and dust monitoring was undertaken in 2008 by the Centre for Policy Research for the 2008 Oyu Tolgoi Social, Economic and Environmental Subset document prepared to assist in regional planning activities.[21]

Monitoring area for Gas Monitoring Programme in August 2008 reported to Oyu Tolgoi Project Social, Economic and Environmental Subset was located north west of Oyu Tolgoi and near to southern part of OHL of the Project (less than three (3) km)(***Figure 6-54***). Parameters sampled included SO_2, CO and NO_2.

[20] Oyu Tolgoi underground mine project, Mongolia – Mining Weekly 26th April 2024. Available at https://www.miningweekly.com/print-version/oyu-tolgoiunderground-mine-project-mongolia-update-2024-04-26 [accessed September 2024]
[21] Oyu Tolgoi Project Social, Economic and Environmental Subset, Final Report, Centre for Policy Research and Population Training and Research Centre, Ulaanbaatar, Mongolia. September 2009



Source: Oyu Tolgoi Mine Project ESIA (2012)

FIGURE 6-54: MONITORING LOCATIONS FOR GAS MONITORING PROGRAMME (2008) AND PARTICULAR MATTER MONITORING PROGRAMME (2009), OYU TOLGOI MINE PROJECT

Samples were collected in balloons at a total of 42 locations across the three zones were selected and were sent to Central Laboratory for detailed analysis. The results of analysis are provided in ***Table 6-23,*** The SO_2, CO and NO_2 concentrations observed across all of the locations were observed to be well within the EU limits where available.

TABLE 6-23: 2008 AMBIENT AIR QUALITY MONITORING RESULTS FROM OYU TOLGOI MINE PROJECT ESIA (2012)

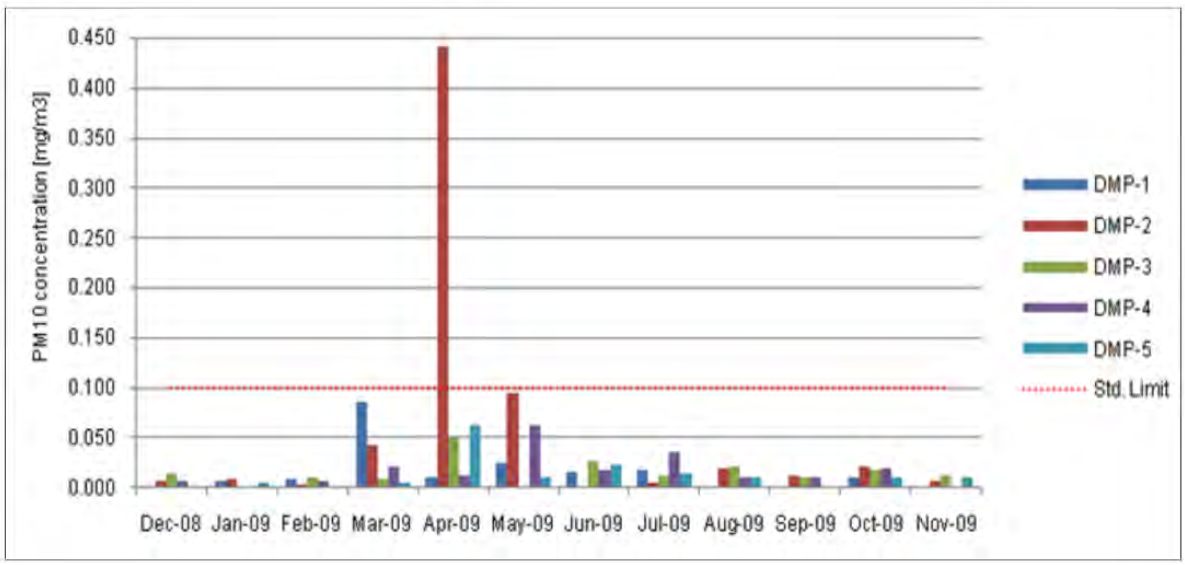
Parameter	Measured Levels (µg/m³)	EU Standard (µg/m³)
SO_2	3 – 64	350 (1 hr average)
CO	140-420	N/A
NO_2	12-155	200 (1 hr average)

Source: Oyu Tolgoi Mine Project ESIA (2012)

Particular Matter

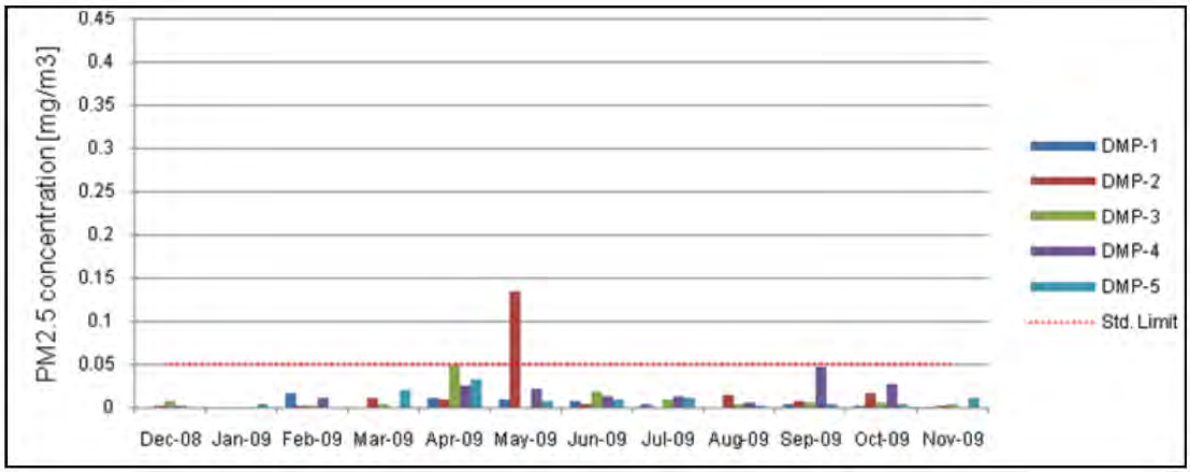
Oyu Tolgoi's Environmental Department's regular dust monitoring for $PM_{2.5}$ and PM_{10} conducted in 2009 (December 2008 to November 2009) at the Mine Licence Area included five (5) locations encompassing the mine project area as shown in ***Figure 6-54***.

Figure 6-55 and ***Figure 6-56*** present PM_{10} and $PM_{2.5}$ results from each of the monitoring sites during 2009.



Source: Oyu Tolgoi Mine Project ESIA (2012)

FIGURE 6-55: PM_{10} CONCENTRATIONS AT OYU TOLGOI MONITORING LOCATIONS, 2009



Source: Oyu Tolgoi Mine Project ESIA (2012)

FIGURE 6-56: $PM_{2.5}$ CONCENTRATIONS AT OYU TOLGOI MONITORING LOCATIONS, 2009

It was reported that concentrations of $PM_{2.5}$ were largely within the Mongolian 24-hour and annual standards of 50 µg/m^3 (0.05 mg/m^3) and 25 µg/m^3 (0.025 mg/m^3) respectively. Concentrations of PM_{10} were recorded also to be largely within the Mongolian 24-hour and annual standard of 100 µg/m^3 (0.1 mg/m^3) and 50 µg/m^3 (0.05 mg/m^3) respectively.

It is understood that March, April and May months correspond to a time of year when dust lift-off and storm events are common.

6.1.9.2 AIR QUALITY SURVEY (2025)

This section outlines the current state of air quality in the NZE Wind Farm project area, including the OHL and its surrounding environment. In line with the methodology described in the scoping report, the field survey team conducted air quality measurements between 10 and 21 April 2025. The findings from air quality monitoring carried out at the project site also discussed in this chapter.

Monitoring Methodology

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, two were located within the Wind Farm site, three along the OHL route, and one along the proposed access road.

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 PM_{10}) were continuously recorded over a 24-hour period. Additionally, nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) 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 1.5 meters above ground level to ensure consistency with standard ambient air sampling protocols.

The air quality monitoring data collected during the field survey were analysed by comparing the recorded values against the permissible limits outlined in the Mongolian standard MNS 4585:2016, as well as relevant international air quality guidelines. This comparison enabled

the assessment of compliance and the identification of any potential exceedances or environmental concerns.



FIGURE 6-57: SETUP OF AIR QUALITY MONITORING EQUIPMENT

Survey Results

Table 6-24 presents the details of the air quality monitoring locations recorded during the field survey, while their locations are showed in ***Figure 6-58*** and ***Figure 6-59***.

TABLE 6-24: AIR QUALITY MONITORING LOCATIONS DETAILS

Coded Name	Monitoring Period	Coordinates, Decimal degree		Elevation (m)	Remark
		N	E		
Along the access road					
AQ1	14-15 Apr 2025	43.36888°	106.17893°	1346	Located approximately 11 km southwest of the wind farm area, [redacted]
Wind Farm site					
AQ2	10-11 Apr 2025	43.46882°	106.35098°	1516	Located in near a household's winter camp, situated in the central area designated for wind turbine installation.
AQ3	12-13 Apr 2025	43.43967°	106.3606°	1464	Located near a household's winter camp in the central area designated for wind turbine installation.
Along the OHL route					

Coded Name	Monitoring Period	Coordinates, Decimal degree		Elevation (m)	Remark
		N	E		
AQ4	16-17 Apr 2025	43.39699°	106.45082°	1394	Located southeast of [redacted]
AQ5	18-19 Apr 2025	43.27965°	106.6398°	1275	Centre of Gaviluut bagh, Khanbogd soum.
AQ6	20-21 Apr 2025	43.03072°	106.7915°	1186	On the western side of the Oyu Tolgoi mine fence.

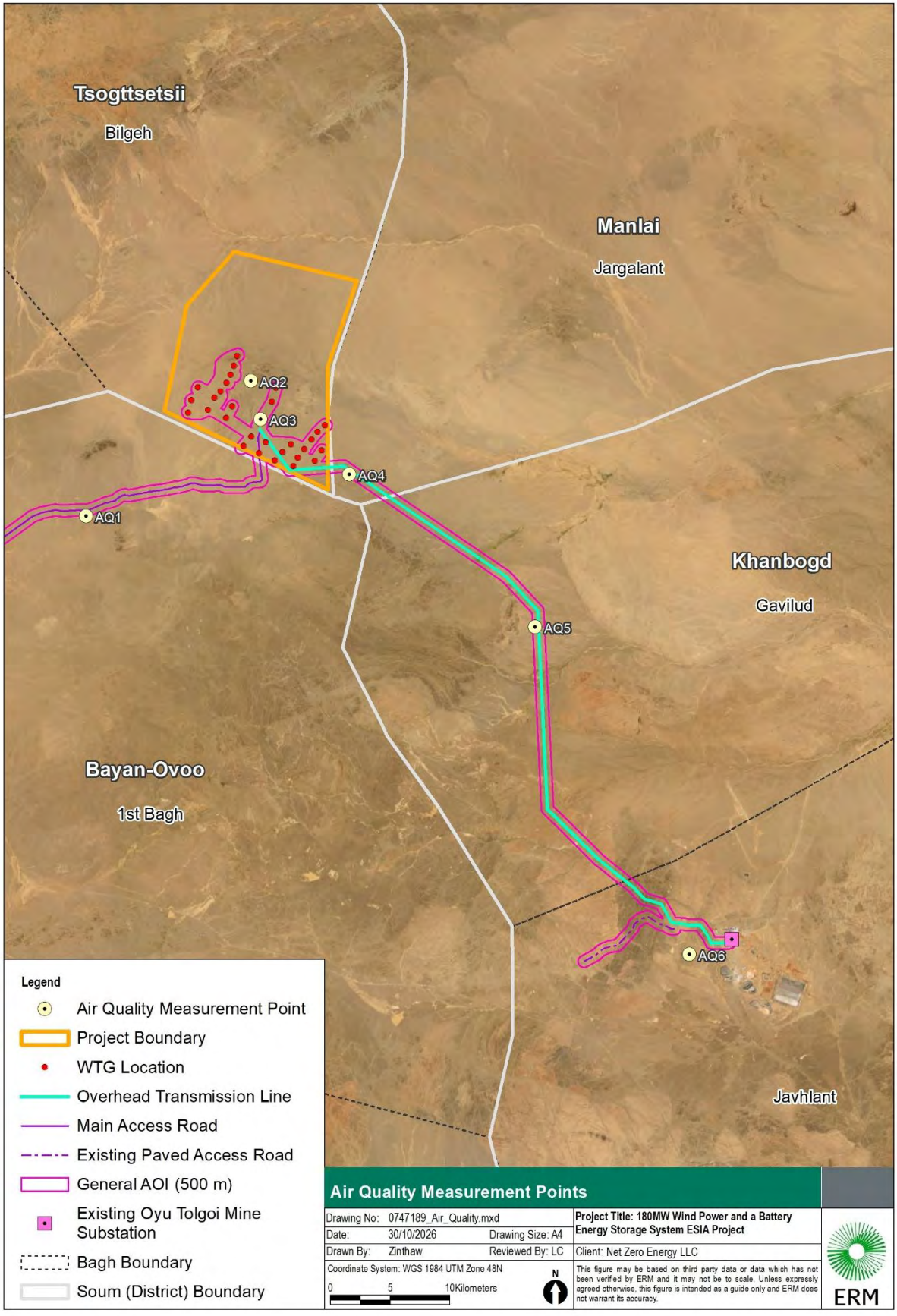
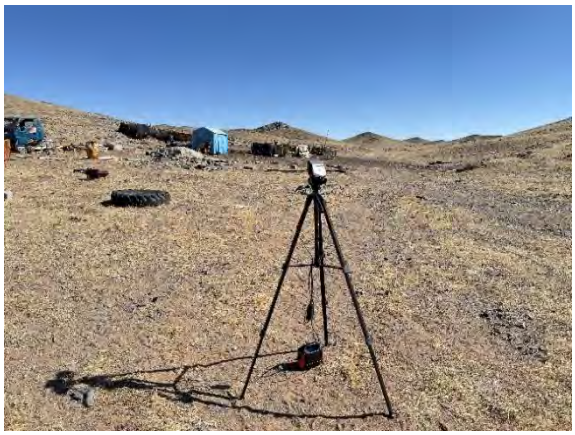


FIGURE 6-58: LOCATIONS OF AIR QUALITY MEASUREMENT POINTS



AQ1



AQ2



AQ3



AQ4



AQ5



AQ6

FIGURE 6-59: LOCATIONS OF AIR QUALITY MONITORING LOCATIONS

At the air quality monitoring points, the 24-hour average concentrations of fine particulate matter ($PM_{2.5}$) were approximately 9 to 33 times lower than the maximum permissible limit specified in the Mongolian air quality standard (MNS 4585:2016), and approximately 3 to 10 times lower than the guideline values set by the World Health Organization (WHO, 2021).

The highest measured $PM_{2.5}$ value ranged from 3 to 25 times below the Mongolian standard limit. Compared to WHO guidelines, concentrations at monitoring points AQ1 through AQ5

were 1.5 to 7.5 times lower, while point AQ6 showed a slightly elevated concentration, exceeding the guideline by 2.1 µg/m^3.

The detailed $PM_{2.5}$ measurement results from the field survey are presented in ***Table 6-25***.

TABLE 6-25: CONCENTRATIONS OF FINE PARTICULATE MATTER ($PM_{2.5}$)

No.	Coded Name	Average Concentration (24-hour measurement), µg/m³	Maximum Value (24-hour measurement), µg/m³	24-hour average	
				MNS4585:2016 µg/m³	WHO 2021, µg/m³
1	AQ1	4.0	7.0	50	15
2	AQ2	2.7	9.7		
3	AQ3	2.9	6.6		
4	AQ4	2.8	3.6		
5	AQ5	1.5	2.0		
6	AQ6	5.3	17.1		

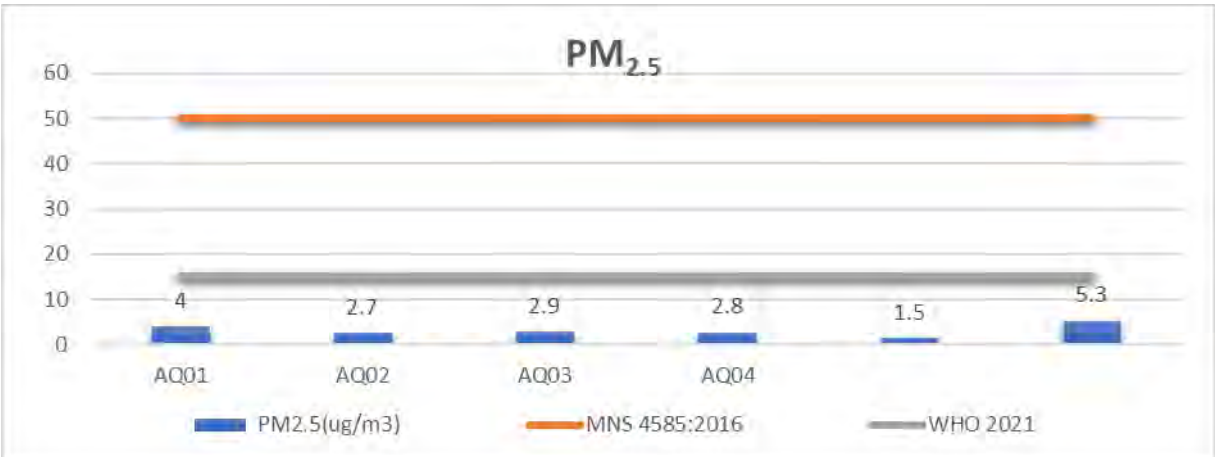


FIGURE 6-60: $PM_{2.5}$ PARTICULATE MATTER CONCENTRATIONS AT MONITORING LOCATIONS

At the air quality monitoring points, the 24-hour average concentrations of coarse particulate matter (PM_{10}) were approximately 9 to 26 times below the maximum permissible limits set by the Mongolian air quality standard (MNS 4585:2016), and 4 to 12 times lower than the World Health Organization's (WHO, 2021) guideline values.

The highest measured PM_{10} values were 4 to 12 times below the Mongolian standard limits. Compared to WHO guidelines, concentrations at monitoring points AQ2 and AQ6 were slightly lower by 1.4 µg/m³ and 0.3 µg/m³, respectively, while the other points recorded concentrations 3 to 5 times higher than the guidelines.

The detailed PM10 measurement results from the field survey are presented in ***Table 6-26***.

TABLE 6-26: CONCENTRATION OF COARSE PARTICULATE MATTER (PM_{10})

No.	Coded Name	Average Concentration (24-hour measurement), µg/m³	Maximum Value (24-hour measurement), µg/m³	24-hour average	
				MNS4585:2016 **µg/m³**	WHO 2021, **µg/m³**
1	AQ1	5.4	11.1	100	45
2	AQ2	11.7	43.6		
3	AQ3	6.1	17.1		
4	AQ4	3.8	9.0		
5	AQ5	5.5	11.6		
6	AQ6	9.0	44.7		

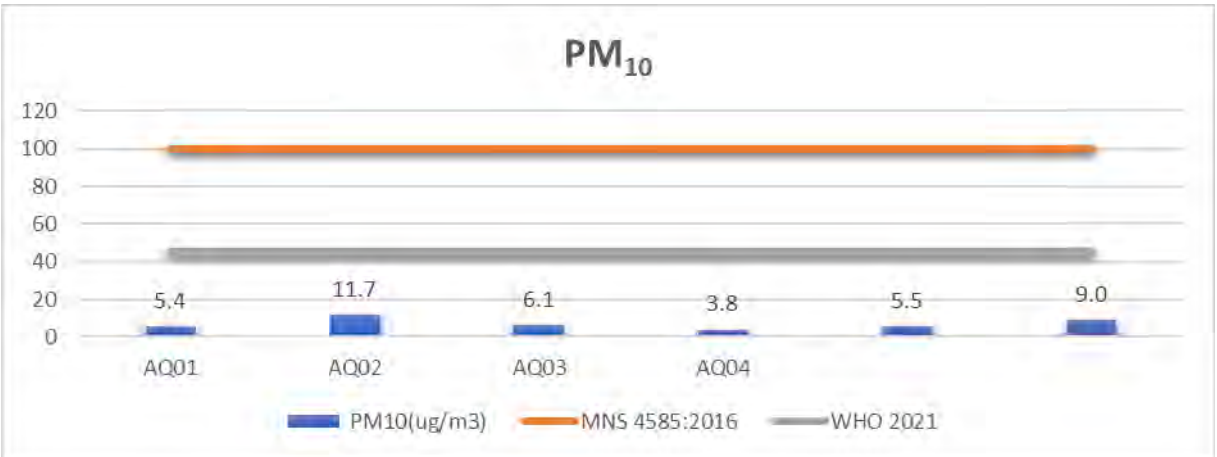


FIGURE 6-61: PM_{10} PARTICULATE MATTER CONCENTRATIONS AT MEASUREMENT SITES

At the air quality monitoring locations, nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) concentrations were measured over a one-hour period. During this time, nitrogen dioxide and sulfur dioxide were all below detection limit.

Conclusion

Air quality monitoring was carried out at six key locations across the NZE Wind Farm site, the overhead transmission line route, and the planned access road, following established methods. Most monitoring locations were situated in sparsely populated areas near herders' winter camps, with one located near the Oyu Tolgoi mine fence.

The results showed that levels of fine particulate matter ($PM_{2.5}$) were significantly below the limits set by Mongolia's National Air Quality Standard, ranging from about 9 to 33 times lower. These levels also fell well below the World Health Organization's guideline values. Coarse particulate matter (PM_{10}) exhibited a similar pattern, with concentrations far below both Mongolian standards and WHO recommendations.

Importantly, sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) were below detection limit during the monitoring period at any of the sites as the project sites located away from industrial zones and settlements areas.

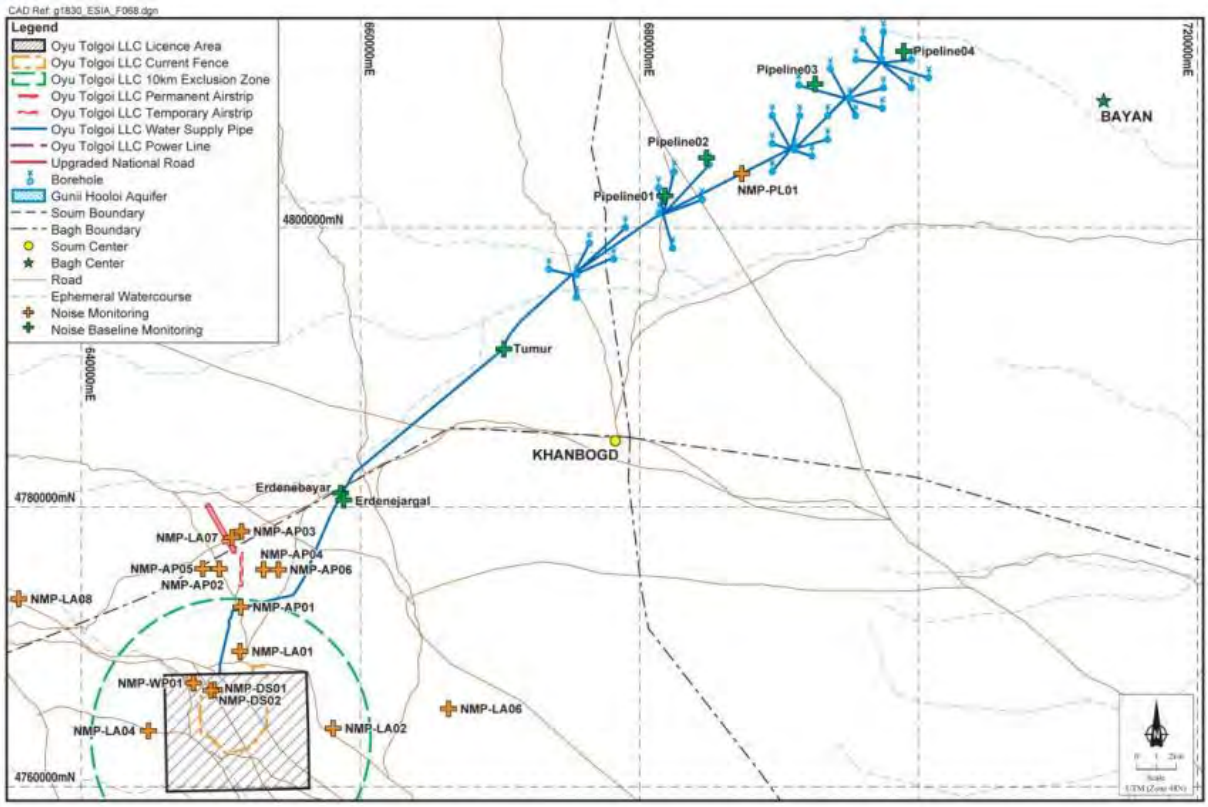
Given that the area experiences frequent and intense dust storms during early spring, summer, and autumn, it is crucial to factor in these seasonal climatic conditions when planning and designing project activities. These dust storms, as natural hazards, may require temporary halting of work to protect infrastructure and, most importantly, to ensure the health and safety of workers on site.

6.1.10 NOISE LEVEL AND VIBRATION

6.1.10.1 BASELINE NOISE INFORMATION FROM OYU TOLGOI MINE PROJECT ESIA (2012)

This section and below sections present the baseline assessment of environmental noise conditions within the NZE wind farm area and along OHL route. Understanding existing noise levels is important for evaluating potential noise impacts during construction and operational phases and for establishing appropriate mitigation measures.

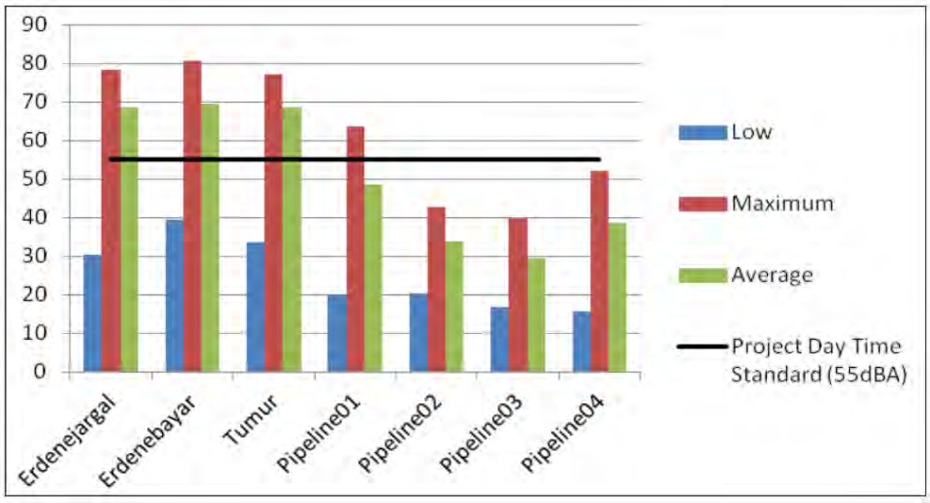
A baseline noise survey was conducted during March 2011 for Oyu Tolgoi Mine Project ESIA which is located at southern end of the OHL. Although this baseline survey in 2011 was conducted more than ten years ago, these data are included as additional regional context for the project. Day and night-time noise measurements were recorded along the Gunii Hooloi water supply pipeline route (***Figure 6-62***). Among the monitoring locations, Erdenejargal and Erdenebayar stations were located approximately 15 km away from the southern part of the OHL, while Tumur station was ~35km and Pipeline 01 – 04 stations were more than 50 km away from the OHL.



Source: Oyu Tolgoi Mine Project ESIA (2012)

FIGURE 6-62: NOISE MONITORING LOCATIONS ALONG THE GUNII HOOLOI WATER SUPPLY PIPELINE OF OYU TOLGOI MINE PROJECT

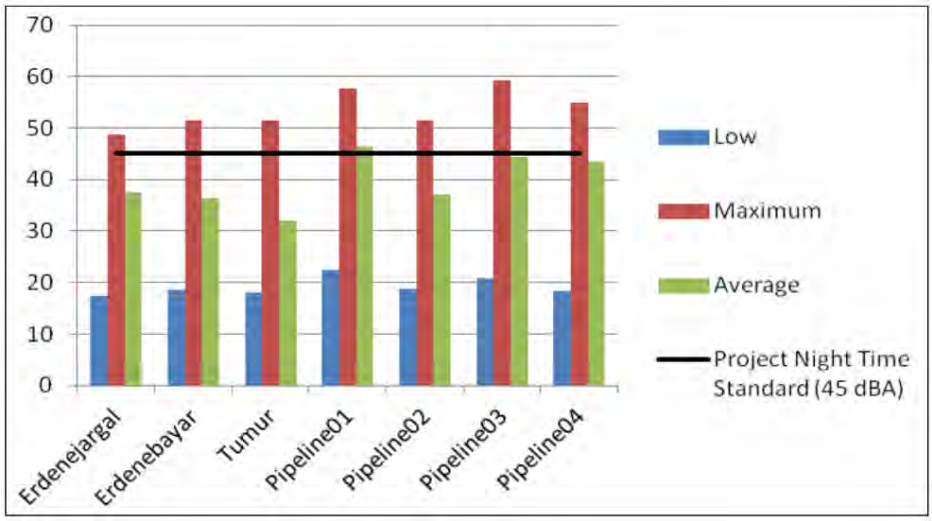
A summary of the results from the March 2011 noise survey along the water supply pipeline are presented in ***Figure 6-63*** and ***Figure 6-64*** for day-time and night-time baseline noise.



Source: Oyu Tolgoi Mine Project ESIA (2012)

FIGURE 6-63: DAY TIME NOISE MONITORING ALONG WATER PIPELINE (DBA)[22]

[22] As per Mongolia National Standard MNS 4585:2016, the updated daytime noise level standard will be 60 (dBA).



Source: Oyu Tolgoi Mine Project ESIA (2012)

FIGURE 6-64: NIGHTTIME NOISE MONITORING ALONG WATER PIPELINE (DBA)

Noise measurements made at the Erdenejargal, Erdenebayar and Tumur monitoring locations along the pipeline route were above the daytime Project Standard. Measurements at the Erdenejargal and Erdenebayar locations were influenced by traffic noise (i.e. trucks) from the coal transportation route related to the Tavan Tolgoi mine and led to higher average values being recorded. It was noted that wind speed recorded at the monitoring locations were high, which were reported to possibly contribute to the recorded elevated noise readings.

With regard to night-time noise measurements, results from all monitoring sites were reported mostly below the Project Standards.

6.1.10.2 NOISE MONITORING FOR OYU TOLGOI MINE (2024)

More recently, according to Oyu Tolgoi Mine's Independent Environmental and Social Consultant Compliance Monitoring Report (May 2024), it was reported that noise monitoring at the OT is conducted at four continuous ambient air and noise quality monitoring network stations, with one of these being a control station. In 2022 noise monitoring at these stations, which include the location of the Tailings Storage Facility, the Waste Management Centre, and at the Manlai camp residential area, returned monitoring results ranging from 22.5 to 48.1 dB, below the standard of 60 dBA. There have been no noise-related incidents or complaints at the OT mine site.[23]

6.1.10.3 NOISE LEVEL SURVEY (2025)

The noise level survey to collect primary data was conducted at six locations representative of the Wind Farm Project site, the OHL, and nearby off-site areas, selected specifically for their proximity to sensitive receptors potentially impacted by the Project. In this section, the survey findings are compared with relevant national standards (MNS 4585:2016) and IFC, Environmental, Health, and Safety Guidelines (Noise1.7).

[23] Independent Environmental and Social Consultant Compliance Monitoring Report, Oyu Tolgoi Mine. May 2024. Available at https://www.ot.mn/en/report [accessed February 2025]

Monitoring Methodology

48-hour noise survey was carried out at six locations within the Project area. Four of these monitoring points (NO1, NO2, NO3, and NO4) were situated near local herders' winter camps. Location NO5 was positioned at the centre of Gaviluud bagh, while location NO6 was located outside the fence, on the western side of the Oyu Tolgoi mine.

At each monitoring location, noise measurements were performed using a REED Data Logging Sound Meter. The noise measurements were made on tripod at a height of 1.5m above the ground (consistent with ETSU-R-97) and noise levels were continuously measured over the 48-hour period, with data logged at consecutive 10-minute intervals.

During the noise measurement period, the weather conditions were recorded at fixed times: 10:30 AM, 1:00 PM, 4:00 PM, and 7:00 PM. The weather conditions were measured using the following parameters.

Measured parameters:

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

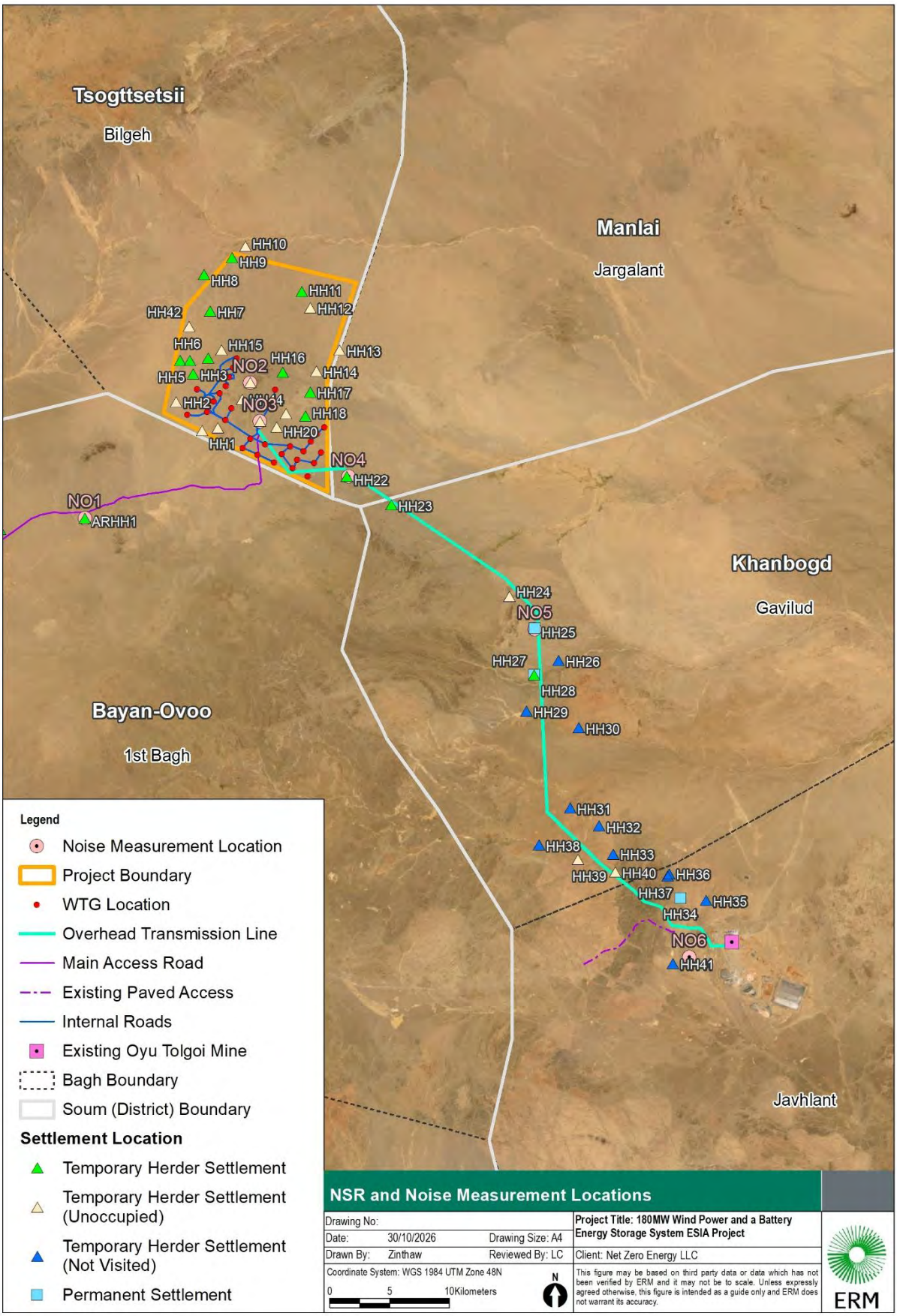


FIGURE 6-65: NOISE SURVEY LOCATIONS (OVERALL)

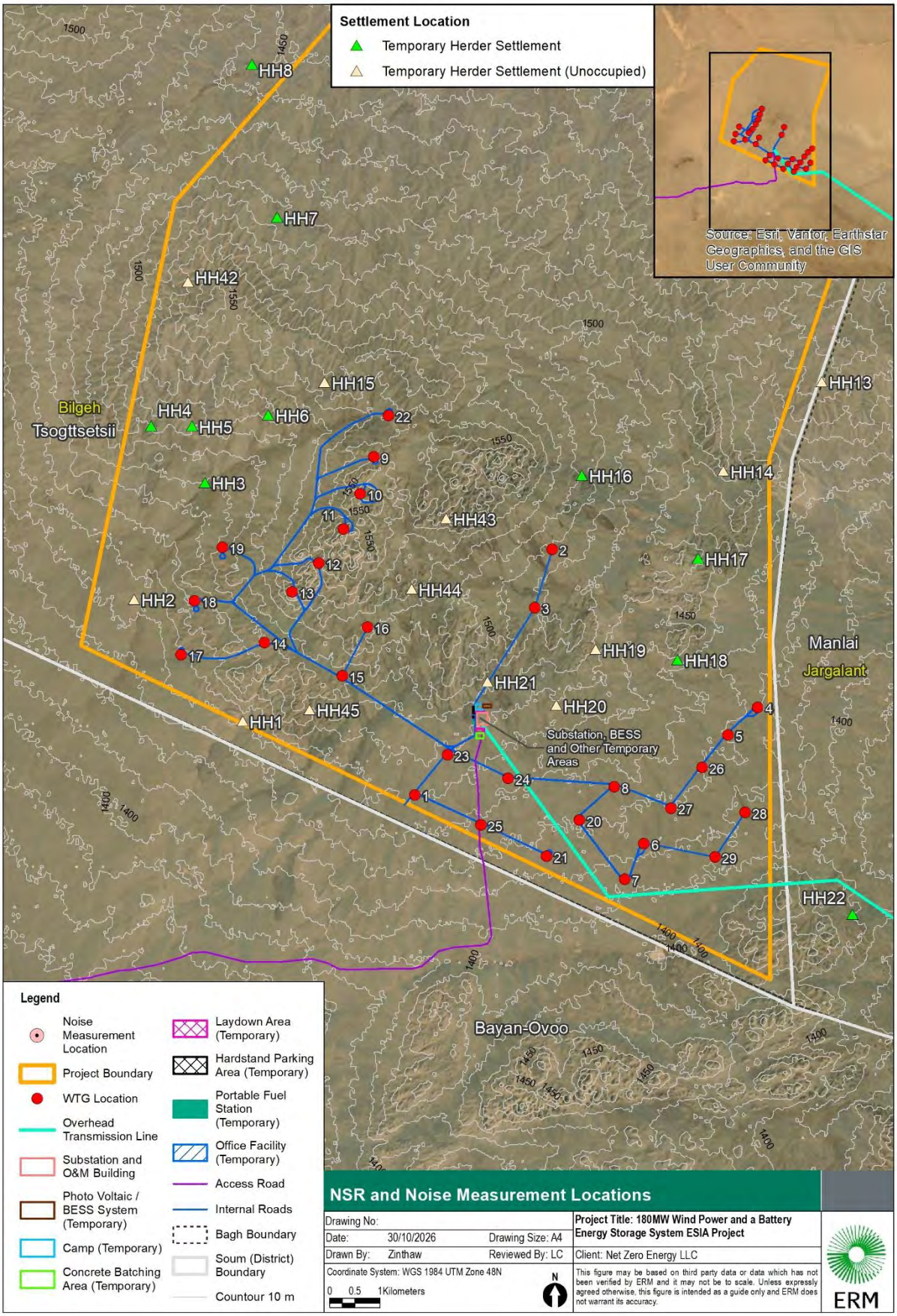


FIGURE 6-66: NOISE SURVEY LOCATIONS NEAR WTG LOCATIONS

TABLE 6-27: NOISE SURVEY SCHEDULE

Date	N02		N03		N01		N04		N05		N06	
	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
10/4/2025	10:36											
11/4/2025												
12/4/2025		10:36	11:41									
13/4/2025												
14/4/2025				11:41	12:12							
15/4/2025												
16/4/2025						12:12	13:27					
17/4/2025												
18/4/2025								13:27	14:15			
19/4/2025												
20/4/2025										14:15	16:45	
21/4/2025												
22/4/2025												16:45

	Started
	Ended

Survey Results

The results of the survey are presented in the following sections.

NO2

At location NO2, measurements were conducted over a 48-hour period, from the morning of 10 April to the morning of 12 April. During this time, daytime measurements were taken three times, and nighttime measurements were taken twice.

TABLE 6-28: NOISE SURVEY RESULTS AT LOCATION NO2

Location	**NO2 (In front of the herder's winter camp located in the northern part of the WTG project area)**					
Coordinate	43.46882⁰N, 106.35098⁰E					
Date and Time	Day time			Nighttime		
	Min dBA	Max dBA	Average dBA	Min dBA	Max dBA	Average dBA
10/4/2025 10:36 AM started	26.60	45.50	33.24	29.70	66.10	46.72
11/4/2025 Continued	43.10	67.20	57.29	36.50	57.60	41.91
12/4/2025 10:36 AM ended	32.10	41.10	36.37	-	-	-

TABLE 6-29: WEATHER CONDITIONS DURING NOISE MEASUREMENT AT LOCATION NO2

Date	**Timestamp**	**Weather conditions**				
		Wind speed (m/s)	**Wind directions**	**Pressure (hPa)**	**AIR T (⁰C)**	**AIR RH (%)**
10/4/2025	10:30 AM	3.80	West	838.5	13.0	17.0
	1:00 PM	4.50	West	837.5	15.8	15.2
	4:00 PM	4.25	West	836.1	15.7	16.4
	7:00 PM	4.70	West	836.0	13.3	22.7
11/4/2025	10:30 AM	7.70	Northwest	837.0	5.8	55.0
	1:00 PM	7.35	West	836.4	9.5	37.5
	4:00 PM	9.30	West	836.5	8.7	42.3
	7:00 PM	6.90	West	836.8	6.6	52.5
12/4/2025	10:30 AM	3.70	West	849.6	11.8	14.3

Daytime Noise Level

The daytime noise measurement covered the period from 07:06 to 21:56 on 10 April. The noise level max reached 45.5 dBA at 17:36, whereas the minimum level reached 26.6 dBA at 17:16 on 10 April. The average value was 33.24 dBA.

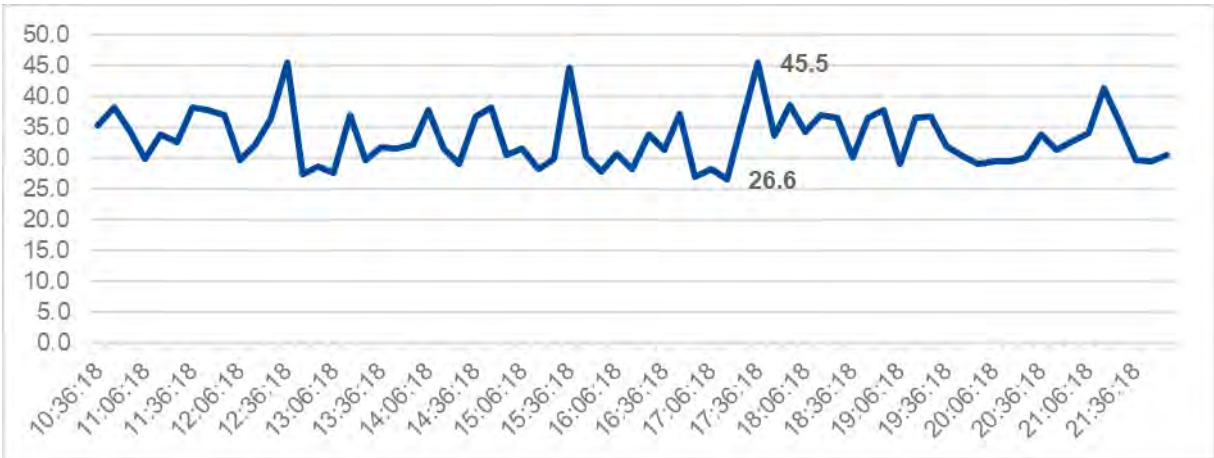


FIGURE 6-67: DAYTIME NOISE LEVELS AT LOCATION NO2, 10 APRIL

The noise max reached 67.2 dBA at 13:56 on 11 April, whereas the minimum level reached 43.1 dBA at 17:16 on 11 April. The average value was 57.3 dBA.

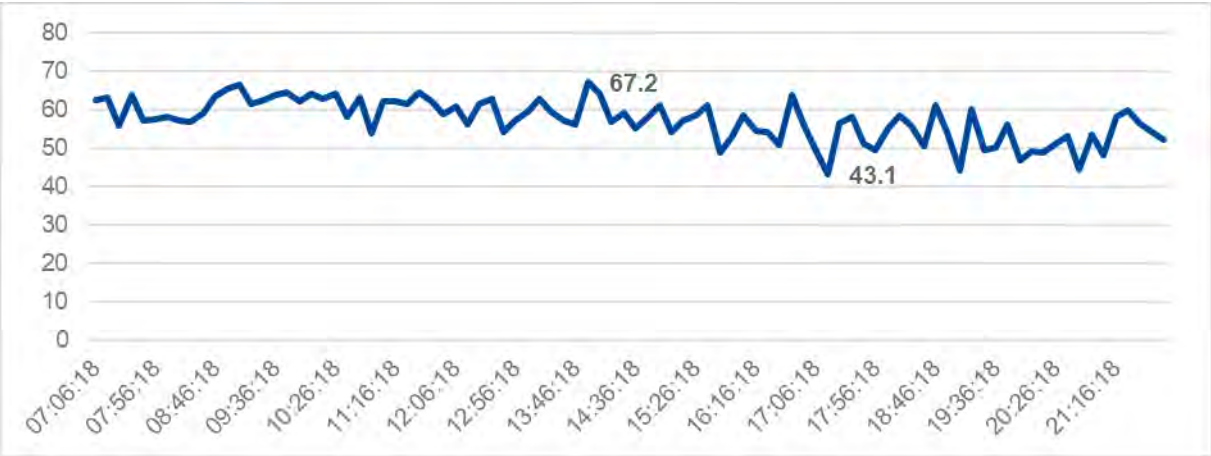


FIGURE 6-68: DAYTIME NOISE LEVELS AT LOCATION NO2, 11 APRIL

The noise level reached a maximum of 41.1 dBA at 07:56 and a minimum of 32.1 dBA at 10:36 on 12 April. The average value was 36.4 dBA.

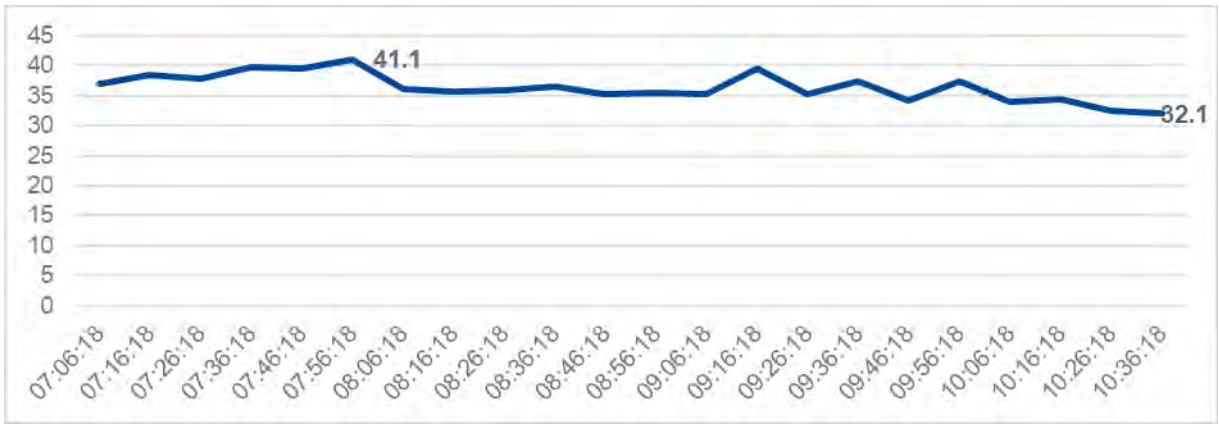


FIGURE 6-69: DAYTIME NOISE LEVELS AT LOCATION NO2, 12 APRIL

Nighttime noise level

The nighttime noise measurement covered the period from 22:06 on 10 April to 06:56 the following morning. The noise levels ranged from a minimum of 29.7 dBA to a maximum of 66.1 dBA, with an average value of 46.7 dBA. The maximum noise level of 66.1 dBA was recorded at 06:36 on 11 April, while the minimum level of 29.7 dBA occurred at 23:16 on 10 April.

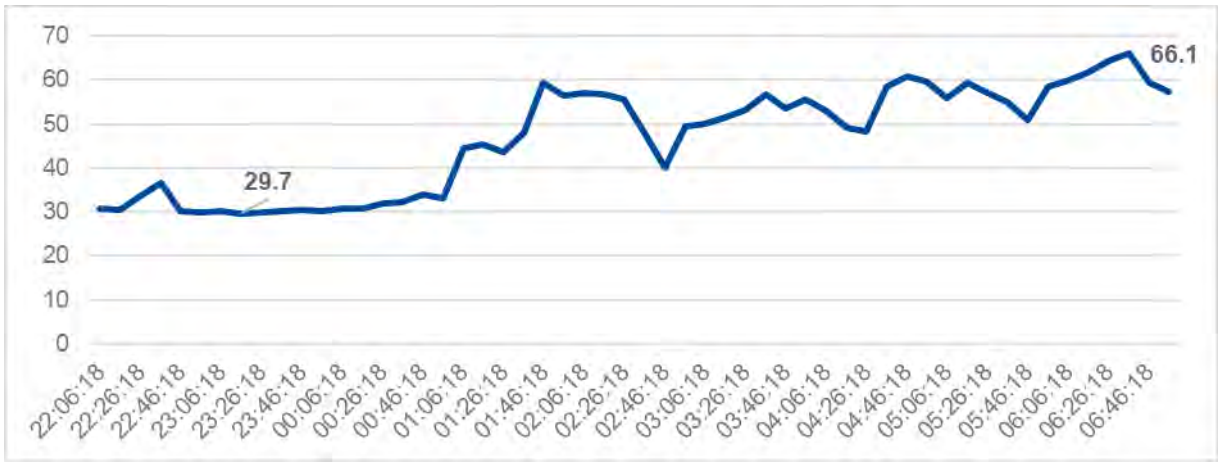


FIGURE 6-70: NIGHTTIME NOISE LEVELS AT LOCATION NO2, 10 APRIL

The noise levels ranged from a minimum of 36.5 dBA to a maximum of 57.6 dBA, with an average value of 41.9 dBA. The maximum noise level of 57.6 dBA was recorded at 22:26 on 11 April, while the minimum levels of 36.5 dBA were recorded at 06:36 and 06:56 on 12 April.

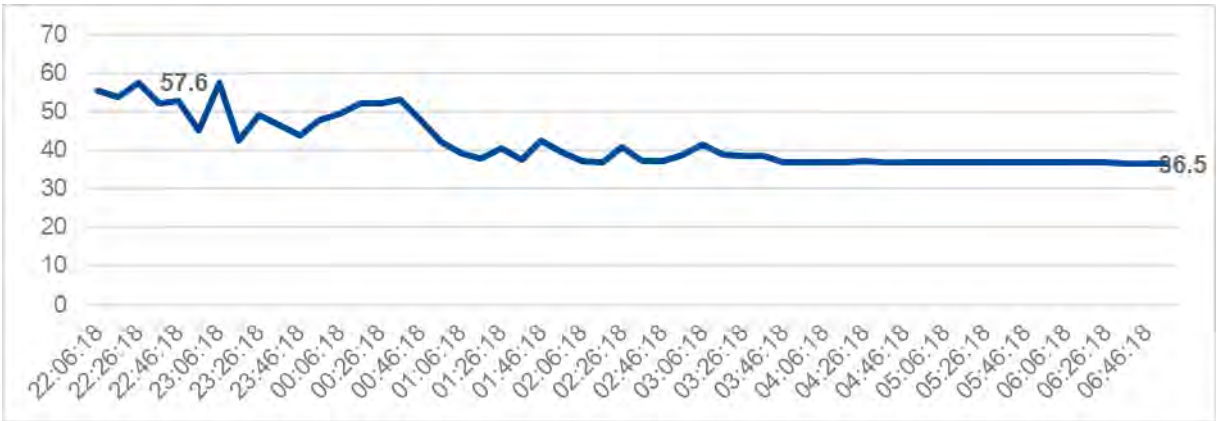


FIGURE 6-71: NIGHTTIME NOISE LEVELS AT LOCATION NO2, 11 APRIL

Summary of Findings at NO2

The average daytime noise level at NO2 did not exceed the maximum permissible limit of 60.0 dBA set by the national standard MNS 4585:2016. However, on 11 April, the average daytime noise level exceeded the IFC standard value of 55 dBA by 2.3 dBA.

NO2 is located near an uninhabited herder's winter shelter, with no human activity noise source in the vicinity. The observed noise levels are attributed solely to wind-induced noise, which varies with changes in wind speed and frequency. For instance, on 10 April, the noise level was 26.6 dBA at 17:16, rising to 45.5 dBA by 17:36 due to increased wind activity.

The average nighttime noise level at NO2 closely aligns with the limits set by both national and IFC standards. Specifically, on 10 April, it slightly exceeded the limit by 1.7 dBA, while on 11 April, it measured 41.9 dBA, remaining within the prescribed limits.

NO3

At location NO3, measurements were conducted over a 48-hour period, from 11:51 on 12 April to 11:41 on 14 April. During this period, daytime noise levels were measured on three occasions, while nighttime measurements were carried out twice.

TABLE 6-30: NOISE SURVEY RESULTS AT LOCATION NO3

Location	**NO3 (In front of the winter camp of the household located in the central part of the WTG site)**					
Coordinate	43.43967⁰N, 106.3606⁰E					
Date and Time	Day time			Nighttime		
	Min dBA	Max dBA	Average dBA	Min dBA	Max dBA	Average dBA
12/4/2025 11:41 AM started	29.30	54.30	39.69	30.00	45.60	35.49
13/4/2025 Continued	28.90	61.40	46.97	30.70	46.30	35.21
14/4/2025 11:41 AM ended	29.00	45.20	34.21	-	-	-

TABLE 6-31: WEATHER CONDITIONS DURING NOISE MEASUREMENT AT LOCATION NO3

Date	Timestamp	Weather conditions				
		Wind speed (m/s)	Wind directions	Pressure (hPa)	AIR T (°C)	AIR RH (%)
12/4/2025	11:30 AM	3.90	West	849.0	13.7	12.0
	1:00 PM	3.90	West	847.7	15.7	11.4
	4:00 PM	2.50	West	844.7	17.4	8.9
	7:00 PM	2.15	West	842.8	16.0	9.0
13/4/2025	11:30 AM	3.95	Northwest	846.9	11.5	16.2
	1:00 PM	6.10	West	847.0	11.7	16.5
	4:00 PM	4.88	West	847.0	11.4	39.8
	7:00 PM	5.67	Northwest	847.7	10.0	34.7
4/14/2025	11:30 AM	4.20	Southeast	851.8	9.3	24.9

Daytime Noise Level

At location NO3, the noise level on 12 April fluctuated between 29.3 dBA and 54.3 dBA, with an average of 39.7 dBA. The maximum noise level of 54.3 dBA was recorded at 16:11, while the minimum of 29.3 dBA occurred at 19:51. On 12 April, the noise level displayed a generally decreasing trend starting from 17:41.

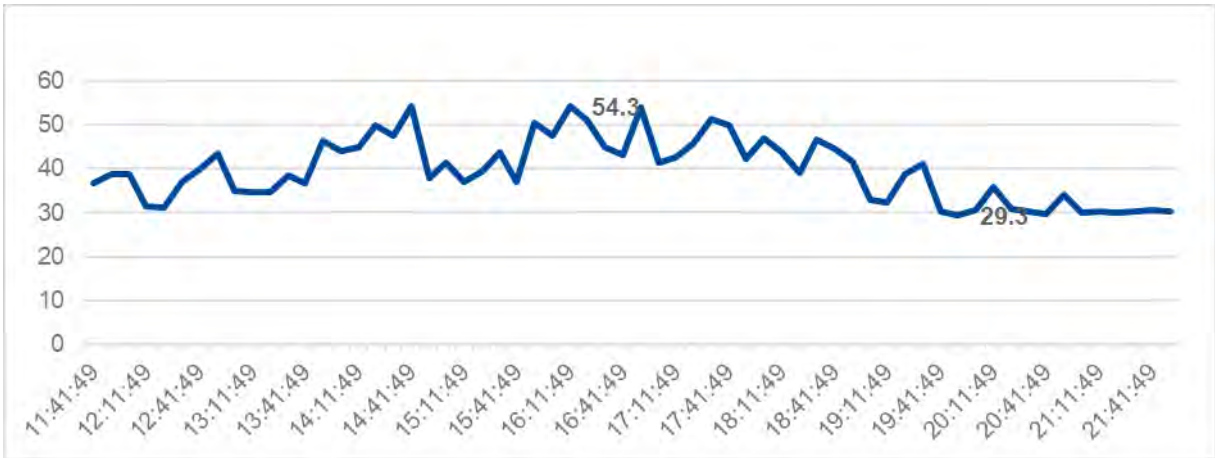


FIGURE 6-72: DAYTIME NOISE LEVELS AT LOCATION NO3, 12 APRIL

The noise level on 13 April fluctuated between 28.9 dBA and 61.4 dBA, with an average of 47.0 dBA. The maximum noise level of 61.4 dBA was recorded at 10:51, while the minimum level of 28.9 dBA occurred at 20:01 on the same day. Noise levels on 13 April showed considerable fluctuations, with sharp rises and drops. For instance, the level was 34.3 dBA at 19:01 but increased by 18.0 dBA just ten (10) minutes later, reaching 52.3 dBA at 19:11.

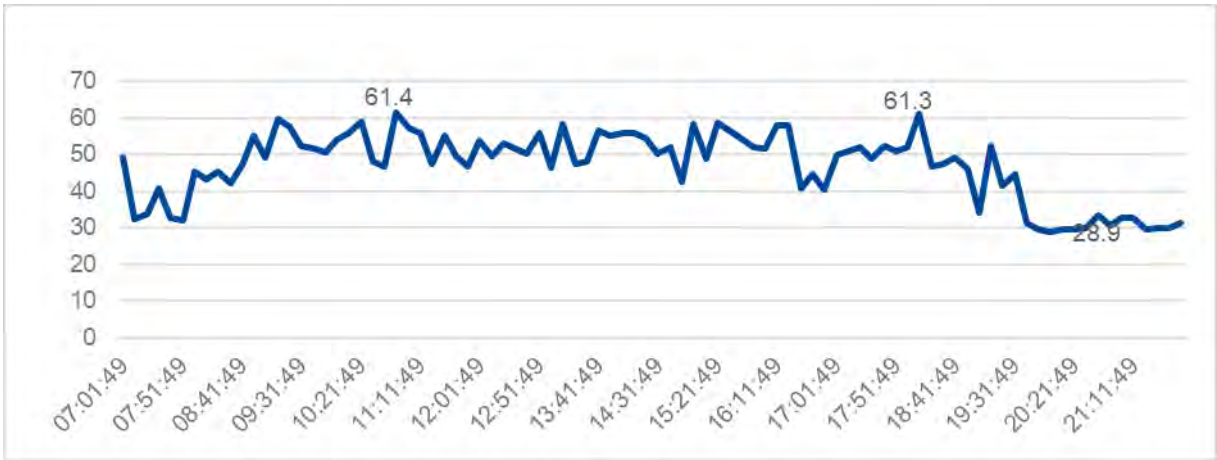


FIGURE 6-73: DAYTIME NOISE LEVELS AT LOCATION NO3, 13 APRIL

The noise level on 14 April fluctuated between 29.0 dBA and 45.2 dBA, with an average of 34.2 dBA. The maximum noise level of 45.2 dBA was recorded at 11:31, while the minimum level of 29.0 dBA was observed at 09:41 on the same day. At location NO2, a total of four hours of measurements were conducted on 14 April to complete the 48-hour monitoring period. During this time, the noise level showed minimal variation.

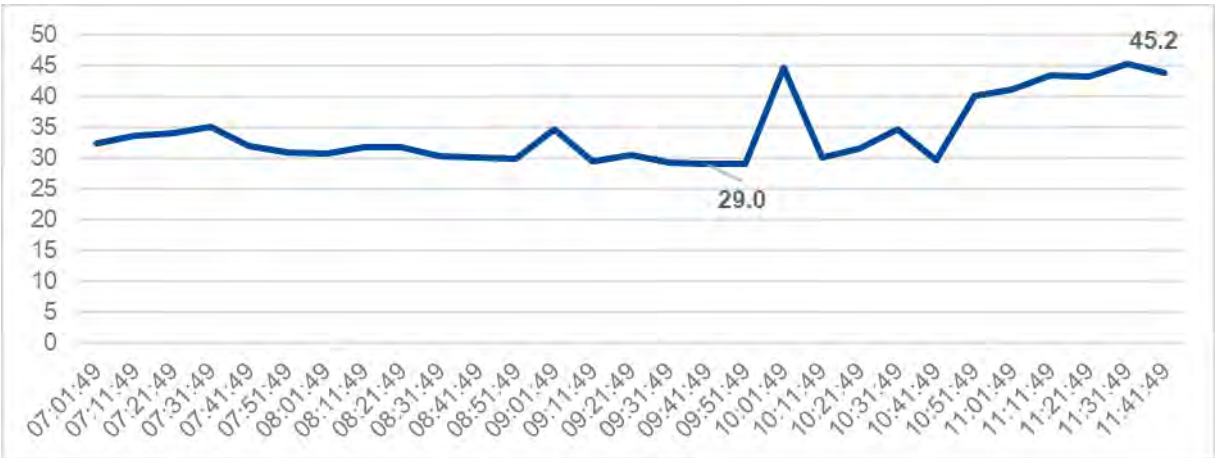


FIGURE 6-74: DAYTIME NOISE LEVELS AT LOCATION NO3, 14 APRIL

Nighttime noise level

The nighttime noise measurement covered the period from 22:01 on that day to 06:51 the following morning. The noise level ranged from a minimum of 30.0 dBA to a maximum of 45.6 dBA, with an average value of 35.5 dBA. The maximum noise level of 45.6 dBA was recorded at 04:21 on 13 April, while the minimum level of 30.0 dBA occurred at 22:11 on 12 April.

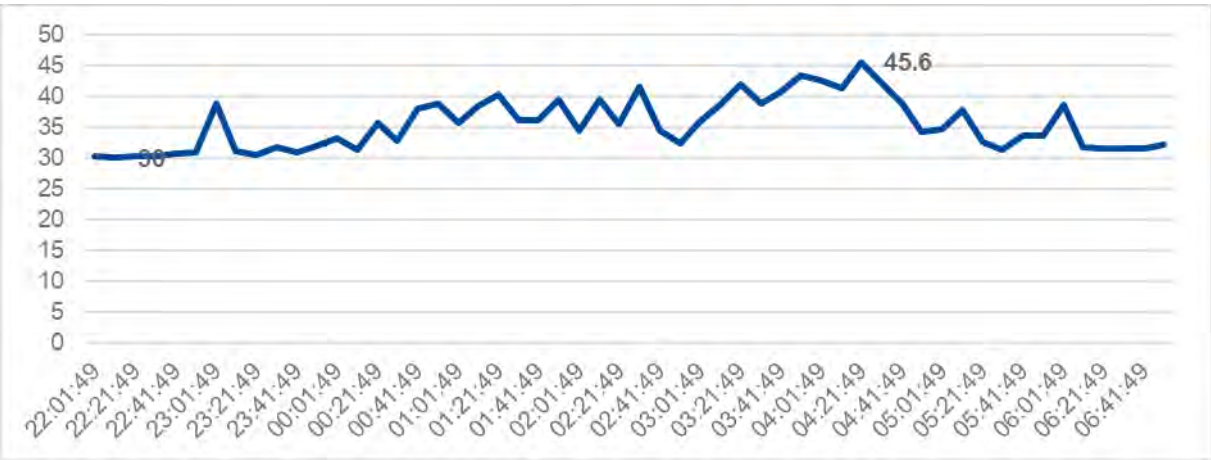


FIGURE 6-75: NIGHTTIME NOISE LEVELS AT LOCATION NO3, 12 APRIL

The noise level ranged from a minimum of 30.7 dBA to a maximum of 46.3 dBA, with an average value of 35.2 dBA. The maximum noise level of 46.3 dBA was recorded at 00:41 on 14 April, while the minimum level of 30.7 dBA was observed at 15:11 on the same day.

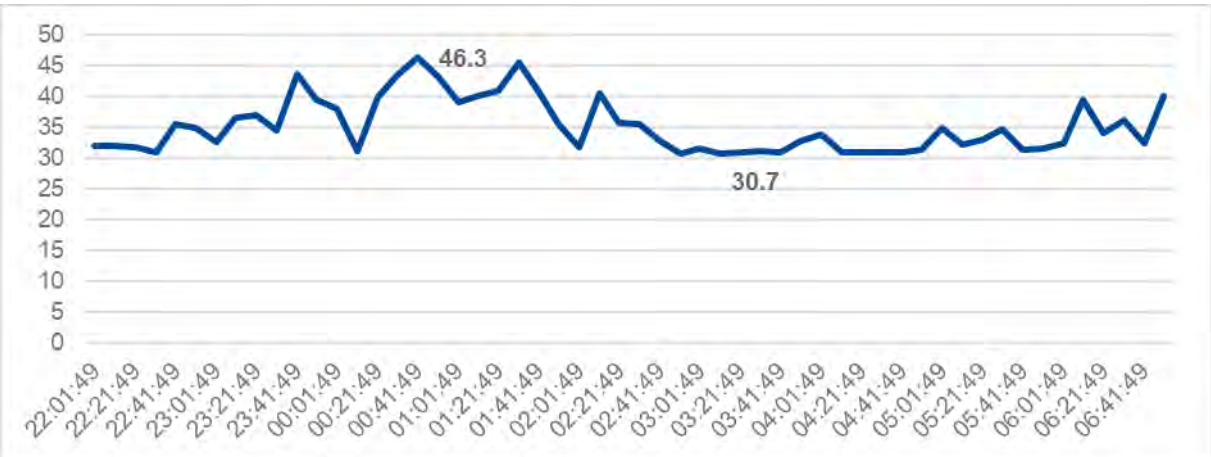


FIGURE 6-76: NIGHTTIME NOISE LEVELS AT LOCATION NO3, 13 APRIL

Summary of Findings at NO3

The average levels of daytime and nighttime noise did not exceed national or IFC regulations. However, occasional increases in wind speed during both day and night resulted in sudden spikes in noise levels.

NO1

At location NO1, measurements were conducted over a 48-hour period, from 12:22 PM on 14 April to 12:12 PM on 16 April. During this time, daytime measurements were taken on three occasions, while nighttime measurements were recorded twice.

TABLE 6-32: NOISE SURVEY RESULTS AT LOCATION NO1

Location	**NO1 (To the southwest of the WTG construction site, along the access road, [redacted]**
Coordinate	43.36888⁰N, 106.17893⁰E

Location	**NO1 (To the southwest of the WTG construction site, along the access road, [redacted]**					
Date and Time	Day time			Nighttime		
	Min dBA	Max dBA	Average dBA	Min dBA	Max dBA	Average dBA
14/4/2025 12:12 PM started	39.20	61.70	47.22	28.60	45.80	32.97
15/4/2025 Continued	29.10	49.60	39.83	28.90	49.40	32.82
16/4/2025 12:12 PM ended	29.00	52.00	36.85	-	-	-

TABLE 6-33: WEATHER CONDITIONS DURING NOISE MEASUREMENT AT LOCATION NO1

Date	**Timestamp**	**Weather conditions**				
		Wind speed (m/s)	**Wind directions**	**Pressure (hPa)**	**air t (ºC)**	**RH (%)**
14/4/2025	12:00 PM	4.73	Southeast	851.4	10.3	22.9
	4:00 PM	4.00	Southeast	849.9	13.2	16.4
	7:00 PM	4.53	East	849.6	11.5	16.1
15/4/2025	10:30 AM	4.43	West	844.5	15.3	13.4
	13:00 PM	5.33	Northwest	844.8	16.4	11.9
	4:00 PM	3.13	Northwest	845.0	16.0	13.5
	7:00 PM	3.48	Northwest	846.7	13.9	15.9
16/4/2025	10:30 AM	2.82	West	847.3	10.9	13.8
	12:00 PM	1.48	Southwest	846.8	12.7	12.3

Daytime noise level

Noise levels on 14 April fluctuated between 39.2 dBA and 61.7 dBA. The average noise level was 47.2 dBA. The maximum noise level of 61.7 dBA was recorded at 13:22, while the minimum level of 39.2 dBA occurred at 19:22 on the same day.

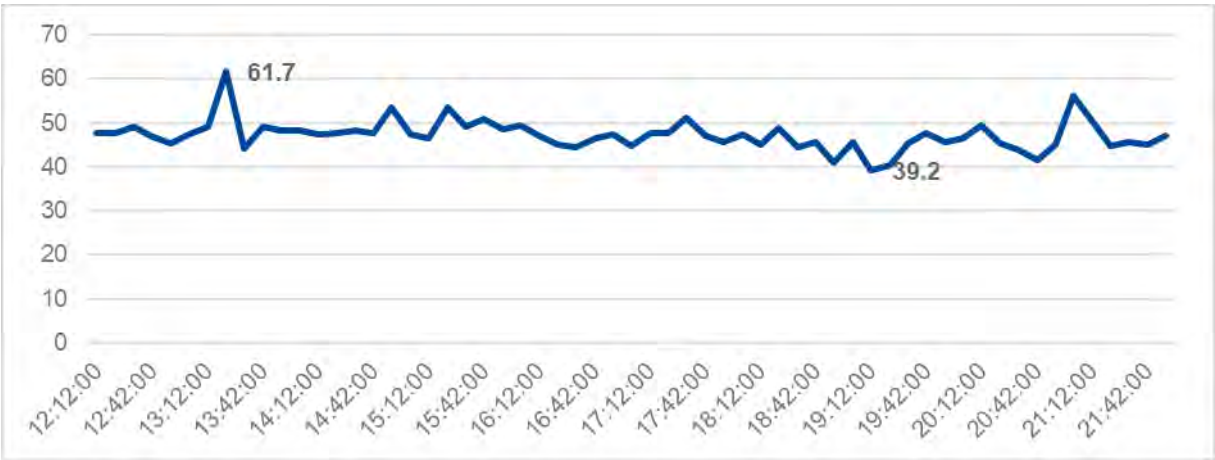


FIGURE 6-77: DAYTIME NOISE LEVELS AT LOCATION NO1, 14 APRIL

Noise levels on 15 April fluctuated between 29.1 dBA and 49.6 dBA. The average noise level was 39.8 dBA. The maximum noise level of 49.6 dBA was recorded at 10:52, while the minimum level of 29.1 dBA occurred at 07:02 on the same day. Noise levels remained at their lowest between 07:02 and 09:32, before increasing from 09:42, fluctuating between 32.0 and 49.6 dBA until 21:52.

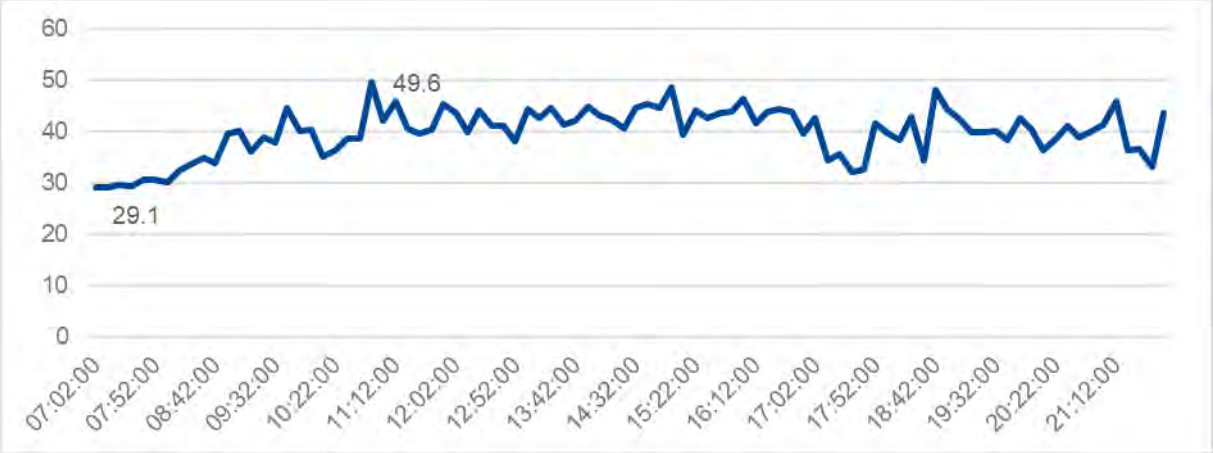


FIGURE 6-78: DAYTIME NOISE LEVELS AT LOCATION NO1, 15 APRIL

Noise levels on 16 April fluctuated between 29.0 dBA and 52.0 dBA. The average noise level was 36.9 dBA. The maximum noise level of 52.0 dBA was recorded at 09:52, while the minimum level of 29.0 dBA occurred at 07:02 on the same day. At 09:32, the noise level was

34.2 dBA, increasing by 17.5 dBA to reach 51.7 dBA at 09:42. Despite this, overall noise fluctuations during the measurement period were minimal.



FIGURE 6-79: DAYTIME NOISE LEVELS AT LOCATION NO1, 16 APRIL

Nighttime noise level

Noise levels on 14 April fluctuated between 28.6 dBA and 45.8 dBA. The average noise level was 33.0 dBA. The maximum noise level of 45.8 dBA was recorded at 23:42 on 14 April, while the minimum level of 28.6 dBA occurred at 04:22 on 15 April. Nighttime noise measurement began at 22:02, and no significant increase in noise levels was observed between 01:12 and 06:52.

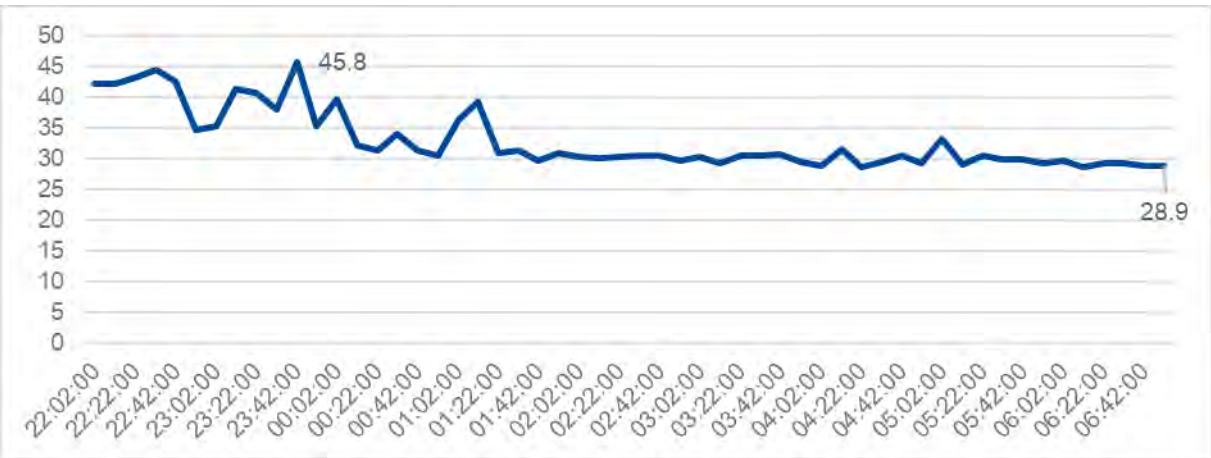


FIGURE 6-80: NIGHTTIME NOISE LEVELS AT LOCATION NO1, 14 APRIL

Noise levels on 15 April fluctuated between 28.9 dBA and 49.4 dBA. The average noise level was 32.8 dBA. The maximum noise level of 49.4 dBA was recorded at 23:32 on 15 April, while the minimum level of 28.9 dBA occurred at 06:52 on 16 April. Noise levels did not increase sharply between 02:12 and 06:52.

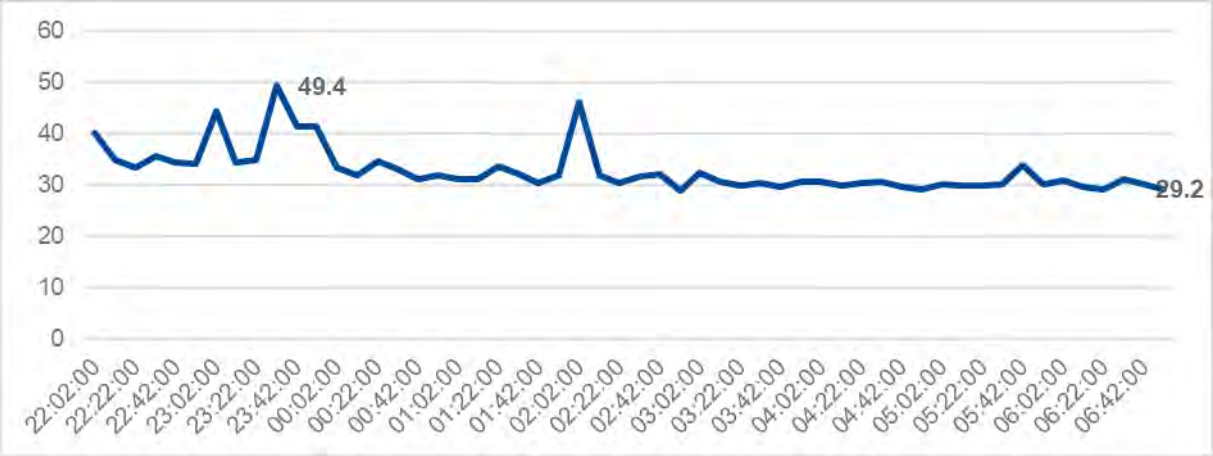


FIGURE 6-81: NIGHTTIME NOISE LEVELS AT LOCATION NO1, 15 APRIL

Summary of Findings at NO1

Overall, the average levels of both daytime and nighttime noise did not exceed national or IFC regulatory limits. Noise levels fluctuated significantly during the daytime, whereas they remained relatively stable at night.

NO4

Noise measurements were conducted over a 48-hour period, from the afternoon of 16 April to the afternoon of 18 April. During this time, daytime measurements were taken on three occasions, while nighttime measurements were recorded twice.

TABLE 6-34: NOISE SURVEY RESULTS AT LOCATION NO4

Location	**NO4 (Southeast of [redacted] along the transmission line route)**					
Coordinate	43.396990⁰N, 106.450820⁰E					
Date and Time	Day time			Nighttime		
	Min dBA	Max dBA	Average dBA	Min dBA	Max dBA	Average dBA
16/4/2025 13:27 PM started	32.40	51.70	39.55	29.10	45.00	32.20
17/4/2025 Continued	30.50	47.40	37.71	31.30	53.20	39.34
18/4/2025 13:27 PM ended	36.40	47.00	40.61	-	-	-

TABLE 6-35: WEATHER CONDITIONS DURING NOISE MEASUREMENT AT LOCATION NO4

Date	**Timestamp**	**Weather conditions**				
		Wind speed (m/s)	**Wind directions**	**Pressure (hPa)**	**AIR T (⁰C)**	**AIR RH (%)**
16/4/2025	1:30 PM	4.17	West	888.3	3.9	9.7

Date	Timestamp	Weather conditions				
		Wind speed (m/s)	Wind directions	Pressure (hPa)	AIR T (°C)	AIR RH (%)
	4:00 PM	4.72	Northwest	885.7	6.4	9.1
	7:00 PM	5.05	Northwest	886.4	4.1	12.0
17/4/2025	10:30 AM	4.88	North	891.0	-1.8	38.4
	1:00 PM	5.88	North	890.1	3.9	15.6
	4:00 PM	5.06	North	889.5	6.6	15.5
	7:00 PM	4.99	Northwest	889.8	5.6	19.7
18/4/2025	10:30 AM	4.68	North	891.1	4.4	15.4
	1:00 PM	4.32	North	890.5	8.6	12.4

Daytime noise level

Noise levels on 16 April fluctuated between 32.4 dBA and 51.7 dBA. The average noise level was 39.6 dBA. The average noise level did not exceed national or IFC regulatory limits.

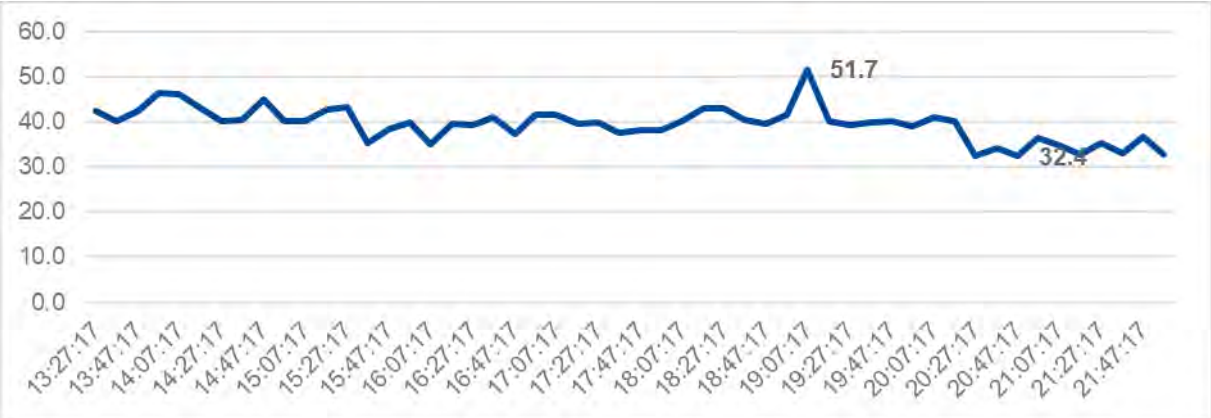


FIGURE 6-82: DAYTIME NOISE LEVELS AT LOCATION NO4, 16 APRIL

Noise levels on 17 April fluctuated between 30.5 dBA and 47.4 dBA. The average noise level was 37.7 dBA. The average noise level did not exceed national or IFC regulatory limits.

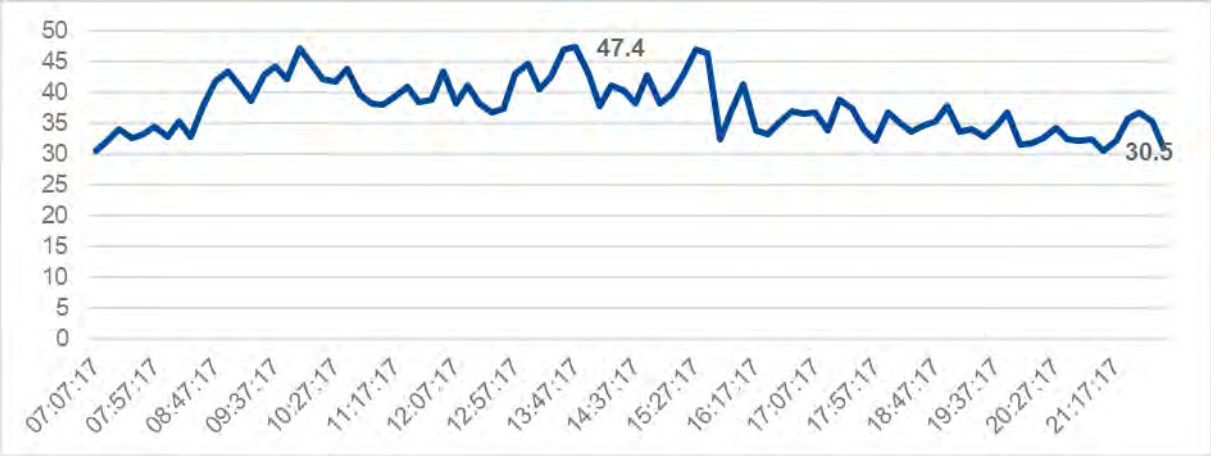


FIGURE 6-83: DAYTIME NOISE LEVELS AT LOCATION NO4, 17 APRIL

Noise levels on 18 April fluctuated between 36.4 dBA and 47.0 dBA during the period from 07:07 to 13:27. The average noise level was 40.6 dBA. The average noise level did not exceed national or IFC regulatory limits.

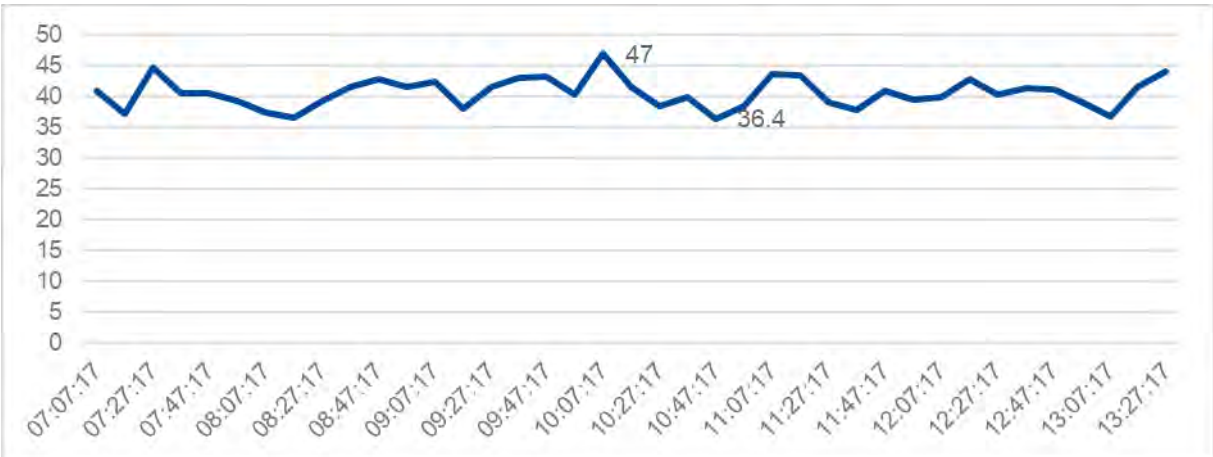


FIGURE 6-84: DAYTIME NOISE LEVELS AT LOCATION NO4, 18 APRIL

Nighttime noise level

The nighttime noise measurement covered the period from 22:07 on 16 April to 06:57 on 17 April. During this time, noise levels ranged from a minimum of 29.1 dBA to a maximum of 45.0 dBA, with an average value of 32.2 dBA. The average noise level did not exceed national or IFC regulatory limits.



FIGURE 6-85: NIGHTTIME NOISE LEVELS AT LOCATION NO4, 16 APRIL

The nighttime noise measurement covered the period from 22:07 on 17 April to 06:57 on 18 April. During this time, noise levels ranged from a minimum of 31.3 dBA to a maximum of 53.2 dBA, with an average value of 39.3 dBA. The average noise level did not exceed national or IFC regulatory limits.



FIGURE 6-86: NIGHTTIME NOISE LEVELS AT LOCATION NO4, 17 APRIL

Summary of Findings at NO4

Overall, the average levels of daytime and nighttime noise have not exceeded the national and IFC regulations. During the daytime, noise levels fluctuate significantly, whereas at night they remain relatively stable.

NO5

Noise measurements were conducted over a 48-hour period, from the afternoon of 18 April to the afternoon of 20 April. During this time, daytime measurements were taken on three occasions, while nighttime measurements were recorded twice.

TABLE 6-36: NOISE MONITORING RESULTS AT LOCATION NO5

Location	NO5 (Gaviluud bagh centre)
Coordinate	43.279650^{0}N, 106.639800^{0}E

Location	NO5 (Gaviluud bagh centre)					
Date and Time	Day time			Nighttime		
	Min dBA	Max dBA	Average dBA	Min dBA	Max dBA	Average dBA
18/4/2025 14:15 PM started	32.60	53.60	40.83	29.50	43.90	33.51
19/4/2025 Continued	35.30	58.80	42.19	29.10	44.70	33.09
20/4/2025 14:15 PM ended	34.90	52.10	42.38	-	-	-

TABLE 6-37: WEATHER CONDITIONS DURING NOISE MEASUREMENT AT LOCATION NO5

Date	Timestamp	Weather conditions				
		Wind speed (m/s)	Wind directions	Pressure (hPa)	AIR T (ºC)	AIR RH (%)
18/4/2025	14:30: PM	3.65	Northwest	844.9	15.7	9.9
	4:00 PM	3.48	West	843.8	16.3	9.6
	7:00 PM	2.82	West	843.3	14.5	9.6
19/4/2025	10:30 AM	1.62	West	855.2	2.3	33.1
	1:00 PM	2.70	West	854.2	5.9	18.1
	4:00 PM	2.47	West	853.6	7.3	16.4
	7:00 PM	2.12	West	850.4	9.4	10.7
20/4/2025	10:30 AM	3.45	Northwest	846.3	5.3	33.5
	1:00 PM	3.13	West	845.9	7.9	26.0

Daytime noise level

Daytime noise levels were measured between 14:15 and 21:55 on 18 April. During this period, noise levels ranged from a minimum of 32.6 dBA to a maximum of 53.6 dBA, with an average value of 40.8 dBA.

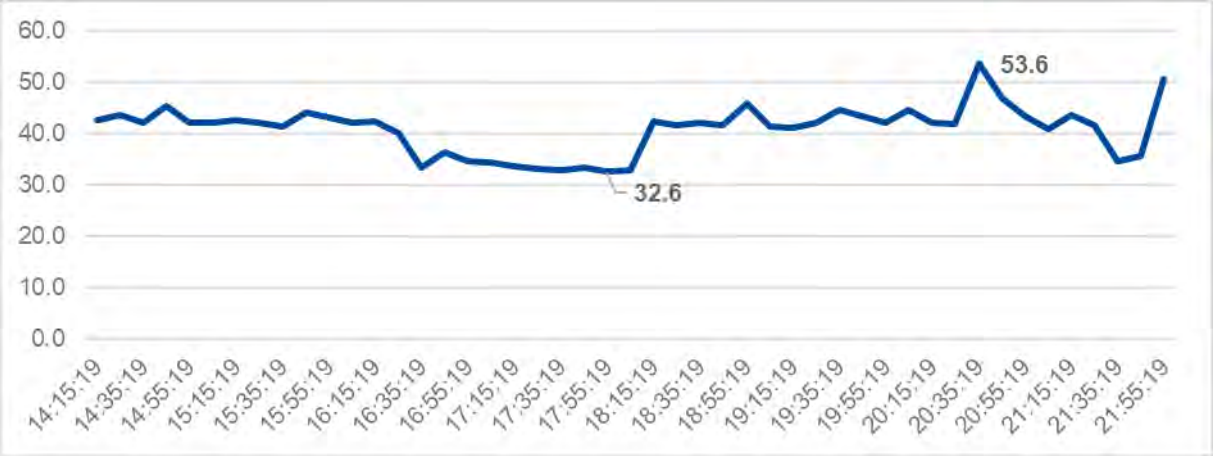


FIGURE 6-87: DAYTIME NOISE LEVELS AT LOCATION NO5, APRIL 18

Daytime noise levels were measured between 07:05 and 21:55 on 19 April. During this period, noise levels ranged from a minimum of 35.3 dBA to a maximum of 58.8 dBA, with an average value of 40.8 dBA.

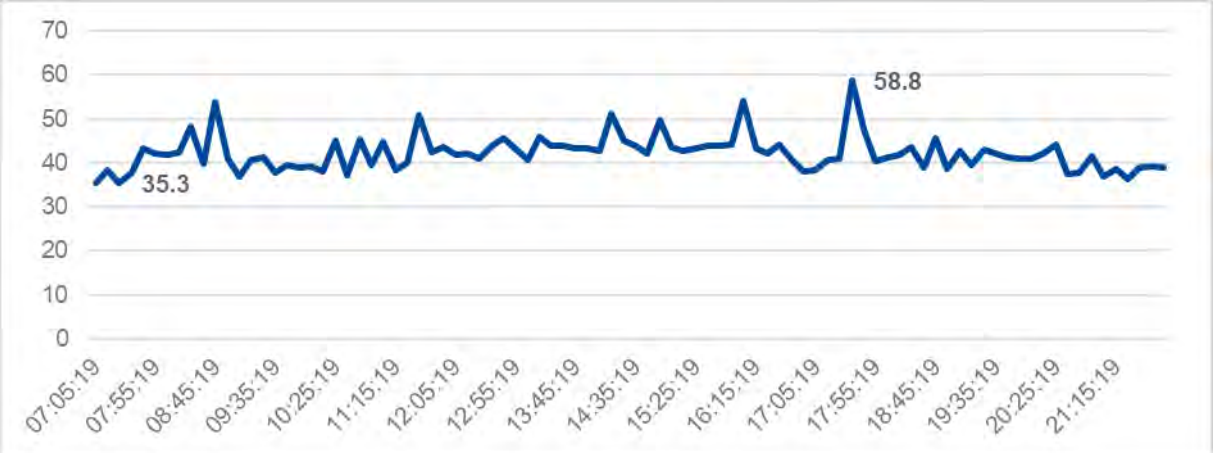


FIGURE 6-88: DAYTIME NOISE LEVELS AT LOCATION NO5, 19 APRIL

Daytime noise levels were measured between 07:05 and 14:15 on 20 April. During this period, noise levels ranged from a minimum of 34.9 dBA to a maximum of 52.1 dBA, with an average value of 42.4 dBA.



FIGURE 6-89: DAYTIME NOISE LEVELS AT LOCATION NO5, 20 APRIL

Nighttime noise level

The nighttime noise measurement covered the period from 22:05 on 18 April to 06:55 on 19 April. During this time, noise levels ranged from a minimum of 29.5 dBA to a maximum of 43.9 dBA, with an average value of 33.5 dBA.

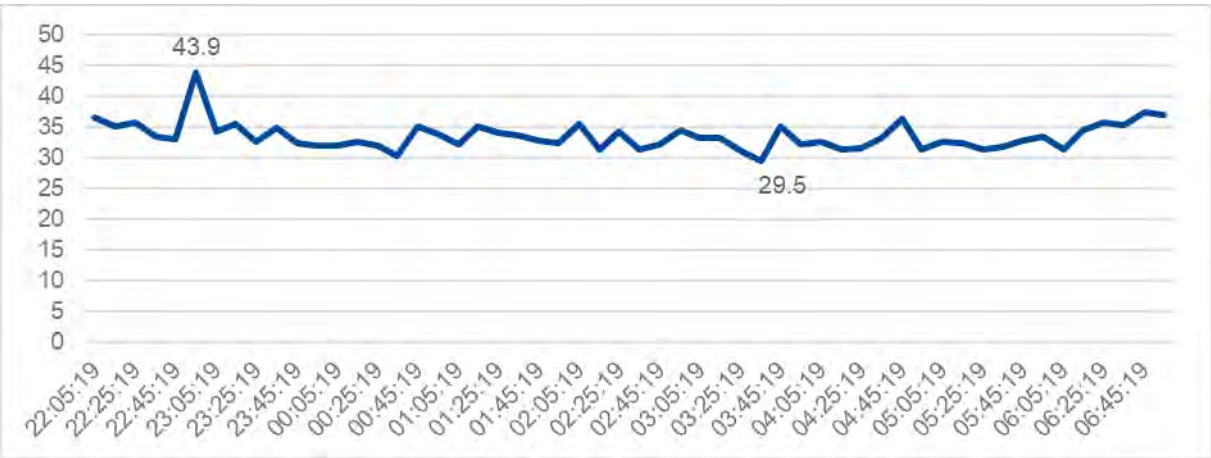


FIGURE 6-90: NIGHTTIME NOISE LEVELS AT LOCATION NO5, 18 APRIL

The nighttime noise measurement covered the period from 22:05 on 19 April to 06:55 on 20 April. During this time, noise levels ranged from a minimum of 29.1 dBA to a maximum of 44.7 dBA, with an average value of 33.1 dBA.

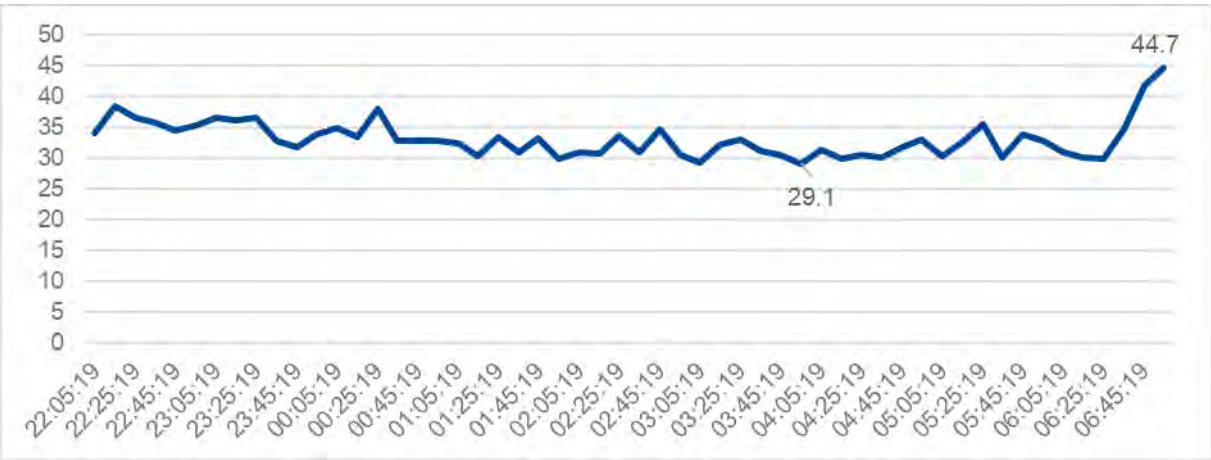


FIGURE 6-91: NIGHTTIME NOISE LEVELS AT LOCATION NO5, 19 APRIL

Summary of Findings at NO5

Overall, the average levels of both daytime and nighttime noise did not exceed national or IFC regulatory limits. Noise levels fluctuated significantly during the daytime, whereas they remained relatively stable at night.

NO6

Noise measurements were conducted over a 48-hour period, from the afternoon of 20 April to the afternoon of 22 April. During this time, daytime measurements were taken on three occasions, while nighttime measurements were recorded twice.

TABLE 6-38: NOISE SURVEY RESULTS AT LOCATION NO6

Location	**NO5 (Outside the fence on the west side of the Oyu Tolgoi mine)**					
Coordinate	43.03072⁰N, 106.7915⁰E					
Date and Time	Day time			Nighttime		
	Min dBA	Max dBA	Average dBA	Min dBA	Max dBA	Average dBA
20/4/2025 16:45 PM started	37.10	50.50	42.48	29.10	36.60	31.54
21/4/2025 Continued	31.90	56.90	38.81	31.50	44.10	36.70
22/4/2025 16:45 PM ended	35.40	54.20	42.27	-	-	-

TABLE 6-39: WEATHER CONDITIONS DURING NOISE MEASUREMENT AT LOCATION NO6

Date	**Timestamp**	**Weather conditions**				
		Wind speed (m/s)	**Wind directions**	**Pressure (hPa)**	**AIR T (⁰C)**	**AIR RH (%)**
20/4/2025	5:00 PM	3.80	West	887.3	14.0	12.3

Date	Timestamp	Weather conditions				
		Wind speed (m/s)	Wind directions	Pressure (hPa)	AIR T (ºC)	AIR RH (%)
	7:00 PM	3.80	West	887.1	12.4	16.9
21/4/2025	10:30 AM	5.34	West	884.9	8.7	7.3
	1:00 PM	5.96	West	883.1	15.2	9.1
	4:00 PM	4.57	West	880.8	17.6	8.2
	7:00 PM	3.03	West	880.6	16.2	8.3
22/4/2025	10:30 AM	3.42	Southwest	880.3	10.4	7.8
	1:00 PM	3.37	Southwest	878.2	17.4	6.4
	4:00 PM	4.97	West	875.8	19.6	6.2

Daytime noise level

Daytime noise levels were measured between 16:45 and 21:55 on 20 April. During this period, noise levels ranged from a minimum of 37.1 dBA to a maximum of 50.5 dBA, with an average value of 42.5 dBA. The average noise level did not exceed national or IFC regulatory limits.

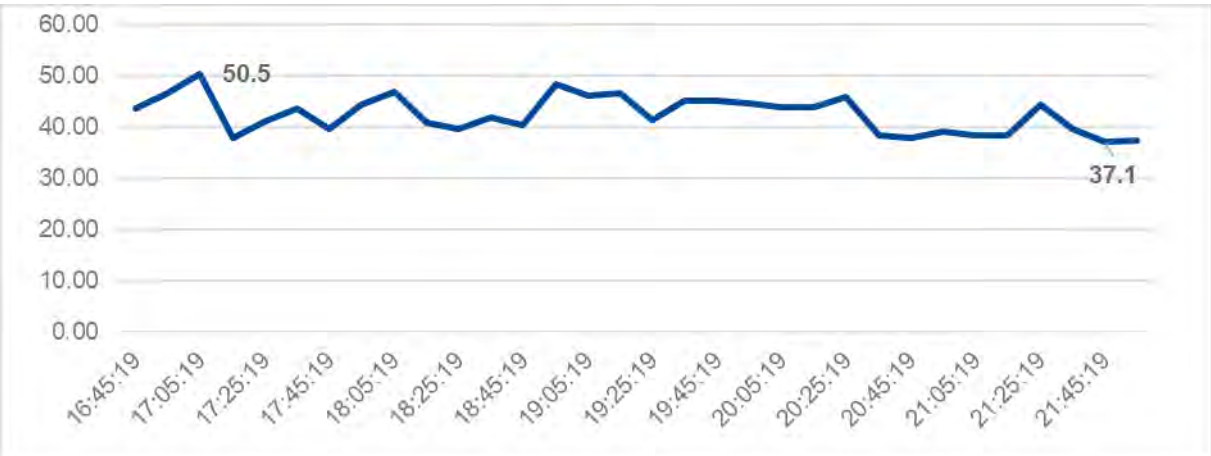


FIGURE 6-92: DAYTIME NOISE LEVELS AT LOCATION NO6, 20 APRIL

Daytime noise levels were measured between 07:05 and 21:55 on 21 April. During this period, noise levels ranged from a minimum of 31.9 dBA to a maximum of 56.9 dBA, with an average value of 38.8 dBA. The average noise level did not exceed national or IFC regulatory limits.

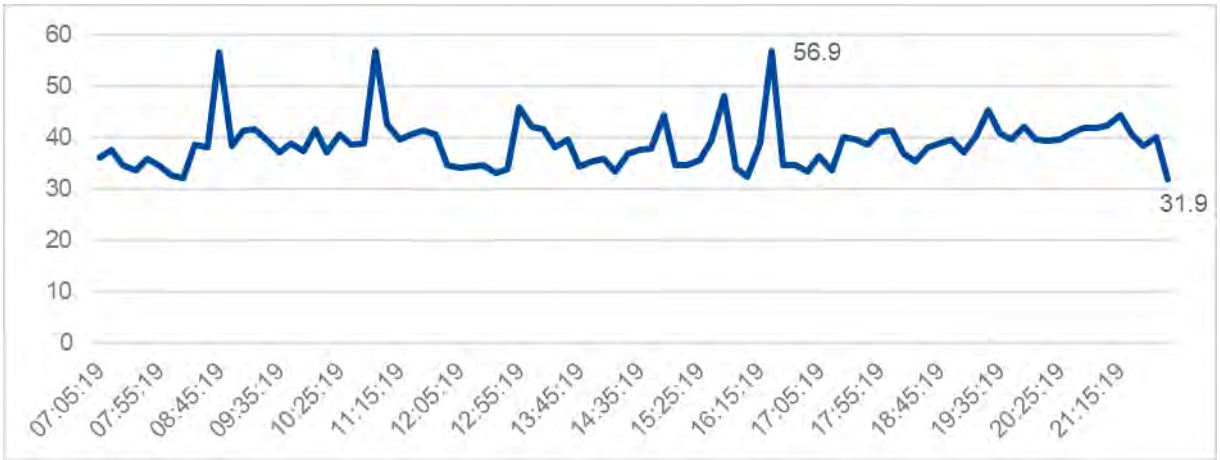


FIGURE 6-93: DAYTIME NOISE LEVELS AT LOCATION NO6, 21 APRIL

Daytime noise levels were measured between 07:05 and 16:45 on 22 April. During this period, noise levels ranged from a minimum of 35.4 dBA to a maximum of 54.2 dBA, with an average value of 42.3 dBA. The average noise level did not exceed national or IFC regulatory limits.



FIGURE 6-94: DAYTIME NOISE LEVELS AT LOCATION NO6, 22 APRIL

Nighttime noise level

The nighttime noise measurement covered the period from 22:05 on 21 April to 06:55 the following morning. During this time, noise levels ranged from a minimum of 29.1 dBA to a maximum of 36.6 dBA, with an average value of 31.5 dBA. The average noise level did not exceed national or IFC regulatory limits.

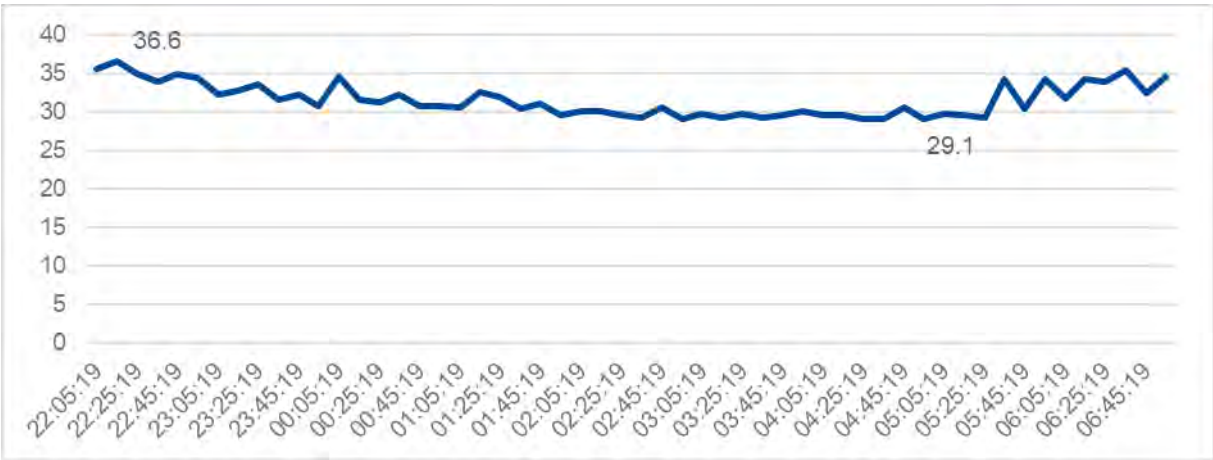


FIGURE 6-95: NIGHTTIME NOISE LEVELS AT LOCATION NO6, 20 APRIL

The nighttime noise measurement covered the period from 22:05 on 21 April to 06:55 on 22 April. During this time, noise levels ranged from a minimum of 31.5 dBA to a maximum of 44.1 dBA, with an average value of 36.7 dBA. The average noise level did not exceed national or IFC regulatory limits.

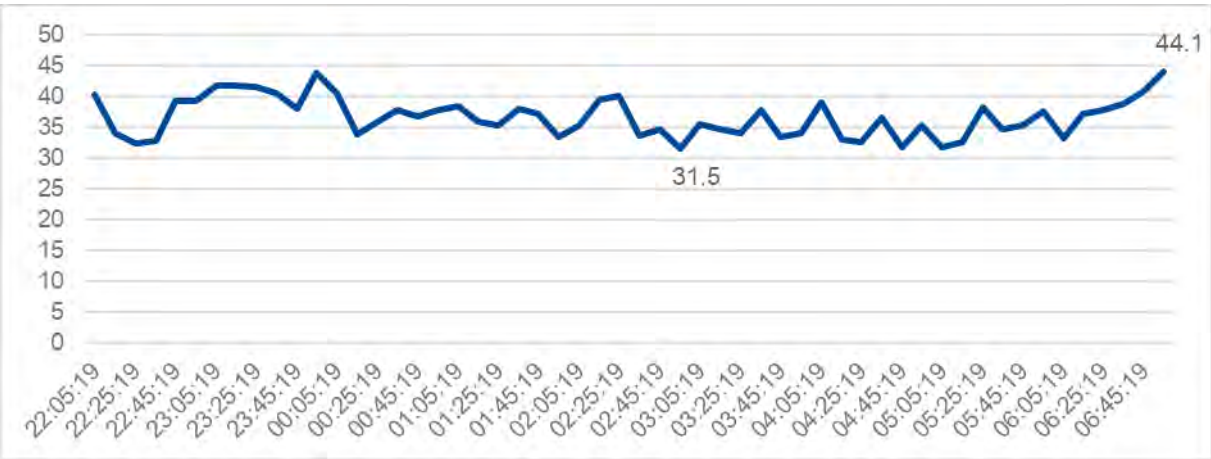


FIGURE 6-96: NIGHTTIME NOISE LEVELS AT LOCATION NO6, 21 APRIL

Summary of Findings

Overall, the average levels of daytime and nighttime noise have not exceeded the national and IFC regulations. During the daytime, noise levels fluctuate significantly, whereas at night they remain relatively stable.

Conclusion

The average daytime noise levels at the field measurement locations NO1–NO6 ranged between 33.2 and 57.3 dBA, while the nighttime levels ranged between 31.5 and 46.7 dBA. The highest average daytime and nighttime noise levels were recorded at location NO2. Specifically, the nighttime noise level on 10 April and the daytime level on 11 April (46.7 dBA and 57.3 dBA, respectively) exceeded the IFC standard limits by 1.7–2.3 dBA. However, the average daytime noise levels at all locations did not exceed the national MNS 4585:2016 standard. Only the nighttime average noise level on 10 April at location NO2 exceeded the national standard by 1.7 dBA.

During the field measurement period, there were no stationery or mobile sources of noise at NO2 or the other locations. At NO2, where the highest average noise level was recorded, the wind predominantly blew from the west at a speed of 3.8–4.7 m/s on 10 April. On 11 April, the wind speed increased to 6.9–9.3 m/s, again predominantly from the west. These occasional strong winds were considered the main factor contributing to elevated and fluctuating noise levels at the study site.

6.1.10.4 DERIVATION OF BACKGROUND NOISE CRITERIA FOR APPLICATION TO OPERATIONAL WTG NOISE ASSESSMENT

Further analysis of background noise survey results are conducted so as to derive background noise criteria that are needed for the modelling assessment of WTG operational potential noise impacts. The analysis was conducted on survey datasets collected at NO2, NO3 and NO4, which are at Noise Sensitive Receivers located at the WTG Area.

Wind speed data from an on-site NZE Light Detection and Ranging (LiDAR) station was obtained for the noise monitoring period between 10 to 22 April 2025. 10-minute wind speeds that are concurrent with the collected noise data were downloaded. A vertical wind shear factor was then applied to correct the wind speed data from the lowest LiDAR measurement point of 40m to noise monitor height at ground level. Any noise monitoring data points affected by a wind speed above 5 m/s and rainfall were discarded as they may contain erroneous noise measurements that do not represent the ambient noise environment. Average day and night average ambient noise levels were then computed from the residual noise data. These average ambient noise levels are used to represent the existing noise levels at the NSRs. The day and night average ambient noise levels at the three Noise Measurement Locations that are relevant to the NSRs are presented in ***Table 6-40.***

TABLE 6-40: AVERAGE AMBIENT NOISE LEVELS

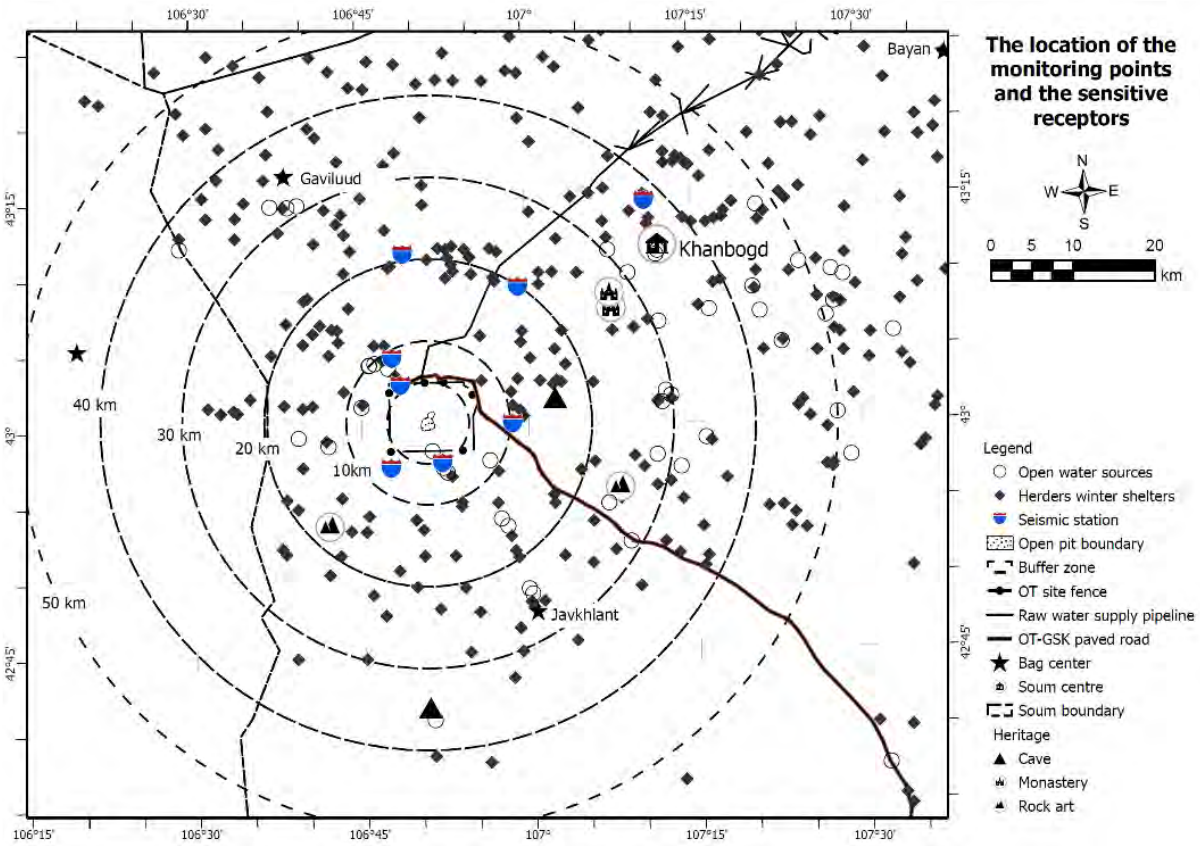
Noise Measurement Location	Average Ambient Noise Level, dB(A) *	
	Day	Night
N02	36	37
N03	38	34
N04	40	42

Note:

*Data affected by wind speeds >5m/s and rainfall is discarded

6.1.10.5 VIBRATION MEASURESMENTS NEAR OYU TOLGOI MINE (2022)

In second quarter of 2022 a ground vibration survey was completed by the Institute of Astronomy and Geophysics, Mongolian Academy of Science. The study area is located in the territory of Khanbogd soum, between N 42.9° to 43.3°, E 106.7° to 107.3°, and it covered approximately 2,170km^2 area. Field measurements were done at eight (8) locations over seven (7) days that captured four blast events at the Oyu Tolgoi's open pit, four blasts at the underground mine complex, and one blast at the Dugat gravel quarry. Peak particle velocity associated with the blasts were 0.001 - 0.185 mm/sec which was lower than the permissible level of 5 mm/sec[24].



Source: Blast-induced ground vibration impact assessment on the sensitive receptors, Bataa Dandarmaa, et al. (December 2023)

FIGURE 6-97: LOCATION OF VIBRATION MONITORING POINTS NATURAL HAZARDS

6.1.11 LANDSCAPE AND VISUAL CHARACTERISTICS

The distinctive landscape of the Mongolian Gobi Desert is largely shaped by its elevation above sea level, the surrounding mountain ranges, and its significant distance from any ocean. These geographic and climatic factors contribute to the region's extreme continental arid climate, characterized by limited summer precipitation and frequent storms.

The Gobi zone extends south of the steppe zone, stretching from the western Great Lakes Depression and the Valley of the Lakes to the eastern national border in a broad strip. This region comprises semi-desert landscapes. These landscape subtypes together form the broader Gobi environment, which retains features of both steppe and desert ecosystems. As

[24] Technical Basis for Guidelines to Minimize Annoyance Due to Blast Overpressure and Ground Vibration issued by the Australian and New Zealand Environment Council (ANZEC) in 1990.

such, the term “Gobi” generally refers to a dry region with dual connotations; however, in a modern geographical context, it is best understood as a distinct transitional landscape, an independent natural zone situated north of the true desert belt.

The project area encompasses several notable mountains, including Tsetsii Mountain (1,790 m), Uguumur Mountain, the highest peak of the Great Shankh Range (1,789 m), Khanbogd Mountain (1,350 m), Bumbat Zadgain Khar (1,233.3 m), Javkhlant Mountain (1,295 m), and Dalai Duulga (1,240 m). These mountains are characterized by domed peaks often topped with stone spires. The relative elevation of the mountain ranges typically varies between 200 and 500 meters above the surrounding terrain.

6.1.11.1 LANDSCAPE AND VISUAL SURVEY 2025

The field survey encompasses the NZE Wind Farm project area and the OHL route corridor.

The NZE Wind Farm construction site is situated in the Bilgeh Bagh area, in the southeastern part of Tsogttsetsii Soum. It is located approximately 70 kilometres southeast of the Tsogttsetsii Soum centre.

The OHL route extends approximately 61 kilometres and traverses the administrative territories of four baghs across three soums. Specifically, the route passes through Bilgeh Bagh of Tsogttsetsii Soum, Jargalant Bagh of Manlai Soum, and Gaviluud and Javkhlant Baghs of Khanbogd Soum.

Landscape of Wind Farm Site

NZE Wind Farm site is characterized by high plateau with hill ranges terrain with elevations ranging from 1,500 to 1,550 meters above sea level, interspersed with valleys situated at approximately 1,380 to 1,520 meters elevation. The highest point within the site is Mount Zogdor, located near the centre, with an elevation of 1,581.3 meters above sea level.

Additionally, Il Luus Uul (1,592.9 m) and Baga Luus Uul (1,492 m), located southwest of the wind farm area, represent the highest elevations in the surrounding area. Local communities maintain a longstanding tradition of revering the land; for example, Ikh Luus Uul was historically worshipped by the residents of Mogoit Bagh in Bayan-Ovoo Soum.



FIGURE 6-98: GENERAL LANDSCAPE VIEW OF THE NZE WIND FARM PROJECT AREA

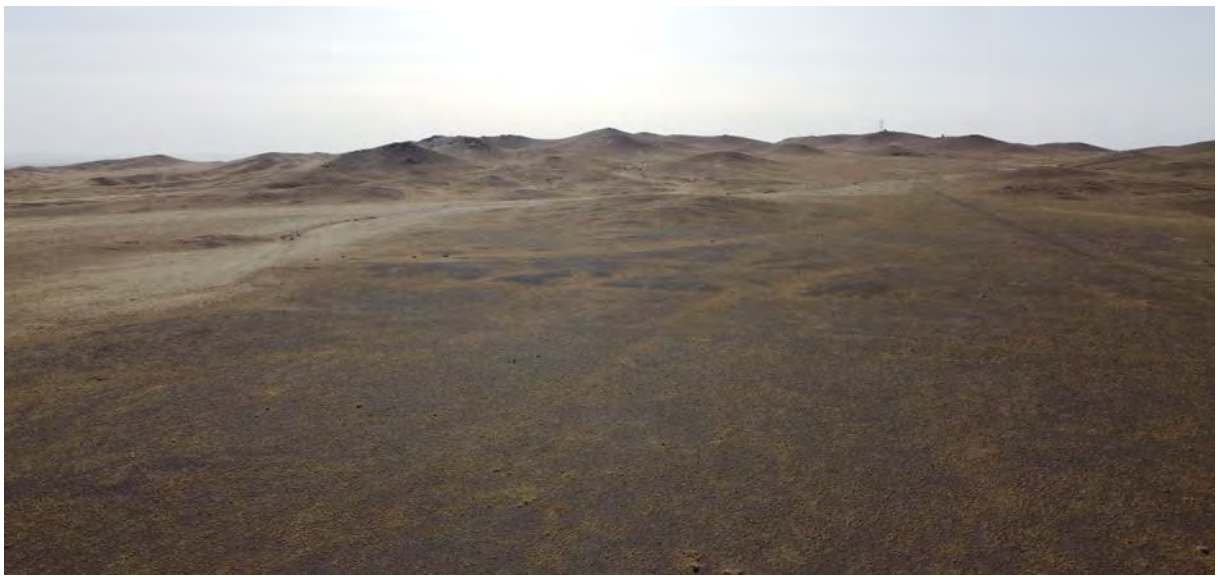


FIGURE 6-99: VIEW OF ZOGDOR MOUNTAIN FROM THE SOUTHEAST

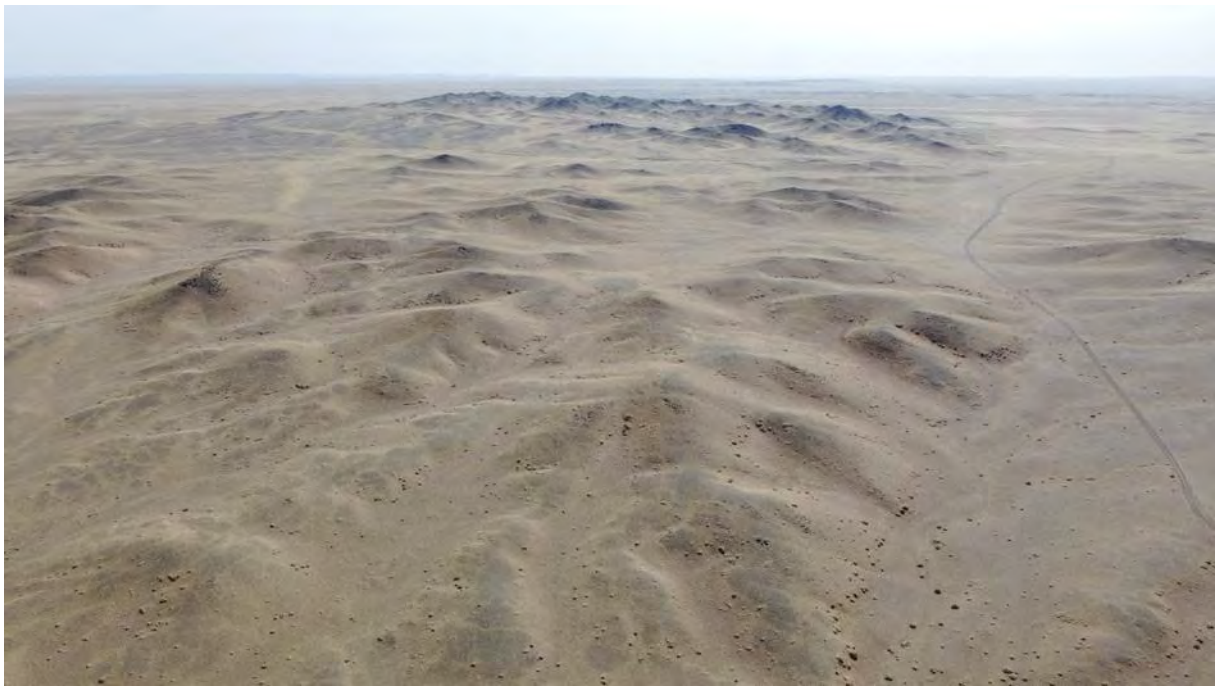


FIGURE 6-100: VIEW OF NZE WIND FARM SITE FROM THE NORTH



FIGURE 6-101: VIEW OF WIND FARM AREA FROM THE WEST



FIGURE 6-102: VIEW OF WIND FARM AREA FROM THE SOUTHEAST



FIGURE 6-103: IKH LUUS MOUNTAIN



FIGURE 6-104: BAGA LUUS MOUNTAIN

Landscape of OHL Route Corridor

The OHL route will begin southeast of the wind farm site and extend to the Oyu Tolgoi Mine Substation. The terrain along the route generally slopes downward from northwest to southeast, with elevations ranging from approximately 1,440 to 1,200 meters above sea level. The OHL will traverse a landscape of valleys and rocky outcrops, passing through low hills with elevations between 1,220 and 1,440 meters. From its starting point, the route will follow a southeast direction along the Nuhen Buutsiin Ridge (1,442.1 m) and the northern valley of the Suuj Ridge (1,427.4 m). It will then continue southward along the eastern slope of Gurvan Gaviluud Mountain, and further southeast along the southwestern side of Munkh Ovoo Mountain, crossing flat valleys and rocky hills before reaching the Oyu Tolgoi Mine.

The residents of Gaviluud bagh in Khanbogd Soum hold an annual ritual to purify the earth and water through the worship of Munkh Ovoo. This sacred site is located approximately 3.5 kilometres east of the planned overhead transmission line (OHL) route.

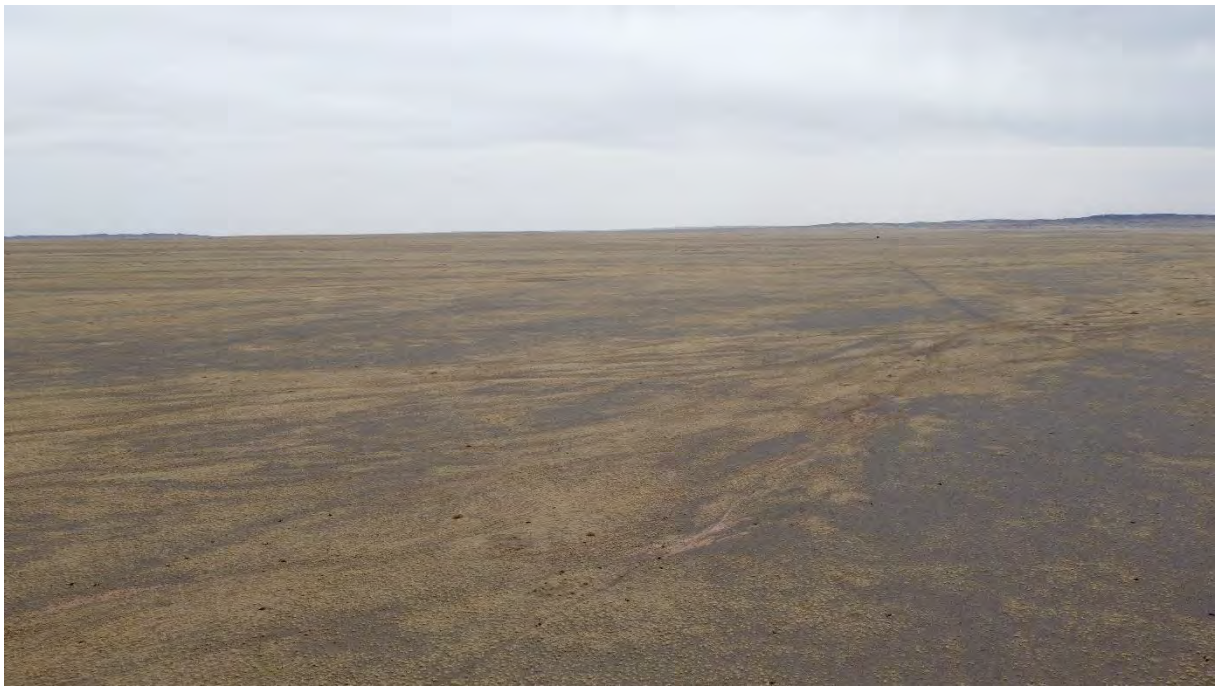


FIGURE 6-105: VIEW FROM THE SOUTHEAST OF THE STARTING POINT OF THE OHL ROUTE CORRIDOR



FIGURE 6-106: NUHEN BUUTS RIDGE



FIGURE 6-107: VIEW FROM THE NORTHERN VALLEY OF THE NUHEN BUUTSIIN RIDGE, LOOKING SOUTHEAST ALONG THE OHL ROUTE



FIGURE 6-108: VIEW OF THE GURVAN GAVILUUD MOUNTAIN FROM THE SOUTH



FIGURE 6-109: VIEW OF THE OHL ROUTE PASSING THROUGH THE EASTERN VALLEY OF GURVAN GAVILUUD MOUNTAIN



FIGURE 6-110: MUNH OVOO MOUNTAIN

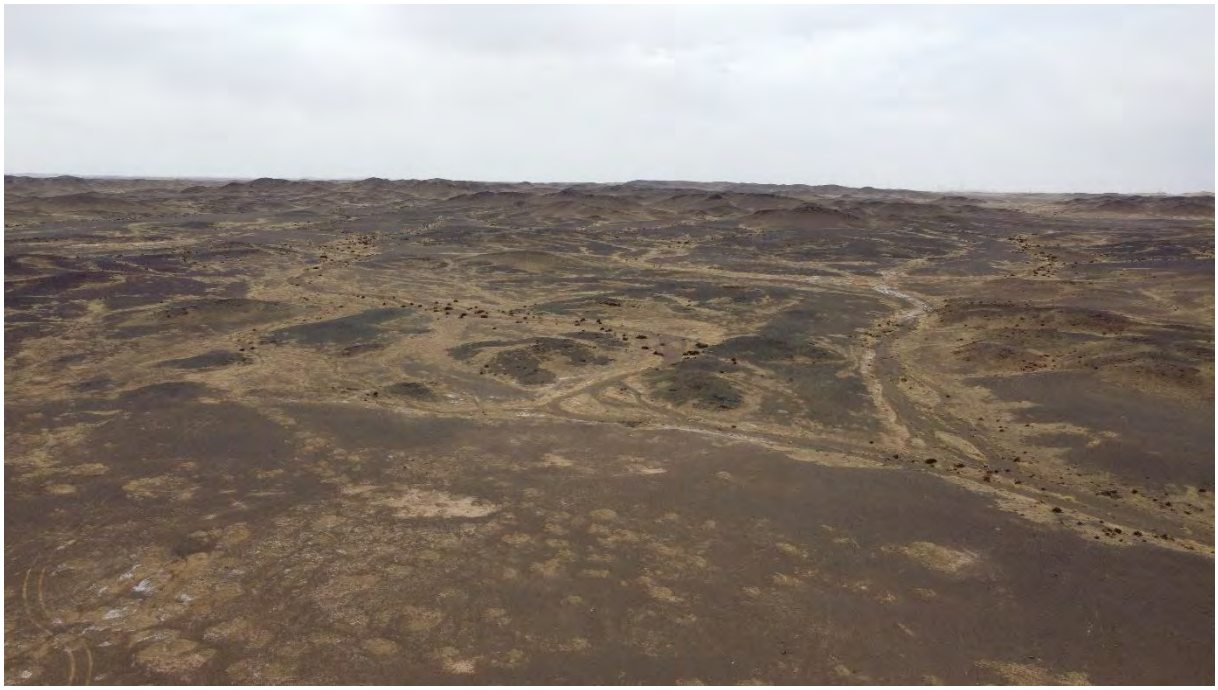


FIGURE 6-111: LANDSCAPE OF THE OHL ROUTE CORRIDOR - A VIEW OF THE WESTERN SIDE OF SHIVEE OVOO MOUNTAIN

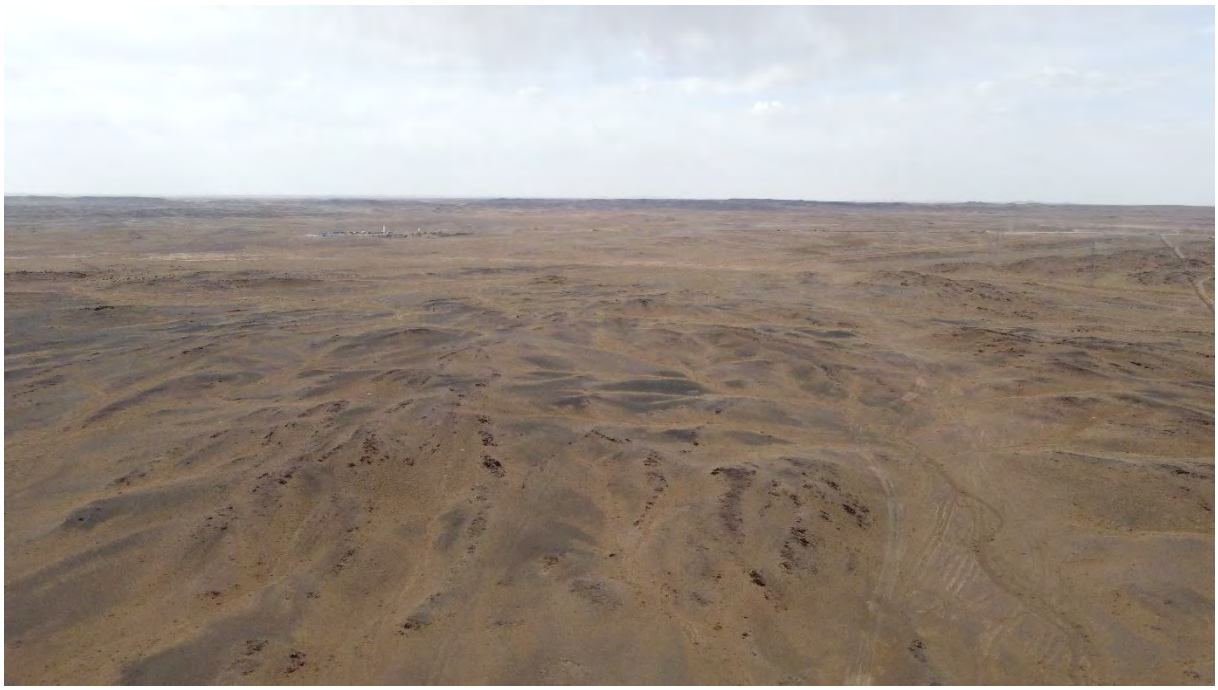


FIGURE 6-112: END OF THE OHL: VIEW FROM SOUTH TO NORTH, WESTERN SIDE OF THE OYU TOLGOI

6.2 BIODIVERSITY

6.2.1 INTRODUCTION

This section provides an overview of the baseline biodiversity conditions within the Project area (including the WTG Area, OHL, and access road) and its surroundings based on primary data collected from baseline surveys and desktop assessment of secondary data. Extensive literature review was undertaken using a range of sources such as publicly available information (including existing studies and reports from nearby projects), research articles, global biodiversity datasets, and the Project's Detailed Environmental Impact Assessment (DEIA) prepared in compliance with Mongolian laws and regulations. A scoping site visit was conducted for the Project in 9 – 13 September 2024, as well as baseline field surveys for terrestrial flora (vegetation) and fauna (including surveys targeting avifauna and mammals of conservation concern) in August, September and November 2024, and January, April and May 2025. Biodiversity-related information was also gathered from stakeholder engagement activities undertaken during site visits. As mentioned in ***Section 6.1.7***, there are no permanent aquatic habitats in the Project area as all water bodies in the region are primarily dry riverbeds or temporary, therefore all biodiversity taxa discussed in the context of this Project are terrestrial, while aquatic habitats and species are not discussed further due to their absence.

A Critical Habitat Assessment (CHA) was conducted in line with IFC PS6 requirements to identify the presence and extent of critical habitats in the Project area, with full details presented in ***Annex B***. Species of conservation concern are also identified for each taxon of flora and fauna, and overall habitat and species sensitivity have been designated to inform the biodiversity impact assessment (***Chapter 7***).

For the purpose of the biodiversity baseline evaluation, the Project's Area of Influence (AoI) has been conservatively defined as a five (5) km radius from each WTG and a two (2) km buffer from the central line of the OHL and Access Road. This AoI also served as the designated Study Area for the field investigations conducted between August 2024 and May 2025.

The following sections establish the baseline conditions for biodiversity in the Project area, covering the following:

- Biodiversity assessment methodologies (including desktop research and field surveys):
- Information on the ecoregion within which the Project is situated, as well as legally protected areas and internationally recognized areas of biodiversity importance near the Project site;
- Identification of different habitats in the Study Area based on factors like land-use, floral assemblage and topographical features, and categorization of representative habitats as 'Natural' or 'Modified' per IFC PS6 definitions;
- Identification of specific sensitivities associated with different habitats, i.e., congregatory sites, roosting sites, feeding ground etc.;
- Species recorded in the Project area, including flora, avifauna, volant mammals (bats), other terrestrial mammals, herpetofauna (reptiles and amphibians), and insects; and
- Summary of species of conservation concern, results of the CHA, and sensitivity of habitats and species in the Project area.

6.2.2 METHODOLOGIES

6.2.2.1 DESKTOP ASSESSMENT METHODOLOGY

Desk-based assessment plays a significant role in the initial screening of the Project activity and the Project Site. It is a continuous process and, throughout the period of assessment desk-based studies, provides inputs in designing the survey, establishing the baseline, complementing primary data and the Critical Habitat Assessment (CHA). Desktop research and literature review help in assessing potential Critical Habitat candidates based on species' distribution patterns, preferred habitat and factors that can influence the species distribution (e.g. anthropogenic development). Desk-based assessment is also used to identify habitat contiguity, habitats of conservation significance (e.g., protected areas) and probable hotspots for migratory and congregatory species. The Ecologically Appropriate Area of Analysis (EAAA) for the CHA is delineated as part of the desk-based review by determining ecological boundaries where the patterns, processes, features and functions are similar.

Key data sources used during establishing baseline (including CHA) are listed in the table below. Secondary information review was not restricted to the below-mentioned sources only, and all reviewed literature are mentioned as footnotes in respective chapters.

Desktop review plays a significant role in the initial screening of the Project activity and the Project Site. It is a continuous process and, throughout the period of assessment desk-based studies, provides inputs for survey design, establishing the baseline conditions for biodiversity, complementing primary data, and the Critical Habitat Assessment (CHA). Desktop survey and literature review help in assessing potential Critical Habitat candidates based on species' movement patterns, preferred habitats, and other relevant factors that can influence the species' distribution (e.g., anthropogenic development). Desk-based assessment is also used to identify habitat contiguity, habitats of conservation significance (e.g. protected areas) and probable hotspots for migratory and congregatory species.

Desktop review of baseline consists of a comprehensive range of sources, with prominent desktop data sources used to inform this baseline listed below. Secondary information review was not restricted to the below-mentioned sources only, and all reviewed literature are mentioned as footnotes in respective chapters.

- Online databases on protected and internationally recognised areas of biodiversity importance, including the Key Biodiversity Area ("KBA") Partnership, Important Bird and Biodiversity Area ("IBA") Factsheets by BirdLife, Alliance for Zero Extinction Sites, UNESCO World Heritage Site, and Protected Planet by the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC);
- Online databases on species, including the IUCN Red List of Threatened Species version 2025-1 ("IUCN" or "IUCN Red List"), Global Biodiversity Information Facility ("GBIF"), iNaturalist, eBird, and Avibase;
- Mongolian Red Book (published in 1987 with latest revision in 2014);
- Mongolian Red Lists part of the Regional Red List Series, including:
    - Mongolian Red List of Mammals (2006)[25];

[25] Clark, E. L., Munkhbat, J., Dulamtseren, S., Baillie, J. E. M., Batsaikhan, N., Samiya, R. and Stubbe, M. (compilers and editors) (2006). Mongolian Red List of Mammals. Regional Red List Series Vol. 1. Zoological Society of London, London. (In English and Mongolian)

  - Mongolian Red List of Reptiles and Amphibians (2011)[26];
  - Mongolian Red List of Birds (2011)[27];
  - Mongolian Red List of Plants (2012)[28];
- Publicly available data and scientific literature;
- Site-specific Integrated Biodiversity Assessment Tool ("IBAT") report generated for the Project; and
- Information made available by the client, including the Project's Detailed Environmental Impact Assessment (DEIA) – which was conducted in compliance with Mongolian laws and regulations and included preliminary and limited biodiversity field surveys – as well as monitoring reports and data provided from the Oyu Tolgoi Mine project.

Conservation Status

For all species discussed, their global conservation status is determined based on the IUCN Red List, while their regional conservation status is based on the Mongolian Red List Series. Both of these schemes use the nine-category classification system depicted in ***Table 6-41***. In addition, multilateral environmental agreements and protocols related to the conservation and protection of biodiversity to which Mongolia is a signatory have also been considered, with those relevant to the Project summarized below:

- **Convention on the Conservation of Migratory Species of Wild Animals ("CMS")**: Also known as the Bonn Convention, this international agreement aims to conserve terrestrial, marine, and avian migratory species throughout their range. Under the CMS framework, a number of agreements and memoranda of understanding (MoU) have been signed, focusing on specific endangered species. Mongolia ratified the CMS in 1999 and is a signatory to the MoU regarding the Conservation of Migratory Birds of Prey in Africa and Eurasia (in force since 1 November 2008), with the objective of enhancing conservation of migratory birds of prey with respect to their range, population dynamics, and habitat. The latest iteration of Appendices I and II was put into effect on 17 May 2024.[29]
- **Convention on International Trade in Endangered Species (CITES)**: This multilateral treaty aims to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species in the wild. The latest revision of Appendices I, II and III were put into effect on 7 February 2025.[30]

[26] Terbish, Kh., Munkhbayar, Kh., Clark, E.L., Munkhbat, J., Monks, E.M., Munkhbaatar, M., Baillie, J.E.M., Borkin, L., Batsaikhan, N., Samiya, R. and Semenov, D.V. (compilers and editors) (2006). Mongolian Red List of Reptiles and Amphibians. Regional Red List Series Vol. 5. Zoological Society of London, London.

[27] Gombobaatar, S. and Monks, E. M. (Compilers). Seidler, R., Sumiya, D., Tseveenmyadag, N., Bayarkhuu, S., Baillie, J. E. M., Boldbaatar, Sh., Uuganbayar, Ch. (Editors). 2011. Regional Red List Series Vol. 7. Birds. Zoological Society of London, National University of Mongolia and Mongolian Ornithological Society.

[28] Nyambayar, D., Oyuntsetseg, B. and Tungalag, R. (compilers). 2011. Jamsran, Ts., Sanchir, Ch., Bachman S., Soninkhishig, N,, Gombobaatar, S., Baillie, J.E.M., and Tsendeekhuu Ts. (editors). Regional Red List Series Vol. 9. Plants. Zoological Society of London, National University of Mongolia, Admon Press.

[29] Convention on the Conservation of Migratory Species of Wild Animals (CMS). Appendices I and II effective 17 May 2024. Available at: https://www.cms.int/sites/default/files/uploads/revised-appendices_cop14_e.pdf

[30] Convention on International Trade in Endangered Species of Wild Fauna and Flora. Appendices I, II and III valid from 7 February 2025. Available at: https://cites.org/sites/default/files/eng/app/2025/E-Appendices-2025-02-07.pdf

Three key pieces of legislation govern the protection of flora and fauna in Mongolia, which also designate species for legal protection under the categories of 'Very Rare' and 'Rare' (see ***Table 6-41***). It should be noted that these categories do not follow the IUCN's nine-grade classification scheme adopted for the Global and Regional Red Lists, as shown in ***Figure 6-113***.

TABLE 6-41: MONGOLIAN LAWS FOR THE PROTECTION OF FLORA AND FAUNA

Source of Protection Designation	Definition of 'Very Rare' Species	Definition of 'Rare' Species
Law on Natural Plants of 1995 (including list of 'Very Rare' plant species) and its associated List of 'Rare' Plants (Appendix to Government Resolution No. 153)[31]	Very Rare – "Plant species with no natural regeneration capacity, very restricted distribution and no usable reserves, and that are in danger of extinction (this classification applies to the plants listed in the Appendix to this Law).	Rare – "Plant species with limited natural regeneration capacities and limited distribution and reserves, and that potentially are at risk of extinction."
Law on Fauna of 2000 and its 2001 revision (Government Resolution No. 264)[32]	Very Rare – "Wildlife species that have a restricted capacity to recover, a limited distribution, no usable reserves and are in danger of extinction."	Rare – "Fauna which have a limited capacity to recover, limited distribution, have a small population and are potentially in danger of extinction."
Law on Animals (2012) and List of Rare Wild Species[33] (Government Resolution No. 7, 2012)[34]	Extremely Rare – "Endangered animals whose number reduced drastically in their distribution area as a whole or in most parts and resources for use I absent."	Rare – "Animals whose number reduced in their range area, has few resources and which are at risk of extinction."

Species are only considered legally protected if they are listed under Mongolian laws and regulations such as those mentioned above. The protection of Rare and Very Rare species is enforced through the implementation of Mongolia's Environmental Impact Assessment laws, prohibitions on hunting and trapping, establishing protected areas to protect habitats of importance to threatened species, and listing of designated species in the Mongolian Red Book (first published in 1987, revised in 1997 and 2014).

[31] Mongolian Law on Natural Flora, 1995. Ulaanbaatar. https://faolex.fao.org/docs/pdf/mon77264E.pdf
[32] Mongolian Law on Fauna, 2000. Ulaanbaatar. https://faolex.fao.org/docs/pdf/mon77263E.pdf
[33] Mongolian Law on Animals, 2012. Ulaanbaatar. https://legalinfo.mn/en/edtl/16230948910941
[34] Mongolian Law on Animals, 2012. Ulaanbaatar. https://www.fao.org/faolex/results/details/en/c/LEX-FAOC231650

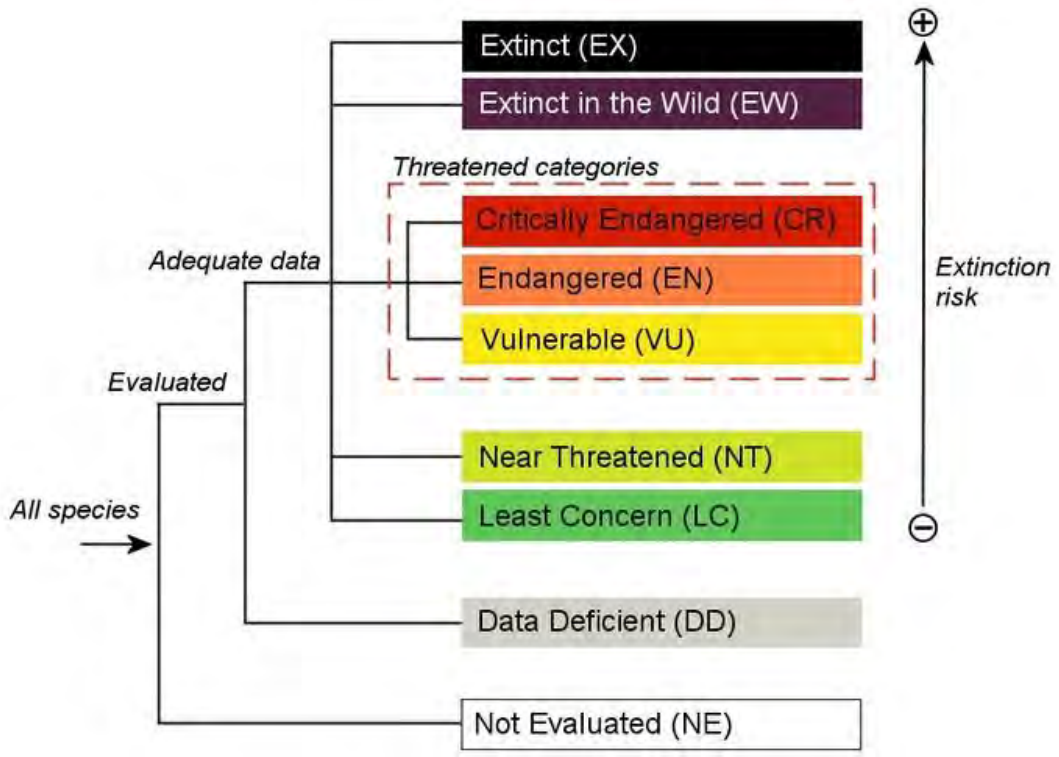


FIGURE 6-113: IUCN RED LIST NINE-GRADE CLASSIFICATION SYSTEM

6.2.2.2 PRIMARY DATA COLLECTION

Six (6) survey events for biodiversity were conducted between August 2024 and May 2025. The objective of these surveys are to gather primary data using best international practices for sampling and analysis methodologies. General surveys were conducted for terrestrial flora and fauna, as well as specialist surveys targeting key species and taxa of conservation significance—particularly those that may be directly affected by the Project—including avifauna, volant mammals (e.g. bats), large mammals (including the Asiatic Wild Ass *Equus hemionus*, Goitered Gazelle *Gazella subgutturosa*, Argali Sheep *Ovis ammon*, and Snow Leopard *Panthera uncia*), and the Asian Houbara *Chlamydotis macqueenii*). Information on these surveys are summarized in ***Table 6-42*** below.

TABLE 6-42: BIODIVERSITY BASELINE SURVEY METHODOLOGIES AND TIMING

Target Taxa	Date	Survey Methodologies
Terrestrial flora and vegetation communities	Two seasons covering summer (rainy season) and spring (dry season): • 24 August – 3 September 2024 • 7-20 May 2025	Quadrats, transect surveys, and site walkovers.
Small mammals, herpetofauna (reptiles and amphibians) and insects.	Two seasons covering summer (rainy season) and spring (dry season): • 24 August – 3 September 2024 • 7-20 May 2025	• Transect surveys for herpetofauna and insects; and • Live (Sherman) traps for small mammals.

Target Taxa	Date	Survey Methodologies
Avifauna (general surveys for birds and targeted surveys for Asian Houbara)	Six (6) survey events covering autumn migration, winter, spring migration, and breeding season. • 24 August – 3 September 2024 • 20 September – 3 October 2024 • 1-14 November 2024 • 3-16 January 2025 • 2-15 April 2025 • 7-20 May 2025	• Vantage Point surveys, complemented by transects, point-counts and nest surveys; • Carcass surveys (3x3 km transect lengths); • Vehicle-based line transects; and • Targeted transects for the Asian Houbara.
Chiropterofauna (bats)	Five (5) survey events (no surveys in January 2025 i.e. winter due to lower levels of activity/presence. • 24 August – 3 September 2024 • 20 September – 3 October 2024 • 1-14 November 2024 • 2-15 April 2025 • 7-20 May 2025	• Passive acoustic surveys (complemented by searches of roost sites); and • Mist netting.
Mammals	Six (6) survey events: • 24 August – 3 September 2024 • 20 September – 3 October 2024 • 1-14 November 2024 • 3-16 January 2025 • 2-15 April 2025 • 7-20 May 2025	• Transect surveys for large and small mammals; and • Camera trapping for large mammals complemented by interviews with local herders (general and also targeting Asiatic Wild Ass, Goitered Gazelle, Argali Sheep, and Snow Leopard).

6.2.3 EASTERN GOBI DESERT STEPPE ECOREGION

Mongolia hosts a diverse range of biomes, ecosystems, and highly variable landscape types. Of the 16 ecoregions that exist within the country (as identified under the WWF's international system of ecoregions), the Project is situated within the Eastern Gobi Desert Steppe ecoregion and to the west and north of the Alashan Plateau Semi-Desert (see ***Figure 6-114***).[35] There are no clear distinctions that differentiate these two ecoregions, but rather delineates the approximate boundaries between the more steppe-like grassland ecosystems to the north and more arid, desert-like ecosystems to the south. The Eastern Gobi Desert Steppe extends from the Inner Mongolian Plateau (China), situated at 1,000 to 1,500 m elevation, northward into Mongolia, covering approximately 281,800 km^2. It is bound to the east and north by relatively moist grasslands in Mongolia and Manchuria, and to the west and south by the semi-deserts of the Alashan Plateau. The region provides potential habitat for many wildlife species and a human population of semi-nomadic herders with relatively limited permanent settlements. The Eastern Gobi Desert Steppe is also classified as a sub-ecoregion of the larger Central Asian Gobi Desert ecoregion, where the latter contains a total of 15 matrix ecosystems.[36] As

[35] WWF Terrestrial Ecoregions, based on Olson, D. *et al*. 2001. Terrestrial ecoregions of the world: a new map of life on Earth. Bioscience 51(11):933-938. https://doi.org/10.1641/0006-3568(2001)051[0933:TEOTWA]2.0.CO;2

[36] Chimed-Ochir B., Hertzman T., Batsaikhan N., Batbold D., Sanjmyatav D., Onon Yo and Munkhchuluun B. 2010. Filling the Gaps to protect the biodiversity of Mongolia. World Wildlife Fund Mongolia Program. Admon. Ulaanbaatar. Available at: https://wwfeu.awsassets.panda.org/downloads/filling_the_gaps_final_report_low_resolution_2.pdf

illustrated in ***Figure 6-115***, the Project's WTG area lies within desert steppe while the OHL traverses semi-desert ecosystems.

The southern Gobi as a whole is characterized by extremely cold winters and limited precipitation. Vegetation in this ecoregion is considered homogenous across large areas and consists of drought-adapted shrubs and thinly distributed low grasses. The Eastern Gobi Desert Steppe has a reported total of 480 species of true desert and desert steppe flora, of which nine (9) are endemic to the region.[37] The World Wildlife Fund (WWF) reports dominant shrubs to include two (2) *Caragana* species (*C. bungei* and *C. leucocephala*) and names other examples of shrubs in the ecoregion such as grey sparrow's saltwort (*Salsola passerina*), grey sagebrush (*Artemisia xerophytics*), *Potaninia mongolica*, and *Nitraria sibirica*. Low grasses include needle grass (*Stipa gobica* and *S. glareosa*) and bridlegrass (*Cleistogenes soongorica*). The desert steppe vegetation is susceptible to damage caused by trampling (livestock or off-road vehicles) and overgrazing.

Extreme climate conditions in the Gobi Desert of southern Mongolia has resulted in the evolution of nomadic and semi-migratory characteristics among resident ungulates, including the Asiatic Wild Ass (*Equus hemionus*), Goitered Gazelle (*Gazella subgutturosa*), and Mongolian Gazelle (*Procapra gutturosa*). WWF also reports that mammals characteristic of this ecoregion include the Saiga Antelope (*Saiga tatarica mongolica*), Marbled Polecat (*Vormela peregusna*), and several species of Jerboa (*Zapodidae*), of which several species are endemic to the deserts of Central Asia including the Long-eared Jerboa (*Euchoreutes naso*), Kozlov's Pygmy Jerboa (*Salpingotus kozlovi*), Mongolian Jerboa (*Stylodipus andrewsi*), and Gobi Jerboa (*Allactaga bullata*). The mountains of this ecoregion are reported to include potential habitat for snow leopards (*Panthera uncia*) but given the large distance of the Project from the mountainous area of this ecoregion, and the uncertainty whether any snow leopards survive in the mountains, this species is not considered relevant to this Project. Birds characteristic of the desert steppe include the Asian Houbara Bustard (*Chlamydotis undulata*), Pallas's Sandgrouse (*Syrrhaptes paradoxus*), Mongolian Ground Jay (*Podoces hendersoni*), Greater Plover (*Charadrius leschenaultii*), Mongolian Desert Finch (*Bucanetes mongolicus*), Chukar (*Alectoris chukar*), Lammergeier (*Gypaetus barbatus*), and Cinereous Vulture (*Aegypius monachus*).

In relative terms, the Eastern Gobi Desert Steppe receives more precipitation and are potentially more productive than other desert regions to the west, providing resources such as suitable pastures for livestock grazing. Therefore, this ecoregion experiences a higher degree of anthropogenic pressure from nomadic and semi-nomadic herders, including overgrazing and degradation of grasslands and shrublands by livestock that are raised for meat as well as for cashmere wool production. Nevertheless, the area in which the Project is situated remains very scarcely populated and less disturbed by nomadic pastoralism, industrial and infrastructural development, and other anthropogenic activities in comparison to the portion of the ecoregion located within China and supports more intact wildlife populations.

[37] Ulziikhutag N., Dariimaa S., Ganbold E., Nyambayar D., Urgamal M., Zumberelmaa D., Enkhmaa U. 2015. Flora of Mongolia. (Huperziaceae-Ephedraceae). Munkhiin Useg, Ulaanbaatar.

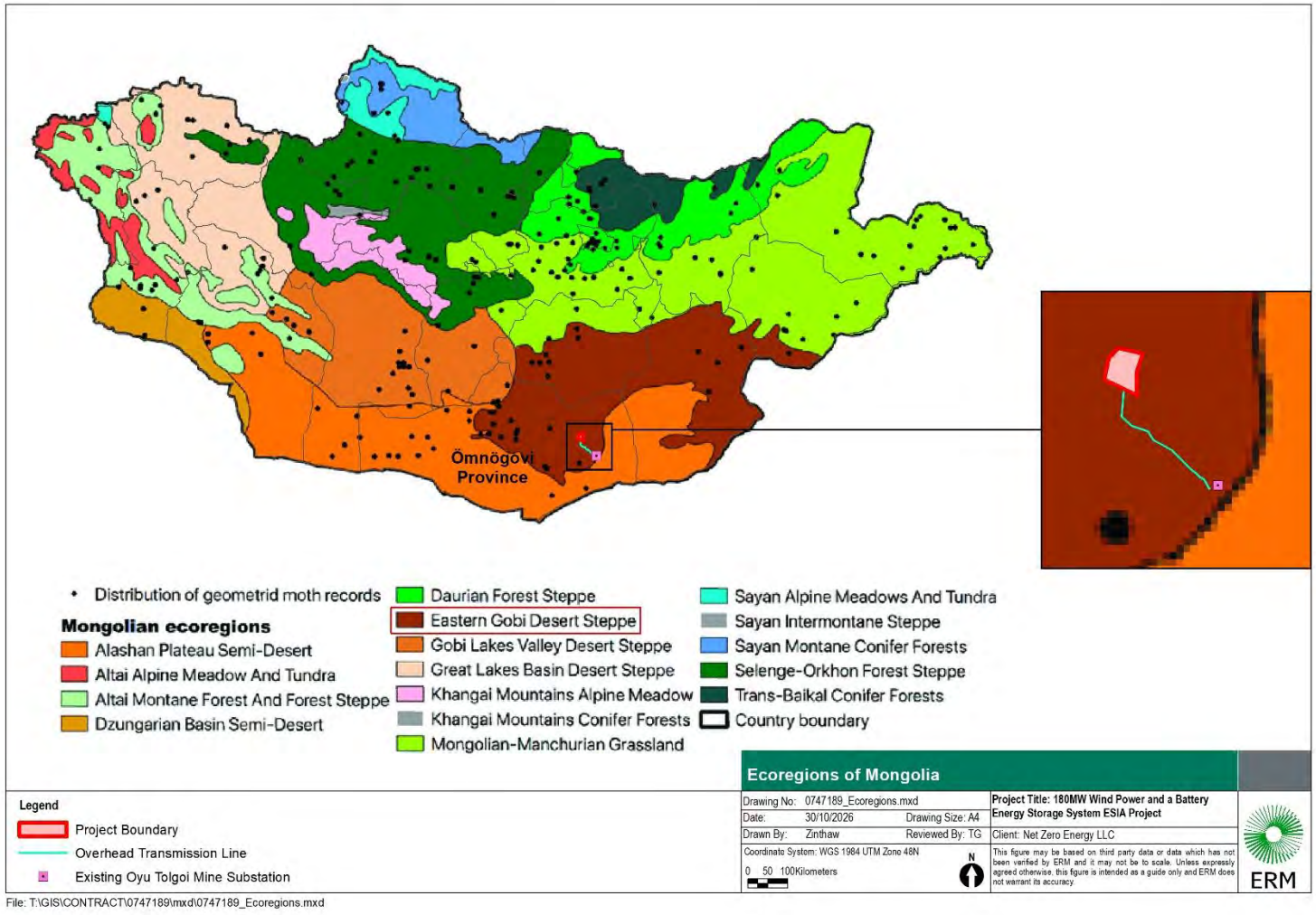


FIGURE 6-114: ECOREGIONS OF MONGOLIA

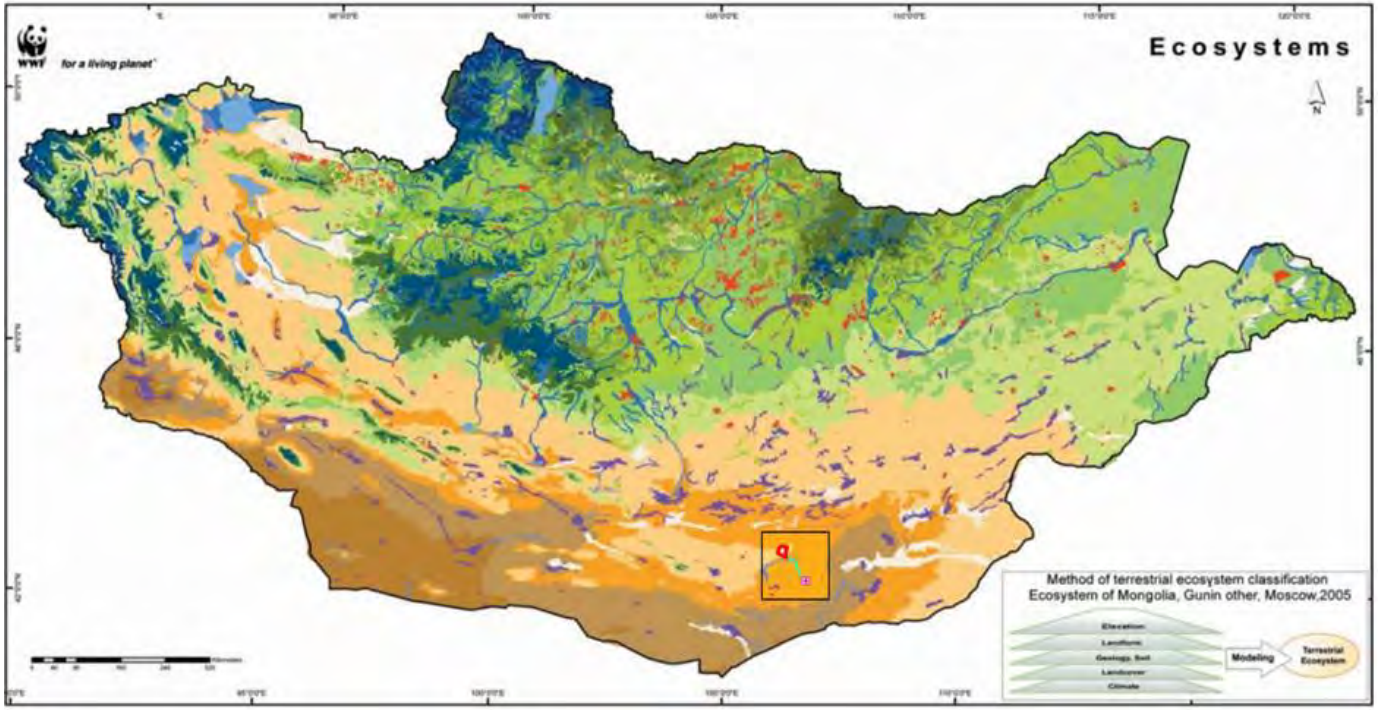


FIGURE 6-115: ECOSYSTEMS IN MONGOLIA

6.2.4 LEGALLY PROTECTED AND INTERNATIONALLY RECOGNISED AREAS OF BIODIVERSITY IMPORTANCE

This subsection details the areas in the vicinity of the Project Site that are designated for protection, as well as internationally recognized areas of biodiversity value such as Key Biodiversity Areas (KBA) which can incorporate Important Bird and Biodiversity Areas (IBA). Under the provisions of International Finance Corporation (IFC) Performance Standard 6 (PS6), protected and internationally recognized areas require specific management actions that satisfy the mitigation hierarchy if development proceeds within their boundaries. Consultation with protected area managers and the community would be required.

A total of five (5) biodiversity areas of significance have been identified within 50 km of the Project, including three (3) Locally Protected Areas, one (1) Strictly Protected Area, and one (1) KBA/IBA. ***Figure 6-116*** maps these five areas with respect to the Project boundaries and ***Table 6-43*** summarises key information about these areas. Definitions of Locally Protected Areas, Strictly Protected Areas, KBAs, and IBAs, as well as details on each area listed below, are provided in subsequent sections.

TABLE 6-43: LIST OF PROTECTED AND INTERNATIONALLY RECOGNISED AREAS WITHIN 50 KM FROM THE PROJECT SITE

No.	Biodiversity Area	Type	Closest Linear Distance from Project Site (km)
1	Gurvan gavluud, Har deliin tolgod	Locally Protected Area	Overlaps with the Project's TL
2	Ih baga luus	Locally Protected Area	Overlaps with the Project's Access Road
3	Tulugtiin tal	Locally Protected Area	1.6 km
4	Galba Gobi	KBA and IBA	26.4 km
5	Small Gobi A Strictly Protected Area	Strictly Protected Area	36.3 km from southern end of OHL, 75-85 km from WTG area

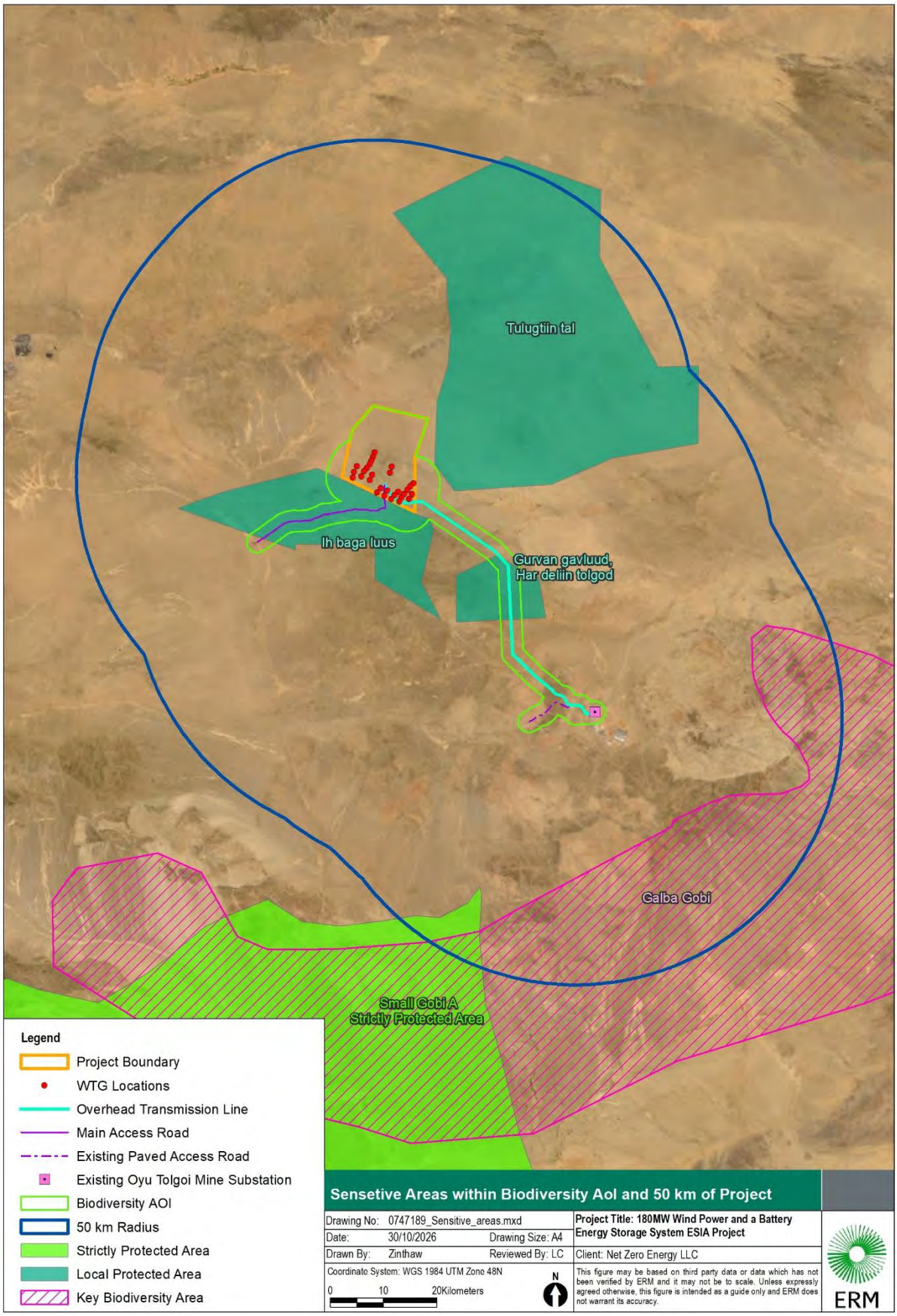


FIGURE 6-116: SENSITIVE BIODIVERSITY AREAS WITHIN 50 KM OF THE PROJECT SITE

6.2.4.1 LOCALLY PROTECTED AREAS

Under the provisions of the Law on Special Protected Areas of 1994, local-level governments in Mongolia may designate specific areas of their territory under special local protection for the preservation of local natural areas, unique structures, and historical and cultural monuments, as well as "proper use" of natural resources[38]. These areas are thus legally protected and further classified into two categories: 'Forests, Fauna, Vegetation, and Water Resources", and "Natural and Historical Monuments"[39]. The distinctions between these two categories were not explained in this directive.

The three (3) Locally Protected Areas presented in ***Figure 6-116*** are situated either within or in close proximity to the Project Site. The Mongolian Ministry of Environment and Climate Change's National Agency for Meteorology and Environmental Monitoring[40] provides the following information on these areas.

Gurvan gavluud, Har deliin tolgod has an area of 16,291.63 ha and is classified under the category of "Forest, Fauna, Vegetation, and Water Resources". This Locally Protected Area is designated for 15 years (from 29 September 2015 to 29 September 2030). An existing TL and the main road between Tsogttestsii and Khanbogd traverse this area. Satellite imagery indicates several herder settlements within this area.

Ih baga luus has an area of 51,736.83 ha and is classified under the category of 'Forest, Fauna, Vegetation, and Water resource area'. This Locally Protected Area is designated for 20 years (from 10 November 2015 to 10 November 2035). An existing TL, the Heavy-Duty Coal Transport Road, as well as main road between Tsogttestsii and Khanbogd traverse this area.

Tulugtiin tal has an area of 220,828.22 ha and is classified under the category of 'Forest, Fauna, Vegetation, Water resource area'. This Locally Protected Area is designated for ten (10) years (from 28 August 2015 to 25 August 2025).

During consultation with the Land Officer of Khanbogd Soum on 27 August 2025, it was advised that the main intention of the Locally Protected Area is to prevent mining exploration and mining operations. The Land Officer also advised that the construction of infrastructure (e.g. road and overhead transmission line) are permissible within the locally protected area.[41] There is no government-recognised management plan in place for the locally protected area. The Khanbogd soum governor officially confirmed no objection to the proposed infrastructure[42].

6.2.4.2 STRICTLY PROTECTED AREAS

Strictly Protected Areas (SPA) are defined as areas that seek to protect natural landscapes to preserve their unique features and formations, rare fauna and flora, evolutionary unique areas, and significant historical, cultural, and natural sites. These are designated for legal protection

[38] Law of Mongolia on Specially Protected Areas, November 15, 1994, Ulaanbaatar City. Available at: https://legalinfo.mn/en/edtl/16230948087431 [Accessed March 2025]
[39] Minister of Environment's Directive No. 07 on the Adoption of the Regulation on the Taking of Land for Local Protection, Appendix 1. Available at: https://legalinfo.mn/mn/detail?lawId=204310 [Accessed March 2025]
[40]Environmental Information Centre, National Agency for Meteorology and Environmental Monitoring, Ministry of Environment and Climate Change. Available at:https://www.eic.mn/[41] With approval by the Citizens' Representative Meeting (CRM) and the General Authority for Land Management.
[41] With approval by the Citizens' Representative Meeting (CRM) and the General Authority for Land Management.
[42] Official Letter No 01/880 dated 6 October 2026.

under the Law on Special Protected Areas (1994) and managed by the national government and its agencies.[43] The national-level protected areas are divided into four categories of protection. Strictly Protected Areas represent the most stringent level of protection, followed by National Parks and Nature Reserved which are established for the purpose of ecological, biological, paleontological and/or geological conservation, and finally Natural Monuments (further categorized into natural and/or historical/cultural monuments).

The Law on Special Protected Areas (1994) also places limitations on the types of activities which can be undertaken within three different zones of an SPA: (i) the 'pristine' zone is limited to protection measures required to maintain the integrity of the SPA; (ii) the 'protected' zone is limited to activities required to restore damaged habitat; and (iii) the 'limited use' zone is restricted to a range of permitted activities, such as those allowed within the pristine and protected zones, habitat restoration and recovery, biodiversity studies, nature-based tourism, and a limited selection of economic activities (e.g. harvesting and use of resources by local residents such as medicinal plants).

The Law on Buffer Zones (1997) further regulates the buffer zones to be established around SPAs and National Parks, defining 'buffer zones' as "those areas established to minimize, eliminate, and prevent actual and potential adverse impacts to Strictly Protected Areas and National Parks, to increase public participation, to secure their livelihood and to establish requirements for the proper use of natural resources."[44]

The nearest SPA to the Project site is the Small Gobi SPA, which consists of two sections ("A" and "B") and is over 35 km from the Project at its closest point (as shown in ***Figure 6-116*** and ***Table 6-43***). More detail is provided below although given the distance it is not considered a key concern for the Project.

Small Gobi (A and B) Strictly Protected Area

Located in southeastern Mongolia in part of the Gobi Desert, the Small Gobi SPA (also known as the "Gobiin Baga") was established in 1975 and remained in the category of an SPA under the Law on Special Protected Areas (1994). It was designated as a SPA preserve the distinctive natural habitats of the southeastern Gobi of Mongolia, which had relatively low levels of disturbance from grazing and hunting at the time of designation. It is also categorized as an IUCN Category Ib Protected Area (also referred to as a 'Wilderness Area'), which refers to protected areas that are "usually large unmodified or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition."[45]

The Small Gobi SPA is characterized by an arid landscape of desert steppe, semi-desert, flat and rolling terrain, grasslands, sand dunes, dry riverbeds, and rocky outcrops that plays a crucial role in transboundary wildlife conservation, particularly for wide-ranging and migratory ungulates like the Asiatic Wild Ass (*Equus hemionus*), Goitered Gazelle (*Gazella subgutturosa)*, Siberian Ibex (*Capra sibirica*) and Argali (*Ovis ammon*). Other species of conservation

[43] Law on Special Protected Areas, 15 November 1994. Ulaanbaatar, Mongolia. https://faolex.fao.org/docs/pdf/mon77268E.pdf
[44] Law on Buffer Zones, 23 October 1997. Ulaanbaatar, Mongolia. https://faolex.fao.org/docs/pdf/mon78977.pdf
[45] Lausche, Barbara. (2011). Guidelines for Protected Areas Legislation. IUCN, Gland, Switzerland. https://portals.iucn.org/library/efiles/documents/eplp-081.pdf

importance that have been recorded in the SPA (with rarity) include the Eurasian Lynx (*Lynx lynx*) and Snow Leopard (*Panthera uncia*).[46]

The total SPA spans an area of approximately 18,304 km^2 and is composed of two separate units - Small Gobi "A" covering 11,478 km^2, and Small Gobi "B" covering 6,826 km^2.[47] As shown in ***Figure 6-116***, these two distinct sections are separated by a distance of approximately 70 km at the closest point, and both overlap with the internationally recognized Galba Gobi KBA and IBA (discussed in the subsequent section). Of the two areas, only Small Gobi A is located within a 50 km radius from the Project. Additionally, as per the Law on Buffer Zones of 1997, the Small Gobi A has a buffer area of 16,401 km^2, in which any activities such as logging for industrial purposes, hunting, mineral exploration, mining, and construction can only be conducted with an approved Detailed Environmental Impact Assessment (DEIA) in accordance with relevant legislation. This. As stipulated by this law, the DEIA shall also include the opinion and recommendation of the Protected Area Administration and shall engage with organizations responsible for the management of national and local SPAs for public disclosure of the proposed Project and securing approvals as required.

6.2.4.3 KEY BIODIVERSITY AREAS

Key Biodiversity Areas are places of international importance for the conservation of biodiversity and defined as sites that contribute significantly to the global persistence of biodiversity, and applicable to terrestrial, freshwater, and marine ecosystems. Global KBAs are typically sites where there is a regular occurrence of significant numbers of one or more globally threatened species, restricted-range species and/or congregatory species.

Sites qualify as global KBAs if they meet one or more of 11 criteria, grouped into the following five (5) categories: threatened biodiversity, geographically restricted biodiversity, ecological integrity, biological processes, and irreplaceability. KBAs are often situated over existing legally protected areas (PAs) and also encompass Alliance for Zero Extinction sites (AZEs), Important Bird and Biodiversity Areas (IBAs), Important Plant Areas (IPA), and Important Sites for Freshwater Biodiversity, but may be KBAs with no local protection status or recognition.

The only KBA within 50 km assessment area from the Project Site is the Galba Gobi KBA, which is also an IBA as presented in ***Figure 6-116***. This 'Galba Gobi' KBA and IBA overlaps with the Small Gobi A detailed above. It is over 25 km from the Project at its closest point. More detail is provided below although given the distance it is also not considered a key concern for the Project.

Galba Gobi[48]

The Galba Gobi KBA and IBA has a total area of 828,328 ha and is characterized by a 100 km-long desert valley, with rolling hills, sand dunes and dry riverbeds with elm and saxaul trees. Some rocky hills and oases are found in the area. Poaching of the Near Threatened (NT) Asiatic Wild Ass (*Equus hemionus*) and other wildlife species has increased in recent years.

[46] Augugliaro, C., Paniccia, C., Janchivlamdan, C., Monti, I. E>, Boldbaatar, T., and Munkhtsog, B. 2019. Mammal inventory in the Mongolian Gobi, with the southeasternmost documented record of the Snow Leopard, *Panthera uncia* (Schreber, 1775), in the country. Check List 15(4): 565-578. https://doi.org/10.15560/15.4.565

[47] UNEP-WCMC (2025). Protected Area Profile for Gobiin baga /A/ from the World Database on Protected Areas, November 2025. Available at: https://www.protectedplanet.net/124309

[48] BirdLife International (2025). Site factsheet: Galba Gobi. Available at: https://datazone.birdlife.org/site/factsheet/galba-gobi

Pastures utilized by the Asiatic Wild Ass populations in southern Mongolia also overlap with grazing areas for livestock, resulting in competition for food and water. The site is bisected by an existing road linking mines in Omnogobi aimag with the Chinese border. The area was listed as an IBA as it hosts globally threatened species and supports biome-restricted assemblages, with IBA qualifying species including the Vulnerable (VU) Asian Houbara (*Chlamydotis macqueenii*), Least Concern (LC) Mongolian Ground Jay (*Podoces hendersoni*), LC Pallas's Sandgrouse (*Syrrhaptes paradoxus*), and LC Saxaul Sparrow (*Passer ammodendri*).[49] Other species of conservation concern found in the Galba Gobi include globally threatened and migratory birds such as the Endangered (EN, IUCN) Saker Falcon (*Falco cherrug*), Near Threatened (NT) Cinereous Vulture (*Aegypius monachus*), LC Short-toed Snake Eagle (*Circaetus gallicus*), LC Booted Eagle (*Hieraaetus pennatus*), and LC Amur Falcon (*Falco amurensis*), which also breed at the site. Non-bird species that occur in the Galba Gobi include the EN Asiatic Wild Ass (*Equus hemionus*), VU Goitered Gazelle (*Gazella subgutturosa*), NT Argali (*Ovis ammon*), NT Siberian Ibex (*Capra sibirica*), and LC Long-eared Jerboa (*Euchoreutes naso*).[50]

Migratory Flyways

The Project area is located at the convergence of three (3) global flyways for migratory birds, namely the East Asian-Australasian Flyway, Central Asian Flyway and West Asian-East African Flyway, as depicted in ***Figure 6-117***. Although flyways have very loosely defined boundaries, it likely the Project falls within the EAAF and possibly the CAF. Migration seasons will differ between bird species, but for the Project it is generally considered that spring migration occurs around mid-March to early June, while autumn migration occurs from around August to early October, peaking in mid-September. Breeding seasons also vary according to particular species.

[49] Ibid.
[50] Key Biodiversity Areas Partnership (2025) Key Biodiversity Areas factsheet: Galba Gobi. Extracted from the World Database of Key Biodiversity Areas. Available at: https://www.keybiodiversityareas.org/site/factsheet/28296/assessment

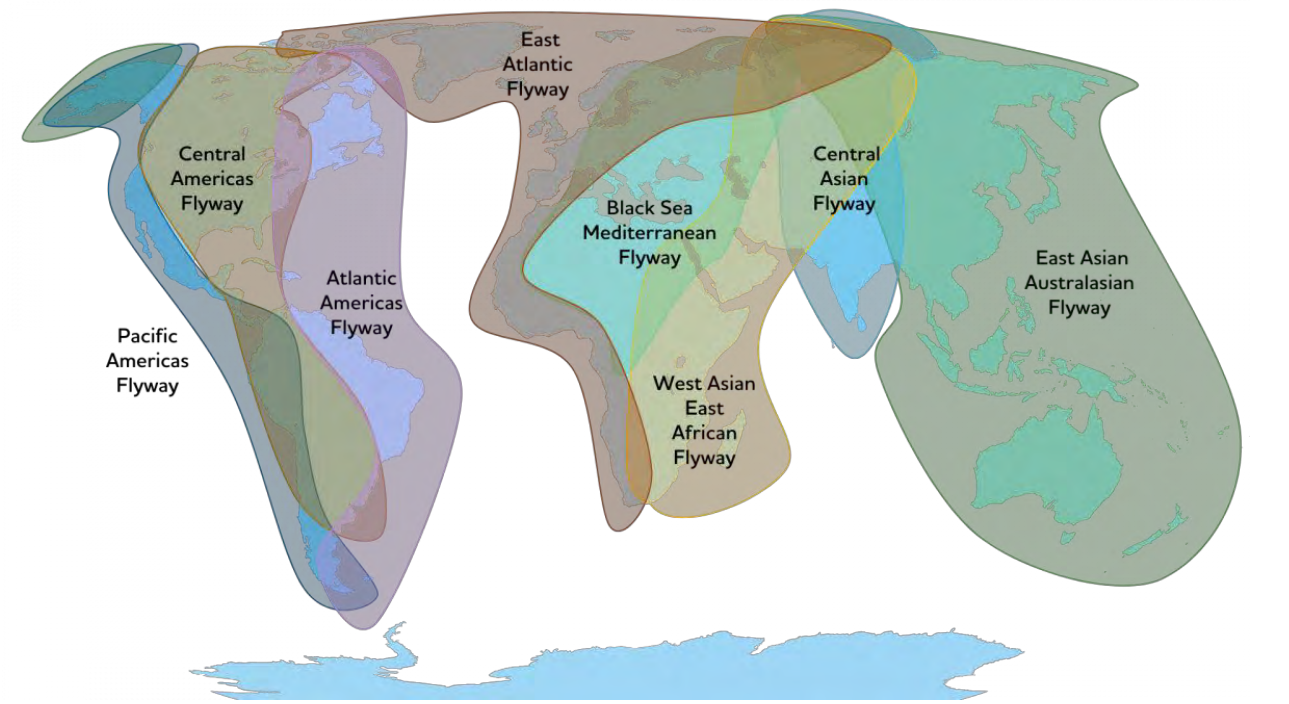


FIGURE 6-117: MIGRATORY FLYWAYS

6.2.5 HABITATS

The following section is aimed at classifying the habitat types present in the Project area as broadly "Natural Habitat" or "Modified Habitat", primarily based on the degree of anthropogenic activity/pressure on these habitats, with reference to information available to date. Both natural and modified habitats may contain high biodiversity values, thereby qualifying as "Critical Habitat", and is primarily assessed based on biodiversity value and biodiversity sensitivities associated with the Project landscape, rather than on anthropogenic pressure.

IFC PS6 provides the following definition of Natural and Modified Habitat:

- **Natural Habitat**[51]: Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.
- **Modified Habitat**[52]**:** Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands.

The IFC PS6 Guidance Note (2019) defines the following guidelines for determining Natural and Modified Habitat:

[51] Paragraph 13. IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012)
[52] Paragraph 11. IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012)

- Natural habitats are not to be interpreted as untouched or pristine habitats[53]. It is likely that the majority of habitats designated as natural will have undergone some degree of historical or recent anthropogenic impact.
- The habitat still largely contains the principal characteristics and functions of a native ecosystem(s)[54], it should be considered a natural habitat regardless of some degree of degradation and/or the presence of some invasive alien species, secondary forest, human habitation, or other human-induced alteration.
- Natural disturbances[55] such as forest fire, hurricane, or tornado (bleaching events are also considered Natural Disturbances) affecting a natural habitat would not lead to a modified habitat designation.
- Habitat would retain its pre-project modification designation[56]. It would not be considered modified habitat, if it was recently degraded by concerned project related activity.
- The level of anthropogenic impact should be determined with respect to the greater landscape/seascape[57] in which the project is located.

6.2.5.1 NATURAL AND MODIFIED HABITAT ASSESSMENT

The Project is situated within a dry, desert steppe environment where no standing or flowing surface water bodies or features have been identified within the AoI. Initial habitat analysis referred to available secondary data, satellite imagery, and observations from the scoping site visit conducted by ERM in September 2024, which was then refined through ground-truthing during the six baseline surveys.

Overall, the Project landscape is dominated by desert-steppe rangeland habitat, characterized by flat and slightly undulating desert steppe, hills and hillocks, mountains and valleys, and dry natural drainage channels and riverbeds. Flora primarily consist of cold temperature- and drought-adapted low grasses and shrubs growing on sandy, gravelly/rubble soils that are widely distributed across the open plains. These vegetation patches are important for sustaining local biodiversity by providing shaded area (resting areas for mammals) and nesting microhabitats for avian species. Trees and other larger plant species are very limited in the Project area.

Habitats within the AoI have been delineated based on natural landscape and topographical features, vegetation communities, and degree of anthropogenic pressure present. As shown in ***Figure 6-118*** and ***Table 6-44*** below, the Project AoI is predominantly comprised of rangeland habitat that meets the definition of 'natural habitat' per IFC PS6, with minimal modified habitats in the area. Landscape features identified throughout the rangeland habitat in the AoI include mountains, hills and hillocks, open plains and valleys of desert steppe, and dry riverbeds and ephemeral drainage channels. These areas are predominantly composed of native vegetation and utilized by resident and migratory fauna, has not been substantially modified by anthropogenic activities (e.g. large-scale land conversion), and retains much of its primary ecological functions. Overall, the Project area has experienced light to moderate levels of habitat degradation over the years, primarily due to livestock grazing, as evidenced by the conditions of vegetation communities observed during baseline surveys (see ***Figure 6-*** and

[53] GN39. IFC Guidance Note (2019) of PS6 (2012).
[54] GN39. IFC Guidance Note (2019) of PS6 (2012).
[55] GN38. IFC Guidance Note (2019) of PS6 (2012).
[56] GN38. IFC Guidance Note (2019) of PS6 (2012).
[57] GN27. IFC Guidance Note (2019) of PS6 (2012).

Table 6-48 for more details). It should be noted that the baseline surveys were carried out following above-average precipitation in 2024 (compared to long-term average rainfall) in Tsogttsetsii, Omnogobi, whereas pasture degradation is more severe during more extreme dry years and drought/dzud periods (such as the 2022-2023 event).[58, 59]

Though human disturbances such as herding, grazing by cattle species, and traditional nomadic pastoralism are present throughout the area and contribute to habitat degradation, they are not significant in scale and size to the extent that the affected areas are significantly degraded nor have floral and faunal species compositions been altered to the extent that communities are not largely of native origin, i.e. could be categorized as modified habitat. Subsequent sections provide more information on rangelands present in the AoI.

TABLE 6-44: NATURAL AND MODIFIED HABITATS WITHIN THE BIODIVERSITY AOI

Habitat	Area (ha)	Percentage of Total Area
Natural (Rangeland)	64,932	98.04%
Modified (Built-up Areas)	1,300	1.96%
Total	**66,232**	**100%**

The total area of natural habitat (desert-steppe rangelands) that will be affected by temporary and permanent Project infrastructure is approximately 141.53 ha (***Table 6-45***). Of this, 77.78 ha will be lost due to the construction and installation of permanent Project facilities, including the footprints of the WTGs, OHL towers, substation, internal roads within the WTG area, and access road along the OHL (***Table 6-46***).

TABLE 6-45: TOTAL AREA OF DISTURBANCE FROM TEMPORARY AND PERMANENT FACILITIES

Project Facility	Facility Type	Number	Unit area of foundation (m^2)	Disturbed Area (ha)
WTGs (including foundation)	Permanent	29	330	0.96
60 x 45m WTG hardstand excluding foundation	Permanent	29	2,370	6.87
OHL towers	Permanent	228	400	9.12
Substation and O&M Building	Permanent	1	49,920	4.99
Access Road to WTG area (30.9 km length, 8 m width) (only upgrades to existing road, no new construction, i.e. modified habitat)	Permanent	1	247,200	24.72
Internal Roads within 29 WTG area (~56.1 km length, 8 m width)	Permanent	1	448,800	44.88

[58] Climate Hazards Centre UC Santa Barbara and World Food Programme. 2026. Mongolia: Rainfall Indicators at Subnational Level (1981-2026). Available at: https://data.humdata.org/dataset/mng-rainfall-subnational

[59] International Federation of Red Cross and Red Crescent Societies. 2023. DREF Final Report: Mongolia Cold Wave 2022. Available at: https://reliefweb.int/report/mongolia/mongolia-cold-wave-2022-dref-final-report-mdrmn017

Project Facility	Facility Type	Number	Unit area of foundation (m^2)	Disturbed Area (ha)
Access road along OHL (65 km length, 4 m width), excluding OHL towers foundation area • New Unpaved Section: Step-up Substation to OHL Access Road ~4 km • Existing road to be upgraded: 220kV OHL access road ~33.1 km (i.e. modified habitat) • New Unpaved Section: that follows OHL ~25.1 km	Permanent	 1 1 1	 16,000 132,400 100,400	 1.60 13.24 10.04
Photo Voltaic / BESS System	Temporary	1	11,076	1.11
Camp	Temporary	1	15,222	1.52
Concrete Batching Area	Temporary	1	15,001	1.50
Laydown Area	Temporary	1	21,030	2.10
Hardstand Parking Area	Temporary	1	3,816	0.38
Portable Fuel Station	Temporary	1	400	0.04
Office Facility	Temporary	1	1,800	0.18
60 x 105 m WTG excavation, crane hardstand and laydown areas	Temporary	29	6,300	18.27
Total				**141.53 ha**

TABLE 6-46: TOTAL AREA OF NATURAL HABITATS AFFECTED BY PERMANENT FACILITIES

Facility	Type	Number	Unit area of foundation (m^2)	Disturbed Area (ha)
WTGs (including foundation)	Permanent	29	330	0.96
60 x 45m WTG hardstand excluding foundation	Permanent	29	2,370	6.87
OHL towers (excluding 17 towers located in OT Mine area i.e. modified habitat)	Permanent	211	400	8.44
Substation and O&M Building	Permanent	1	49,920	4.99
Internal Roads within 29 WTG area (~56.1 km length, 8 m width)	Permanent	1	448,800	44.88
Access road along OHL (65 km length, 4 m width), excluding OHL towers foundation area* • New Unpaved Section: Step-up Substation to OHL Access Road ~4 km • New Unpaved Section: that follows OHL ~25.1 km	Permanent	 1 1	 16,000 100,400	 1.60 10.04
Total				77.78 ha

Facility	Type	Number	Unit area of foundation (m^2)	Disturbed Area (ha)
*Note that the 30.9km access road to the WTG area and 33.1km existing road to be part of the OHL access road are both existing roads that will be upgraded, therefore they are considered to be modified habitat and not included in this table.				

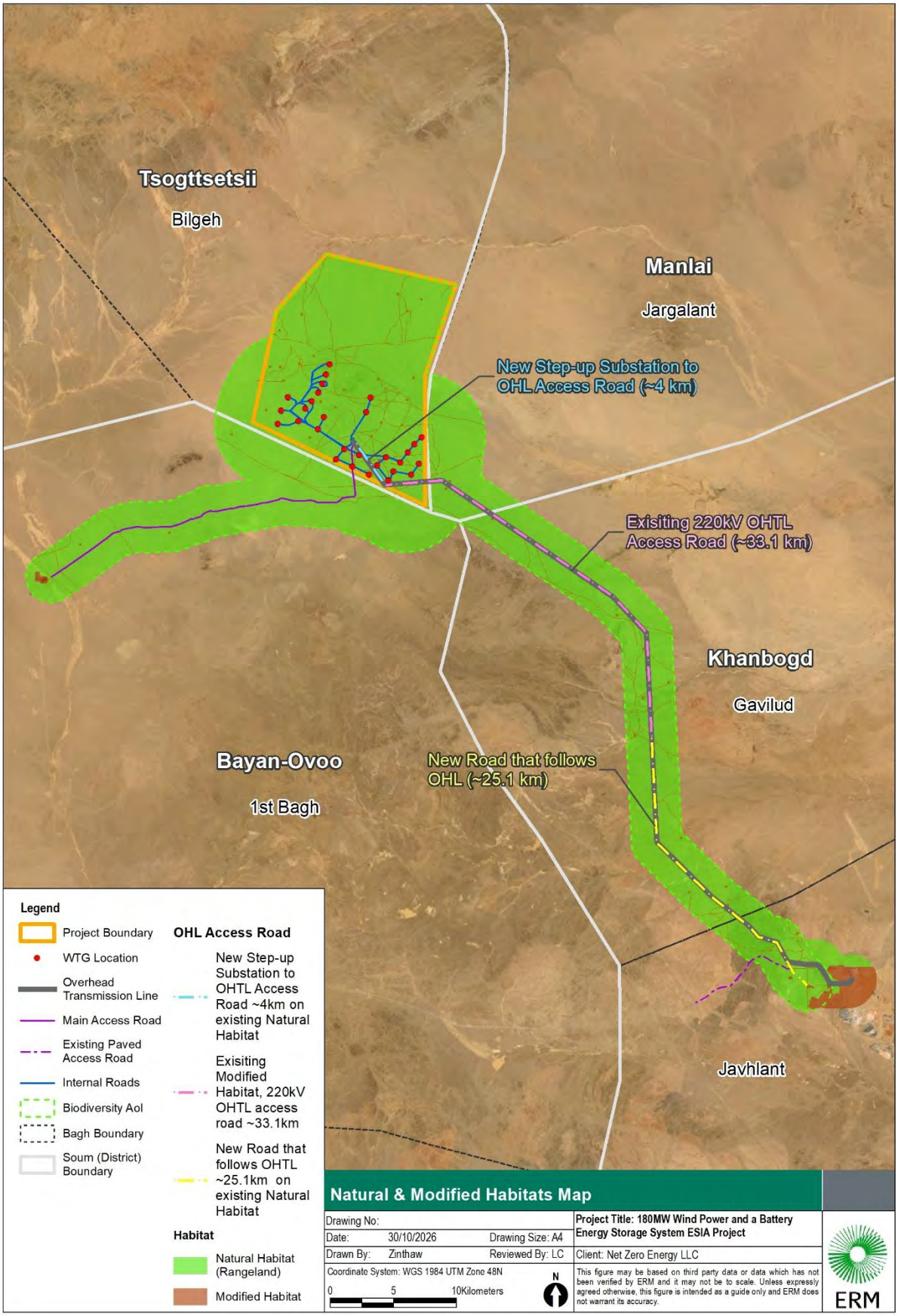


FIGURE 6-118: NATURAL AND MODIFIED HABITATS WITHIN THE BIODIVERSITY AOI

6.2.5.2 NATURAL HABITAT (RANGELANDS)

Mountains, Hills, and Hillocks

These areas observed within natural rangeland habitats across the AoI consist of hilly terrain, including the slopes and peaks of low and mid-elevated mountains and hills, with rocky slopes and narrow valleys (***Figure 6-119***). Dominant flora species found in this habitat type includes *Stipa gobica and Allium* spp. growing with other low shrub and bush species on sandy and gravelly soils. Vegetation associations documented in this habitat includes:

- *Stipa gobica-Allium polyrhizum-Cleistogenes aquarrosa-Kraschninikovia ceratoides*;
- *Allium polyrhizum-Artemisia frigida-Stipa gobica-Cleistogenes songarica-Caragana leucophloea*; and
- *Allium polyrhizum-Anabasis brevifolia-Stipa gobica*.

Flora species of conservation concern recorded within this habitat type during the baseline surveys include *Amygdalus mongolica*—classified as EN on Mongolia Red List (MRL) and Rare under the Law on Natural Plants (1995)—as well as *Artemisia xanthochroa* (NT, MRL and Very Rare)*, Asterothamnus centraliasiaticus* (LC on MRL, Very Rare)*, Caryopteris mongholica* (VU on MRL, Rare)*, Olgaea leucophylla* (NT on MRL, Very Rare)*, Oxytropis aciphylla* (Rare)*, Stellaria dichotoma* (NT on MRL, Very Rare)*, Tugarinovia mongolica* (VU on MRL, Very Rare), and *Vincetoxicum sibiricum* (LC on MRL, Rare)*.* Other common species include *Salsola laricifolia* and *Ajania achilleoides*.

Fauna species of conservation concern predominantly observed in this habitat type during surveys include the Cinereous Vulture (*Aegypius monachus*) (NT on IUCN Red List), Saker Falcon (*Falco cherrug*) (EN, IUCN and VU, MRL), Mongolian Ground Jay (*Podoces hendersoni*) (VU, MRL), Great Bustard (*Otis tarda*) (EN, IUCN and VU, MRL), Goitered Gazelle (*Gazella subgutturosa*) (VU, IUCN and MRL), and Mongolian Gazelle (*Procapra gutturosa*) (LC, IUCN and EN, MRL).

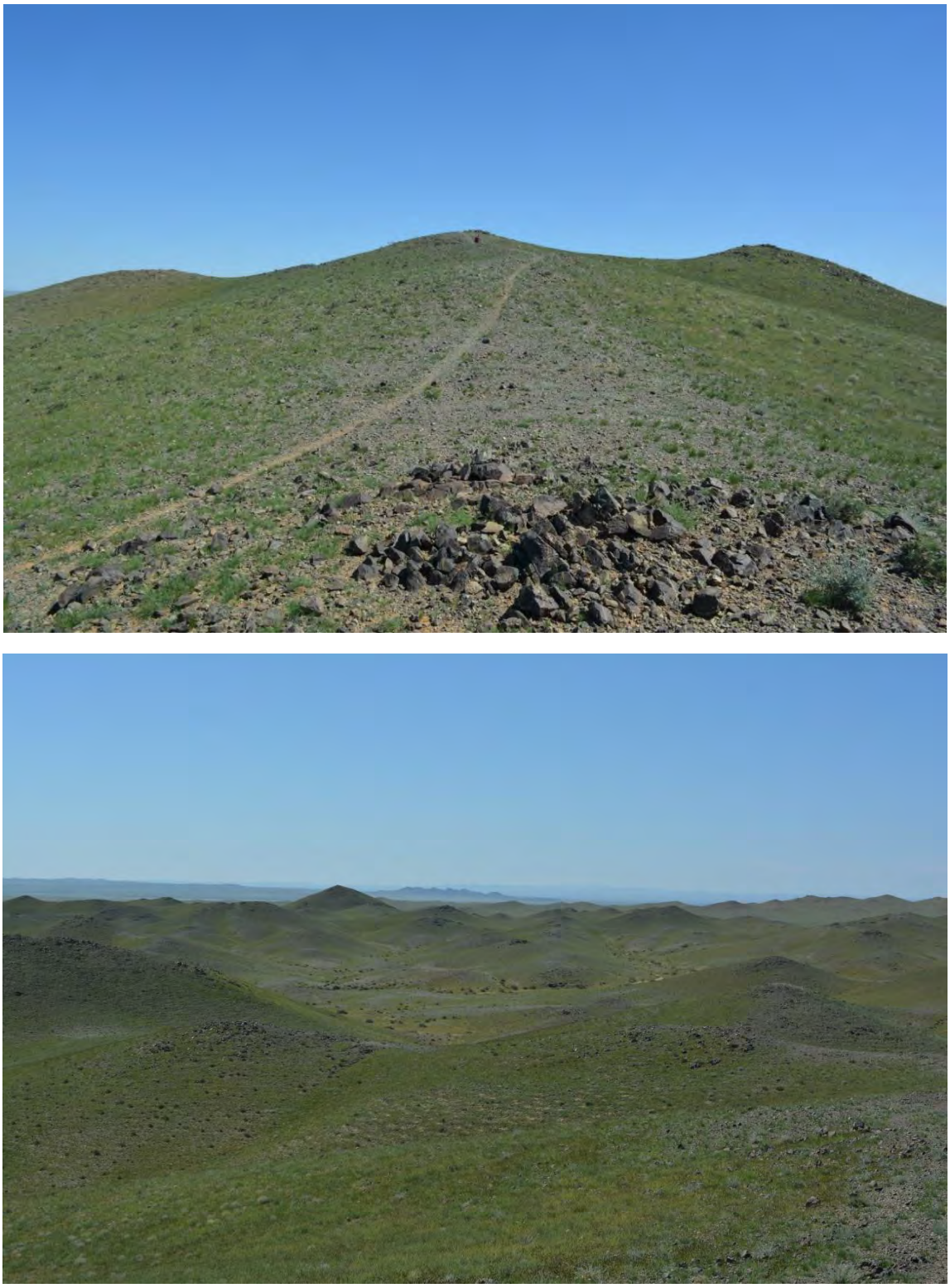


FIGURE 6-119: MOUNTAINS, HILLS AND HILLOCKS IN THE PROJECT AREA

Open Plains and Desert Steppe

Rangelands in the Project AoI include areas of open plains characterized by wide valleys situated between low and mid-elevated mountains, open areas of scarcely vegetated desert steppe, and open desert steppe areas transitioning toward foothills. Plant communities are dominated by desert steppe vegetation such as *Allium* spp., *Artemisia* spp., and *Stipa gobica*, with the following assemblages observed:

- *Allium polyrhizum, A.mongolicum-Stipa gobica, Cleistogenes songarica-Artemisia frigida, Ajania achilleoides*;
- *Anabasis brevifolia, Potaninia mongolica, Salsola passerina-Allium polyrhizum-Stipa gobica, Cleistogenes songarica*; and
- *Allium polyrhizum-Artemisia frigida-Stipa gobica-Anabasis brevifolia*.

Flora species of conservation concern recorded within this habitat type during the baseline surveys include *Asterothamnus centraliasiaticus* (LC on MRL, Very Rare)*, Oxytropis aciphylla* (Rare)*,* and *Potaninia mongolica* (NT on MRL, Very Rare)*.*

Fauna species of conservation concern observed in this habitat type within the Project AoI include the Cinereous Vulture (*Aegypius monachus*) (NT, IUCN), Saker Falcon (*Falco cherrug*) (EN, IUCN and VU, MRL), Steppe Eagle (*Aquila nipalensis*) (EN, IUCN and LC, MRL), Asiatic Wild Ass (*Equus hemionus*) (NT, IUCN and EN, MRL), Five-toed Pygmy Jerboa (*Cardiocranius paradoxus*) (DD on IUCN, VU on MRL, Rare) and Corsac Fox (*Vulpes corsac*) (LC, IUCN and NT, MRL).





FIGURE 6-120: PLAINS, VALLEYS, AND OPEN AREAS OF DESSERT STEPPE

Dry Riverbeds and Ephemeral Drainage Channels

Dry riverbeds situated within ravines and gullies of low mountains and hills are present across the rangelands in the AoI, as well as dry riverbeds in open desert steppe areas, primarily made up of sandy and saline soils. These areas were observed to be dominated by bushes and Chee

Grass (*Stipa splendens*). Floodwaters deposit alluvial soils in these ravines during rainy season. Dominant vegetation assemblages in this habitat include:

- *Stipa gobica-Allium polyrhizum-Cleistogenes aquarrosa-Kraschninikovia ceratoides;*
- *Amygdalus mongolica-Ajania achilleoides;*
- *Salsola larificifolia;*
- *Achnatherum splendens-Nitraria sibirica-Allium mongolicum; and*
- *Allium polyrhizum-Peganum nigellastrum with annual herbs.*

Flora species of conservation concern recorded within this habitat type during the baseline surveys include *Amygdalus mongolica* (EN, MRL and Rare), *Artemisia xanthochroa* (NT, MRL and Very Rare), *Asterothamnus centraliasiaticus* (LC on MRL, Very Rare), *Caryopteris mongholica* (VU on MRL, Rare), *Oxytropis aciphylla* (Rare), and *Stellaria dichotoma* (NT on MRL, Very Rare).

Fauna species of conservation concern observed in these habitats within the AoI include the Cinereous Vulture (*Aegypius monachus*) (NT, IUCN), Short-toed Snake Eagle (*Circaetus gallicus*) (LC, IUCN and EN, MRL), and Bearded Vulture (NT, IUCN and VU, MRL), as well as the Red Fox (*Vulpes vulpes*) (LC, IUCN and NT, MRL).





FIGURE 6-121: DRY RIVERBEDS AND DRAINAGE CHANNELS

6.2.5.3 MODIFIED HABITATS

Built-up Areas

The density of human settlements in the overall region remains very low[60], and the level of human influence is among the lowest of the world; therefore, the Mongolian Gobi region has been identified as among the world's largest and most intact (least converted) remaining wild areas[61]. Minimal human disturbance was also observed in the Project's WTG land lease area, limited to scattered winter camp structures and access tracks, a small number of wells (consisting of small buildings), two of NZE's Light Detection and Ranging (LiDAR) installations, a tower structure that appears to be defunct, road networks traversing through the WTG area and along the OHL (***Figure 6-122***). These areas are also noted to be scarcely populated, with small, temporary herder settlements and structures located in the Project boundaries and the surrounding areas used as pastures for livestock grazing by nomadic herder communities. The route of an existing transmission line passes to the south of the land lease area. The main built-up structures within the Project's AoI include the Oyu Tolgoi mine located at the southern end of the Project's OHL route, as well as a small coal processing facility adjacent to the existing road network to which the Project's access road will connect (likely a structure that forms part of the Tavan Tolgoi Mine north of the Project).

[60] M. Heiner, Y. Bayarjargal, J. Kiesecker, D Galbadrakh, N. Batsaikhan. 2013. Identifying Conservation Priorities in the Face of Future Development: Applying Development by Design in the Mongolian Gobi. Mongolian Academy of Sciences (MAS); Mongolian Academy of Sciences, Institute of Geography (2009) Mongolian National Atlas. Ulaanbaatar.

[61] Sanderson EW, Jaiteh M, Levy MA, Redford KH, Wannebo AV and Woolmer G (2002) The human footprint and the last of the wild. Bioscience 52(10): 891-904. http://dx.doi.org/10.1641/0006-3568(2002)052[0891:THFATL]2.0.CO;2




Herder's Settlement Structures



Coal Processing Facility adjacent to Access Road (Google Earth)



Oyu Tolgoi Mine (Google Earth)

FIGURE 6-122: BUILT-UP STRUCTURES

6.2.6 FLORA

Two (2) rounds of flora surveys were conducted from 24 August – 3 September 2024 and 7 – 20 May 2025, with 19 sampling locations in August 2024 and 43 sampling points in May 2025. The location and quantity of sampling points were selected with the aim of obtaining a representative description of floral diversity and density in the Project area. Some additional plots that weren't surveyed in August 2024 were added in May 2025 to account for potential changes in the locations of each wind turbine, as the final WTG layout had not yet been finalized at the time of these surveys. Floral sampling locations are shown in ***Figure 6-123*** below.

A total of 109 plant species belonging to 70 genera and 29 families were recorded throughout the baseline surveys within the Project AoI. See ***Annex A*** for a detailed checklist of all floral species recorded, along with their geographic distribution within the Project area, habitats in which they were observed, cultural and/or socioeconomic value and uses, as well as global and regional conservation status.

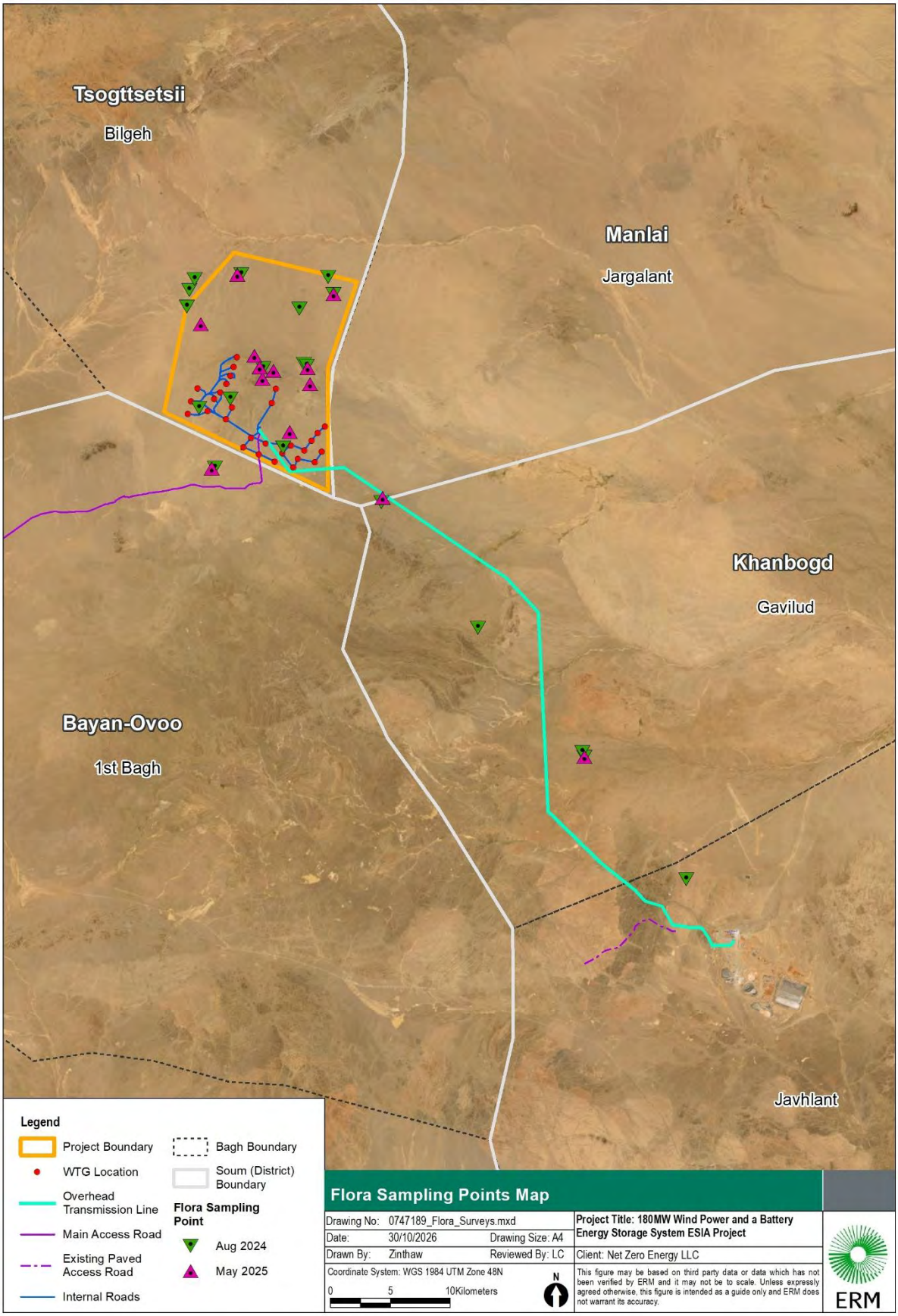


FIGURE 6-123: LOCATIONS OF FLORA SAMPLING POINTS IN AUGUST 2024 AND MAY 2025

6.2.6.1 FLORAL DIVERSITY AND ABUNDANCE

As shown in ***Figure 6-124***, the majority of species observed are perennial plants (59 species), followed by annual plants (29 species), shrubs (10 species), semi-shrubs (7 species, and subshrubs (4 species). See ***Section 6.2.6.4*** for details on flora species of conservation concern, as well as ***Annex A*** for a detailed checklist of all floral species recorded along with their distribution, habitats, socioeconomic value and uses, and global and regional conservation status. See ***Figure 6-125*** for overall flora species diversity and distribution throughout the AoI as observed from the August 2024 and May 2025 surveys.

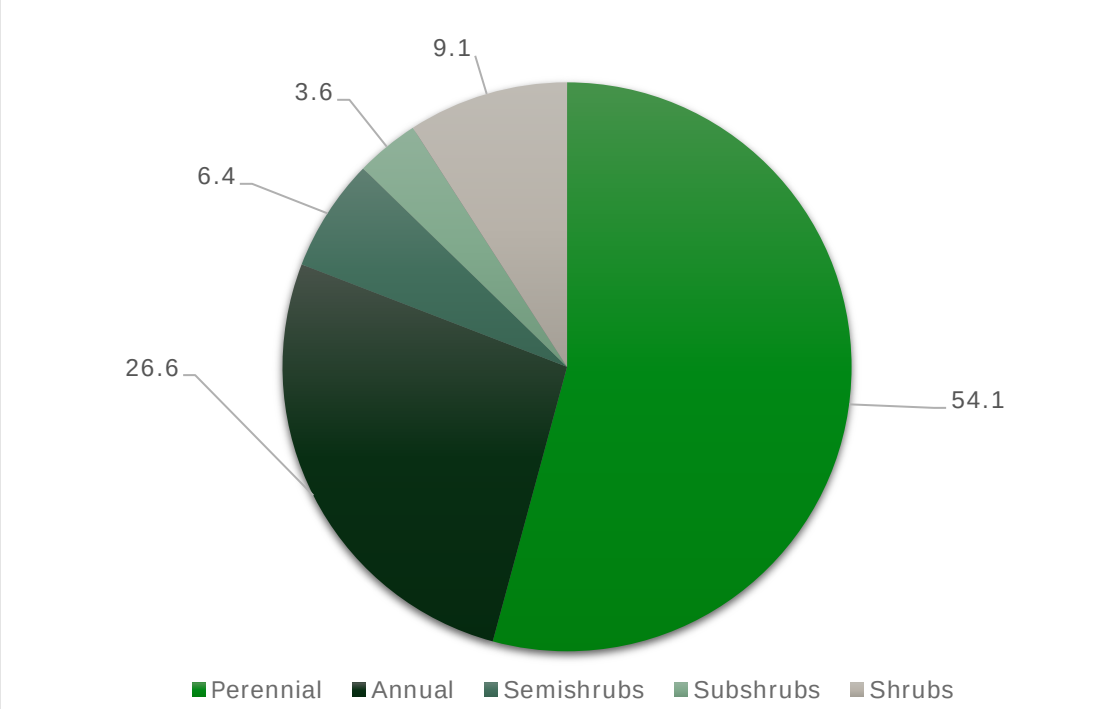


FIGURE 6-124: FLORA SPECIES RECORDED IN THE PROJECT AREA BY LIFE FORM (%)

During the August 2024 survey, the most frequently observed plant species are *Allium mongolicum* and *Allium polyrhizum*—both of which were found in 18 out of 19 plots—followed by *Bassia dasyphylla*, *Enneapogon borealis*, and *Eragrostis minor* (17 plots); *Ajania achilleoides*, *Peganum nigellastrum*, and *Stipa gobica* (16 plots); *Cleistogenes songarica, Oxytropis aciphylla*, and *Salsola collina* (15 plots); *Aristida adscensionis, Convolvulus ammanii, Ferula bungeana,* and *Rheum nanum* (14 plots); *Artemisia frigida*, *Corispermum mongolicum,* and *Kraschenninnikovia ceratoides* (13 plots); *Anabasis brevifolia, Caragana leucophloea,* and *Iris bungei* (12 plots).

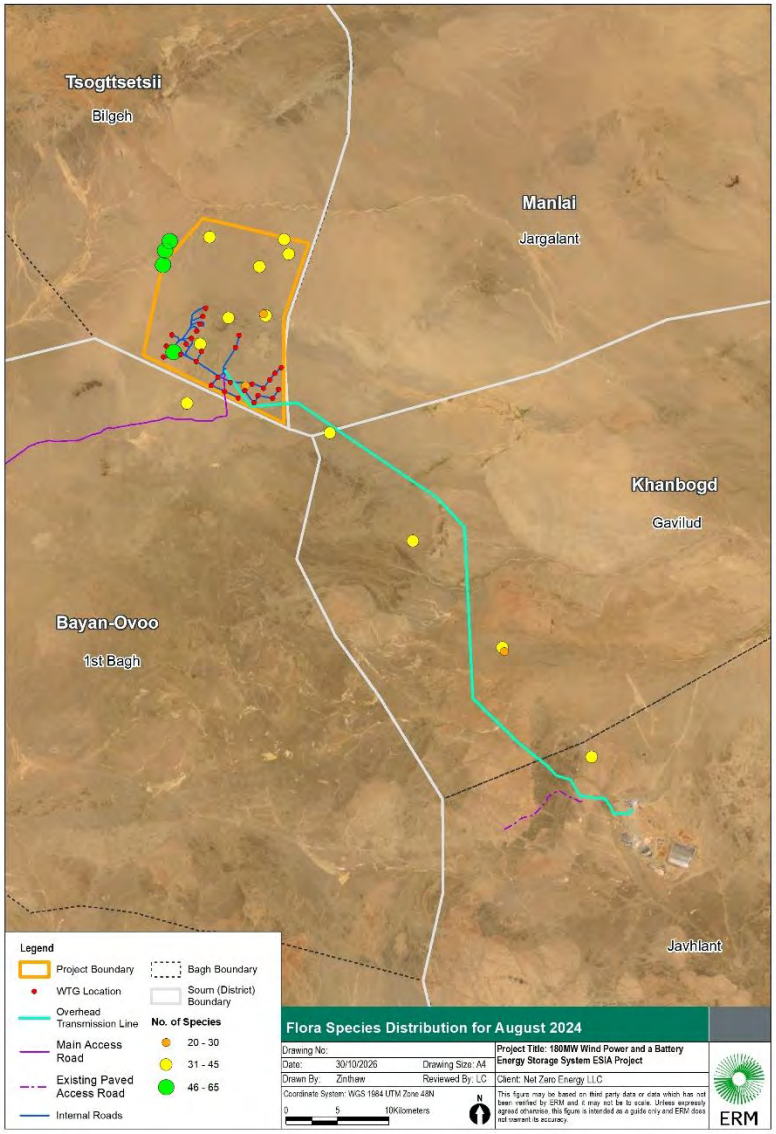
In the May 2025 survey, the most frequently observed plant species is *Stipa gobica* – which was found in all 41 plots – followed by *Allium polyrhizum, Oxytropis aciphylla, Kraschenninnikovia ceratoides, Caragana leucophloea, Cleistogenes songarica, Ajania achilleoides,* and *Artemisia frigida*, all of which were recorded in 31 to 40 plots.

Overall, the most commonly observed flora species across all sampling points for both surveys are *Allium polyrhizum*, *Stipa gobica, Ajania achilleoides*, *Oxytropis aciphylla, Cleistogenes songarica, Allium mongolicum, Artemisia frigida, Kraschenninnikovia ceratoides,* and *Asparagus gobicus*. In terms of dominance, the species that make up the largest proportion of total

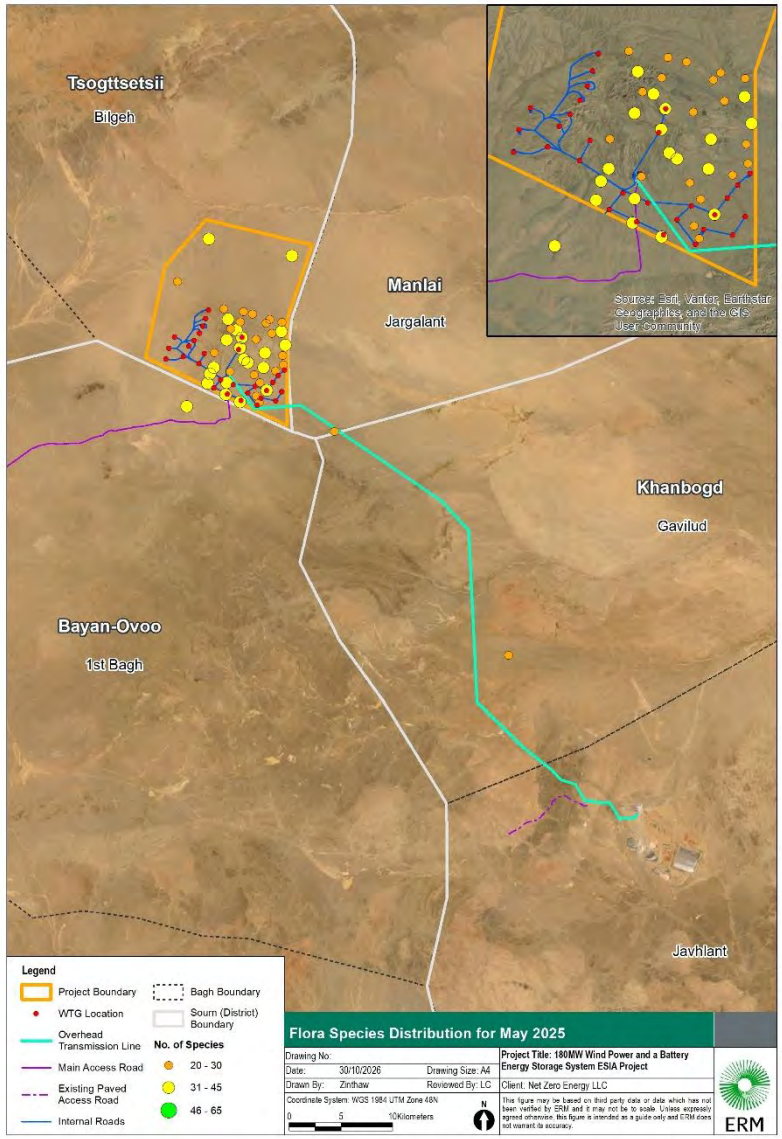
vegetation cover across all sampling points, on average, are *Stipa gobica* and *Allium polyrhizum.*

None of these species are considered flora of conservation concern, as none of them are listed on the IUCN Red List (except for *Allium mongolicum* which is assessed as Least Concern), Mongolian Red List (MRL) for Plants (except for *Oxytropis aciphylla* which is assessed as Least Concern), and the Mongolian Law on Natural Plants of 1995 and Mongolian Red Book.

Of the five areas with the highest levels of species richness recorded per plot during the August 2024 survey, four are located in the WTG area (with records of between 39 to 52 species) while the other plot is located in the northern section of the OHL (with 51 species recorded). Similarly, plots with the highest species diversity recorded in May 2025 are all located within the WTG area, with records of between 20 to 28 species. The plot coverage of species in August 2024 averaged at 41.4 percent, ranging from 30 – 65 percent vegetation cover, while the average plot cover was 32.7 percent in May 2025, ranging from 20 – 45 percent vegetation cover. Overall, species richness and vegetation cover are similar between sampling plots in the WTG area compared to the OHL area. The average number of species observed within each plot in the WTG area and along the OHL are 31 and 31.2 species, respectively, while the percentage of vegetation cover recorded are 41.9 percent and 40 percent, respectively.

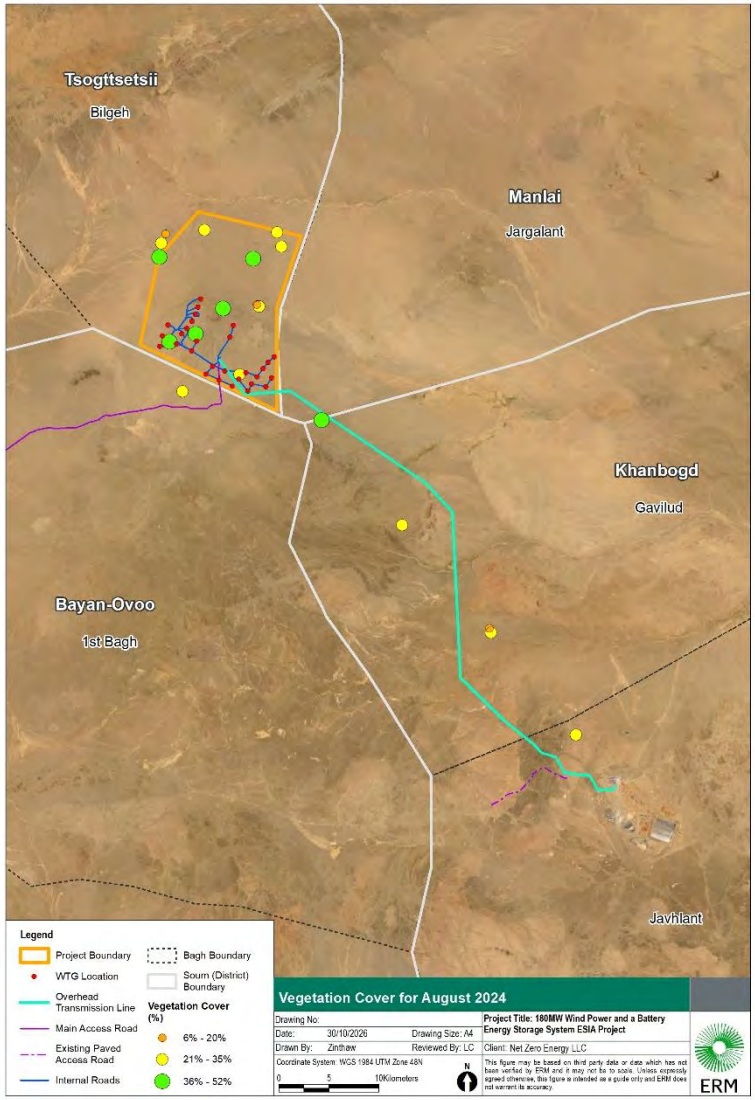


August 2024

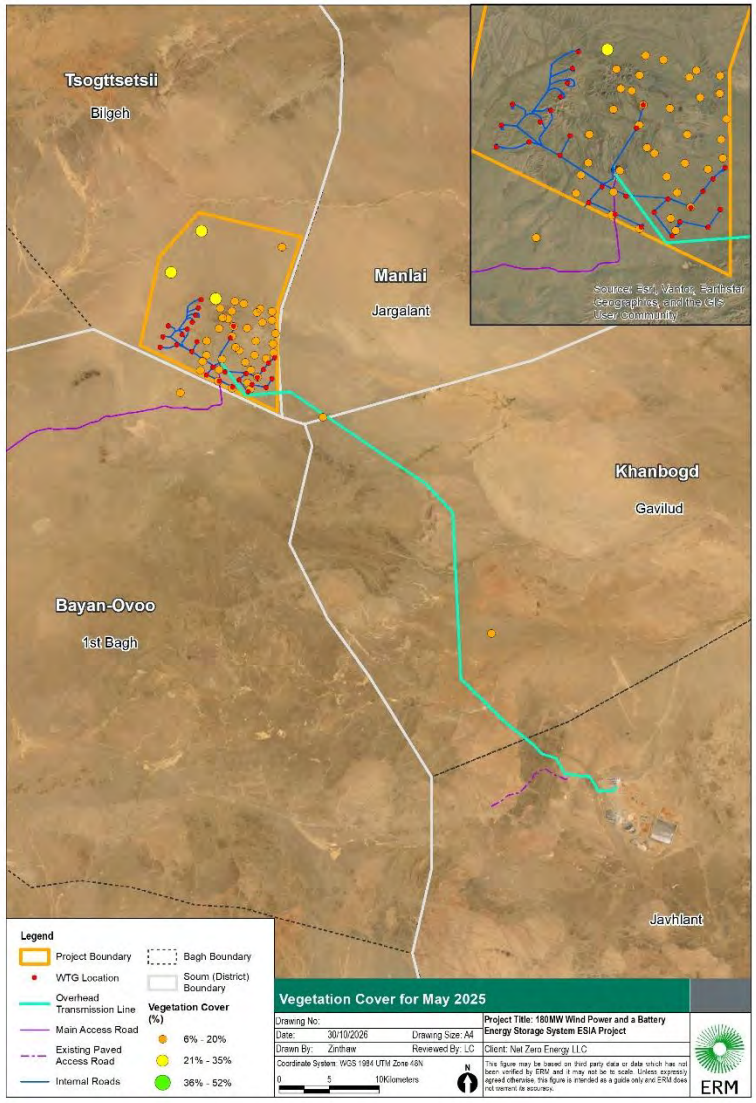


May 2025

FIGURE 6-125: FLORA SPECIES RICHNESS AND DISTRIBUTION IN THE PROJECT AREA



August 2024



May 2025

FIGURE 6-126: SAMPLING PLOTS WITH THE HIGHEST RECORDED SPECIES DIVERSITY

TABLE 6-47: FLORA SAMPLING PLOTS WITH THE HIGHEST SPECIES RICHNESS

Plot	Coordinates		No. of Species	Vegetation Cover (%)	Average Height (cm)	Plant Communities	Remarks
	Latitude	Longitude					
August 2024							
FL-4	43.478701	106.364148	52	45	12	*Stipa gobica, Cleistogenes songarica-Salsola laricifolia, Krascheninnikovia ceratoides, Caragana pymaea-Allium polyrhizum* with annual herbs	Central section of the WTG Area near turbines T15 and T4.
FL-8L	43.376474	106.483701	51	45	10	*Stipa gobica, Cleistogenes songarica-Allium polyrhizum, A.mongolicum-Artemisia frigida-Anabasis brevifolia*	Northern portion of OHL.
FL-6	43.449497	106.297314	41	50	18	*Allium polyrhizum-Artemisia frigida-Stipa gobica, Cleistogenes songarica-Caragana leucophloea, Krascheninnikovia ceratoides*	Eastern section of the WTG Area near turbines T2, T3 and T9.
FL-3A	43.525887	106.286666	39	50	10	*Allium polyrhizum-Stipa gobica, Cleistogenes songarica-Anabasis brevifolia, Reaumuria soongarica* with annual herbs	Northern section of the WTG Area, at least 5.5 km from the nearest turbine.
FL-13	43.456319	106.329614	39	40	15	*Stipa gobica, Cleistogenes songarica-Allium polyrhizum-Krascheninnikovia ceratoides, Salsola laricifolia, Amygdalus mongolica-Ajania achilleoides* with annual herbs	Central/eastern section of the WTG Area, adjacent to turbines T7, T8 and T11.
May 2025							
FL-3	43.51265	106.30031	28	20	15	*Stipa gobica-Anabasis brevifolia-Allium polyrhizum*	Northern section of the WTG Area, at least five (5) km from the nearest turbine.
FL-4	43.488318	106.355351	23	30	12	*Stipa gobica-Allium polyrhizum-Ajania achilleoides, Artemisia frigida-Krascheninnikovia ceratoides*	Central section of the WTG Area near turbines T15 and T4.

Plot	Coordinates		No. of Species	Vegetation Cover (%)	Average Height (cm)	Plant Communities	Remarks
	Latitude	Longitude					
FL-1	43.549395	106.339029	22	35	15	*Allium polyrhizum-Stipa gobica-Anabasis brevifolia, Salsola passerina, Potaninia mongolica-Krascheninnikovia ceratoides, Nitraria sibirica*	Northern section of the WTG Area at least 6.5 km away from the nearest turbine.
N1	43.479455	106.360433	20	35	18	*Stipa gobica* dominant, with shrubs	Central section of the WTG Area approximately two (2) km from turbines T15 and T4.
FL-18	43.4678	106.423998	20	40	20	*Stipa gobica-Allium polyrhizum-Artemisia frigida* with shrubs	Western section of the WTG area around four (4) km from turbine '4 point'.

6.2.6.2 VEGETATION COMMUNITIES

Geobotanical analysis of flora sampling plots and species recorded during the baseline surveys were complemented by review of scientific literature and available datasets to identify vegetation communities present in the Project area. Overall, 13 plant communities have been identified in the WTG area and along the OHL route as mapped in ***Figure 6-127. Table 6-48*** presents details on each vegetation community, including dominant species present, the size of each community (in ha), and degradation intensity (based on species diversity, vegetation cover, abiotic ground cover, grazing pressure, etc.) assessed according to a three-range scale: not degraded, lightly degraded, and moderately degraded. Of the 13 vegetation communities identified, seven (7) are moderately degraded (53.8%), Four (4) are lightly degraded (30.8%), one (1) community is partially not and lightly degraded (7.7%), and one (1) is not degraded (7.7%).

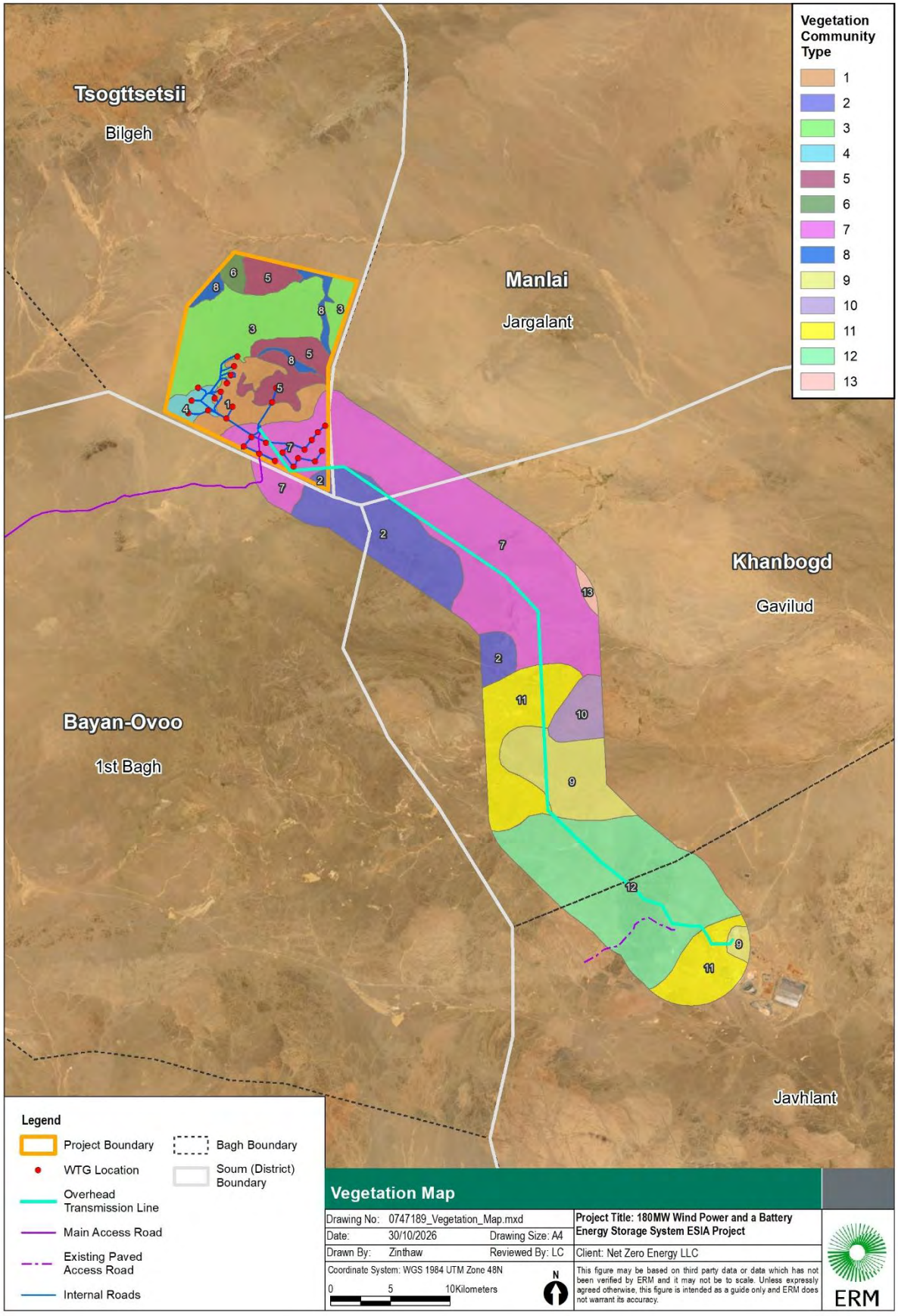


FIGURE 6-127: VEGETATION COMMUNITIES IN THE PROJECT AREA

TABLE 6-48: VEGETATION COMMUNITIES IN THE PROJECT AREA

No.	Vegetation Community	Location	Area (ha)	Degradation Level
1	*Stipa gobica-Allium polyrhizum-Cleistogenes squarrosa-Krascheninnikovia ceratoides-Salsola laricifolia,* and *Amygdalus mongolica-Ajania achilleoides.*	WTG Area	3,114	Communities on mountains, hills and hillocks are not degraded. Communities in mountain valleys and dry riverbeds are lightly degraded.
2	*Stipa gobica-Cleistogenes songorica-Allium polyrhizum,* and *Amygdalus mongolica-Artemisia frigida-Anabasis brevifolia.*	WTG Area and OHL	8,528	Not degraded.
3	*Allium polyrhizum-Artemisia frigida-Stipa gobica-Anabasis brevifolia.*	WTG Area	7,697	Moderately degraded.
4	*Allium polyrhizum-Artemisia frigida-Stipa gobica, Cleistogenes songorica-Caragana leucophloea,* and *Krascheninnikovia ceratoides.*	WTG Area	873	Moderately degraded.
5	*Allium polyrhizum-Anabasis brevifolia-Stipa gobica.*	WTG Area	3,797	Moderately degraded.
6	*Anabasis brevifolia, Potaninia mongolica, Salsola passerina-Allium polyrhizum-Stipa gobica,* and *Cleistogenes songorica.*	WTG Area	542	Lightly degraded.
7	*Allium polyrhizum, Amygdalus mongolica-Stipa gobica, Cleistogenes songorica-Artemisia frigida,* and *Ajania achilleoides.*	WTG Area	23,462	Moderately degraded.
8	*Achnatherum splendens-Nitraria sibirica-Allium mongolicum, Allium polyrhizum-Peganum nigellastrum*, and other annual herbaceous plants.	WTG Area and OHL	1,101	Moderately degraded.
9	*Salsola passerina, Anabasis brevifolia, Reaumuria soongarica-Allium polyrhizum-Stipa gobica,* and *Cleistogenes songorica.*	OHL	5,704	Lightly degraded.
10	*Stipa gobica-Ajania achilleoides-Allium polyrhizum,* and *Caragana leucophloea*	OHL	1,872	Lightly degraded.
11	*Anabasis brevifolia-Salsola passerina-Reaumuria soongorica,* and *Potaninia mongolica*	OHL	9,063	Moderately degraded.
12	*Potaninia mongolica, Salsola laricifolia, Amygdalus mongolica-Stipa gobica,* and other annual herbs.	OHL	15,595	Moderately degraded.
13	*Stipa gobica-Artemisia frigida-Allium polyrhizum,* and *Caragana leucophloea*	OHL	329	Lightly degraded.

6.2.6.3 SOCIOECONOMIC AND CULTURAL USES/SERVICES

Among a total of 109 plant species recorded in the Project area, 34 species are utilized for medicinal purposes (including traditional medicine and pharmaceutical production), seven (7) species are suitable for livestock fodder, and three (3) are known to be collected for subsistence food. See ***Table 6-49*** for the full details. Given the distribution of *Anabasis brevifolia* and *Stipa gobica* across the entire survey area, it is not possible to determine the most suitable area for pasture and it can be assumed that herders may utilize different areas according to the vegetation growth rather than species composition.

TABLE 6-49: SOCIOECONOMIC/CULTURAL VALUE AND USES OF FLORA SPECIES RECORDED IN THE PROJECT AREA

No	Scientific Name	Mongolian Name	Medicinal Use	Livestock Fodder	Subsistence (Food)
1	*Allium mongolicum*	Монгол сонгино	✓	✓	-
2	*Allium polyrhizum*	Үндсэрхэг сонгино	✓	-	✓
3	*Alyssum canescens*	Бууралдуу янгиц	✓	-	-
4	*Amygdalus mongolica*	Монгол бүйлэс	✓	✓	-
5	*Anabasis brevifolia*	Ахар навчит баглуур	✓	✓	-
6	*Artemisia frigida*	Өлчир шарилж	✓	-	-
7	*Artemisia macrocephala*	Ээрэм шарилж	✓	-	-
8	*Artemisia xerophytica*	Хуурайсаг шарилж	✓	-	-
9	*Asterothamnus centraliasiaticus*	Төв азийн лавай	✓	-	-
10	*Bassia dasyphylla*	Үслиг мананхамхаг	✓	-	✓
11	*Caragana korshinskyi*	Коржинскийн харгана	✓	-	-
12	*Convolvulus ammanii*	Амманы сэдэргэнэ	✓	-	-
13	*Dontostemon integrifolius*	Бүтэн навчит багдай	✓	-	-
14	*Euphorbia mongolica*	Монгол сүүт-өвс	✓	-	-
15	*Haplophyllum dauricum*	Дагуур хүж өвс	✓	-	-
16	*Iris bungei*	Бунгийн цахилдаг	✓	-	-
17	*Limonium bicolor*	Алаг бэрмэг	✓	-	-
18	*Nitraria sibirica*	Сибирь хармаг	✓	-	✓
19	*Olgaea leucophylla*	Цагааннавчит хасзул	✓	-	-
20	*Orostachys spinosa*	Хатгуурт үлд-өвс	✓	-	-
21	*Oxytropis aciphylla*	Өргөст ортууз	✓	-	-

No	Scientific Name	Mongolian Name	Medicinal Use	Livestock Fodder	Subsistence (Food)
22	*Peganum nigellastrum*	Харлаг үмхий өвс	✓	-	-
23	*Potentilla bifurca*	Имт гичгэнэ	✓	-	-
24	*Reaumuria soongarica*	Зүүнгарын улаанбударгана	✓	✓	-
25	*Rheum nanum*	Намхан гишүүнэ	✓	✓	-
26	*Salsola collina*	Толгодын бударгана	✓	-	-
27	*Salsola laricifolia* Turcz. Ex Litv.	Шинэсэрхүү бударгана	✓	-	-
28	*Salsola passerina*	Улаан бударгана	✓	✓	-
29	*Scorzonera pseuvdodivaricata*	Хуурамч дэрэвгэр хависгана	✓	-	-
30	*Stellaria dichotoma*	Ацан ажигана	✓	-	-
31	*Stipa gobica*	Говийн хялгана	✓	✓	-
32	*Tribulus terrestris*	Зэлэн зангуу	✓	-	-
33	*Vincetoxicum sibiricum*	Тэсэрхүү тэмээнхөх	✓	-	-
34	*Zygophyllum xanthoxylon*	Шар модот хотир	✓	-	-

Sources:
- Urgamal, M., & Kwon, O. 2015. The handbook for traditional knowledge on biological resources (Vol. 1, p. 632). Ulaanbaatar: SeoHyeong Publishing Printed in the Republic of Korea. National Institute of Biological Resources (NIBR). ISBN 978-89-6811-202-7 (93470)
- Magsar, U., Baasansuren, E., Tovuudorj, M. E., Shijirbaatar, O., Chinbaatar, Z., Khureltsetseg, L. and Kwon, O. 2013. Medicinal plant diversity in the southern and eastern Gobi Desert region, Mongolia. Journal of Ecology and Environment 42(4): 1-13. DOI 10.1186/s41610-018-0064-5
- World Health Organization. 2013. Medicinal plants in Mongolia. ISBN 978-92-9061-632-0. Available at: 9789290616320_eng.pdf

6.2.6.4 FLORA SPECIES OF CONSERVATION CONCERN

Of all 109 flora species observed in the Project area, one (1) species (*Kalidium foliatum* or *Kalidiopsis wagenitzii*) is classified as Data Deficient (DD) on the IUCN Red List, while the rest are not evaluated. In terms of regional conservation status, *Amygdalus mongolica* is classified on the Mongolian Red List of Plants as Endangered (EN), while *Tugarinovia mongolica* and *Caryopteris mongholica* are Vulnerable (VU). The remaining species are categorized as Least Concern or not evaluated on the IUCN Red List and Mongolian Red List.

National protection status is designated based on the classifications of 'Very Rare' or 'Rare' as prescribed by the Law on Natural Plants (1995), which is also captured in the Mongolian Red Book (refer to ***Section 6.2.2.1*** for more details and definitions of the classifications). In total, five (5) 'Rare' species have been recorded in the Project area during the August 2024 and May 2025 baseline surveys, including *Amygdalus mongolica, Caryopteris mongholica, Oxytropis aciphylla, Stellaria dichotoma,* and *Vincetoxicum sibiricum*. Four (4) are listed as 'Very Rare',

including *Artemisia xanthochloa, Olgaea leucophylla, Potaninia mongolica,* and *Tugarinovia mongolica.*

Based on a review of available literature[62, 63, 64], none of the flora species of conservation significance meet the definitions of an endemic and/or range-restricted species per IFC PS6, i.e. plant species with a global extent of occurrence (EOO) of less than 50,000 km^2.

In addition to plant species recorded from the ESIA baseline surveys, the Project's DEIA also found the presence of *Artemisia xanthochroa*, as well as three (3) other unique species of conservation significance, including *Chesneya mongolica* (listed as Very Rare and NT on the Mongolian Red List but NE on IUCN), as well as *Oxytropis aciphylla* and *Ephedra sinica*, both of which are listed as Rare but NE on the IUCN Red List and Mongolian Red List.

Figure 6-128 maps the locations of sampling plots at which flora species of conservation concern were recorded during the ESIA baseline surveys, while ***Table 6-50*** presents details on all 13 species mentioned above.

[62] Urgamal, M. and Oyuntsetseg, B. (2017). Atlas of the Endemic Vascular Plants of Mongolia. Ulaanbaatar. Mongolia. "Bembi San" Press. 107pp.
[63] Urgamal, M., Oyuntsetseg, B., Nyambayar, D., and Dulamsuren, C. (2014). Conspectus of the vascular plants of Mongolia. In Ch. Sanchir & Ts. Jamsran (Eds.), (p. 334). Ulaanbaatar, Mongolia: "Admon" Press.
[64] Baasanmunkh, S., Urgamal, M., Oyuntsetseg, B., Grabovskaya-Borodina, A., Oyundelger, K., Tsegmed, Z., Gundegmaa, V., Kechaykin, A. A., Pyak, A. I., Zhao, L. Q., & Choi, H. J. (2021). Updated Checklist of Vascular Plants Endemic to Mongolia. Diversity, 13(12), 619. https://doi.org/10.3390/d13120619

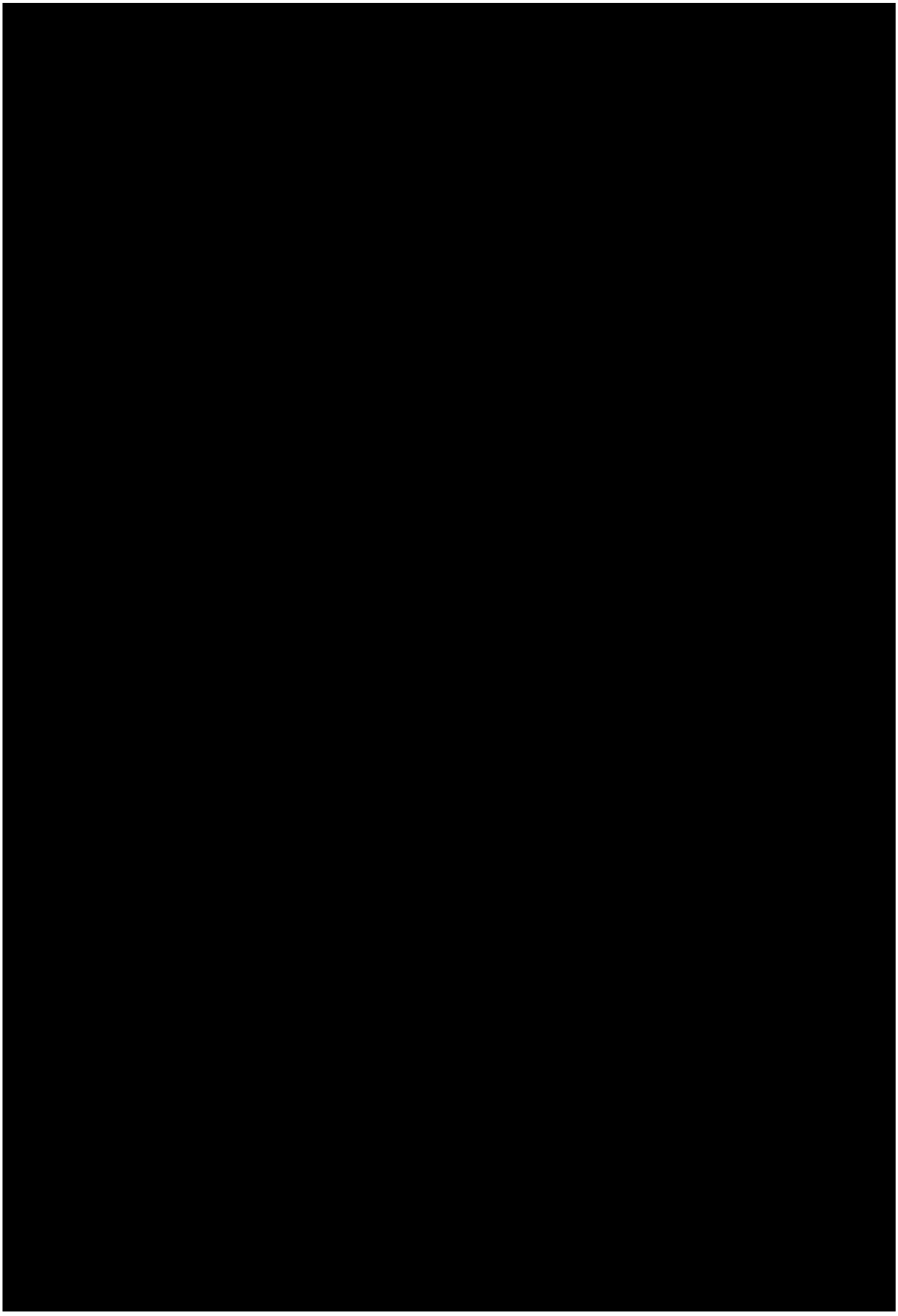


FIGURE 6-128: [redacted]

TABLE 6-50: FLORA SPECIES OF CONSERVATION CONCERN RECORDED DURING BASELINE SURVEYS

№	Species	IUCN Red List*	Mongolian Red List of Plants (2011)**	Law on Natural Plants (1995) / Red Book***	Observed Survey Location		Species Information
					August 2024	May 2025	
1	*Amygdalus mongolica* Монгол бүйлэс	NE	EN	Rare	WTG and OHL	WTG	*Amygdalus mongolica* is present in Mongolia and China, and known from the East Gobi, Gobi Altai, and Alashan Gobi regions of Mongolia. This shrub species is found in hilly areas, stony slopes and dry riverbeds of desert and desert steppe and used for both traditional medicine and pasture for grazing livestock. It is classified as Endangered on the Mongolian Red List due to a regional extent of occurrence of less than 5,000 km² and an area of occupancy of no more than 500 km^2. The number of adult individuals, as well as the distribution and habitat area and number of habitats is declining.
2	*Artemisia xanthochroa* Хуурайсаг шарилж	NE	NT	Very Rare	WTG	WTG	*Artemisia xanthochroa* is present in Mongolia and China, and known from the East Gobi, Gobi Altai, and Alashan Gobi regions of Mongolia. This semi-shrub species is found on dry slopes and steppe habitats of the Gobi Desert. There are no known significant threats to this species but it likely faces habitat degradation from overgrazing and drought. It is classified as Near Threatened on the Mongolian Red List due to threats from overgrazing and drought.
3	*Asterothamnus centraliasiaticus* Төв азийн лавай	NE	LC	Very Rare	WTG and OHL	WTG	*Asterothamnus centraliasiaticus* is present in Mongolia and China and known from the northwestern and southern regions of Mongolia, including the Gobi Desert. This semi-shrub species occurs in desert, desert steppe, grassland, meadow, rocky and gravelly slopes, stony foothills and riverbeds, and open sand dune habitats. Although the species is at risk of habitat degradation due to livestock overgrazing and anthropogenic disturbances (thus it was listed as Very Rare under the Law on Natural Plants in 1995), it has since been considered Least Concern on the Mongolian Red List because it does not meet the threshold for higher levels of regional threat.

№	Species	IUCN Red List*	Mongolian Red List of Plants (2011)**	Law on Natural Plants (1995) / Red Book***	Observed Survey Location		Species Information
					August 2024	May 2025	
4	*Caryopteris mongholica* Монгол догар	NE	VU	Rare	WTG and OHL	WTG	*Caryopteris mongholica* has a geographic range encompassing Mongolia, China and Russia, and has been recorded from most of central, southern and eastern Mongolia, including the Gobi Desert. This shrub species can be found on rocky slopes of mountains and sandy soils of steppe and desert habitats. It is classified as Vulnerable on the Mongolian Red List as it has a regional extent of occurrence of less than 5,000 km^2 and a regional area of occupancy of no more than 500 km^2. Its range is also expected to be in decline due to overgrazing by livestock and mining activities.
5	*Chesneya mongolica*	NE	NT	Very Rare	DEIA surveys		*Chesneya mongolica* is a perennial herb found in Mongolia and China and has been recorded from the northwestern, central, and southern regions of Mongolia including the Gobi Altai and Alashan Gobi. It grows in desert areas on sandy and stony slopes of hills, as well as sandy and gravelly bottoms of streams. It is classified as NT on the Mongolian Red List due to its relatively small regional geographic range as well as pressures from anthropogenic disturbances and habitat degradation (e.g. drought and overgrazing).
6	*Ephedra sinica* Chinese Ephedra	LC	NE	Rare	DEIA surveys		*Ephedra sinica* occurs over a large area in Central Asia including China, Mongolia, and Russia. This shrub is typically found in arid areas and highlands on slopes, dry riverbeds, sandy soils, and mountain sides. It has been extensively utilized in Chinese herbal medicine for hundreds of years and is widely cultivated.
7	*Olgaea leucophylla* Цагааннавчит хасзул	NE	NT	Very Rare	WTG and OHL	-	*Olgaea leucophylla* is found in Mongolia and China and has been recorded from eastern and southern Mongolia including the East Gobi and Gobi Altai regions. This perennial plant species can be found on rocky and sandy slopes of mountains and hills in desert and desert steppe ecosystems. It is also collected and used for traditional medicine. It is classified as Vulnerable on the Mongolian Red List due to its limited geographic range and

№	Species	IUCN Red List*	Mongolian Red List of Plants (2011)**	Law on Natural Plants (1995) / Red Book***	Observed Survey Location		Species Information
					August 2024	May 2025	
							impacts from habitat degradation caused by mining activities and drought conditions.
8	*Oxytropis aciphylla*	NE	NE	Rare	WTG and OHL	WTG and OHL	*Oxytropis aciphylla* is present in Mongolica, China and Russia, and known from the north, northwest, and southern regions of Mongolia including the East Gobi. It inhabits sandy and gravelly areas on hill slopes, high plains, rocky deserts, sandy lakeshores, and dry hillsides in desert steppe areas and floodplains in valleys. It is also known to be used for its traditional medicine properties.
9	*Potaninia mongolica* Монгол хойрго	NE	NT	Very Rare	WTG and OHL	WTG and OHL	*Potaninia mongolica* is present in Mongolia and China, and known from the Valley of Lakes, East Gobi, Gobi Altai, and Alashan Gobi regions of Mongolia.[65] It inhabits gravelly and sandy soils, mountain valleys, and hill slopes in desert and desert steppe zones. This species has been recorded as an ingredient used for traditional medicine. It can stay dormant under harsh environmental conditions and regenerate after a long time. However, in Mongolia it is at risk of habitat degradation due to mining activities, hence its classification as Near Threatened on the Mongolian Red List.[66]
10	*Stellaria dichotoma*	NE	NE	Rare	WTG	-	*Stellaria dichotoma* is a perennial herb species known from Mongolia, China and Russia. It inhabits stony and sandy hill slopes in steppe areas and is known to be utilized for traditional medicine purposes, but limited information is available on this species in general.
11	*Tugarinovia mongolica*	NE	VU	Very Rare	WTG and OHL	-	*Tugarinovia mongolica* is found in Mongolia and China and has been recorded from southern Mongolia including the East Gobi and Gobi Altai regions. This perennial plant species can be found

[65] Urgamal, M. et. al. 2018. Species Catalogue of Rare and Threatened Vascular Plants of Mongolia. Ulaanbaatar. Mongolia. Bembi San Press. 193pp.
[66] Nyambayar, D et. al. 2011. Mongolian Red List of Plants and Conservation Plan. Regional Red List Series Vol. 9. Zoological Society of London, National University of Mongolia, Admon Press.

№	Species	IUCN Red List*	Mongolian Red List of Plants (2011)**	Law on Natural Plants (1995) / Red Book***	Observed Survey Location		Species Information
					August 2024	May 2025	
	Монгол шардалан						on rocky slopes in desert habitats. It is also collected and used for traditional medicine. Although relatively widespread in Mongolia, it is classified as Vulnerable on the Mongolian Red List due to declining habitat size and quality attributed to mining activities.
12	*Vincetoxicum sibiricum* Тэсэрхүү тэмээнхөх	NE	LC	Rare	OHL	-	*Vincetoxicum sibiricum* has a widespread geographic distribution ranging from Mongolia to China, Kazakhstan, Korea, and Russia. It is also found in almost all of Mongolia except for the northern-central regions. This species grows on rocky hill slopes and sandy soils in desert steppe zones. Although it had been included on the Rare Plant List in 1995, it was classified as Least Concern by the Mongolian Red List in 2011 due to absence of significant threats. It is also used as an ingredient for traditional medicines for treating bile diseases, dysentery, pneumonia, as a hemostatic agent, and for detoxification and wound healing.
13	*Kalidium foliatum* Навчирхаг бударгана	DD	NE	NE	OHL	-	Information on the species' distribution, population and ecological requirements are very limited, hence the Data Deficient classification on the IUCN Red List. This species is present in southern European Russia and Asian Turkey and is protected under the Bern Convention. Also known by the synonym *Kalidiopsis wagenitzii*.[67]

Abbreviations: NE = Not Evaluated, LC = Least Concern, DD = Data Deficient, NT = Near Threatened, VU = Vulnerable, EN = Endangered

Notes:
* IUCN Global Red List of Threatened Species, Version 2025-2.
** Nyambayar, D., Oyuntsetseg, B. and Tungalag, R. (compilers). 2011. Jamsran, Ts., Sanchir, Ch., Bachman S., Soninkhishig, N,, Gombobaatar, S., Baillie, J.E.M., and Tsendeekhuu Ts. (editors). Mongolian Red List of Plants and Conservation Plan. Regional Red List Series Vol. 9. Plants. Zoological Society of London, National University of Mongolia, Admon Press.
*** Classification of 'Very Rare' and 'Rare' is based on Mongolia's Law on Natural Plants of 1995, Government Resolution No. 153 of 1995 in the appendix to the Law on Natural Plants, and Mongolian Red Book. 2014. Ulaanbaatar, Mongolia. Admon Press.

[67] Bilz, M. 2011. Kalidiopsis wagenitzii (Europe assessment). The IUCN Red List of Threatened Species 2011: e.T165184A5987108.

№	Species	IUCN Red List*	Mongolian Red List of Plants (2011)**	Law on Natural Plants (1995) / Red Book***	Observed Survey Location		Species Information
					August 2024	May 2025	

Key sources: Mongolian Red List of Plants; Urgamal, M. et. al. 2018. Species Catalogue of Rare and Threatened Vascular Plants of Mongolia. Ulaanbaatar. Mongolia. Bembi San Press. 193pp; and Flora of China database (efloras.org).



Potaninia mongolica (NT on MRL, Very Rare)



Caryopteris mongholica (VU on MRL, Rare)



Amygdalus mongolica (EN on MRL, Rare)



Olgaea leucophylla (NT on MRL, Very Rare)



Stellaria dichotoma (NE)



Tugarinovia mongolica (VU on MRL, Very Rare)



Artemisia xanthochloa (NT on MRL, Very Rare)



Vincetoxicum sibiricum (LC on MRL, Rare)



Oxytropis aciphylla (LC on MRL)



Asterothamnus centraliasiaticus (Very Rare)

Source: ERM's August 2024 and May 2025 baseline surveys.

FIGURE 6-129: PHOTOGRAPHS OF FLORA SPECIES OBSERVED IN THE PROJECT AREA

6.2.7 AVIFAUNA

Six (6) survey events were conducted for avifauna from August 2025 and May 2025, consisting of three methods: transects and point counts, vantage point surveys, nest/roost search, and carcass search surveys. In addition, birds recorded via camera traps have also been recorded. A total of 16,977 birds belonging to 63 species and 14 orders were observed within the Project's Study Area. A detailed checklist of all avian species recorded from all survey methodologies is presented in ***Annex A***. Photographs of bird species identified in the Project area during the baseline surveys are presented in ***Figure 6-138***.

6.2.7.1 SPECIES RICHNESS AND ABUNDANCE

Among a total of 16,977 individuals recorded, passerine birds (Passeriformes order) made up the vast majority with a total of 15,600 birds, followed by Pterocliformes with a total of 609 birds observed. The species richest orders recorded from the baseline surveys are Passeriformes (with 33 species or 52.4% of all species), followed by raptors including Accipitriformes (12 species or 19%) and Falconiformes (5 species or 8%), while the remaining orders were only represented by one or two species.for a summary of the most abundant species recorded in the Project area.

Avifauna surveys have also been conducted as part of the Oyu Tolgoi mine's biodiversity monitoring schemes between 2011 and 2024, which recorded a total of 240 bird species belonging to 17 orders, 45 families and 135 genera in the Oyu Tolgoi area. According to the Oyu Tolgoi Mine Environmental Management Plan Implementation Report of 2024, large flocks of Horned Larks were recorded in January and February of 2024, as well as large flocks of migrating Daurian Jackdaws (*Corvus dauuricus*), which aligns with the results of the Project's baseline surveys.

Table 6-51 summarizes avian species diversity and abundance (by order) as recorded from all avifauna surveys.

The most abundant species recorded across both the WTG and OHL areas were the Horned Lark (*Eremophila alpestris*), with a total of 14,215 birds recorded over 2,316 observations, followed by the Pallas's Sandgrouse (*Syrrhaptes paradoxus*) with 609 birds recorded over 99 observations. The Horned Lark and Pallas's Sangrouse are considered migratory species with respect to their global populations, but within the context of the East Gobi Desert Steppe region, they are considered resident breeders. Both of these species are classified as Least Concern on the IUCN Red List and the Mongolian Red List. See ***Table 6-52*** for a summary of the most abundant species recorded in the Project area.

Avifauna surveys have also been conducted as part of the Oyu Tolgoi mine's biodiversity monitoring schemes between 2011 and 2024, which recorded a total of 240 bird species belonging to 17 orders, 45 families and 135 genera in the Oyu Tolgoi area.[68] According to the Oyu Tolgoi Mine Environmental Management Plan Implementation Report of 2024, large flocks of Horned Larks were recorded in January and February of 2024, as well as large flocks of migrating Daurian Jackdaws (*Corvus dauuricus*), which aligns with the results of the Project's baseline surveys.[69]

[68] 2024 Environmental Management Plan Implementation Report for Oyu Tolgoi Copper-Gold Mining Project located in Khanbogd Soum, Umnogovi Province. Made available through communication with Oyu Tolgoi Mine and facilitated by the Client.
[69] The Oyu Tolgoi Mine's 2024 Implementation Report provided figures for species richness and abundance that contain statistical inconsistencies, therefore these have not been cited.

TABLE 6-51: AVIAN SPECIES RICHNESS AND ABUNDANCE (BY TAXONOMIC ORDER)

Order	No. of Species	% of all Species	Total No. of Birds	% of Total Birds	Most Dominant Species in the Order	Total No. of Individuals
Accipitriformes	12	19.05	497	2.93	*Aegypius monachus* Cinereous Vulture	307
Anseriformes	2	3.17	45	0.27	*Cygnus cygnus* Whooper Swan	40
Bucerotiformes	1	1.59	4	0.02	*Upupa epops* Common Hoopoe	4
Charadriiformes	1	1.59	7	0.04	*Charadrius leschenaultia* Greater Sandplover	7
Colombiformes	1	1.59	34	0.20	*Columba livia* Rock Dove	34
Cuculiformes	2	3.17	3	0.02	*Cuculus canorus* Common Cuckoo	2
Falconiformes	5	7.94	101	0.59	*Falco naumanni* Lesser Kestrel	80
Otidiformes	1	1.59	4	0.02	*Otis tarda* Great Bustard	4
Passeriformes	33	52.38	15,600	91.89	*Eremophila alpestris* Horned Lark	14,215
Pelecaniformes	1	1.59	9	0.05	*Platalea leucorodia* Eurasian Spoonbill	9

Order	No. of Species	% of all Species	Total No. of Birds	% of Total Birds	Most Dominant Species in the Order	Total No. of Individuals
Piciformes	1	1.59	1	0.01	*Jynx torquilla* Eurasian Wryneck	1
Pterocliformes	1	1.59	609	3.59	*Syrrhaptes paradoxus* Pallas's Sandgrouse	609
Strigiformes	1	1.59	2	0.01	*Athene Noctua* Little Owl	2
Suliformes	1	1.59	61	0.36	*Phalacrocorax carbo* Great Cormorant	61

TABLE 6-52: MOST ABUNDANT BIRD SPECIES RECORDED IN PROJECT AREA DURING BASELINE SURVEYS

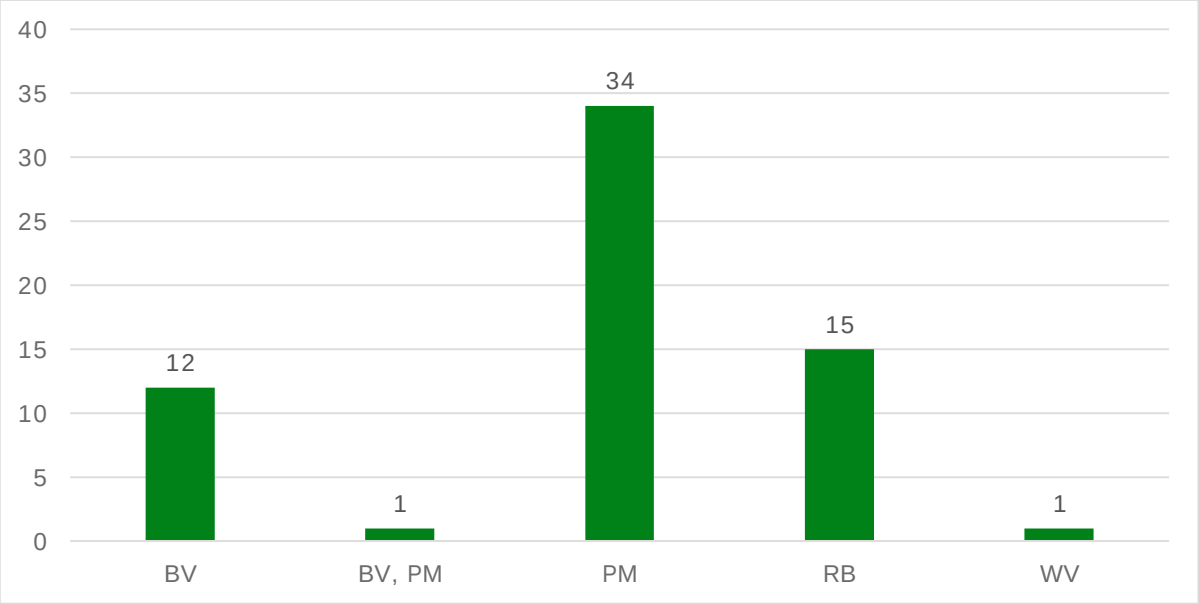
№	Scientific Name	Common Name	IUCN Red List*	Mongolian Red List of Birds**	Total No. of Birds	% of All Birds	Average No. of Birds per Record	Frequency (No. of Records)	Areas most frequently observed
1	*Eremophila alpestris*	Horned Lark	LC	LC	14,215	83.73	6.1	2,316	Dry riverbeds
2	*Syrrhaptes paradoxus*	Pallas's Sandgrouse	LC	LC	609	3.59	6.15	99	Mountains, hills and hillocks
3	*Calcarius lapponicus*	Lapland Longspur	LC	LC	475	2.80	13.5	35	Open plains and desert steppe
4	*Corvus corax*	Northern Raven	LC	LC	355	2.09	1.3	263	Open plains and desert steppe
5	*Aegypius monachus*	Cinereous Vulture	NT	LC	307	1.81	3.19	96	Open plains and desert steppe
6	*Melanocorypha mongolica*	Mongolian Lark	LC	LC	233	1.37	6.8	34	Dry riverbeds
7	*Oenanthe deserti*	Desert Wheatear	LC	LC	147	0.87	1.2	116	Mountains, hills and hillocks
8	*Milvus migrans*	Black Kite	LC	LC	141	0.83	1.6	87	Open plains and desert steppe
9	*Falco naumanni*	Lesser Kestrel	LC	LC	80	0.47	1.6	48	Mountains, hills and hillocks
10	*Phalacrocorax carbo*	Great Cormorant	LC	LC	61	0.36	61	1	Dry riverbeds
11	*Corvus dauuricus*	Daurian Jackdaw	LC	LC	50	0.29	25	2	Dry riverbeds
12	*Cygnus cygnus*	Whooper Swan	LC	LC	40	0.24	40	1	Open plains and desert steppe

№	Scientific Name	Common Name	IUCN Red List*	Mongolian Red List of Birds**	Total No. of Birds	% of All Birds	Average No. of Birds per Record	Frequency (No. of Records)	Areas most frequently observed

Note:
Abbreviations: LC = Least Concern, NT = Near Threatened
* IUCN Global Red List of Threatened Species, Version 2025-2.
* Gombobaatar, S. and Monks, E. M. (Compilers). Seidler, R., Sumiya, D., Tseveenmyadag, N., Bayarkhuu, S., Baillie, J. E. M., Boldbaatar, Sh., Uuganbayar, Ch. (Editors). 2011. Regional Red List Series Vol. 7. Birds. Zoological Society of London, National University of Mongolia and Mongolian Ornithological Society.

6.2.7.2 OCCURRENCE AND DISTRIBUTION

Among a total of 63 bird species observed in the Project area, the majority are passage migrants (34 species), followed by resident breeders (15 species) and breeding visitors (12 species), as illustrated in ***Figure 6-130***. Overall, non-resident species that migrate through the Project area (i.e. breeding visitors, winter visitors and passage migrants), make up 76% of species (or 46 species total) recorded during the baseline surveys. These include threatened raptors such as the Short-toed Snake eagle (*Circaetus gallicus*) (LC on IUCN Red List and EN on Mongolian Red List for Birds) and the Himalayan Griffon (*Gyps himalayensis*) (NT on IUCN Red List), as well as other LC species such as the Eastern Buzzard (*Buteo japonicus*), Oriental Honey Buzzard (*Pernis ptilorhynchus*), Lesser Kestrel (*Falco naumanni*), and Black Kite (*Milvus migrans*). Fewer resident birds were observed in the area as occurrence depends on air temperature and availability of food sources, while the Project area is scarcely vegetated and contains few wetlands, open water sources (e.g. lakes and ponds), and woody vegetation that provide suitable habitat conditions.



Abbreviations: BV = Breeding Visitor; PM = Passage Migrant; RB = Resident Breeder; WV = Winter Visitor.

FIGURE 6-130: ECOLOGICAL STATUS OF RECORDED AVIAN SPECIES

The months during which the highest number of species and individuals were recorded across the WTG and OHL areas were September 2024, followed by the months of January 2025 and November 2024, as shown in ***Figure 6-131***. This is due to the occurrence of higher numbers of breeding visitors, resident breeders, as well as migratory species as the seasonal timing coincides with the peak migration period when birds travel from their summer breeding grounds to their wintering grounds. During the autumn migration period and winter season, many resident breeders classified as Least Concern on the IUCN Red List and Mongolian Red List were present in large numbers, including the Horned Lark (*Eremophila alpestris*), Pallas's Sandgrouse (*Syrrhaptes paradoxus*), Mongolian Lark (*Melanocorypha mongolica*), and Northern Raven (*Corvus corax*), as well as LC breeding visitors such as the Daurian Jackdaw (*Corvus dauuricus*), Lesser Kestrel (*Falco naumanni*), Black Kite (*Milvus migrans*). Small bird species such as the Horned Lark and Lapland Longspur (*Calcarius lapponicus*) were most commonly observed in areas with seasonal or temporary water sources, unfrozen ravines, and

valleys. A large number of small birds were recorded in November 2024 and January 2025 at a spring located in a dry ravine called Ar Gol that remains unfrozen during winter, where interviewed locals also reported seeing herds of Asiatic Wild Ass (*Equus hemionus*), as mapped in ***Figure 6-141***. Due to relatively high vegetation yields during the winter of 2024, seed-eating birds had more abundant food sources, making overwintering easier in the Project area for these species.

Overall, no large flocks of birds were observed with high frequency in the Project area during the survey periods. Small flocks of raptors, including Cinereous Vultures (*Aegypius monachus*) (NT, IUCN) and Eastern Buzzards (*Buteo japonicus*) (LC, IUCN), were recorded during the autumn (September) and spring (April/May) migration periods. One large flock of Great Cormorants (*Phalacrocorax carbo*) consisting of 61 individuals and a large flock of Whooper Swans (*Cygnus cygnus*) with 40 individuals were also observed during the April spring migration. Other migrant species observed that typically do not occur in the region during this time period include the Great Bustard *Otis tarda* (EN on IUCN and VU on Mongolian Red List), with four (4) individuals observed in the WTG area in November 2024.

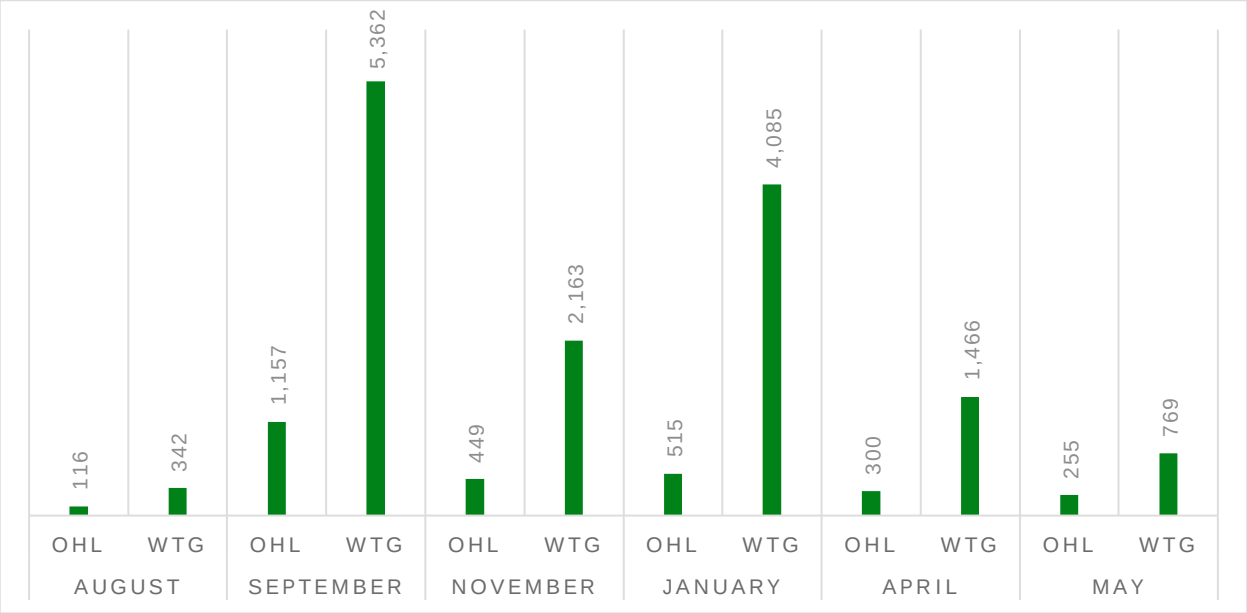


FIGURE 6-131: OCCURRENCE OF ALL AVIAN SPECIES RECORDED DURING THE AUGUST 2024 - MAY 2025 BASELINE SURVEYS

6.2.7.3 TARGETED SURVEYS FOR ASIAN HOUBARA (*CHLAMYDOTIS MACQUEENII*)

Specialist surveys were conducted to target the Asian Houbara, which is classified as VU on the IUCN Red List and Mongolian Red List, and listed as Very Rare under the Mongolian Law on Fauna. A total of 404 line transect surveys and point counts (3,503 km long) were conducted between the 12 vantage points over the six (6) surveys between August 2024 – May 2025, consisting of 864 hours of observation. Local herders were also interviewed to identify the species' presence in the Project area (including sharing descriptions, images, field guides, and behavioural characteristics to allow for more accurate identification). Overall, no Asian Houbaras were observed or recorded from interviews. Local herders who reported living in the area year-round has not observed the species in the area. This could be attributed to the absence of suitable breeding habitats for the species in both the WTG area and along the OHL, as the species prefers open desert steppe and semi-desert areas in the Trans-Altai Gobi

(western Mongolia) and Alashan Gobi (southern-central Mongolia) with shrubs and bushes of Saxaul (*Haloxylon ammodendron*).[70]

6.2.7.4 VANTAGE POINT (VP) SURVEYS AND COLLISION RISK MODELLING

The purpose of VP surveys is to quantify the level of flight activity and its distribution by bird species across the Project footprint (and particularly the WTG area), with the primary objective of providing data for the Collision Risk Model (Band *et al*. 2007; Band, 2024; NatureScot, 2024) to predict bird mortalities from collision with turbines. VP surveys followed the principles laid out in guidelines published by NatureScot[71], which include determination of the number of VP locations based on habitat specifications and species' detectability, as well as a minimum of 72 hours of observations per VP.

A total of 12 VP locations were used during the surveys, with VP1-6 distributed throughout the WTG area, VP7 located at the beginning of the OHL within the WTG area, VP8-11 located along the OHL route, and VP12 on the main access road (see ***Figure 6-132***). It should be noted that the VP8-11 do not follow the exact route of the final OHL as it had not yet been determined at the time of the surveys.

For the VPs covering the WTG Area, three (3) height bands were used to estimate flight heights. These were determined from the total WTG height, rotor blade width and taking into account the underlying terrain. Based on the expected WTG design at the time of surveys, the three bands were determined as follows.

- 0 – 19 m: To allow for the effect of downdraft and compensates for potential height estimation difficulties over undulating terrain;
- 19 – 201 m: The height at which there is a collision risk with turbine blades; and
- Above 201 m: Any birds in this area are considered above collision risk height.

VP observations took place during daylight hours and were carried out with the aid of a spotting scope and binoculars. Weather conditions and visibility were recorded and, where possible, photographs of species/individuals encountered were taken to enhance the identification of the birds. The following information was also collected in the field:

- Species identification, number of individuals, age and sex where possible;
- Time of sighting and duration of overfly observed;
- Flight height above ground level in specific bands as identified above, recorded at regular (15 second) intervals;
- Flight path/direction and distance from observer(s);
- Flight activity (e.g. flying, stooping, gliding, soaring, diving, perching, etc.); and
- Habitat in which species were observed.

[70] Gubin, B. 2009. A natural History of the Houbara Bustard. Environment Agency – Abu Dhabi; Batsaikhan, N., A. Bold, and S. Dorjderem (compilers). 2005. Distribution of Houbara Bustard (*Chlamydotis undulata macqueenii*) in Mongolia. A. Bold, S. Boldbataar, and K. Munkhbayar (editors). Avian and Reptile Fauna in Mongolia. Ulaanbaatar.
[71] NatureScot. 2024. Recommended bird survey methods to inform impact assessment of onshore windfarms. Available at: https://www.nature.scot/doc/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms#8-vantage-point-survey

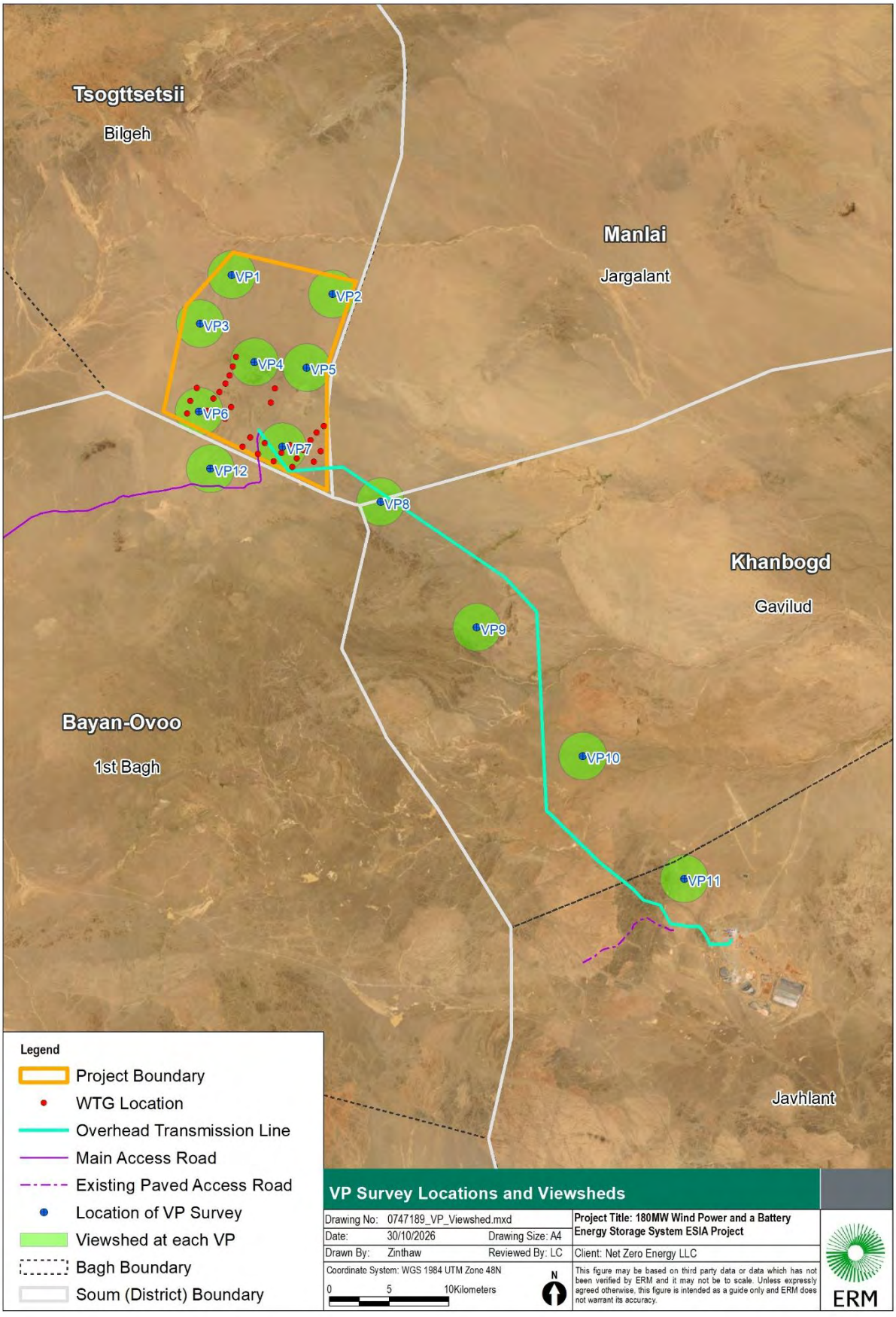


FIGURE 6-132: VP SURVEY LOCATIONS AND VIEWSHEDS

Out of 63 bird species recorded in the Project area, a total of 52 species were observed from vantage point surveys. The most frequently observed and most abundant bird species recorded from vantage point surveys include the LC Horned Lark (*Eremophila alpestris*), LC Northern Raven (*Corvus corax*), NT Cinereous Vulture (*Aegypius monachus*), LC Black Kite (*Milvus migrans*), LC Pallas's Sandgrouse (*Syrrhaptes paradoxus*), LC Lapland Longspur (*Calcarius lapponicus*), and LC Desert Wheatear (*Oenanthe deserti*), as shown in ***Table 6-53***, ***Figure 6-133***, and ***Figure 6-134***. The number of species observed per vantage point is relatively evenly distributed across all VP locations, with VP4, VP5, and VP6 being the most species rich. In terms of abundance, VP7, VP2, and VP6 recorded significantly higher numbers of individuals while VP9, VP10 and VP11 are the least abundant.

TABLE 6-53: RESULTS OF VANTAGE POINT SURVEYS (AUGUST 2024 - MAY 2025)

VP No.	No. of Species	No. of Individuals	Dominant Species
VP1	14	1,050	• Horned Lark (*Eremophila alpestris*) • Cinereous Vulture (*Aegypius monachus*) • Lapland Longspur (*Calcarius lapponicus*)
VP2	18	2,697	• Horned Lark (*Eremophila alpestris*) • Mongolian Lark (*Melanocorypha mongolica*) • Northern Raven (*Corvus corax*)
VP3	16	831	• Horned Lark (*Eremophila alpestris*) • Cinereous Vulture (*Aegypius monachus*) • Black Kite (*Milvus migrans*)
VP4	20	1,033	• Horned Lark (*Eremophila alpestris*) • Black Kite (*Milvus migrans*) • Cinereous Vulture (*Aegypius monachus*)
VP5	19	2,562	• Horned Lark (*Eremophila alpestris*) • Pallas's Sandgrouse (*Syrrhaptes paradoxus*) • Desert Wheatear (*Oenanthe deserti*)
VP6	20	599	• Horned Lark (*Eremophila alpestris*) • Pallas's Sandgrouse (*Syrrhaptes paradoxus*) • Northern Raven (*Corvus corax*)
VP7	17	2,838	• Horned Lark (*Eremophila alpestris*) • Northern Raven (*Corvus corax*) • Pallas's Sandgrouse (*Syrrhaptes paradoxus*)
VP8	13	1,086	• Horned Lark (*Eremophila alpestris*) • Northern Raven (*Corvus corax*) • Cinereous Vulture (*Aegypius monachus*)
VP9	14	344	• Horned Lark (*Eremophila alpestris*) • Cinereous Vulture (*Aegypius monachus*)
VP10	16	292	• Horned Lark (*Eremophila alpestris*) • Northern Raven (*Corvus corax*)
VP11	14	321	• Northern Raven (*Corvus corax*) • Horned Lark (*Eremophila alpestris*) • Desert Wheatear (*Oenanthe deserti*)
VP12	15	431	• Horned Lark (*Eremophila alpestris*) • Northern Raven (*Corvus corax*) • Cinereous Vulture (*Aegypius monachus*)

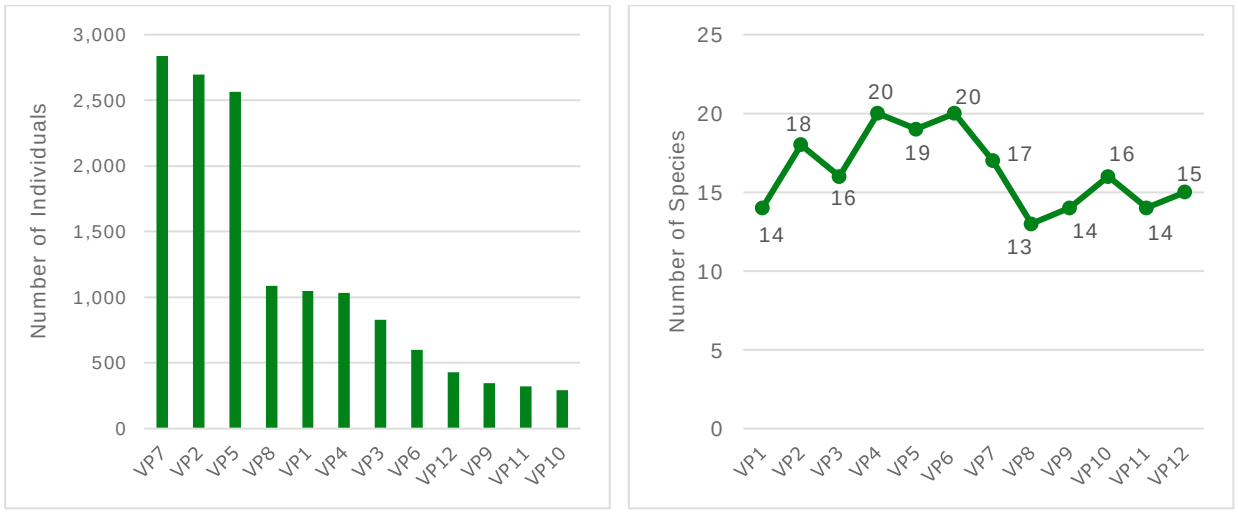


FIGURE 6-133: TOTAL NUMBER OF INDIVIDUALS AND SPECIES RECORDED FROM VANTAGE POINT SURVEYS (AUGUST 2024 - MAY 2025)

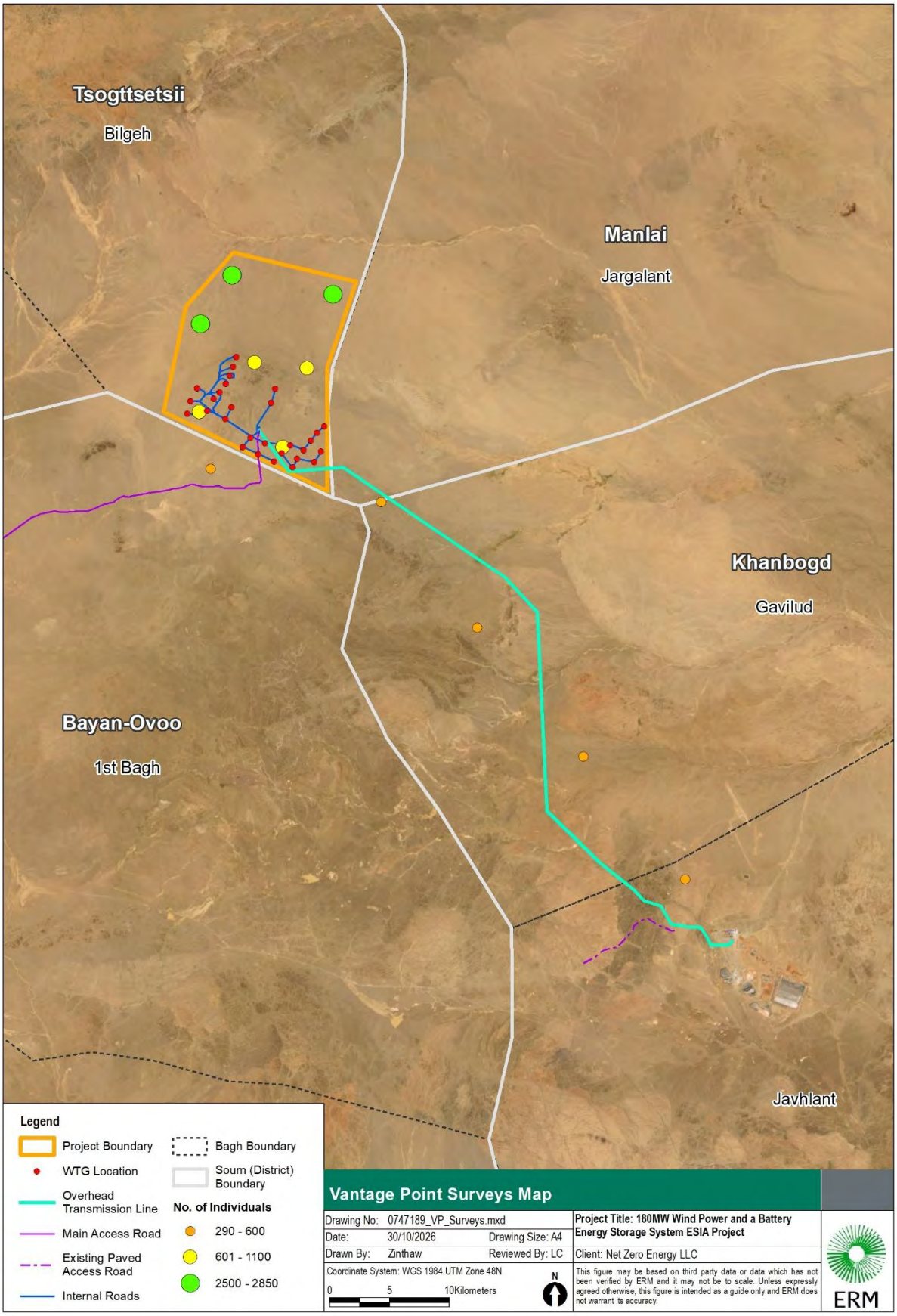


FIGURE 6-134: AVIAN SPECIES ABUNDANCE PER VANTAGE POINT (AUGUST 2024 - MAY 2025 SURVEYS)

6.2.7.5 COLLISION RISK MODELLING (CRM)

Introduction

Overhead transmission lines and Wind Turbine Generators (WTGs) are potential obstacles for birds' flight and, in certain conditions, a collision may occur. Direct mortality or lethal injury related to collision is a known issue for onshore wind power projects.[72] Collisions can occur not only with the rotor blades, but also with towers, nacelles and associated structures, such as meteorological masts.

Several factors can influence the risk of collision, including:

- Location of these structures (i.e. are they sited on regular local flight paths or migration routes);
- Extent to which birds are flying at heights at which the turbines are operating;
- Extent to which different species exhibit avoidance behaviour (i.e. alter their flight path to avoid the structures);
- Extent to which some bird species fly at night, a time when the structures are much less visible;
- Extent to which the birds' flight patterns change naturally during poorer weather conditions, or in the case of raptors when stooping or pursuing prey, hence making them more susceptible to collisions;
- Use of lighting on the turbines which may attract birds at night; and
- Extent of habituation.

The risk of increased mortality to birds from wind farms and the effects that such mortality might have on bird populations has resulted in the development of models to help predict the risk of bird collisions. As with any idealised mathematical model, the findings provide an indication of what the likely risks are, rather than a definitive statement about what will happen. To assess the diversity of birds using the WTG Area and to estimate the probability of collision resulting from the wind turbines, VP surveys were carried out to inform a Collision Risk Model (CRM).

The CRM is based on the internationally recognized Band Model approach published by NatureScot[73] that estimates the likelihood of birds colliding with wind turbines by combining species-specific biometrics, turbine dimensions and operational parameters, and site-specific flight activity data. The model first calculates the theoretical collision rate assuming no avoidance, based on the predicted number of bird transits through the rotor-swept area and the probability of collision during a single transit. This is then adjusted using avoidance rates, which reflect the proportion of birds that are likely to take evasive action, be displaced, or otherwise avoid the turbines. The model outputs the predicted numbers of collisions per month and year that are subsequently interpreted in terms of population sensitivity and the conservation status of relevant species and designated sites.

[72] Perrow, M., 2017. Wildlife and Wind Farms – Conflicts and Solutions. Pelagic Publishing. ISBN 9781784271190.
[73] NatureScot, 2000. Windfarms & Birds: Calculating the theoretical collision risk assuming no avoidance action. Guidance Note Series. SNH, Battleby.

Targeted Bird Species Selection

Table 6-54 lists all selected bird species for the CRM and the reasons for their inclusion. Saker Falcon is a threatened species under both the IUCN Red List and the Mongolian Red Book. Cinereous Vulture, while not listed in the Mongolian Red Book, is classified as a conservation species by IUCN. Black Kite, Lesser Kestrel, and Upland Buzzard are migratory raptors observed flying at rotor-swept height during the VP surveys. These birds were selected for the CRM. Whooper Swan, a migratory species, was selected due to its large body size, which increases collision risk with turbine blades. Pallas's Sandgrouse and Horned Lark, although listed as Least Concern (LC) by IUCN and not included in the Mongolian Red Book, were chosen because they exhibit high flight activity during migration periods in the area.

In summary, eight bird species were identified as targeted species for the CRM. The remaining species recorded during the VP surveys were excluded from the CRM since they were not observed at rotor-swept height, of low conservation status, not known to exhibit collision-prone behaviour (e.g., soaring), of small body sizes, and/or recorded in small numbers.

TABLE 6-54: SELECTED BIRD SPECIES FOR CRM

Species	Conservation Status	At Risk Height during VP Surveys	Rationale
Saker Falcon (*Falco cherrug*)	EN (IUCN), VU (Mongolia Red List of Birds)	Yes	IUCN and Mongolian Red Book conservation species
Cinereous Vulture (*Aegypius monachus*)	NT (IUCN)	Yes	IUCN conservation species
Black Kite (*Milvus migrans*)	LC (IUCN)	Yes	Migratory soaring raptor; 133 individuals recorded during VP surveys, with some at rotor height
Lesser Kestrel (*Falco naumanni*)	LC (IUCN)	Yes	Migratory soaring raptor; 38 individuals recorded during VP surveys, with some at rotor height
Upland Buzzard (*Buteo hemilasius*)	LC (IUCN)	Yes	Migratory soaring raptor; 18 individuals recorded during VP surveys, with some at rotor height
Whooper Swan (*Cygnus cygnus*)	LC (IUCN)	Yes	Migratory large-bodied species; observed at rotor height during VP surveys
Pallas's Sandgrouse (*Syrrhaptes paradoxus*)	LC (IUCN)	Yes	Very high flight activity for a migratory species that occurs at key periods in the year in the area
Horned Lark (*Eremophila alpestris*)	LC (IUCN)	Yes	Very high flight activity for a migratory species that occurs at key periods in the year in the area

Band Model and General Modelling Parameters

The NatureScot Collision Risk Model (also known as the Band Model), which provides a method based on vantage point data to estimate the number of birds likely to collide with turbines at a proposed onshore wind farm, was used to evaluate the collision risk.

The general parameters used for the modelling are summarized in ***Table 6-55***, with the following assumptions adopted:

1. Rotor Speed: Since no specific data on turbine blade rotational speed was provided in the technical documents, the operational speed curve of a similar 6.0 MW turbine was used for estimation. Under an average wind speed of 8.7 m/s, the rotor speed is approximately 8.323 rpm.
2. Blade Pitch: Larger blade pitch angles increase the likelihood of bird collisions. As the turbine adjusts blade pitch according to wind speed and no pitch–wind speed data was available in the technical report, a worst-case scenario was assumed, with a blade pitch angle of 30°, representing the highest potential collision risk.
3. Turbine Layout: Turbines are arranged horizontally at equal intervals along a straight line 12 km wide, oriented perpendicular to the prevailing wind direction.
4. Operational time: In the absence of such data, the default operational time of 85% suggested by NatureScot[74]

TABLE 6-55: WINDFARM AND TURBINE DATA USED IN CRM

Parameter	Value	Unit
Latitude	43.34 °N	-
No. of Operational Turbine	29	-
Width of Wind Farm	12	km
Average Wind Speed	8.7	m/s
Model	[redacted]	-
Hub Height	[redacted]	m
Rotor Radius	[redacted]	m
No. of Blade	3	-
Rotation Speed	8.323	rpm
Max Blade Width	[redacted]	m
Blade Pitch	30	degree
Proportion of Time Operational	85	%

Bird Data for Modelling

The parameters related to the target species used for the modelling are summarized in Table, with the following assumptions adopted:

- Male and female birds may differ in appearance; therefore, average values are used to represent morphological parameters.
- If flight speed data cannot be obtained for a species, substitute values from a bird species of similar size, or from the same family or genus.

[74] Naturescot. 2024. Guidance on Using an Updated Collision Risk Model to Assess Bird Collision Risk at Onshore Wind Farms. https://www.nature.scot/doc/guidance-using-updated-collision-risk-model-assess-bird-collision-risk-onshore-wind-farms

- The Band Model requires a nocturnal activity ranking on a scale of 1-5, from 1 = hardly any night activity to 5 = as active at night as by day. Since the target species are diurnal, their level of nocturnal activity was assumed to be low and a score of 1 was attributed.
- It was assumed in accordance with the Band Model's default that the target species' flights through the Project's rotors were equally split between upwind and downwind.

TABLE 6-56: BIRD DATA USED IN CRM

	Bird length (m)	Wingspan (m)	Bird flight speed[75]	Flight type	% of upwind/ downwind	Nocturnal activity ranking
Saker Falcon	0.5	1.15[7677]	13	gliding	50%	1
Cinereous Vulture	1.09	2.725[78]	17	gliding	50%	1
Black Kite	0.55	1.4[79]	14	gliding	50%	1
Lesser Kestrel	0.3	0.675[8081]	12	gliding	50%	1
Upland Buzzard	0.65	1.52[82]	15	gliding	50%	1
Whooper Swan	1.5	2.2[83]	17.5[84]	flapping	50%	1

[75] Bruderer, Bruno & BOLDT, ANDREAS. (2001). Flight characteristics of birds: I. Radar measurements of speeds.
[76] Carolina raptor center. 2024. Saker Falcon. https://carolinaraptorcenter.org/wp-content/uploads/2024/12/Saker-Falcon-Reference-Sheet-Docent-Version.pdf
[77] Victoria Hekman. 2005. Falco cherrug. Animal Diversity Web. https://animaldiversity.org/accounts/Falco_cherrug/
[78] Alfredo Salvador. 2024. Cinereous Vulture. CornellLab. https://birdsoftheworld.org/bow/species/cinvul1/cur/introduction
[79] Tim S. David, Jaume Orta, Jeffrey S. Marks, Ernest Garcia, and Guy M. Kirwan. 2021. Black Kite. CornellLab. https://birdsoftheworld.org/bow/species/blakit1/cur/introduction
[80]Yohan Sassi, Lise Bartholus, Mathieu Garcia, Nicolas Saulnier, Philippe Pilard, Olivier Duriez, Modeling Falco naumanni (Lesser Kestrel) habitat selection according to meteorological conditions to identify risk-inducing wind turbines, Ornithological Applications, Volume 127, Issue 2, 1 May 2025, duaf003, https://doi.org/10.1093/ornithapp/duaf003
[81] European Comission Life commission database. 2005. Reinforcement and conservation of Lesser Kestrel populations in Aude (FR) and Extrémadure (ES). https://webgate.ec.europa.eu/life/publicWebsite/project/LIFE05-NAT-F-000134/reinforcement-and-conservation-of-lesser-kestrel-populations-in-aude-fr-and-extremadure-es
[82] *Buteo* Lacépède, 1799 in Döring M (2022). Checklist dataset https://doi.org/10.15468/c3kkgh accessed via GBIF.org on 2025-11-26.
[83] RSPB. 2025. Whooper Swan. https://www.rspb.org.uk/birds-and-wildlife/whooper-swan
[84] Pennycuick, C. J., Åkesson, S., & Hedenström, A. (2013). Air speeds of migrating birds observed by ornithodolite and compared with predictions from flight theory. Journal of the Royal Society, Interface, 10(86), 20130419. https://doi.org/10.1098/rsif.2013.0419

	Bird length (m)	Wingspan (m)	Bird flight speed[75]	Flight type	% of upwind/ downwind	Nocturnal activity ranking
Pallas's Sandgrouse	0.34	0.69[85]	18.5	flapping	50%	1
Horned Lark	0.18	0.32[86]	10.5	flapping	50%	1

Collision Risk Modelling Results

According to published research, actual collision rates are generally low in operating wind farms due to the high avoidance of wind turbines exhibited by most birds[87]. The default avoidance rate for birds recommended by NatureScot guidance for onshore wind farms is 98.0%, with some species like geese having a higher avoidance rate of up to 99.8%[88]. Nonetheless, the Project's collision rates were calculated using avoidance rates of 95.0%, 98.0%, 99.0%, and 99.5% to illustrate uncertainty arising from avoidance behaviour.

The modelled collision rates within the Project site are summarised on a monthly and annual basis from ***Table 6-57*** to ***Table 6-64***. Under the 98% default avoidance, Cinereous Vulture (2.7345 birds per year) and Black Kite (2.4124 birds per year) have the highest predicted annual collision rates, whereas Saker Falcon shows the lowest estimated collision rate of 0.0071 birds per year. The remaining species have predicted annual collisions as follows: 0.2587 Lesser Kestrels, 0.2049 Upland Buzzards, 0.8466 Pallas's Sandgrouses, and 0.7198 Horned Larks per year. NatureScot[89] suggests an avoidance rate of 99.5% for Whooper Swan, under which the simulated annual collision rate is 0.5694 birds per year.

Cinereous Vulture shows particularly high activity in January and November, and Black Kite shows high activity in April and September, while Upland Buzzard exhibits a peak in September, resulting in increased collision estimates during these periods. Other species occur consistently throughout the four seasons, with no significant peaks observed.

[85] Eduardo de Juana and Peter F. D. Boesman. 2020. Pallas's Sandgrouse. CornellLab. https://birdsoftheworld.org/bow/species/palsan1/cur/introduction
[86]Horned Lark. CornellLab. https://www.allaboutbirds.org/guide/Horned_Lark/id
[87] Marques et al. 2014. Understanding bird collisions at wind farms: An updated review on the causes and possible mitigation strategies. Biological Conservation. 179. P40-52.
[88] NatureScot. (2025). Wind farm impacts on birds - Use of Avoidance Rates in the NatureScot Wind Farm Collision Risk Model. https://www.nature.scot/doc/wind-farm-impacts-birds-use-avoidance-rates-naturescot-wind-farm-collision-risk-model
[89] NatureScot. 2025. Wind farm impacts on birds - Use of Avoidance Rates in the NatureScot Wind Farm Collision Risk Model (v4). https://www.nature.scot/doc/wind-farm-impacts-birds-use-avoidance-rates-naturescot-wind-farm-collis…

TABLE 6-57: COLLISION SIMULATION RESULTS FOR SAKER FALCON (NUMBER OF BIRDS)

Avoidance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Per Year
95%	0.0018	0.0011	0.0014	0.0000	0.0000	0.0018	0.0018	0.0074	0.0000	0.0013	0.0000	0.0011	**0.0177**
98%	0.0007	0.0005	0.0006	0.0000	0.0000	0.0007	0.0007	0.0030	0.0000	0.0005	0.0000	0.0004	**0.0071**
99%	0.0004	0.0002	0.0003	0.0000	0.0000	0.0004	0.0004	0.0015	0.0000	0.0003	0.0000	0.0002	**0.0035**
99.5%	0.0002	0.0001	0.0001	0.0000	0.0000	0.0002	0.0002	0.0007	0.0000	0.0001	0.0000	0.0001	**0.0018**

TABLE 6-58: COLLISION SIMULATION RESULTS FOR CINEREOUS VULTURE (NUMBER OF BIRDS)

Avoidance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Per Year
95%	1.1390	0.4946	0.6220	0.0866	0.0000	0.7768	0.7877	0.0100	0.5707	0.5787	1.2980	0.4719	**6.8361**
98%	0.4556	0.1978	0.2488	0.0347	0.0000	0.3107	0.3151	0.0040	0.2283	0.2315	0.5192	0.1888	**2.7345**
99%	0.2278	0.0989	0.1244	0.0173	0.0000	0.1554	0.1575	0.0020	0.1141	0.1157	0.2596	0.0944	**1.3672**
99.5%	0.1139	0.0495	0.0622	0.0087	0.0000	0.0777	0.0788	0.0010	0.0571	0.0579	0.1298	0.0472	**0.6836**

TABLE 6-59: COLLISION SIMULATION RESULTS FOR BLACK KITE (NUMBER OF BIRDS)

Avoidance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Per Year
95%	0.0000	0.3840	0.4830	1.1644	0.5895	0.6032	0.6117	0.0000	1.3794	0.4494	0.0000	0.3665	**6.0310**
98%	0.0000	0.1536	0.1932	0.4658	0.2358	0.2413	0.2447	0.0000	0.5517	0.1798	0.0000	0.1466	**2.4124**
99%	0.0000	0.0768	0.0966	0.2329	0.1179	0.1206	0.1223	0.0000	0.2759	0.0899	0.0000	0.0733	**1.2062**
99.5%	0.0000	0.0384	0.0483	0.1164	0.0590	0.0603	0.0612	0.0000	0.1379	0.0449	0.0000	0.0366	**0.6031**

TABLE 6-60: COLLISION SIMULATION RESULTS FOR LESSER KESTREL (NUMBER OF BIRDS)

Avoidance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Per Year
95%	0.0000	0.0405	0.0509	0.0000	0.1308	0.0636	0.0645	0.0550	0.1558	0.0474	0.0000	0.0386	**0.6468**
98%	0.0000	0.0162	0.0204	0.0000	0.0523	0.0254	0.0258	0.0220	0.0623	0.0189	0.0000	0.0154	**0.2587**
99%	0.0000	0.0081	0.0102	0.0000	0.0262	0.0127	0.0129	0.0110	0.0312	0.0095	0.0000	0.0077	**0.1294**
99.5%	0.0000	0.0040	0.0051	0.0000	0.0131	0.0064	0.0064	0.0055	0.0156	0.0047	0.0000	0.0039	**0.0647**

TABLE 6-61: COLLISION SIMULATION RESULTS FOR UPLAND BUZZARD (NUMBER OF BIRDS)

Avoidance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Per Year
95%	0.0000	0.0334	0.0420	0.0478	0.0000	0.0524	0.0531	0.0021	0.2105	0.0390	0.0000	0.0318	**0.5122**
98%	0.0000	0.0133	0.0168	0.0191	0.0000	0.0210	0.0213	0.0009	0.0842	0.0156	0.0000	0.0127	**0.2049**
99%	0.0000	0.0067	0.0084	0.0096	0.0000	0.0105	0.0106	0.0004	0.0421	0.0078	0.0000	0.0064	**0.1024**
99.5%	0.0000	0.0033	0.0042	0.0048	0.0000	0.0052	0.0053	0.0002	0.0210	0.0039	0.0000	0.0032	**0.0512**

TABLE 6-62: COLLISION SIMULATION RESULTS FOR WHOOPER SWAN (NUMBER OF BIRDS)

Avoidance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Per Year
95%	0.0000	0.3612	0.4542	2.9685	0.0000	0.5673	0.5753	0.0000	0.0000	0.4227	0.0000	0.3447	**5.6939**
98%	0.0000	0.1445	0.1817	1.1874	0.0000	0.2269	0.2301	0.0000	0.0000	0.1691	0.0000	0.1379	**2.2776**
99%	0.0000	0.0722	0.0908	0.5937	0.0000	0.1135	0.1151	0.0000	0.0000	0.0845	0.0000	0.0689	**1.1388**
99.5%	0.0000	0.0361	0.0454	0.2969	0.0000	0.0567	0.0575	0.0000	0.0000	0.0423	0.0000	0.0345	**0.5694**

TABLE 6-63: COLLISION SIMULATION RESULTS FOR PALLAS'S SANDGROUSE (NUMBER OF BIRDS)

Avoidance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Per Year
95%	0.1345	0.1352	0.1700	0.0838	0.3515	0.2123	0.2153	0.3796	0.0762	0.1582	0.0708	0.1290	**2.1164**
98%	0.0538	0.0541	0.0680	0.0335	0.1406	0.0849	0.0861	0.1518	0.0305	0.0633	0.0283	0.0516	**0.8466**
99%	0.0269	0.0270	0.0340	0.0168	0.0703	0.0425	0.0431	0.0759	0.0152	0.0316	0.0142	0.0258	**0.4233**
99.5%	0.0135	0.0135	0.0170	0.0084	0.0352	0.0212	0.0215	0.0380	0.0076	0.0158	0.0071	0.0129	**0.2116**

TABLE 6-64: COLLISION SIMULATION RESULTS FOR HORNED LARK (NUMBER OF BIRDS)

Avoidance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Per Year
95%	0.0701	0.1221	0.1536	0.0576	0.0319	0.1918	0.1945	0.0093	0.5263	0.1429	0.1827	0.1166	**1.7996**
98%	0.0281	0.0489	0.0614	0.0230	0.0128	0.0767	0.0778	0.0037	0.2105	0.0572	0.0731	0.0466	**0.7198**
99%	0.0140	0.0244	0.0307	0.0115	0.0064	0.0384	0.0389	0.0019	0.1053	0.0286	0.0365	0.0233	**0.3599**
99.5%	0.0070	0.0122	0.0154	0.0058	0.0032	0.0192	0.0195	0.0009	0.0526	0.0143	0.0183	0.0117	**0.1800**

Potential Biological Removal and Fatality Thresholds

Potential Biological Removal (PBR) is a conservation management metric used to calculate the maximum number of non-natural, human-caused animal deaths or removals (such as wildlife collisions with wind farm infrastructure) that a population can sustain while still allowing the stock to maintain itself or recover. To conduct a Potential Biological Removal (PBR) analysis on bird species selected for the CRM, consultation was undertaken with expert Mongolian ornithologists in September 2026 to inform input parameters for Potential Biological Removal (PBR) calculations. The parameters discussed included the Mongolian population, flyway population, adult annual survival rate, and the age at first breeding for the target species. The experts advised that sufficient information was not available for most of the target species.

To define the level of Project-related mortality that each target species can sustain, species-specific annual fatality thresholds were set using the following approach, with each species exiting at the first step that sets its threshold:

1. **Zero-threshold screening** – Based on consultation with IFC, EBRD and ADB, any species with a global IUCN Red List[90] status of Critically Endangered (CR) or Endangered (EN), or with a declining population trend, is assigned a threshold of zero, as existing losses are already likely to exceed the level that would pose a risk to the long-term viability of the population. The trend of the relevant national population is used where known; otherwise, the global population trend is used.
2. **PBR calculation** – PBR is calculated using the Wade (1998)[91] formula: PBR = N_{min} × ½R_{max} × F_R, where N_{min} is the minimum population estimate, R_{max} is the maximum annual population growth rate, estimated from adult survival (*s*) and age at first breeding (α) following Niel & Lebreton (2005)[92], and F_R is a recovery factor, set at 0.5 for IUCN Least Concern (LC) species with stable or increasing trends (Wade 1998)[91]. When selecting N_{min}, the national population is used for resident species and the flyway population for migratory species. Where neither is reliably estimated, the global population is used as the starting point, adjusted on the basis of available evidence and professional judgement.
3. **Fatality Threshold Categorisation** – The calculated PBR is assigned to one of three Project-related fatality threshold categories, as shown in ***Table 6-65***.

TABLE 6-65: POTENTIAL BIOLOGICAL REMOVAL AND FATALITY THRESHOLD CATEGORIES

Potential Biological Removal (birds/yr)	Project-related fatality threshold (birds/yr)
< 1,000	0
1,000-100,000	3
> 100,000	5

[90] IUCN (2026). The IUCN Red List of Threatened Species. Version 2026-1. https://www.iucnredlist.org
[91] Wade, P. R. (1998). Calculating limits to the allowable human-caused mortality of cetaceans and pinnipeds. *Marine Mammal Science* 14: 1–37.
[92] Niel, C. & Lebreton, J.-D. (2005). Using demographic invariants to detect overharvested bird populations from incomplete data. *Conservation Biology* 19: 826–835.

Zero-Threshold Screening

The zero-threshold screening results are summarised in ***Table 6-66***. Saker Falcon (IUCN EN and declining global and national populations) and Cinereous Vulture (declining global population) were assigned a threshold of zero. The remaining six species have non-declining trends in Mongolia (Gombobaatar, 2022)[93] and were carried forward to the PBR calculation. Horned Lark has a decreasing global trend (IUCN, 2026)[90], but its Mongolian population is stable (Gombobaatar, 2022)[93]; the more ecologically relevant national trend was therefore applied.

TABLE 6-66: ZERO-THRESHOLD SCREENING

Species	IUCN Red List Status	Global and National Trends	Screening Outcome
Saker Falcon (*Falco cherrug*)	EN	Global: decreasing Mongolia: decreasing	Threshold 0 (IUCN EN and declining global and national trends)
Cinereous Vulture (*Aegypius monachus*)	NT	Global: decreasing Mongolia: unknown	Threshold 0 (declining global trend)
Black Kite (*Milvus migrans*)	LC	Global: stable Mongolia: stable	Carried forward to PBR
Lesser Kestrel (*Falco naumanni*)	LC	Global: stable Mongolia: stable	Carried forward to PBR
Upland Buzzard (*Buteo hemilasius*)	LC	Global: stable Mongolia: stable	Carried forward to PBR
Whooper Swan (*Cygnus cygnus*)	LC	Global: increasing Mongolia: stable	Carried forward to PBR
Pallas's Sandgrouse (*Syrrhaptes paradoxus*)	LC	Global: stable Mongolia: stable	Carried forward to PBR
Horned Lark (*Eremophila alpestris*)	LC	Global: decreasing Mongolia: stable	Carried forward to PBR (more ecologically relevant stable national trend applied)

Information Source:
IUCN, 2026
Global Trend: IUCN, 2026
National Trend: Gombobaatar 2022

Potential Biological Removal Calculation

The input parameters and calculated values of the PBR calculations are summarised in ***Table 6-67***. The expert consultation undertaken in September 2026 confirmed that population and demographic data for the target species are limited nationally and regionally.

The data obtained from the local experts and accessible literature suggested that population estimates at the relevant scale are available only for Whooper Swan (East Asian flyway) and Pallas's Sandgrouse (national). For Black Kite, Lesser Kestrel and Upland Buzzard, no flyway or national estimate is available, and the lower bound or published minimum of the global estimate was adopted as N_{min}. For Horned Lark, no flyway estimate is available, and N_{min} is the

[93] Gombobaatar, S. (2022). *Birds of Mongolia: Species Accounts*. Vol. 1. National University of Mongolia, Mongolica Publishing and Mongolian Ornithological Society, Ulaanbaatar.

estimated population of Tsogttsetsii soum (where the Project is located), derived from the soum area and the lowest density recorded in Mongolia.

As no species-specific demographic data are available for Upland Buzzard or Pallas's Sandgrouse, adult survival (*s*) and age at first breeding (α) were taken from the closest available proxy species: Ferruginous Hawk (*Buteo regalis*) and Pin-tailed Sandgrouse (*Pterocles alchata*), respectively.

Calculated PBR values range from 790 birds/yr for Upland Buzzard to 474,341 birds/yr for Pallas's Sandgrouse (***Table 6-67***).

TABLE 6-67: POTENTIAL BIOLOGICAL REMOVAL CALCULATION INPUTS AND OUTPUTS

Species	Nmin (individuals)	Adult annual survival, s (fraction)	Age at first breeding, α (years)	Rmax	PBR (birds/yr)
Black Kite (*Milvus migrans*)	4,000,000; lower bound of the global estimate of 4,000,000-5,700,000 mature individuals (IUCN, 2026)[91]	0.789 (Newton et al., 2016)[94]	7; upper end of the 1- to 7-year breeding range (Sergio et al., 2017)[95]	0.1053	105,326
Lesser Kestrel (*Falco naumanni*)	80,000; lower bound of the global estimate of 80,000-134,000 mature individuals (IUCN, 2026)[91]	0.72 (Newton et al., 2016)[94]	1 (Serrano et al., 2005)[96]	0.5292	10,583
Upland Buzzard (*Buteo hemilasius*)	10,000; global minimum of more than c.10,000 individuals (BirdLife International, 2024)[97]	0.708; Ferruginous Hawk (*Buteo regalis*) used as a proxy (Newton et al., 2016)[94]	2; Ferruginous Hawk used as a proxy (COSEWIC, 2021)[98]	0.3160	790
Whooper Swan (*Cygnus cygnus*)	57,690; flyway estimate (Wetlands International, 2022)[99]	0.801; BTO (2026)[100]	4; BTO (2026)[100]	0.1606	2,315
Pallas's Sandgrouse (*Syrrhaptes paradoxus*)	3,000,000; national estimate, excluding the Trans-Altai Gobi (Gombobaatar, 2022)[93]	0.60; Pin-tailed Sandgrouse (*Pterocles alchata*) used as a proxy (Benítez-López et al., 2015)[101]	1; sandgrouse plumage maturation (Aourir et al., 2018)[102]	0.6325	474,341

[94] Newton, I., McGrady, M. J. & Oli, M. K. (2016). A review of survival estimates for raptors and owls. *Ibis* 158: 227–248.
[95] Sergio, F. et al. (2017). Migration by breeders and floaters of a long-lived raptor: implications for recruitment and territory quality. *Animal Behaviour* 131: 59–72.
[96] Serrano, D., Oro, D., Ursúa, E. & Tella, J. L. (2005). Colony size selection determines adult survival and dispersal preferences: Allee effects in a colonial bird. *American Naturalist* 166: E22–E31.
[97] BirdLife International (2024). Species factsheets: Upland Buzzard *Buteo hemilasius*. BirdLife Data Zone. https://datazone.birdlife.org
[98] COSEWIC (2021). COSEWIC assessment and status report on the Ferruginous Hawk Buteo regalis in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa. xi + 46 pp.
[99] Wetlands International (2022). *Waterbird Population Estimates*. https://wpe.wetlands.org
[100] BTO (2026). BirdFacts: Whooper Swan *Cygnus cygnus*. British Trust for Ornithology, Thetford. https://www.bto.org/learn/about-birds/birdfacts/whooper-swan
[101] Benítez-López, A., Casas, F., Mougeot, F., García, J. T., Martín, C. A., Tatin, L., Wolff, A. & Viñuela, J. (2015). Individual traits and extrinsic factors influence survival of the threatened pin-tailed sandgrouse (*Pterocles alchata*) in Europe. *Biological Conservation* 187: 192–200.
[102] Aourir, M., Znari, M. & Radi, M. (2018). Plumage development and moult in captive Black-bellied Sandgrouse *Pterocles orientalis*: age and sex variations. *Ostrich* 89(4). https://doi.org/10.2989/00306525.2018.1512016

Species	Nmin (individuals)	Adult annual survival, s (fraction)	Age at first breeding, α (years)	Rmax	PBR (birds/yr)
Horned Lark (*Eremophila alpestris*)	36,000; Tsogttsetsii soum population: 7,200 km² (Sanzheev et al. 2020) × 5 birds/km², the lowest density recorded in Mongolia (Gombobaatar, 2022)[93]	0.55; higher adult male survival (0.55) adopted over the lower female value (0.47) conservatively (Camfield et al., 2011)[103]	1 (AnAge, 2026)[104]	0.6708	6,037

Note: F_R = 0.5 for all species. PBR values are rounded down to whole birds.

[103] Camfield, A. F., Pearson, S. F. & Martin, K. (2011). A demographic model to evaluate population declines in the endangered Streaked Horned Lark. *Avian Conservation and Ecology* 6(2): 4.
[104] AnAge (2026). The Animal Ageing and Longevity Database: Horned Lark *Eremophila alpestris*. Human Ageing Genomic Resources. https://genomics.senescence.info/species/entry.php?species=Eremophila_alpestris

Fatality Threshold Categorisation

Table 6-68 presents the resulting fatality thresholds for all eight target species, where PBR analysis for each species is used to categorize them into species-specific fatality threshold categories (***Table 6-65***). The table also compares them with the predicted annual WTG collisions from the CRM (99.5% for Whooper Swan; 98% avoidance for the other species) to preliminarily identify anticipated mortality exceedances from Project operations.

The comparison suggests that the WTG collision rates of Cinereous Vulture and Upland Buzzard are likely to exceed their 0 birds/yr threshold during operation. Saker Falcon has a very low WTG predicted collision rate, but any Project-related fatality would exceed its 0 birds/yr threshold. All species with thresholds of 3 birds/yr or 5 birds/yr have predicted WTG collision rates well within their thresholds at the modelled avoidance rates.

Notably, Horned Lark was included in the CRM because of its high flight activity during migration periods (***Table 6-52***). However, NatureScot (2025) [105] guidance indicates that passerines, including Horned Lark, are not generally considered to be significantly affected by wind farms. VP survey data for small passerines like Horned Lark are also subject to observer bias, as their detection and identification ranges are much shorter than those of larger species. The recorded flight activity, and hence the predicted collision rate, is therefore unlikely to be a reliable measure of collision risk for this species. The PBR and threshold results for Horned Lark should therefore be interpreted with caution.

The thresholds presented in ***Table 6-68*** apply to the Project as a whole. Fatalities attributable to the OHL that are recorded during post-construction fatality monitoring (PCFM) will also count towards the same thresholds as WTG fatalities.

TABLE 6-68: ANNUAL FATALITY THRESHOLDS AND PREDICTED WTG COLLISIONS

Species	Basis of threshold	Fatality threshold (birds/yr)	Predicted WTG collisions (birds/yr)
Saker Falcon (*Falco cherrug*)	Global IUCN status EN	0	0.0071
Cinereous Vulture (*Aegypius monachus*)	Declining global trend	0	2.7345
Black Kite (*Milvus migrans*)	PBR 105,326 (> 100,000)	5	2.4124
Lesser Kestrel (*Falco naumanni*)	PBR 10,583 (1,000-100,000)	3	0.2587
Upland Buzzard (*Buteo hemilasius*)	PBR 790 (< 1,000)	0	0.2049
Whooper Swan (*Cygnus cygnus*)	PBR 2,315 (1,000-100,000)	3	0.5694
Pallas's Sandgrouse (*Syrrhaptes paradoxus*)	PBR 474,341 (> 100,000)	5	0.8466
Horned Lark (*Eremophila alpestris*)	PBR 6,037 (1,000-100,000)	3	0.7198

[105] NatureScot. (2025). *Recommended bird survey methods to inform impact assessment of onshore windfarms*. https://www.nature.scot/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms

Collision Risk Modelling Conclusions

Cinereous Vulture and Black Kite have relatively higher simulated collision rates compared to the other modelled bird species. Nonetheless, the IUCN conservation status of Black Kite is LC, with a global population of approximately 4,000,000 individuals. The predicted collision rate is 2.4124 birds/yr, which represents about 0.00006% of the global population and is below the species' fatality threshold of 5 birds/yr, indicating a low impact.

Cinereous Vulture is classified as Near Threatened (NT) by IUCN, with an estimated global population of 16,800-22,800 individuals. The simulated collision rate is 2.7345 birds/yr, accounting for approximately 0.016% of the global population and exceeding the fatality threshold of 0 birds/yr. Saker Falcon (IUCN EN) and Upland Buzzard (IUCN LC) also have fatality thresholds of 0 birds/yr. Although their predicted collision rates are low (0.0071 birds/yr and 0.2049 birds/yr, respectively), any Project-related fatality would exceed the threshold. Therefore, the Project's potential impact on these three species and related mitigation measures will be evaluated in further detail in ***Chapter 7 Environmental Impact Assessment***.

For the other modelled species (Lesser Kestrel, Whooper Swan, Horned Lark and Pallas's Sandgrouse), given their Mongolian and IUCN conservation statuses and the low predicted collision rates (0.2587 to 0.8466 birds/yr) well below their fatality thresholds, the collision risk is unlikely to affect population stability. Compliance with all fatality thresholds, including fatalities associated with the Project's WTGs and OHL, will be verified through PCFM.

6.2.7.6 CARCASS SURVEYS

Carcass search surveys were conducted along line transects (length of three (3) km each) parallel to an existing 220 kV transmission line connecting the Tavan Tolgoi mine to the Oyu Tolgoi mine for all six (6) survey events between August 2024 and May 2025. A total of eight (8) carcasses were found, including four (4) Northern Ravens (*Corvus corax*, LC), two (2) Cinereous Vultures (*Aegypius monachus*, NT), one Pallas's Sandgrouse (*Syrrhaptes paradoxus*, LC) and one Carrion Crow (*Corvus corone,* LC), as shown in ***Figure 6-136*** and ***Table 6-69***. Photographs of documented carcasses are provided in ***Figure 6-136***.

The two Cinereous Vulture carcasses recorded had broken wings and were located 62–65 m from the transmission line and 18–63 m from the wires. Three Northern Ravens and the one Carrion Crow died from collision injuries. One Northern Raven was electrocuted, as evident from a burn mark on the carcass. More than ten (10) feathers of a Pallas's Sandgrouse were found underneath a wire located in close proximity to the Cinereous Vulture carcasses. The four Northern Raven carcasses disappeared within 3–5 months, while the two Cinereous Vulture carcasses remained for only 35 days after the first observation.

In addition to the carcass surveys, data from Oyu Tolgoi mine's annual avifauna monitoring reports have been reviewed. Avifauna mortality incidents recorded in the mine area (near the southern end of the Project's OHL) showed that LC species account for the majority of fatalities (where species could be identified), including the Northern Raven (*Corvus corax*), Daurian Jackdaw (*Corvus dauuricus*), Scaly Thrush (*Zoothera dauma*), Upland Buzzard (*Buteo hemilasius*), Eurasian Spoonbill (*Platalea leucorodia*), Eurasian Tree Sparrow (*Passer montanus*), Great Cormorant (*Phalacrocorax carbo*), Black Kite (*Milvus migrans*), Great Crested Grebe (*Podiceps cristatus*), Osprey (*Pandion haliaetus*), and Pallas's Leaf Warbler

(*Phylloscopus proregulus*). Carcasses of the NT Cinereous Vulture (*Aegypius monachus*) have also been recorded in the mine area. The Oyu Tolgoi Mine 2024 Environmental Management Plan Implementation Report recorded 34 accidents and fatalities between January and October 2024 of seven (7) bird species, three (3) mammal species, and one (1) reptile, with 32.3% of cases attributed to unknown causes, followed by 20.6% cases being due to collision with the mine's transmission lines, electrocution (17.7%), collision with built-up structures such as windows, buildings, and fences (8.8%), vehicle collisions (8.8%), injury from guard dog attack and drowning. Approximately 53% of the total animal deaths were birds despite the installation of bird flight diverters on power lines and pylons.[106]

[106] 2024 Environmental Management Plan Implementation Report for Oyu Tolgoi Copper-Gold Mining Project located in Khanbogd Soum, Umnogovi Province. Made available through communication with Oyu Tolgoi Mine and facilitated by the Client.

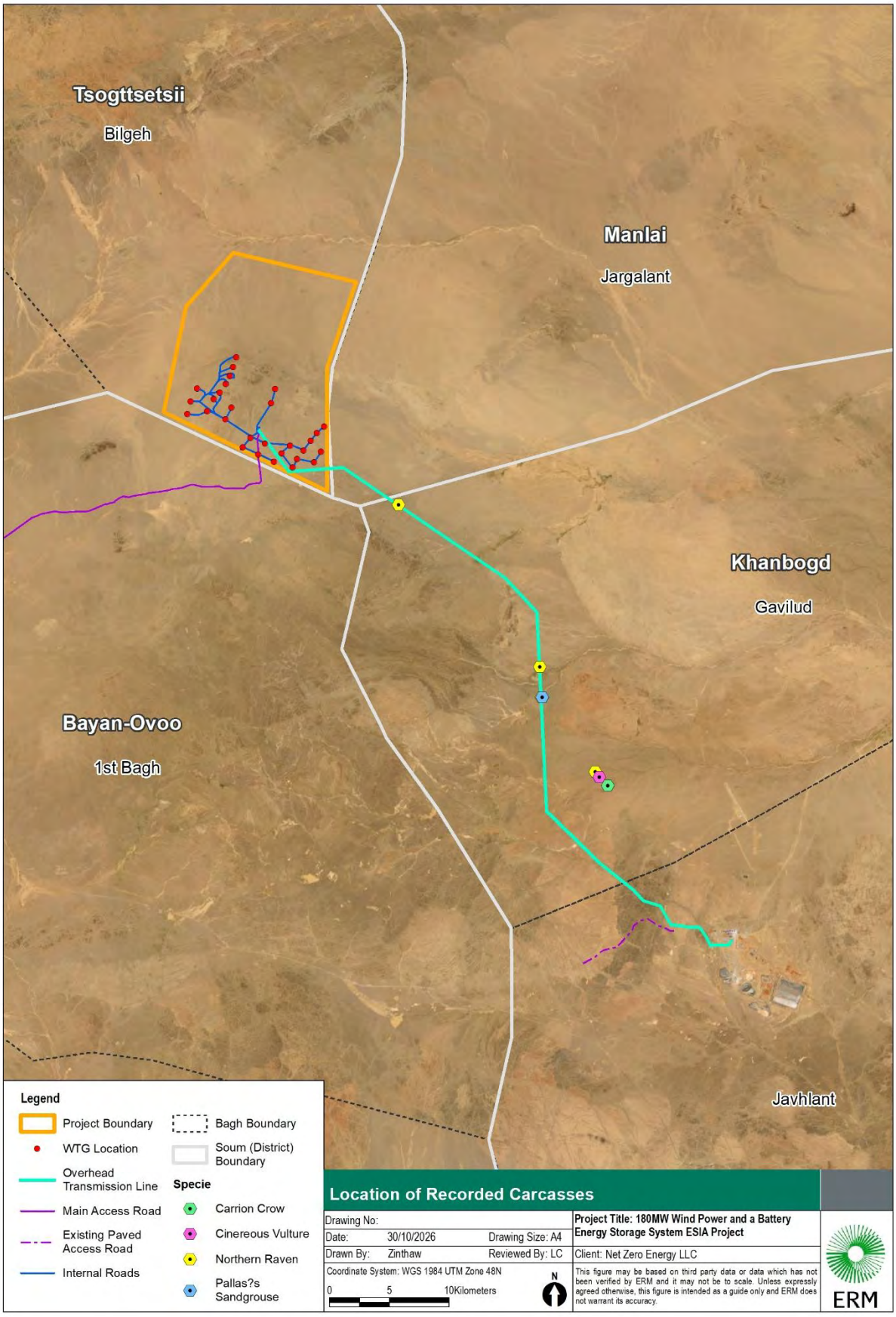


FIGURE 6-135: LOCATIONS OF BIRD CARCASSES DOCUMENTED IN THE PROJECT AREA

TABLE 6-69: BIRD CARCASSES RECORDED NEAR EXISTING TRANSMISSION LINE IN THE PROJECT AREA

№	Line Transect	Species name	No. of Individual	First found date	Last date of observation	Condition (e.g., intact, scavenged)	Note
1	TL1	Northern Raven	1	28 August 2024	9 January 2025	Right wing and secondary feathers	Most likely collided.
2	TL2	Northern Raven	1	28 August 2024	10 January 2025	Intact	Electrocuted near #391 electric pole.
3	TL2	Northern Raven	1	10 January 2025	11 April 2025	Primary and secondary feathers and feathers of body	Only fresh feathers found.
4	TL2	Cinereous Vulture	1	11 April 2025	16 May 2025	Intact	Broken wing and visible collision injuries.
5	TL2	Pallas's Sandgrouse	1	11 April 2025	16 May 2025	Only feathers	More than ten (10) flight and tail feathers found.
6	TL3	Carrion Crow	1	28 August	31 August	Intact	-
7	TL3	Northern Raven	1	8 November 2024	11 April 2025	Intact	-
8	TL3	Cinereous Vulture	1	11 April 2025	16 May 2025	Intact	Broken left wing and visible collision injuries.





Cinereous Vulture *Aegypius monachus* (April 2025)



Northern Raven *Corvus corax* (January 2025)



Northern Raven *Corvus corax* (January 2025)

FIGURE 6-136: BIRD CARCASSES RECORDED IN THE PROJECT AREA

6.2.7.7 BIRD SPECIES OF CONSERVATION CONCERN

The majority of bird species identified during the baseline surveys are not globally or regionally threatened and not legally protected in Mongolia (i.e. classified as Least Concern on the IUCN Red List and Mongolia Red List and not covered under the Mongolian Law on Fauna). In total,

eight (8) bird species of conservation significance have been recorded in the Project area from both the August 2024 – May 2025 surveys, including the Cinereous Vulture (*Aegypius monachus*), Steppe Eagle (*Aquila nipalensis*), Short-toed Snake Eagle (*Circaetus gallicus*), Bearded Vulture (*Gypaetus barbatus*), Himalayan Griffon (*Gyps himalayensis*), Saker Falcon (*Falco cherrug*), Mongolian Ground Jay (*Podoces hendersoni*), and Great Bustard (*Otis tarda*).

Avifauna species with the highest risk of collision with Project infrastructure (particularly wind turbine blades and transmission lines) including large soaring birds, raptors (species belonging to the Accipitriformes and Falconiformes orders), migratory birds, small passerines, large perching birds, and species with high wing loading (body mass to wing area ratio) such as bustards, cranes, storks, geese, swans, eagles, and vultures.[107] All eight (8) birds of conservation concern match these characteristics and thus are also considered vulnerable to collision with WTGs and the OHL. Furthermore, avian interactions with existing infrastructure within the Project area have already been documented during the baseline surveys. Bird carcasses that collided with or were electrocuted by the existing transmission line in the proximity of the Project were observed, including multiple Cinereous Vultures (*Aegypius monachus*) (NT, IUCN). Additionally, [redacted]



FIGURE 6-137: [redacted]

Details on each species is provided in ***Table 6-70*** along with their global and regional conservation status, legal protection status, inclusion/exclusion in the Convention on Migratory Species (CMS) and Convention on International Trade in Endangered Species (CITES), residency status, dominant habitats, and annual collision rate. Please note that certain species were excluded from the CRM and do not have an annual collision rate estimated since they were not recorded during the VP surveys, not observed at rotor-swept height, not known to exhibit collision-prone behaviour (e.g., soaring), of small body sizes, and/or recorded in small numbers. Photographs of species captured during the August 2024 – May 2025 baseline surveys are provided in ***Figure 6-138.***

The Oyu Tolgoi Mine's 2024 Environmental Management Plan Implementation Report also found the presence of four (4) species of conservation concern in the mine project's area, all of

[107] Bennun, L., van Bochove, J., Ng, C., Fletcher, C., Wilson, D., Phair, N. and Carbone, G. 2021. Mitigating biodiversity impacts associated with solar and wind energy development. IUCN and The Biodiversity Consultancy. Available at: https://doi.org/10.2305/IUCN.CH.2021.04.en

which were recorded during the baseline surveys, namely the Cinereous Vulture (*Aegypius monachus*), Saker Falcon (*Falco cherrug*), Short-toed Snake Eagle (*Circaetus gallicus*), and Great Bustard (*Otis tarda*).[108]

The Project's DEIA reports that "around 40 species of birds were identified near the project site", of which 12 are species of conservation importance including species that were not observed during the ESIA baseline surveys—i.e. the Eastern Imperial Eagle (*Aquila heliaca*), Pallas's Fish-eagle (*Haliaeetus leucoryphus*), Swan Goose (*Anser cygnoides*), Lesser White-fronted Goose (*Anser erythropus*), and Dalmatian Pelican (*Pelecanus crispus*)—as well as species that were found during the ESIA surveys, i.e. the Saker Falcon (*Falco cherrug*), Mongolian Ground Jay (*Podoces hendersoni*), Bearded Vulture (*Gypaetus barbatus*), and Great Bustard (*Otis tarda*). It should be noted that survey methodologies and results (including species' abundance and distribution in the Project area) are not specified in the DEIA beyond that the listed avifauna species were "identified near the project site". Due to ambiguity regarding whether the species reported in the DEIA were found during field surveys or from secondary data, it is assumed that the above-mentioned species were identified from secondary research, and thus have been excluded from ***Table 6-70***.

Results of Expert Consultations

The Great Bustard (*Otis tarda*) (EN, IUCN) and the Asian Houbara (*Chlamydotis macqueenii*) (VU, IUCN) are both globally and regionally threatened bustard species that possess morphological and behavioural characteristics that make them highly susceptible to collision with wind turbines and overhead transmission lines, such as flying within the rotor swept zone or at OHL height (particularly while on migration), foraging in open habitats, and having lower manoeuvrability due to high wing loading (weight-to-wing area ratio). However, results of both the ESIA and DEIA baseline surveys show no presence of the Asian Houbara in the Project area, while only four (4) Great Bustards were recorded over one (1) observation during the ESIA surveys. To verify the extent of these two species' presence across the Project's wider Ecologically Appropriate Area of Analysis (EAAA), i.e. the spatial unit used to assess the presence of any critical habitats (see ***Annex B*** for more details on the EAAA), an expert consultation was conducted with Gombobaatar Sundev, a leading Mongolian ornithologist who has also conducted avifauna surveys in the Tsogtsettsi and Khanbogd areas of Omnogobi Province over the past two years (including for the Project's ESIA, a nearby wind farm, and monitoring for OT Mine's 220 kV transmission line).[109]

Results of the expert consultation indicate that both the Great Bustard and the Asian Houbara exhibit very low abundance in the Project's EAAA due to the area not aligning with these species' habitat preferences. Great Bustard populations in Mongolia are only known to breed in the northern regions, after which they migrate over a broad front through the steppes toward wintering grounds such as northern China and the Korean peninsula, typically through habitats that do not correspond to the Project's EAAA. The Project area is characterized by hilly slopes and rocky outcrops which Great Bustards tend to avoid, as they prefer migrating through open plains or mountain valleys. Furthermore, based on field experience in and around the Project

[108] 2024 Environmental Management Plan Implementation Report for Oyu Tolgoi Copper-Gold Mining Project located in Khanbogd Soum, Umnogovi Province. Made available through communication with Oyu Tolgoi Mine and facilitated by the Client.
[109] Gombobaatar Sundev is a Professor at the National University of Mongolia in Ulanbaatar, President of the Mongolian Ornithological Society, and co-author of the Mongolian Red List of Birds (2011), Princeton Field Guide to the Birds of Mongolia (2019), and numerous research articles on Mongolian avifauna.

area, the expert found that Great Bustards were never observed in large numbers (with no more than five individuals per flock, including during the autumn and spring migration seasons) and that no significant collision risk is anticipated for this species due to low abundance in the area.

Regarding the Asian Houbara, the consultation also revealed that very low species abundance and insignificant collision risk is expected in the Project's EAAA due to habitat incompatibility. The Asian Houbara exhibits high preference for shrubs and bushes of Saxaul (*Haloxylon ammodendron*) in the Gobi Desert, especially during breeding season as they nest on the ground in areas surrounded by scrub. However, this plant species was not found during any ESIA or DEIA baseline surveys, while areas of hilly slopes and rocky outcrops found throughout the Project's EAAA also do not correspond with the Asian Houbara's habitat preferences. Similar to the results of the ESIA and DEIA surveys, other field studies conducted over recent years by the consulted expert also found no presence of the Asian Houbara in and around the EAAA. Expert insights and available literature indicate that the Asian Houbara is more likely to be found in higher densities in the Trans-Altai Gobi (southwestern Mongolia) and Alashani Gobi (south-central), as well as the Galba Gobi (south of the EAAA).[110,111]

[110] Gombobaatar, S. and Monks, E. M. 2011. Regional Red List Series Vol. 7 Birds. Zoological Society of London, National University of Mongolia and Mongolian Ornithological Society.
[111] Nyambayar. B, Bayarjargal, B., Stacey, J. and Braunlich, A. 2009. Houbara Bustard and Saker Falcon Surveys in Galba Gobi IBA, southern Mongolia: Preliminary Technical Report to the World Bank and BirdLife International. Wildlife Science and Conservation Centre of Mongolia. https://documents1.worldbank.org/curated/en/828211468060543659/pdf/627640WP0Houba00Box0361493B0PUBLIC0.pdf

TABLE 6-70: AVIAN SPECIES OF CONSERVATION SIGNIFICANCE RECORDED FROM ESIA BASELINE SURVEYS

No.	Scientific Name	Common Name	Conservation Status*	Residency Status	Notes	Observations	Annual Collision Rate**
Accipitriformes							
1	*Aegypius monachus*	Cinereous Vulture	• IUCN Red List: NT • Mongolian Red List of Birds: LC • Law on Fauna / Red Book: Not Listed • CITES: N/A • CMS: N/A	Resident breeder and partial migrant in Project area	• **Habitats:** Open plains and desert steppe in Project area. Also common on mountainous and hilly terrain within WTG area. • **Records:** 307 individuals over 96 observations.	307 individuals recorded over 96 observations.	2.7345 birds per year
2	*Aquila nipalensis*	Steppe Eagle	• IUCN Red List: EN • Mongolian Red List of Birds: LC • Law on Fauna / Red Book: Not Listed • CITES: N/A • CMS: Appendix I	Passage migrant in Project area	• **Habitats:** Open plains and desert steppe, and dry riverbeds in Project area. • **Records:** Three (3) individuals over two (2) observations.	3 individuals recorded over two (2) observations.	N/A (excluded from the CRM due to a small number of VP records)
3	*Circaetus gallicus*	Short-toed Snake Eagle	• IUCN Red List: LC • Mongolian Red List of Birds: EN • Law on Fauna / Red Book: Very Rare • CITES: N/A • CMS: N/A	Passage migrant in Project area	• **Habitats:** Dry riverbeds, ephemeral drainage channels and valleys in Project area. • **Records:** One (1) individual.	1 individual recorded.	N/A (excluded from the CRM as the species was not recorded during the VP surveys)
4	*Gypaetus barbatus*	Bearded Vulture	• IUCN Red List: NT • Mongolian Red List of Birds: VU • Law on Fauna / Red Book: Rare • CITES: N/A • CMS: Appendix I	Resident breeder in Project area	• **Habitats:** Dry riverbeds, ephemeral drainage channels and valleys in Project area. • **Records:** Four (4) individuals over Four (4) observations.	4 individuals recorded over four (4) observations.	N/A (excluded from the CRM as the species was not recorded during the VP surveys)

No.	Scientific Name	Common Name	Conservation Status*	Residency Status	Notes	Observations	Annual Collision Rate**
5	*Gyps himalayensis*	Himalayan Griffon	• IUCN Red List: NT • Mongolian Red List of Birds: LC • Law on Fauna / Red Book: Not Listed • CITES: Appendix II • CMS: Appendix II	Breeding visitor and passage migrant	• **Habitats:** Mountains, hills and hillocks in Project area. • **Records:** One (1) individual over One (1) observation.	1 individual recorded.	N/A (excluded from the CRM as the species was not recorded during the VP surveys)
Falconiformes							
6	*Falco cherrug*	Saker Falcon	• IUCN Red List: EN • Mongolian Red List of Birds: VU • Mongolian Law on Fauna / Red Book: Not Listed • CITES: N/A • CMS: N/A (excludes Mongolian populations)	Resident breeder in Project area	• **Habitats:** Mountains, hills and hillocks in Project area. • **Records:** Nine (9) individuals over eight (8) observations.	9 individuals recorded over eight (8) observations.	0.0071 birds per year
Passeriformes							
7	*Podoces hendersoni*	Mongolian Ground Jay	• IUCN Red List: LC • Mongolian Red List of Birds: VU • Mongolian Law on Fauna / Red Book: Rare • CITES: N/A • CMS: N/A	Resident breeder in Mongolia	• **Habitats:** Mountains, hills and hillocks in the Project area. • **Records:** Seven (7) individuals over six (6) observations.	7 individuals recorded over six (6) observations.	N/A (excluded from CRM due to a small number of VP records)
Otidiformes							
8	*Otis tarda*	Great Bustard	• IUCN Red List: EN • Mongolian Red List of Birds: VU • Mongolian Law on Fauna / Red Book: Rare	Passage migrant in Project area	• **Habitats:** Mountains, hills and hillocks in the Project area. • **Records:** Four (4) individuals over one (1) observation.	4 individuals recorded over one (1) observation.	N/A (excluded from the CRM as the species was

No.	Scientific Name	Common Name	Conservation Status*	Residency Status	Notes	Observations	Annual Collision Rate**
			• CITES: N/A • CMS: Appendix II				not recorded during the VP surveys)

Abbreviations: NE = Not Evaluated, LC = Least Concern, DD = Data Deficient, NT = Near Threatened, VU = Vulnerable, EN = Endangered

*Notes on Conservation Status:
- IUCN Global Red List of Threatened Species, Version 2025-2.
- Mongolian Red List of Birds: Gombobaatar, S. and Monks, E. M. (Compilers). Seidler, R., Sumiya, D., Tseveenmyadag, N., Bayarkhuu, S., Baillie, J. E. M., Boldbaatar, Sh., Uuganbayar, Ch. (Editors). 2011. Regional Red List Series Vol. 7. Birds. Zoological Society of London, National University of Mongolia and Mongolian Ornithological Society.
- Classification of 'Very Rare' and 'Rare' is based on Mongolia's Law on Fauna of 2000, Mongolian Government Resolution No. 264 (2001), Annex to Mongolian Government Resolution No. 7 (2012), and Mongolian Red Book. 2014. Ulaanbaatar, Mongolia. Admon Press.
- CITES: Appendices I, II and III valid from 7 February 2025. Available at: https://cites.org/sites/default/files/eng/app/2025/E-Appendices-2025-02-07.pdf
- CMS: Appendices I and II effective 17 May 2024. Available at: https://www.cms.int/sites/default/files/uploads/revised-appendices_cop14_e.pdf

** Number of collisions per year for modelled species assuming 98% avoidance rate (refer to previous Collision Risk Modelling section for results with other avoidance rate assumptions).



Cinereous Vulture *Aegypius monachus*
(NT IUCN; LC MRL)



Bearded Vulture *Gypaetus barbatus*
(NT IUCN; VU MRL)



Great Bustard *Otis tarda*
(EN IUCN; VU MRL)



Steppe Eagle *Aquila nipalensis*
(EN IUCN; LC MRL)



Himalayan Griffon *Gyps himalayensis*
(NT IUCN; LC MRL)



Saker Falcon *Falco cherrug*
(EN IUCN; VU MRL)



Short-toed Snake Eagle *Circaetus gallicus*
(LC IUCN; EN MRL)



Mongolian Ground Jay *Podoces hendersoni*
(LC IUCN; VU MRL)



Horned Lark *Eremophila alpestris*
(LC, IUCN and MRL)



Pallas's Sandgrouse *Syrrhaptes paradoxus*
(LC, IUCN and MRL)



Oriental Honey Buzzard *Pernis ptilorhynchus*
(LC, IUCN and MRL)



Common Kestrel *Falco tinnunculus*
(LC, IUCN and MRL)



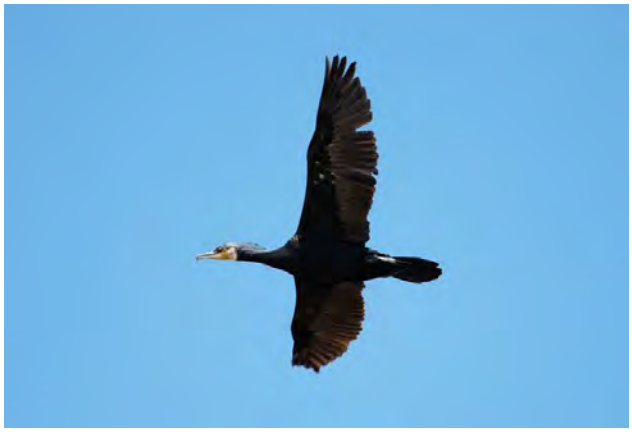
Eastern Buzzard *Buteo japonicus*
(LC, IUCN and MRL)



Whooper Swan *Cygnus cygnus*
(LC, IUCN and MRL)



Golden Eagle *Aquila chrysaetos*
(LC, IUCN and MRL)



Great Cormorant *Phalacrocorax carbo*
(LC, IUCN and MRL)



Black Kite *Milvus migrans*
(LC, IUCN and MRL)



Lesser Kestrel *Falco naumanni*
(LC, IUCN and MRL)



Lapland Longspur *Calcarius lapponicus*
(LC, IUCN and MRL)



Mongolian Lark *Melanocorypha mongolica*
(LC, IUCN and MRL)

Source: Mongolica (2024 and 2025)

FIGURE 6-138: PHOTOGRAPHS OF DOCUMENTED BIRD SPECIES IN THE PROJECT AREA

6.2.8 NON-AVIAN FAUNA

6.2.8.1 NON-VOLANT MAMMALS

Surveys conducted to identify the presence of terrestrial (non-volant) mammals in the area include line transects, Sherman live traps, and camera traps. Survey results presented in this section exclude domesticated animals and cattle species such as goats and camels.

Species Richness, Abundance and Occurrence

Six (6) rounds of field surveys conducted between August 2024 and May 2025 targeting non-volant terrestrial mammals were conducted for the Project, including the WTG area and along the OHL. Survey methods carried out include line transects and opportunistic sampling, Sherman traps, and camera traps.

During the surveys, a total of 367 individuals belonging to 17 species, 11 families, and six (6) orders were recorded in the Project area. With regards to species richness, rodents make up 58.9% of the 17 species identified (10 species), followed by ungulates (3 species, 17.6%), carnivores (2 species, 11.8%), insectivores (1 species, 5.9%) and lagomorphs (1 species, 5.9%). Of these, a total of 11 mammal species (64.7%) recorded showed nocturnal activity patterns, while six (6) species (35.3%) were diurnal. Additionally, two (2) species (11.7%) were observed to be active during both day and night, indicating a degree of behavioural flexibility. In terms of abundance, ungulates account for 84% of all individuals recorded (307 individuals) while the remaining 60 individuals are small mammals such as jerboas, hamsters, voles, etc.

Of all mammal species observed during the ESIA baseline surveys, the Mongolian Gazelle (*Procapra gutturosa*), Goitered Gazelle (*Gazella subgutturosa*), and Asiatic Wild Ass (*Equus hemionus*) occurred most frequently and in the highest numbers, with 220, 51, and 36 individuals recorded, respectively. This indicates high density and abundance of ungulates in the Project area due to these species' seasonal movement patterns as they migrate depending on pasture conditions and availability of food and water sources.

As shown in ***Figure 6-139***, the highest number of individuals of all species observed occurred in November 2024, followed by May 2025 and September 2024. Mongolian Gazelles were most

frequently observed during the months of September and November 2024, with most observations recorded in the southern corner of the WTG area (see ***Figure 6-140, A***). Goitered Gazelles were most frequently observed during the May and January 2025 surveys, predominantly recorded in the southeastern portion of the WTG area as well as along the OHL (see ***Figure 6-140, B***). The Asiatic Wild Ass was observed in higher numbers and frequency during the months of August, April and May (as shown in ***Figure 6-140, C***) which aligns with the peak birthing season of April to September.[112] Approximately 80% of observed Asiatic Wild Ass individuals were found outside the WTG area in large gatherings near mountain ranges with better vegetation conditions (relative to other more scarcely vegetated open steppe areas).

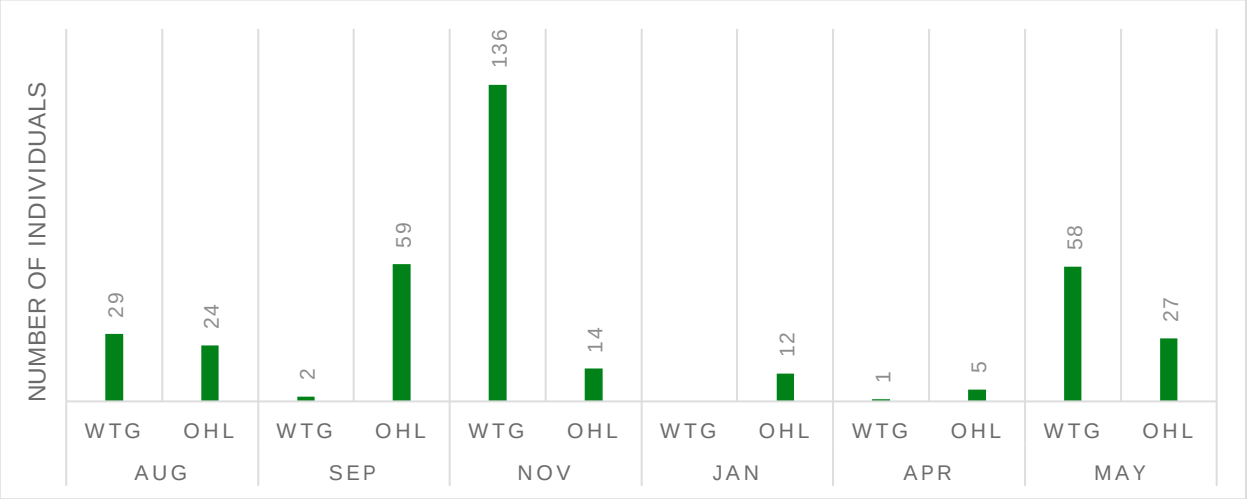
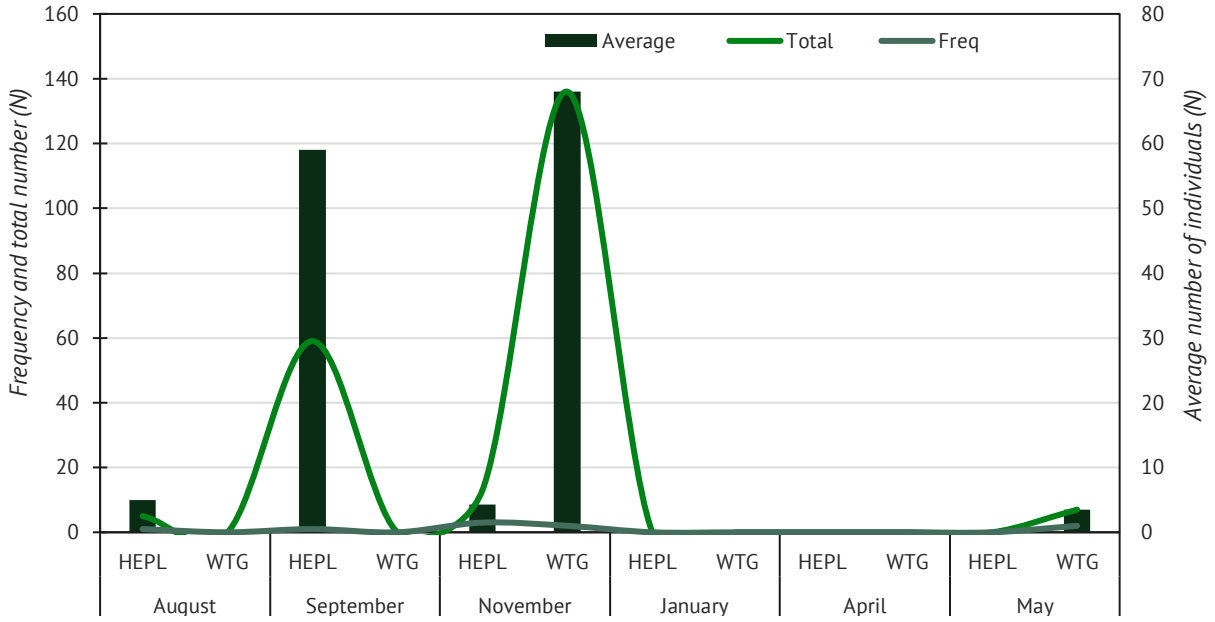
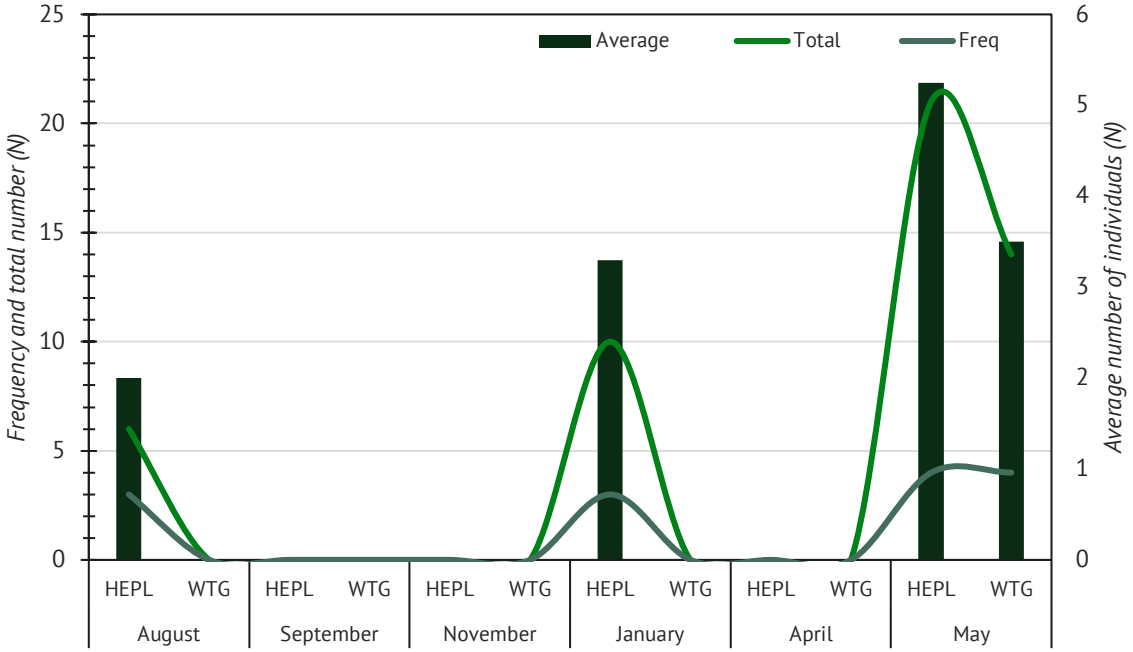


FIGURE 6-139: ABUNDANCE AND OCCURRENCE OF MAMMAL SPECIES RECORDED DURING BASELINE SURVEYS

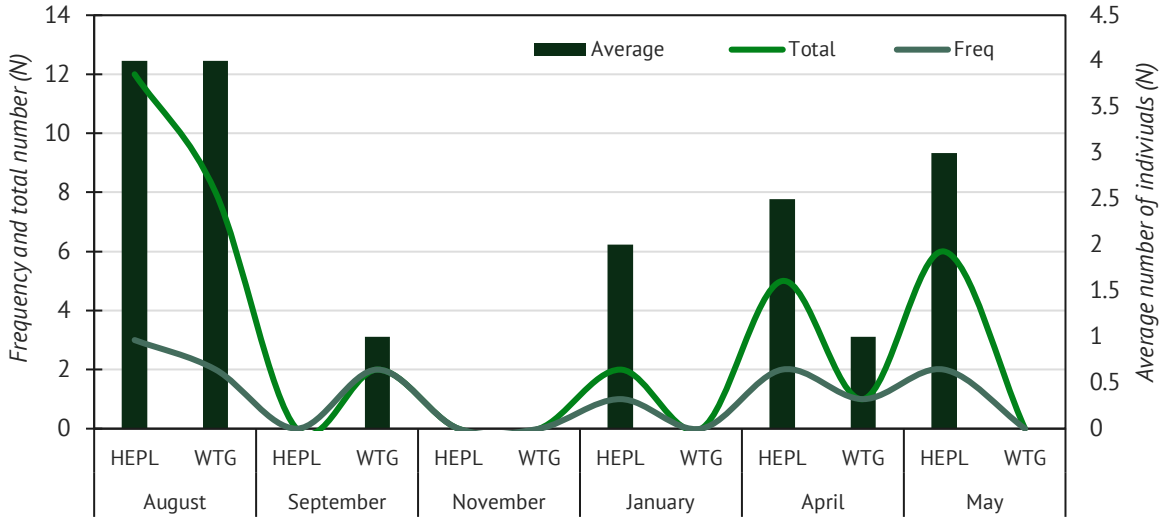


(A): Monthly abundance and observation frequency of the Mongolian Gazelle (*Procapra gutturosa*)

[112] Feh, C., Shah, N., Rowen, M., Reading, R. and Goyal, S.P., 2002, Status and action plan for the Asiatic wild ass (Equus Hemionus), Equids: Zebras, Asses and Horses. Status Survey and Conservation Action Plan, Moehlman, P.D., 62-71, IUCN, Gland, Switzerland.



(B): Monthly abundance and observation frequency of the Goitered Gazelle (*Gazella subgutturosa*)



(C): Monthly abundance and observation frequency of the Asiatic Wild Ass (*Equus hemionus*)

FIGURE 6-140: ABUNDANCE AND OCCURRENCE OF ASIATIC WILD ASS, GOITERED GAZELLE AND MONGOLIAN GAZELLE

Monitoring surveys conducted for the Oyu Tolgoi mine project in 2024 recorded a total of 767 individuals of the Goitered Gazelle (*Gazella subgutturosa*) belonging to 184 herds in and around the mine compound between January and October 2024. [113] The number of individuals observed was highest in January (with 125 individuals found)—coinciding with the breeding season—and lowest in May (49 individuals).[114]

[113] 2024 Environmental Management Plan Implementation Report for Oyu Tolgoi Copper-Gold Mining Project located in Khanbogd Soum, Umnogovi Province. Made available through communication with Oyu Tolgoi Mine and facilitated by the Client.
[114] Cichon, C.; C. Cichon; Y. Woo and K. Woo 2011. "Gazella subgutturosa" (On-line), Animal Diversity Web. https://animaldiversity.org/accounts/Gazella_subgutturosa/

Results of Local Interviews

Local herders encountered during baseline surveys were interviewed to identify the presence of mammal species in the Project area. Species' descriptions, images, field guides, and behavioural characteristics were shared with the interviewees to allow for more accurate identification. A total of 22 interviews with eight (8) local herders were carried out, five (5) of whom reported [redacted] (***Figure 6-141***). Interviewed herders also reported the presence of [redacted] (***Figure 6-141***). Although Argali were not directly observed during the baseline surveys, it is likely that this species occurs in mountain ranges during periods of seasonal movement. ERM observed an Argali's horn placed on a hilltop at a herder's camp (presumably as trophy or cultural reasons). Interviewees who had lived in/near the Project area have also reported that they had not seen any other target mammals of conservation interest such as the Snow Leopard (*Panthera uncia*) (VU, IUCN and MRL and Very Rare) or Siberian Ibex (*Capra sibirica*) (NT, IUCN and MRL and Rare). Neither of these species were observed during the baseline surveys in the Project's study area, potentially due to lack of suitable habitats such as rocky terrain in high-elevation mountainous regions.

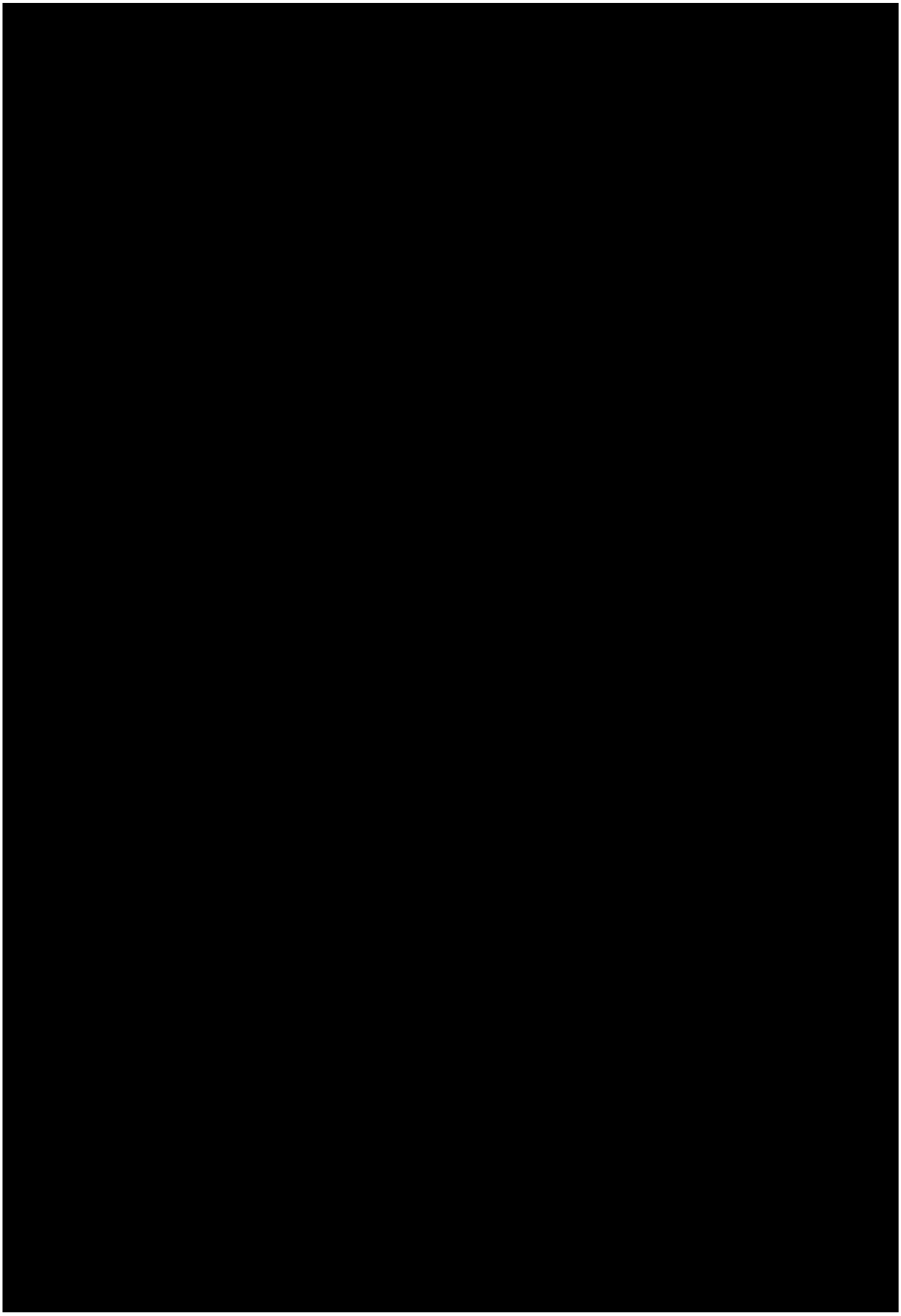


FIGURE 6-141:

Species of Conservation Concern

Among all mammal species recorded in the Project area from the ESIA baseline surveys and the Project's DEIA, five (5) are considered to be species of conservation significance due to their globally and/or regionally threatened status and/or designation for legal protection under Mongolia's Law on Fauna (2000) and its 2001 revision. These include the Asiatic Wild Ass (Equus hemionus), Goitered Gazelle (*Gazella subgutturosa*), Mongolian Gazelle (*Procapra gutturosa*), Five-toed Pygmy Jerboa (*Cardiocranius paradoxus*), and Marbled Polecat (*Vormela peregusna*). The Asiatic Wild Ass is also included in Appendix I and II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Table 6-71 provides details on the total and average number of individuals recorded, frequency of observations, dominant habitats, and conservation status of each species recorded during the August 2024 – May 2025 surveys, as well as information on species recorded in the DEIA. Photographs of mammal species observed in the Project area during the ESIA baseline surveys are presented in ***Figure 6-142.***



Asiatic Wild Ass (*Equus hemionus*)
NT, IUCN and EN, MRL



Goitered Gazelle (*Gazella subgutturosa*)
VU on IUCN and MRL



Corsac Fox (*Vulpes corsac*)
LC, IUCN and NT, MRL



Mongolian Gazelle (*Procapra gutturosa*)
LC, IUCN and EN, MRL



Five-toed Pygmy Jerboa (*Cardiocranius paradoxus*)
DD, IUCN and VU, MRL



Campbell's Hamster (*Phodopus campbelli*)
LC on IUCN and MRL



Gobi Jerboa (*Allactaga bullata*)
LC, IUCN and DD, MRL



Hairy-footed Jerboa (*Dipus sagitta*)
LC on IUCN and MRL



Desert Hamster (*Phodopus roborovskii*)
LC on IUCN and MRL



Long-eared Hedgehog (*Hemiechinus auritus*)
LC on IUCN and MRL



Mongolian Gerbil (*Meriones unguiculatus*)
LC on IUCN and MRL



Red Fox (*Vulpes vulpes*)
LC, IUCN and NT, MRL



Siberian Jerboa (*Allactaga sibirica*)
LC on IUCN and MRL



Pallid Ground Squirrel (*Spermophilus pallidicauda*); LC, IUCN and NE, MRL



House Mouse (*Mus musculus*)
LC on IUCN and MRL



Tolai Hare (*Lepus tolai*)
LC on IUCN and MRL

Source: Mongolica (2024 and 2025)

FIGURE 6-142: MAMMAL SPECIES PHOTOGRAPHED DURING THE AUGUST 2024 - MAY 2025 BASELINE SURVEYS

TABLE 6-71: MAMMAL SPECIES OF CONSERVATION CONCERN RECORDED IN BASELINE SURVEYS

№	Scientific Name	Common name	Recorded Observations from ESIA Baseline Surveys			IUCN Red List	Mongolian Red List	Law on Fauna / Red Book	CITES	CMS	Areas most frequently observed during surveys
			No. of Individuals	Average	Frequency						
Species of Conservation Concern											
1	*Equus hemionus*	Asiatic Wild Ass	36	2.7	13	NT	EN	Rare	I & II	II	Open plains and desert steppe
2	*Gazella subgutturosa*	Goitered Gazelle	51	3.6	14	VU	VU	Rare	-	II	Mountains, hills and hillocks
3	*Procapra gutturosa*	Mongolian Gazelle	220	24	9	LC	EN	-	-	II	Mountain, hills and hillocks
4	*Cardiocranius paradoxus*	Five-toed Pygmy Jerboa	2	1	2	DD	VU	Rare	-	-	Open plains and desert steppe
Species of Lower Conservation Significance											
5	*Vulpes corsac*	Corsac Fox	1	1	1	LC	NT	-	-	-	Open plains and desert steppe
6	*Vulpes vulpes*	Red Fox	3	1	3	LC	NT	-	III	-	Dry riverbeds and drainage channels
7	*Allactaga bullata*	Gobi Jerboa	10	1.4	7	LC	DD	-	-	-	Open plains and desert steppe
8	*Phodopus campbelli*	Campbell's Hamster	1	1	1	LC	LC	-	-	-	Open plains and desert steppe
9	*Phodopus roborovskii*	Desert Hamster	8	1.1	7	LC	LC	-	-	-	Open plains and desert steppe
10	*Allactaga sibirica*	Siberian Jerboa	14	1	13	LC	LC	-	-	-	Open plains and desert steppe

№	Scientific Name	Common name	Recorded Observations from ESIA Baseline Surveys			IUCN Red List	Mongolian Red List	Law on Fauna / Red Book	CITES	CMS	Areas most frequently observed during surveys
			No. of Individuals	Average	Frequency						
11	*Lepus tolai*	Tolai Hare	5	1	5	LC	LC	-	-	-	Mountains, hills and hillocks
12	*Ellobius tancrei*	Zaisan Mole Vole	1	1	1	LC	LC	-	-	-	Open plains and desert steppe
13	*Dipus sagitta*	Hairy-footed Jerboa	6	1	6	LC	LC	-	-	-	Open plains and desert steppe
14	*Mus musculus*	House Mouse	2	1	2	LC	LC	-	-	-	Dry riverbeds and drainage channels
15	*Hemiechinus auritus*	Long-eared Hedgehog	2	1	2	LC	LC	-	-	-	Open plains and desert steppe
16	*Meriones unguiculatus*	Mongolian Gerbil	1	1	1	LC	LC	-	-	-	Open plains and desert steppe
17	*Spermophilus pallidicauda*	Pallid Ground Squirrel	5	2.5	2	LC	NE	-	-	-	Open plains and desert steppe

6.2.8.2 VOLANT MAMMALS (BATS)

Passive acoustic monitoring, mist netting, and active search for roosts and bat substrates were undertaken to measure the presence and activity of bat species in the Project area. Three (3) bat detectors were deployed for passive acoustic monitoring (models Song Meter Mini Bat 2 and Anabat SD2 CF Bat Detector) during the August, September and November 2024 as well as April and May 2025 surveys, while mist nets were installed during the August, September, and November 2024 and May 2025 surveys. Sampling effort for bats and other volant mammals were reduced in the winter season proportionally with lower levels of species' presence and activity in the area during this period due to lower temperatures and reduced food availability. Transects, active search and inspections of potential roost sites were carried out in conjunction with the aforementioned surveys, with locations mapped in ***Figure 6-143***.

Survey locations were selected to provide representative coverage of habitats present in the Project area as well as maximum possible coverage of the proposed wind turbine locations, while also prioritizing areas with higher likelihood of bat occurrence. Full coverage of every WTG was not considered necessary due to the homogeneous nature of habitats within the Project area, which are dominated by extensive desert steppe and semi-desert rangelands exhibiting relatively limited variation in vegetation structure, landform characteristics, and ecological conditions. Topography across the WTG area is generally uniform and characterised by gently undulating terrain with few prominent landscape features that would be expected to influence bat distribution or concentrate bat activity. In such environments, bat occurrence is typically more strongly associated with water sources and areas/structures suitable for roosting. Therefore, sampling locations were designed to achieve representative coverage of WTG footprints while also maximising the likelihood of bat detection, focusing on potential roost sites such as local herders' cattle shelters, small houses, wells, buildings, and rocky structures with crevices. However, no bats were identified in these areas likely due to lack of areas of open water or drinking water sources nearby, absence of favourable roost sites, and existing disturbances from local herders and livestock.

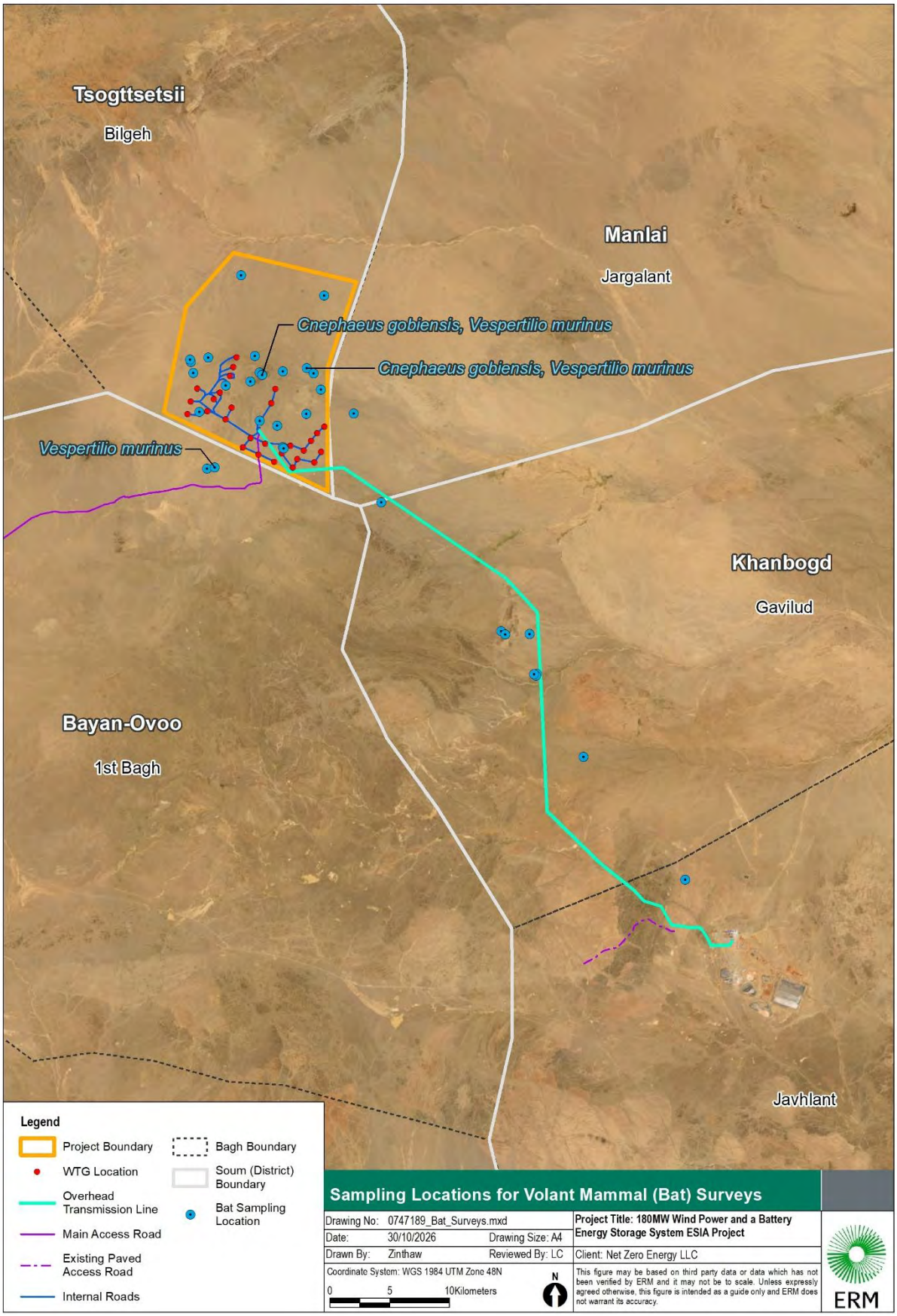
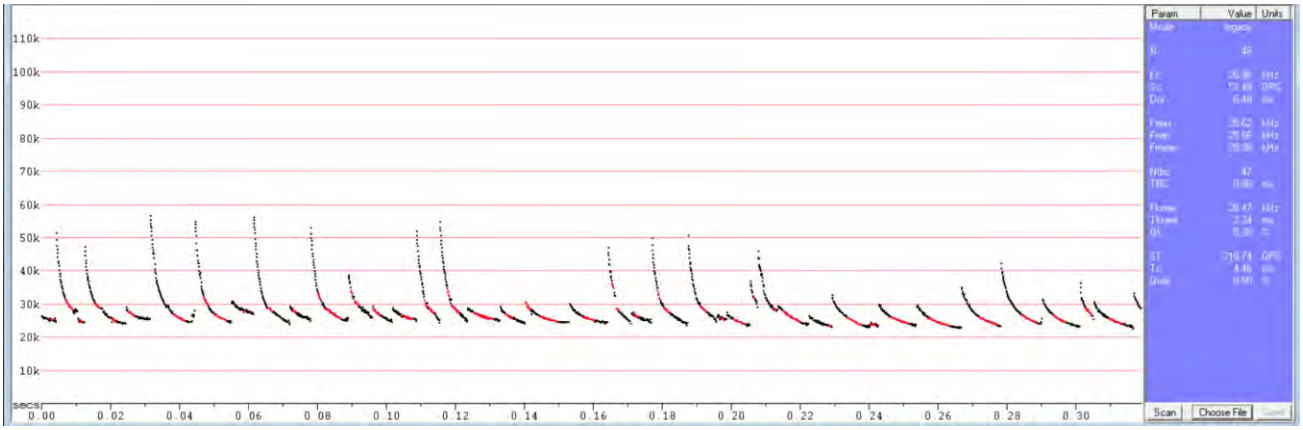
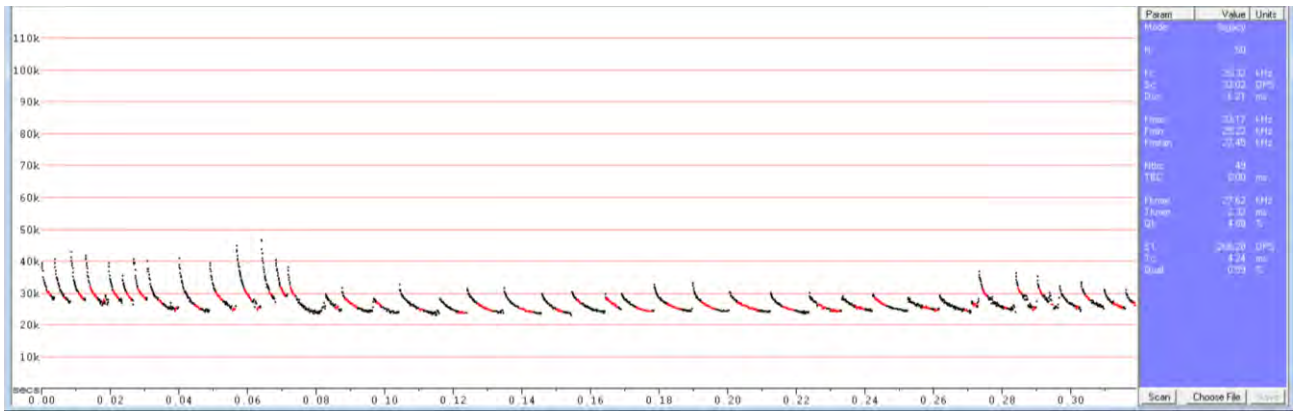


FIGURE 6-143: SURVEY SAMPLING POINTS AND LOCATIONS OF BATS RECORDED

The results of the passive acoustic monitoring surveys indicate the presence of two species based on echolocation call characteristics recorded during the August 2024 baseline surveys: the Parti-coloured Bat (*Vespertilio murinus*) and the Gobi Serotine (*Cnephaeus gobiensis*). These two species were both recorded within close proximity near groundwater wells. Both are assessed as Least Concern on the IUCN Red List and the Mongolian Red List of Mammals. No bats were recorded during the other four survey events when passive acoustic monitoring was conducted, and no bat species were captured from mist nets. However, one acoustic recording from the May 2025 surveys likely matches the Gobi Serotine, though the species identification could not be confirmed due to wind-related noise interference.



Parti-coloured Bat (*Vespertilio murinus*)



Gobi Serotine (*Cnephaeus gobiensis*)

FIGURE 6-144: SPECTROGRAMS OF ECHOLOCATION CALLS OF IDENTIFIED BAT SPECIES

Overall, diversity and abundance of bat species is very low in the Project area, as indicated by the limited observations recorded from the baseline surveys, and only two LC species were recorded, demonstrating the absence of bat species of conservation concern in the Project area.

Regarding potential collision risk with Project infrastructure (including wind turbines and the OHL), collisions cannot be ruled out for the Parti-coloured Bat (*Vespertilio murinus*) due to its flight and behavioural characteristics, but the Project is highly unlikely to pose significant risks to their overall populations due to low abundances in the Project area. This species is an aerial hawker and forages in open skies up to heights of 40 m[115], which falls within the Project's rotor swept area (19 - 201 m). A study from Germany suggests the Parti-coloured Bat performs

[115] Swiss Coordination Centre for bat Conservation. Species Fact Sheet: *Vespertilio murinus*.

song flight for mating and courtship in the vicinity of wind turbines (including the rotor swept zone) due to their preference for establishing mating territories on high structures[116], though whether this applies in the desert steppe landscape of the Project is unclear. Furthermore, while the species has a wide distribution across Europe, Central Asia, and Russia, it is known to have a low abundance in Mongolia.[117] Therefore, while collisions of a small number of individuals may occur, it is highly unlikely to pose a significant risk to the species' overall population.

On the other hand, the Gobi Serotine (*Cnephaeus gobiensis,* formerly known as *Eptesicus gobiensis*) is a ground hawker that hunts in open terrain and feeds on low-flying / ground-dwelling insects (Coleoptera and Heteroptera), preferentially across excrement from large vertebrates such as livestock[118], which indicates the species likely does not typically fly at heights within the rotor swept area.

6.2.8.3 HERPETOFAUNA

A total of 266 individuals belonging to three (3) reptile species were recorded during herpetofauna surveys conducted in August 2024 and May 2025, indicating low species richness in the Project area. These include the Multiocellated Racerunner (*Eremias multiocellata*), Toad-headed Agama (*Phrynocephalus versicolor*) and Gobi Racerunner (*Eremias przewalskii*). As one of the most common species distributed across southern Mongolia, the Toad-headed Agama was observed in the highest numbers, while the remaining species were recorded comparatively small numbers during the survey period. In terms of seasonal variations in abundance, the Multiocellated Racerunner and Toad-headed Agama were more dominant in the Project area in August 2024 compared to May 2025, whereas the same number of Gobi Racerunners were observed in both August 2024 and May 2025 (***Figure 6-145***). All three of these species are categorized as Least Concern on the IUCN Red List and Mongolian Red List and are not considered Very Rare or Rare fauna under Mongolia legislation; therefore, no herpetofauna species of conservation concern have been found in the Project area. ***Table 6-72*** presents more detailed information on the recorded species including abundance, average density, and global and regional conservation status for each. Photographs of observed individuals are presented in ***Figure 6-146***.

[116] Nagy M., Hochradel K., Haushalter C., Simon R., Weber N., Behr O. and Knörnschild M. 2026. Song flight and 3D thermal detection provide evidence for bat attraction to wind turbines in Central Europe. Communications Biology 9(1):460. doi: 10.1038/s42003-026-09882-7. PMID: 41857205; PMCID: PMC13032924.
[117] Coroiu, I. 2016. Vespertilio murinus. The IUCN Red List of Threatened Species 2016: e.T22947A22071456. https://dx.doi.org/10.2305/IUCN.UK.2016-2.RLTS.T22947A22071456.en. Accessed on 05 May 2026.
[118] Dolch, D., Batsaikhan, N., Thiele, K., Burger, F., Scheffler, I., Kiefer, A., Mayer, F., Samjaa, R., Stubbe, A., Stubbe, M., Krall, L. and D. Steinhauser. 2007. Contributions to the Chiroptera of Mongolia with First Evidences on Species Communities and Ecological Niches. Erforschung biologischer Ressourcen der Mongolei / Exploration into the Biological Resources of Mongolia, ISSN 0440-1298. 100.

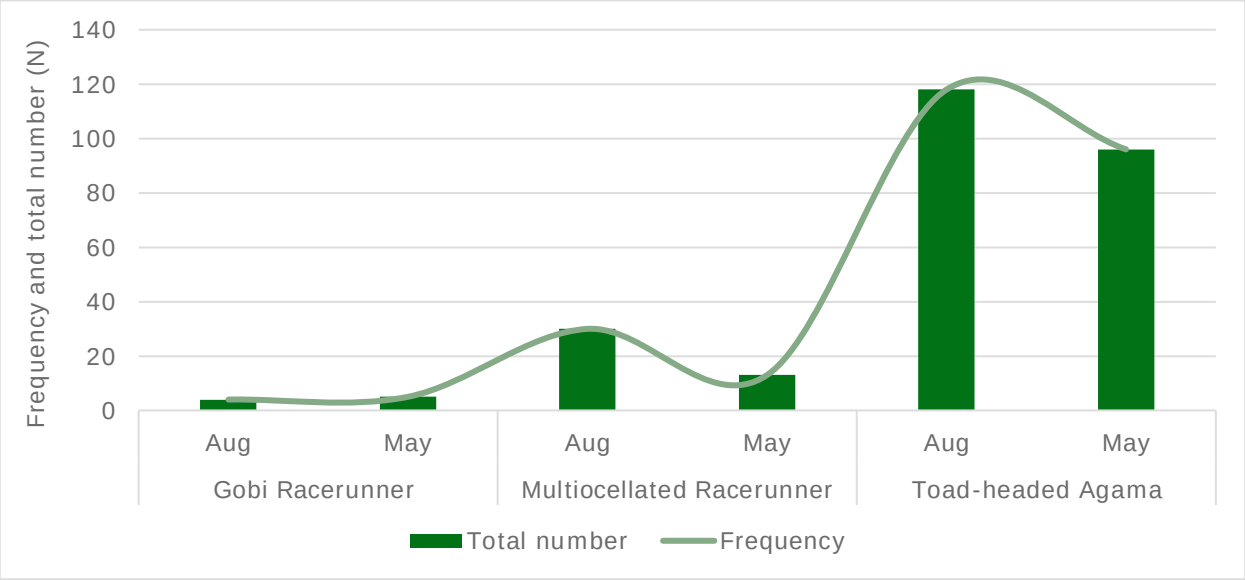


FIGURE 6-145: FREQUENCY, TOTAL AND AVERAGE NUMBER OF INDIVIDUALS OF RECORDED SPECIES IN PROJECT AREA (AUGUST 2024 & MAY 2025)

TABLE 6-72: HERPETOFAUNA SPECIES RECORDED FROM AUGUST 2024 AND MAY 2025 ESIA BASELINE SURVEYS

№	Species	August 2024	May 2025	Total Number	Average Density	Conservation Status
1	Gobi Racerunner *Eremias przewalskii*	4	5	9	0.1125	• IUCN Red List: LC • Mongolian Red List: LC • Law on Fauna / Red Book: Not Listed
2	Multiocellated Racerunner *Eremias multiocellata*	30	13	43	0.5375	• IUCN Red List: LC • Mongolian Red List: LC • Law on Fauna / Red Book: Not Listed
3	Toad-headed Agama *Phrynocephalus versicolor*	118	96	214	2.675	• IUCN Red List: LC • Mongolian Red List: DD • Law on Fauna / Red Book: Not Listed
	Total	**152**	**114**	**266**		



Gobi Racerunner (*Eremias przewalskii*)
LC, IUCN and MRL



Multiocellated Racerunner (*Eremias multiocellata*), LC on IUCN and MRL



Toad-Headed Agama (*Phrynocephalus versicolor*), LC on IUCN and MRL

FIGURE 6-146: PHOTOGRAPHS OF REPTILE SPECIES RECORDED IN THE PROJECT AREA DURING BASELINE SURVEYS

6.2.8.4 INSECTS

Insect surveys conducted during the autumn (August 2024) and spring (May 2025) seasons using sweep netting methods, pitfall traps, light traps, and 1km line transects across the Project area. A total of 68 species were recorded, belonging to 40 families and eight (8) orders out of 24 known insect orders in Mongolia. This indicates relatively low species richness and moderate individual density, likely influenced by weather conditions and the timing of the surveys. However, key orders, families, and genera that play critical roles in maintaining ecosystem balance were represented, suggesting that the region still supports a functionally adequate invertebrate community. These species were classified taxonomically and listed in order, with their distribution patterns and seasonal occurrences (autumn vs. spring) analysed and presented in ***Table 6-73***. Most insect species were observed along dry riverbeds

dominated by *Allium polyrhizum, Amygdalus mongolica–Caragana leucophloe, and Nitraria sibirica*, in mountain valleys near dry narrow river channels where *Amygdalus mongolica* predominates, as well as on hills, ravines, and gullies covered with vegetation dominated by *Artemisia frigida–Caragana leucophloea–Allium polyrhizum*.

Species Richness, Abundance, and Conservation Status

In autumn of 2024, 55 species were recorded, while in the spring, 18 species were found (with some overlapping records). This difference is directly related to weather and air temperature conditions during each period. The species richest order observed during surveys is Coleoptera with 28 species recorded (accounting for 41.2% of all species), followed by Lepidoptera (13 species, 19.1%), Diptera (12 species, 17.6%), Hymenoptera (6 species, 8.8%), and Orthoptera (5 species, 7.4%), while the remaining orders are represented by one (1) or two (2) species (see ***Table 6-73***).

Of all species recorded, only seven (7) are evaluated by the IUCN Red List while the remaining species are not included. These include the Small Bath White (*Pontia chloridice*), which is considered EN in its European range of Bulgaria, Cyprus, Greece, North Macedonia, Central, East and Southern European Russia, and Turkey, but listed as LC in its Mediterranean range (southeastern Europe). No conservation status has been designated for the Small Bath White's global population on the IUCN Red List. The other six (6) LC species are the Black and Gold Bumblebee (*Bombus auricomus*), Old World Swallowtail (*Papilio machaon*), Ängsgetingfluga (*Chrysotoxum festivum*), Marmalade Fly (*Episyrphus balteatus*), *Onthophagus punctatus*, and Verge Cricket (*Eumodicogryllus bordigalensis*). None of the recorded insect species are listed in the Mongolian Red Book except for the Old World Swallowtail, which is listed as a Rare species in the appendix to Government Resolution No. 7 of 2012.

TABLE 6-73: ALL INSECT SPECIES RECORDED IN THE PROJECT AREA DURING THE AUGUST 2024 AND MAY 2025 BASELINE SURVEYS

No.	Order	No. of Species	% of All Species
1	Coleoptera	28	41.2
2	Lepidoptera	13	19.1
3	Diptera	12	17.6
4	Hymenoptera	6	8.8
5	Orthoptera	5	7.4
6	Hemiptera	2	2.9
7	Neuroptera	1	1.5
8	Homoptera	1	1.5
	Total	68	100

Based on the species identified during the survey, trophic classification was conducted to determine their ecological roles within the desert steppe ecosystem. The relative proportions of feeding types were calculated accordingly. Phytophagous species (plant feeders) accounted for

30 species or 44.1%, followed by predators (10 species or 14.8%), parasites (7 species or 10.2%), necrophagous species (1 species or 1.5%), polyphagous (species 11 species or 16.1%) and coprophilous species (dung feeders) (9 species or 13.3%), as shown in ***Figure 6-147.***

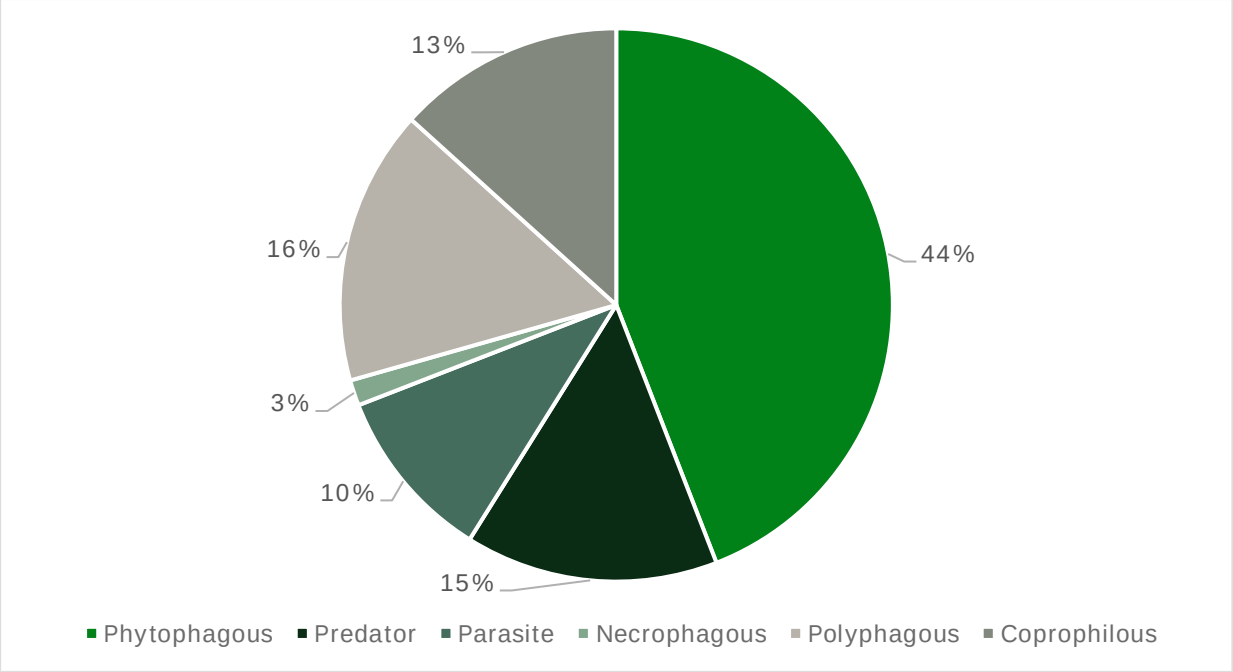


FIGURE 6-147: RECORDED INSECT SPECIES CATEGORIZED BY TROPHIC LEVEL

The most abundant species encountered during the baseline surveys include a Leafhopper species (*Cicadella* sp.), followed by the White Butterfly (*Ponia chloridice*), and the parasitic wasp *Cotesia* sp. Sweep netting with 100 strokes captured between 30 and 100 individuals of each species during the sampling period. Moderately abundant species include the plant bug *Polymerus unifasciatus*, the golden-eyed lacewing *Chrysopa formosa*, and the jumping beetle *Phyllotreta pallidipennis*. Among flies, *Lispe assimilis, Anastoechus nitidulus* and *Calliphora erythrocephala* were collected, as well as a wasp species from the genus Vespa. These species yielded fewer than 50 individuals per 100 sweep net strokes. Ground beetles such as *Blaps rugosa, Blaps femoralis medusula, Anatolica mucronata, Anatolica potanini* and *Carabus* sp., *Amara convexior*, as well as hoverflies such as *Episyrphus balteatus and Chrysotoxum festivum*, were recorded with 4–5 encounters per transect. Crepuscular moths such as *Autographa gamma* and *Hyles livornica* were actively attracted to light traps. ***Table 6-74*** presents all species that were recorded with medium to high levels of frequency during the survey period.

Species that were rarely encountered (with only records of 1-2 individuals per species) include the Old World Swallowtail (*Papilio machaon),* oil beetle *Meloe lederi*, bumblebee *Bombus auricomus*, snout beetle *Bothynoderes* sp., cricket *Eumodcogryllus bordigalensis*, and katydid *Zichya baranovi*. Other infrequently observed species each yielded fewer than ten (10) individuals.

TABLE 6-74: INSECT SPECIES WITH MEDIUM TO HIGH LEVELS OF OCCURRENCE IN PROJECT AREA DURING SURVEYS

Order	Family	Species	Insect Type	Occurrence
Hemiptera	Miridae	*Polymerus unifasciatus*	Phytophagous	(++)
	Cicadellidae	*Cicadella* sp.	Phytophagous	(+++)
Neuroptera	Chrysopidae	*Chrysopa formosa*	Predator	(++)
Coleoptera	Chrysomellidae	*Phyllotreta pallidipennis*	Phytophagous	(++)
		Blaps rugosa	Polyphagous	(++)
		Blaps femoralis medusula	Polyphagous	(++)
		Anatolica mucronate	Polyphagous	(++)
		Anatolica potanini	Polyphagous	(++)
		Carabus sp.	Predator	(++)
		Amara convexior	Predator	(++)
Diptera	Syrphidae	*Episyrphus balteatus*	Corophilous	(++)
		Chrysotoxum festivum	Corophilous	(++)
		Lispe assimilis	Corophilous	(++)
	Bombyliidae	*Bombylinus minor*	Polyphagous	(+)
		Anastoechus nitidulus	Polyphagous	(++)
	Caliphoridae	*Calliphora erythrocephala*	Corophilous	(++)
	Noctuidae	*Autographa gamma*	Phytophagous	(++)
	Pieridae	*Ponia chloridice*	Phytophagous	(+++)
	Nymphalidae	*Melitaea didymoides*	Phytophagous	(++)
	Spingidae	*Hyles livornica*	Phytophagous	(++)
Hymenoptera	Icnneumonidae	*Vespa* sp.	Parasitoid	(++)
	Braconidae	*Cotesia* sp.	Parasitoid	(+++)

Beetles (Coleoptera)

Among the 28 beetle (Coleoptera order) species identified, there are seven (7) predatory species, one (1) scavenger, four (4) coprophagous, ten (10) polyphagous and six (6) phytophagous species. This indicates that multiple beetle families coexist in this habitat, and it is evident that representatives from other families also inhabit the area. When classified by family, there were three (3) species of leaf beetles (Chrysomelidae), eight (8) species of darkling beetles (Tenebrionidae), One (1) species of carrion beetle (Silphidae), one (1) species of blister beetle (Meloidae), three (3) species of ladybird beetles (Coccinellidae), seven (7) species of scarab beetles (Scarabaeidae), One (1) species of weevil (Curculionidae), one (1) species of dor beetle (Geotrupidae), two (2) species of aphodiine dung beetles (Aphodiidae), two (2) species of ground beetles (Carabidae) and one (1) species of rove beetle (Staphylinidae), representing 11 families in total. Among these, darkling beetles—particularly species from the genera *Blaps* and *Anatolica*—along with three genera from the Scarabaeidae

family and aphodiine beetles of the genus *Aphodius*, were the most dominant and widely distributed. Darkling beetles (Tenebrionidae) accounted for 28.6% of all species, while dung beetles (Scarabaeidae) account for 14.2%, indicating that these two families play a dominant ecological role in the study area

Darkling beetles were predominantly found in valleys between hills, hillsides, and gravel-covered areas, indicating that such environments provide optimal shelter and suitable habitats for these species. In pitfall traps, darkling beetles (Tenebrionidae), ground beetles (Carabidae), and rove beetles (Staphylinidae) were primarily recorded. During line transects, blister beetles (Meloe lederi, family Meloidae) and Blaps species of darkling beetles were commonly encountered. Sweep netting captured ladybird beetles (Coccinellidae) and leaf beetles (Chrysomelidae). Dung beetles belonging to the families Scarabaeidae and Aphodiidae were recorded while decomposing livestock dung and manure.

The species *Blaps femoralis* was relatively abundant across the study sites, showing high dominance in the area (***Figure 6-148***). Other darkling beetles, especially those of the genus *Blaps*, feed on dead plant material such as dried leaves, stems, and seeds, as well as decaying vegetation and insect carrion. They become active at night in search of food. Due to their ability to survive in arid conditions and adapt to low-moisture diets, these beetles serve as decomposers, playing an important role in restoring soil nutrients.



FIGURE 6-148: *BLAPS FEMORALIS RESTISPINUS* PHOTOGRAPHED DURING SURVEYS

Decomposers

Dung beetles from the genera Aphodius, Onthophagus, Gymnopleurus, Chironitis and Geotrupes play a significant ecological role in the steppe and desert steppe regions, especially in areas subject to habitat degradation as decomposer beetles are considered to be key indicator species for ecysostem health. In the Project area, seven (7) species from the families Scarabaeidae, Aphodiidae and Silphidae (dung and carrion beetles) were recorded, indicating a high species richness of decomposer beetles (***Figure 6-149***). However, species such as *Gymnopleurus mopsus*, *Onthophagus punctatus*, *Chironitis eumenes*, *Aphodius gurjevae* and *Aphodius immundus* occurred with relatively low density, as only 1–2 individuals were observed per transect.



Left to right: *Nicrophorus argutor, Chrionitis eumenes, Lethrus potaninii, Aphodius gurjevae, Gymopleurus mopsus, Onthophagus punctatur*

FIGURE 6-149: DECOMPOSERS (DUNG AND CARRION BEETLES) RECORDED IN THE PROJECT AREA

Phytophagous Species (Plant Feeders)

The role and ecological importance of plant-feeding insects is substantial in the desert steppe regions characterized by extreme climatic conditions. Herbivorous insects, such as larvae of beetles and members of other insect orders, play a crucial role by feeding on plant leaves, which promotes plant turnover and facilitates nutrient and energy cycling. Moreover, herbivorous insects from all orders serve as an essential food source for birds and reptiles.

Among herbivorous insects, the order Hemiptera (true bugs) holds a significant position. Two species from two families were recorded in the Project area during the surveys. In sweep net sampling (100 sweeps), the plant bug *Polymerus unifasciatus* from the family Miridae was found with a density of 3–12 individuals, while the leafhopper *Cicadella* sp. from the family Cicadellidae showed a higher density of 3–32 individuals. These two taxa were the most abundant compared to other insect orders and families (***Figure 6-150***).



Polymerus unifasciatus (left) and *Cicadella spp.* (right)

FIGURE 6-150: HEMIPTERA SPECIES COLLECTED IN THE PROJECT AREA

Species that were observed relatively infrequently compared to other species include those from the families Curculionidae (*Bothynoderes* sp.), Meloidae (*Meloe lederi*), and Chrysomelidae (*Pallasiola absinthii*), along with five (5) Lepidopteran larvae and eight (8) adult moths and butterflies. Members of the Meloidae family are known to contain a biologically active compound called cantharidin in high concentration, which has traditionally been used in folk medicine and is now being studied for its toxicological properties. Beetles of the *Meloe lederi* species are therefore considered biologically valuable resources. *Pallasiola absinthii* are known to increase in number under favourable climatic conditions, especially in habitats with

Artemisia frigida and *Allium mongolicum* (both of which were recorded in the Project area) and can be abundant in certain parts of Mongolia.

Photograph IN8. Bothynoderes sp., *Meloe lederi, Pallasiola absinthii, Galeruca* sp.



With respect to species of the Lepidoptera order (moths and butterflies), a total of 13 species from nine (9) families were recorded (see ***Figure 6-151***). Among them, seven (7) species were nocturnal, while five (5) were diurnal. Light traps primarily captured individuals from the families Noctuidae, Puralidae and Sphingidae, with species such as *Autographa gamma, Euxoa auxiliaris,*and *Hyles livornica* being commonly observed. Among the diurnal species, *Ponia chloridice* from the white butterfly family (Pieridae) was widely distributed across all habitats. Within this group of Lepidoptera, two species of major agricultural pests were recorded: the Diamondback Moth (*Plutella xylostella*), a key pest of cruciferous plants, and the Beet Webworm (*Loxostege sticticalis*), a generalist feeder known to damage various meadow plants. The Old World Swallowtail (*Papilio machaon*) was also observed actively flying during the May 2025 surveys. This species is widely distributed throughout the Holarctic and Palearctic regions and well-adapted to cold temperate climates, commonly occurring in steppe zones and river valleys. It is classified as Least Concern on the IUCN Red List and listed as a Rare species under Mongolian legislation.



Left to right: *Papilio machaon, Loxostege sticticalis, Euxoa auxiliaris, Hyles livornica, Thyas juno*



Cucullia sp.



Hyles euphorbiae



Anarta trifollii (August)



Hyles livornica



Orgyia dubia



Melitaea didymoides

FIGURE 6-151: LEPIDOPTERA SPECIES COLLECTED IN THE PROJECT AREA

Five insect species from four families were recorded in the semi-desert steppe zone: one species of mole cricket (*Zichya baranovi*), one species of cricket (*Eumodcogryllus bordigalensis*) and three species of grasshoppers (*Compsorphis bryodemoides, Compsorphis davidiana, Mongolotmethis gobiensis*). Grasshoppers of the genus Compsorphis (VP/9-11) were observed in the Gurvan Galuut area near Khanbogd (N43°28.082’; E106°58.060’ / N43°18.238’; E106°68.713’).

Photograph IN11. Cmpsorhips bryodemoides, Compsorhis davidiana, Eumodcogryllus bordigalensis, Zichya baranovi



Predators and Parasitoids

Among predatory insects, ten species were identified, including ground beetles (Carabidae), lady beetles (Coccinellidae), lacewings (Chrysopidae) and robber flies (family Asilidae from the order Diptera). A total of seven parasitic species were recorded in this ecosystem. Notably, two species of predatory robber flies from the genus Stenopogon (Asilidae), two parasitic fly

species from the families Tachinidae and Oestridae, and five parasitoid species from four families of Hymenoptera (Braconidae, Sphecidae, Vespidae, and Ichneumonidae) were documented. Additionally, four species of ground beetles, one lacewing, and three lady beetle species were classified based on their trophic roles .



Left to right: *Pterostichus sp., Carabus sp., Amara convexior, Adonia varigata*



Left to right: *Stenopogon macilentus and Stenopogon spp.*



Left to right: *Adonia varigata, Coccinella septempunctata, Chrysopa sp.*



Left to right: *Podalonia melaena, Opion sp.*

FIGURE 6-152: PREDATORS AND PARASITOIDS COLLECTED IN THE PROJECT AREA

6.2.9 INVASIVE SPECIES

Invasive species are non-native species to a particular ecosystem and whose introduction and spread causes, or are likely to cause, socio-cultural, economic, environmental harm or harm to human health.[119] These species become naturalized in their introduced range and often reproduce in large numbers and spread over a large area. This can result in competition and damage to native species.

Invasive species have the capacity to exacerbate their role in ecosystem degradation through a combination of threats from habitat change, climate change over-exploitation of ecosystem resources and pollution. These further enhance their threat to biodiversity and human health.

According to the Global Invasive Species Database[120] (which records species as invasive if there is evidence of the species negatively impacting biodiversity, and includes species that are widespread, spreading rapidly or present in high abundance), Mongolia is home to 61 invasive species, of which majority are bacteria, fungi, and protists.[121]

No species considered as invasive to Mongolia were found during the baseline surveys.

6.2.10 CRITICAL HABITAT ASSESSMENT SUMMARY

A Critical Habitat Assessment (CHA) was conducted for the Project in accordance with IFC PS6, EBRD ESR6, and their associated Guidance Notes, with the full CHA presented in ***Annex B***. The approach to the CHA was as follows:

1. A Critical Habitat (CH) screening was conducted using a site-specific IBAT report generated for the Project. The screening preliminarily identified candidate flora and fauna species of conservation significance that may occur in the Project area and meet one of the five (5) CH criteria defined by IFC PS6 and Guidance Note 6, including globally and nationally / regionally threatened species listed as CR or EN, endemic or restricted-range species, and migratory and congregatory species. The CH screening found the potential occurrence of 118 CH candidate species within a 50 km radius from the Project Site.
2. Two (2) Ecologically Appropriate Areas of Analysis (EAAA) were delineated for volant (flying) species and non-volant species to determine the spatial extent and scope of the CHA.
3. Consideration of natural and modified habitats was included as part of the CHA, as defined in ***Section 6.2.5***.
4. A desk-based review of available information on the ecological features and biodiversity values within the EAAA, as well as results of the biodiversity baseline surveys were reviewed to inform the CHA.
5. Biodiversity values identified from the CH screening were further screened out based on their ecological requirements, and subsequently assessed with respect to the delineated EAAAs against the five CH Criteria listed below:
    - Criterion 1 – Habitat of significant importance to Critically Endangered and/or Endangered species;

[119] Convention on Biological Diversity. (n.d.). What are Alien Invasive Species? Retrieved from https://www.cbd.int/idb/2009/about/what/
[120] GISD, 2019. Available at: http://www.iucngisd.org/gisd/
[121] Munkhnast D, Chuluunjav C, Urgamal M, Wong L J, Pagad S (2020). GRIIS Checklist of Introduced and Invasive Species - Mongolia. Version 2.7. Invasive Species Specialist Group ISSG. Checklist dataset https://doi.org/10.15468/cskgr1 accessed via GBIF.org

- Criterion 2 – Habitat of significant importance to endemic and/or restricted-range species;
- Criterion 3 – Habitat supporting globally significant concentrations of migratory species and/or congregatory species;
- Criterion 4 – Highly threatened and/or unique ecosystems; and
- Criterion 5 – Areas associated with key evolutionary processes.[122]

Overall, 28 species were assessed as part of the full CHA, none of which meet CH criteria 1-3, nor were any areas or ecosystems considered to meet CH criteria 4-5.

6.2.11 PRIORITY BIODIVERSITY FEATURES ASSESSMENT SUMMARY

EBRD ESR6 paragraph 12 and footnote 84 define Priority Biodiversity Features (PBFs) as "a subset of biodiversity, which are irreplaceable or vulnerable, but at a lower priority level than critical habitats." PBFs include:

- Threatened habitats;
- Vulnerable species;
- Significant biodiversity features identified by a broad set of stakeholders or governments; and
- Ecological structure and functions needed to maintain the viability of the aforementioned priority biodiversity features.

Identification of PBFs in accordance with the criteria and thresholds set out in the EBRD ESR6 Guidance Note (2025) is detailed in the CHA appended in ***Annex B***.

Overall, a total of 62 species qualify as PBFs per EBRD ESR6 criteria and thresholds, as summarized below and listed in ***Table 6-75***.

- Four (4) species meet the thresholds for criterion 2(b), i.e. species recorded in the Project's area of impact during baseline surveys that are classified as VU, EN or CR on the IUCN Red List. These include the Saker Falcon (*Falco cherrug*), Steppe Eagle (*Aquila nipalensis*), Great Bustard (*Otis tarda*), and Goitered Gazelle (*Gazella subgutturosa*). Note that these four species also qualify as PBFs under criterion 4(a).
- Five (5) species meet the thresholds for criterion 2(c), i.e. species recorded in the area of impact during baseline surveys that are EN or CR on the Mongolian Red List. These include the Short-toed Snake Eagle (*Circaetus gallicus*), Asiatic Wild Ass (*Equus hemionus*), Mongolian Gazelle (*Procapra gutturosa*), Argali (*Ovis ammon*), and *Amygdalus mongolica*. Note that the Short-toed Snake Eagle, Asiatic Wild Ass, Mongolian Gazelle, and Argali also qualify as PBFs under criterion 4(a).
- 61 migratory species meet the thresholds for criterion 4(a), i.e. migratory species recorded in the area of impact during baseline surveys, including 56 birds and 5 mammals considered PBFs in the EAAAs. A number of these species also meet criterion 2(b) and/or criterion 2(c), as mentioned above.

[122] IFC PS6 paragraph 16, 2012.

TABLE 6-75: SPECIES QUALIFYING AS PRIORITY BIODIVERSITY FEATURES (EBRD ESR6)

No.	Scientific Name	Common Name	IUCN Red List	Mongolian Red List	EBRD ESR6 Criteria
Avifauna					
1	*Falco cherrug*	Saker Falcon	EN	VU	Criteria 2(b), 4(a)
2	*Aquila nipalensis*	Steppe Eagle	EN	LC	Criteria 2(b), 4(a)
3	*Otis tarda*	Great Bustard	EN	VU	Criteria 2(b), 4(a)
4	*Circaetus gallicus*	Short-toed Snake Eagle	LC	EN	Criteria 2(c), 4(a)
5	*Aegypius monachus*	Cinereous Vulture	NT	LC	Criterion 4(a)
6	*Gyps himalayensis*	Himalayan Griffon	NT	LC	Criterion 4(a)
7	*Accipiter nisus*	Eurasian Sparrowhawk	LC	LC	Criterion 4(a)
8	*Alauda arvensis*	Eurasian Skylark	LC	LC	Criterion 4(a)
9	*Anthus hodgsoni*	Olive-backed Pipit	LC	LC	Criterion 4(a)
10	*Aquila chrysaetos*	Golden Eagle	LC	LC	Criterion 4(a)
11	*Buteo hemilasius*	Upland Buzzard	LC	NE	Criterion 4(a)
12	*Buteo japonicus*	Eastern Buzzard	LC	NE	Criterion 4(a)
13	*Calcarius lapponicus*	Lapland Longspur	LC	LC	Criterion 4(a)
14	*Calliope calliope*	Siberian Rubythroat	LC	LC	Criterion 4(a)
15	*Carpodacus erythrinus*	Common Rosefinch	LC	LC	Criterion 4(a)
16	*Charadrius leschenaultii*	Greater Sandplover	LC	LC	Criterion 4(a)
17	*Circus cyaneus*	Hen Harrier	LC	LC	Criterion 4(a)
18	*Corvus dauuricus*	Daurian Jackdaw	LC	LC	Criterion 4(a)
19	*Cuculus canorus*	Common Cuckoo	LC	LC	Criterion 4(a)
20	*Cuculus saturatus*	Oriental Cuckoo	LC	LC	Criterion 4(a)
21	*Curruca nana*	Asian Desert Warbler	LC	LC	Criterion 4(a)
22	*Cygnus cygnus*	Whooper Swan	LC	LC	Criterion 4(a)
23	*Emberiza pallasi*	Pallas's Bunting	LC	LC	Criterion 4(a)

No.	Scientific Name	Common Name	IUCN Red List	Mongolian Red List	EBRD ESR6 Criteria
24	*Emberiza pusilla*	Little Bunting	LC	LC	Criterion 4(a)
25	*Eremophila alpestris*	Horned Lark	LC	LC	Criterion 4(a)
26	*Falco amurensis*	Amur Falcon	LC	LC	Criterion 4(a)
27	*Falco columbarius*	Merlin	LC	LC	Criterion 4(a)
28	*Falco naumanni*	Lesser Kestrel	LC	LC	Criterion 4(a)
29	*Falco tinnunculus*	Common Kestrel	LC	LC	Criterion 4(a)
30	*Ficedula albicilla*	Red-throated Flycatcher	LC	LC	Criterion 4(a)
31	*Geokichla sibirica*	Siberian Thrush	LC	LC	Criterion 4(a)
32	*Jynx torquilla*	Eurasian Wryneck	LC	LC	Criterion 4(a)
33	*Lanius cristatus*	Brown Shrike	LC	LC	Criterion 4(a)
34	*Lanius excubitor*	Great Grey Shrike	LC	LC	Criterion 4(a)
35	*Lanius isabellinus*	Isabelline Shrike	LC	LC	Criterion 4(a)
36	*Melanocorypha mongolica*	Mongolian Lark	LC	LC	Criterion 4(a)
37	*Milvus migrans*	Black Kite	LC	LC	Criterion 4(a)
38	*Motacilla alba*	White Wagtail	LC	LC	Criterion 4(a)
39	*Motacilla cinerea*	Grey Wagtail	LC	LC	Criterion 4(a)
40	*Motacilla citreola*	Citrine Wagtail	LC	LC	Criterion 4(a)
41	*Muscicapa dauurica*	Asian Brown Flycatcher	LC	LC	Criterion 4(a)
42	*Oenanthe deserti*	Desert Wheatear	LC	LC	Criterion 4(a)
43	*Oenanthe oenanthe*	Northern Wheatear	LC	LC	Criterion 4(a)
44	*Oenanthe pleschanka*	Pied Wheatear	LC	LC	Criterion 4(a)
45	*Pernis ptilorhynchus*	Oriental Honey-buzzard	LC	LC	Criterion 4(a)
46	*Phalacrocorax carbo*	Great Cormorant	LC	LC	Criterion 4(a)
47	*Phoenicurus auroreus*	Daurian Redstart	LC	LC	Criterion 4(a)
48	*Phylloscopus proregulus*	Pallas's Leaf Warbler	LC	LC	Criterion 4(a)
49	*Phylloscopus trochiloides*	Greenish Warbler	LC	LC	Criterion 4(a)

No.	Scientific Name	Common Name	IUCN Red List	Mongolian Red List	EBRD ESR6 Criteria
50	*Platalea leucorodia*	Eurasian Spoonbill	LC	LC	Criterion 4(a)
51	*Syrrhaptes paradoxus*	Pallas's Sandgrouse	LC	LC	Criterion 4(a)
52	*Tadorna ferruginea*	Ruddy Shelduck	LC	LC	Criterion 4(a)
53	*Turdus eunomus*	Dusky Thrush	LC	LC	Criterion 4(a)
54	*Turdus ruficollis*	Red-throated Thrush	LC	LC	Criterion 4(a)
55	*Upupa epops*	Eurasian Hoopoe	LC	LC	Criterion 4(a)
56	*Zoothera aurea*	White's Thrush	LC	LC	Criterion 4(a)
Mammals					
57	*Equus hemionus*	Asiatic Wild Ass	NT	EN	Criteria 2(c), 4(a)
58	*Gazella subgutturosa*	Goitered Gazelle	VU	VU	Criterion 2(b), 4(a)
59	*Procapra gutturosa*	Mongolian Gazelle	LC	EN	Criteria 2(c), 4(a)
60	*Ovis ammon*	Argali	NT	EN	Criteria 2(c), 4(a)
61	*Vespertilio murinus*	Parti-coloured Bat	LC	LC	Criterion 4(a)
Flora					
62	*Amygdalus mongolica*	-	NE	EN	Criterion 2(c)

Note: EN – Endangered; VU – Vulnerable; NT – Near Threatened; DD – Data Deficient; LC – Least Concern; NE – Not Evaluated.

6.2.12 ASSIGNING VALUES TO BIODIVERSITY RECEPTORS

6.2.12.1 METHODOLOGY

The sensitivity or biodiversity value of habitats and species identified via the desk-based assessment and baseline surveys have been evaluated according to the criteria defined in ***Table 6-76*** and ***Table 6-77***, respectively.

TABLE 6-76: SENSITIVITY CRITERIA FOR BIODIVERSITY - HABITAT

Sensitivity	Definition
Low	Habitats with no international, national or local designation/recognition; habitats of significance for species of Least Concern (LC); habitats which are common and widespread within the region.

Sensitivity	Definition
Medium	Habitats within nationally designated or recognised areas; habitats of significant importance to globally Vulnerable (VU), Near Threatened (NT) or Data Deficient (DD) species; habitats of significant importance for nationally restricted range species; habitats supporting nationally significant concentrations of migratory species and/or congregatory species; nationally threatened or unique ecosystems.
High	Habitats within internationally designated or recognised areas; habitats of importance to globally Critically Endangered (CR) or Endangered species (EN); habitats of importance to endemic and/or globally restricted-range species; habitats supporting globally significant concentrations of migratory species and/or congregatory species; highly threatened and/or unique ecosystems, areas associated with key evolutionary species.

TABLE 6-77: SENSITIVITY CRITERIA FOR BIODIVERSITY – SPECIES

Sensitivity	Definition
Low	Species which are included on the IUCN Red List of Threatened Species as Least Concern (LC).
Medium	Species included on the IUCN Red List of Threatened Species as Vulnerable (VU), Near Threatened (NT) or Data Deficient (DD). Species protected under national legislation. Nationally restricted range species. Nationally important number of migratory or congregatory species.
High	Species included on the IUCN Red List of Threatened Species as Critically Endangered (CR) or Endangered (EN). Species having a globally Restricted Range (i.e. plants endemic to a site or found globally at fewer than ten (10) sites, fauna having a distribution range (or globally breeding range for bird species) of less than 50,000 km^2. Internationally important numbers of migratory or congregatory species. Key evolutionary species.

The overall value assigned to biodiversity receptors is based on the criteria defined above are summarized in ***Table 6-78*** for species and ***Table 6-79*** for habitats.

TABLE 6-78: SENSITIVITY RATING OF SPECIES IDENTIFIED IN THE PROJECT AREA

Taxa	Species Name	**Common Name**	Notes	**Sensitivity Rating**
	Falco cherrug	Saker Falcon	• EN under IUCN Red List • VU under Mongolian Red List • Migratory	High
	Aquila nipalensis	Steppe Eagle	• EN under IUCN Red List • LC under Mongolian Red List • Migratory	High
	Otis tarda	Great Bustard	• EN under IUCN Red List • VU under Mongolian Red List • Rare under Law on Fauna • Migratory	High
	Aegypius monachus	Cinereous Vulture	• NT under IUCN Red List • LC under Mongolian Red List	Medium

Taxa	Species Name	**Common Name**	Notes	**Sensitivity Rating**
			• Migratory and Breeding Resident	
	Circaetus gallicus	Short-toed Snake Eagle	• LC under IUCN Red List • EN under Mongolian Red List • Very Rare under Law on Fauna • Migratory	Medium
	Gypaetus barbatus	Bearded Vulture	• NT under IUCN Red List • VU under Mongolian Red List • Rare under Law on Fauna	Medium
	Gyps himalayensis	Himalayan Griffon	• NT under IUCN Red List • LC under Mongolian Red List • Migratory	Medium
	Podoces hendersoni	Mongolian Ground Jay	• LC under IUCN Red List • VU under Mongolian Red List • Rare under Law on Fauna • Breeding Resident	Medium
Mammals	*Equus hemionus*	Asiatic Wild Ass	• NT under IUCN Red List • EN under Mongolian Red List • Rare under Law on Fauna • Migratory	Medium
	Gazella subgutturosa	Goitered Gazelle	• VU under IUCN Red List • VU in Mongolian Red List • Rare under Law on Fauna • Migratory	Medium
	Procapra gutturosa	Mongolian Gazelle	• LC under IUCN Red List • EN under Mongolian Red List • Migratory	Medium
	Ovis ammon	Argali	• NT under IUCN Red List • EN under Mongolian Red List • Rare under Law on Fauna • Migratory	Medium
	Cardiocranius paradoxus	Five-toed Pygmy Jerboa	• DD on IUCN Red List • VU on Mongolian Red List • Rare under Law on Fauna	Medium
Flora	*Amygdalus mongolica*	-	• NE under IUCN Red List • EN under Mongolian Red List • Rare under Law on Natural Plants	Medium
	Artemisia xanthochroa	-	• NE under IUCN Red List • NT under Mongolian Red List • Very Rare under Law on Natural Plants	Medium
	Asterothamnus centraliasiaticus	-	• NE under IUCN Red List • LC under Mongolian Red List • Very Rare under Law on Natural Plants	Medium
	Caryopteris mongholica	-	• NE under IUCN Red List • VU under Mongolian Red List • Rare under Law on Natural Plants	Medium
	Chesneya mongolica	-	• NE under IUCN Red List • NT under Mongolian Red List	Medium

Taxa	Species Name	Common Name	Notes	Sensitivity Rating
			• Very Rare under Law on Natural Plants	
	Ephedra sinica	-	• LC on IUCN Red List • NE on Mongolian Red List • Rare under Law on Natural Plants	Medium
	Olgaea leucophylla	-	• NE on IUCN Red List • NT on Mongolian Red List • Very Rare under Law on Natural Plants	Medium
	Oxytropis aciphylla	-	• NE on IUCN Red List and Mongolian Red List • Rare under Law on Natural Plants	Medium
	Potaninia mongolica	-	• NE on IUCN Red List • NT on Mongolian Red List • Very Rare under Law on Natural Plants	Medium
	Stellaria dichotoma	-	• NE on IUCN Red List and Mongolian Red List • Rare under Law on Natural Plants	Medium
	Tugarinovia mongolica	-	• NE under IUCN Red List • VU under Mongolian Red List • Very Rare under Law on Natural Plants	Medium
	Vincetoxicum sibiricum	-	• NE on IUCN Red List • LC on Mongolian Red List • Rare under Law on Natural Plants	Medium
	Kalidium foliatum	-	• DD on IUCN Red List • NE on Mongolian Red List	Medium
All other flora and fauna species			• NE or LC on IUCN Red List • NE or LC on Mongolian Red List • Not protected under Mongolian legislation	Low

Note: EN – Endangered; VU – Vulnerable; NT – Near Threatened; DD – Data Deficient; LC – Least Concern; NE – Not Evaluated

TABLE 6-79: SENSITIVITY RATING OF HABITATS IDENTIFIED IN THE PROJECT AREA

Habitat	Type	Description	Sensitivity Rating
Mountains, Hills, and Hillocks	Natural	Characterized by hilly terrain and includes the peaks, slopes, and valleys of mountains and hills distributed in the WTG area and along the OHL. Supports high sensitivity species such as Saker Falcon and Great Bustard, as well as medium sensitivity species such as, Cinereous Vulture, Mongolian Ground Jay, Mongolian Gazelle, Goitered Gazelle and nine (9) legally protected plant species of conservation concern.	Medium

Habitat	Type	Description	Sensitivity Rating
Open Plains and Desert Steppe	Natural	Characterized by sparsely vegetated open areas and wide valleys of desert steppe, which is widely distributed across the Project area. Supports high sensitivity species such as Saker Falcon and Steppe Eagle, as well as medium sensitivity species such as Cinereous Vulture, Asiatic Wild Ass, Five-toed Pygmy Jerboa, *Asterothamnus centraliasaticus, Oxytropis aciphylla,* and *Potaninia mongolica.*	Medium
Dry Riverbeds and Ephemeral Drainage Channels	Natural	Characterized by dry riverbeds within ravines and gullies of mountains/hills and in open areas. Supports medium sensitivity species such as Cinereous Vulture, Short-toed Snake Eagle, Bearded Vulture and seven (7) legally protected plant species of conservation concern.	Medium
Built-up Areas	Modified	Built-up structures include the Oyu Tolgoi mine, existing roads, a coal processing facility adjacent to the proposed main access road, and small temporary settlements of nomadic herders. High sensitivity species such as Saker Falcon and Great Bustard, and medium sensitivity species such as Goitered Gazelle and Asiatic Wild Ass have been recorded in the area of the Oyu Tolgoi mine.	Medium

6.2.13 BIODIVERSITY SUMMARY

Baseline studies through primary surveys and secondary desktop research have identified multiple species of conservation significance that potentially occur within the Project AoI, which is defined as a five (5) km radius from each WTG and a two (2) km buffer from the central line of the OHL and Access Road.

The Project AoI, including the WTG area and most of the OHL, is largely situated within the Eastern Gobi Desert Steppe Ecoregion, while the southern section of the transmission line where it connects to the Oyu Tolgoi substation lies within the Alashan Plateau Semi-Desert Ecoregion. The Project site also overlaps with locally protected areas, as well as located 26.4 km from the Galba Gobi Key Biodiversity Area and Important Bird and Biodiversity Area, and 36.3 km from the Small Gobi A Strictly Protected Area (from the closest point). The WTG area legally protected and internationally recognized areas of biodiversity importance.

The habitat assessment done for this Project has identified the Project AoI as comprising of predominantly natural habitat (<99% of the total AoI), characterized by sparsely vegetated areas of open desert steppe, mountains and hills, and dry riverbeds, with drought-adapted shrubs and low glasses thinly distributed throughout. The extent of modified habitats in the AoI is very limited, primarily consisting of the Oyu Tolgoi mine, existing roads, a coal processing facility adjacent to the proposed main access road, and small temporary settlements of nomadic herders.

109 plant species were recorded during the baseline flora surveys conducted in August 2024 and May 2025, which indicates relatively high species diversity. The majority of these species are assessed as Least Concern or Not Evaluated under the IUCN Red List (2025-2) and the Mongolian Red List (2011). 13 flora species of conservation concern have been identified, including those listed as Very Rare or Rare under the Mongolian Law on Natural Plants, or listed as EN or VU on the Mongolian Red List. No globally threatened flora species (CR, EN or VU on IUCN Red List) were observed during the baseline surveys.

A total of 16,977 birds belonging to 63 species have been identified during avifauna surveys conducted over six periods between August 2024 and May 2025, using a combination of vantage point surveys, transects and point counts, and carcass surveys. The majority of bird species identified during the baseline surveys are not globally or regionally threatened and not legally protected in Mongolia. In total, eight (8) bird species of conservation significance have been recorded in the Project area. Collision risk modelling conducted to simulate bird collision with the Project's wind turbines indicate that the predicted annual collision numbers are very low and not expected to have a significant effect on species' population stability. Cinereous Vulture (*Aegypius monachus*) and Black Kite (*Milvus migrans*) have relatively higher simulated collision rates compared to the other target species assessed in the CRM. The predicted annual collision rates are 2.73 and 2.41 individuals per year, respectively, equivalent to 0.016% and 0.00006% of their respective global populations, indicating a negligible impact. Other modelled species had lower predicted collision rates of 0.85 to 0.007 birds per year.

Only two (2) bat species were observed during the baseline surveys, both of which were only detected through passive acoustic monitoring while no bats were recorded from transects and active search/roost inspection, suggesting very low diversity and abundance in the Project area. Both species, the Parti-coloured Bat (*Vespertilio murinus*) and Gobi Serotine (*Cnephaeus gobiensis*), are classified as LC on the IUCN Red List and Mongolian Red List. Available evidence indicates that it is unlikely for either of these species' populations to be significantly affected by collision risk due to their low abundances in the Project area and/or behavioural characteristics.

17 species of non-volant mammals were recorded during the baseline surveys. Of these, four (4) mammal species of conservation significance were identified, while the rest are considered Least Concern on the IUCN Red List and/or Mongolian Red List. Additionally, the Argali (*Ovis ammon*) (NT, IUCN) was not observed during surveys, but herds were reported by interviewed locals to occur in the WTG area.

68 insect species belonging to eight (8) orders were recorded in the surveys, along with three (3) species of reptiles. None of these insects or reptiles are considered to be of conservation significance. In addition, no invasive species have been identified in the Project area during the six baseline survey events.

Lastly, the results of the Critical Habitat Assessment show that there are no Critical Habitat-qualifying biodiversity values for the Project (per IFC PS6 and EBRD ESR6), however, there are 62 species that qualify as Priority Biodiversity Features (per EBRD ESR6).

In accordance with IFC PS6 and EBRD ESR6 requirements the Project must demonstrate no net loss outcomes for natural habitats and PBFs affected by the Project. Mitigation, management, and monitoring measures will be covered in ***Chapter 7 Environmental Impact***

Assessment, as well as the Biodiversity Management Plan (BMP) and Biodiversity Action Plan (BAP) to be developed for the Project.

6.3 SOCIOECONOMIC BASELINE

6.3.1 INTRODUCTION

The following section provides baseline information on the socio-economic conditions of the Project site and its surrounding areas. The baseline data collection covered the following content:

- Demographic profile (age, gender, family structure etc.);
- Occupational profile, including employment and livelihood status;
- Income profile;
- Education;
- Religion;
- Race and ethnicity (including indigenous populations, languages);
- Land use and ownership;
- Access to public services and utilities (housing, electricity, water, roads, aviation, waste management and health services);
- Source and use of energy;
- Study of water use; and
- Vulnerable people.

All the relevant baseline information collected have been incorporated into the following sections.

6.3.2 METHODOLOGY

The information provided in the social baseline sections is based on a review of public information, documents provided by the Client, as well as a review of available literature from ERM's in-house library. In addition, site visits were undertaken in September 2024, February and June 2025 to gather environmental as well as social baseline information from local communities and governmental departments and stakeholder engagements. The following methods were employed:

- The desktop review of key documents includes, but is not limited to, the following:
  - Detailed Environmental Impact Assessment (DEIA) Report;
  - Data of National Statistical Office of Mongolia;
  - Environment and Social Impact Assessment (ESIA) Report of Oyu Tolgoi Project;
  - Brief Information on the Archaeological Examination Work Conducted at the Site of "Net Zero Tech" LLC;
  - Social, Economic and Environmental Baseline Study of Umnugovi Aimag 2018;
  - [redacted] ESMS and Human Resource Policies; and
  - Other relevant documents provided by the client.
- Primary socio-economic baseline data are collected through the following approaches:
  - Focus Group Discussions (FGDs): Engaged with diverse groups within the community to gather qualitative insights about local socio-economic dynamics and data, perceptions of the Project, and potential concerns.

- Four (4) FGDs have been conducted during ERM site visit in February 2025, including FGD with Herders of Bilgeh bagh, Women of Bilgeh bagh, Herders of Gavilud bagh, and Women of Javhlant bagh. Detailed information, summary of key discussion and gender of participants from the FGDs are presented in ***Section 12.5***.

- Key Informant Interviews (KIIs): Conducted with soum and bagh government representatives to collect insights into community structures, resources, and social challenges that may impact or be impacted by the Project.
  - Six (6) KIIs were conducted during ERM site visit in September 2024, including KII with Tsogttsetsii Chairman of the Citizens' Representative, Tsogttsetsii Statistical Officer, Tsogttsetsii Environmental Inspection Officer, Umnugobi Aimag Head of Division of Natural Resources Monitoring, Umnugobi Aimag Head of Development Policy, Planning And Investment Division, and Umnugobi Aimag Meteorology and the Environmental Monitoring Department;
  - Ten (10) KIIs were conducted during ERM site visit in February 2025, including KII with Tsogttsetsii Head of Citizen's Representative Meetings, Tsogttsetsii Land Officer, Tsogttsetsii Social Officer, Tsogttsetsii Labor and Welfare Specialist, Khanbogd Soum Land Officer, Khanbogd Soum Deputy Governor, Governor of Gavilud Bagh, Deputy Governor of Manlai Soum, Manlai Labor and Welfare Specialist, and Manlai Land Officer;
  - Four (4) KIIs were conducted during ERM site visit in June 2025, including KII with Soum governor of Tsogttetsii soum, Gaviluud Bagh Governor, Soum Governor of Khanbogd soum, and Land Officer of Khanbogd soum. Detailed information and summary of key discussion and gender of participants from the KIIs are presented in ***Section 12.5***.

- Household (HH) Surveys[124]: HH surveys were conducted for the households within the Project AoI of both the WTG and OHL. 32 structures have been identified within the Project AoI with 22 owners. All structures were visited during the site visit in February and June 2025. 86% of the owners (19 owners) have been interviewed and the rest 14% owners (3 owners) could not be reached out due to multiple reasons[125].

A summary of the primary data collection is summarized in ***Table 6-80***.

TABLE 6-80: PRIMARY SOCIO-ECONOMIC BASELINE DATA COLLECTION ACTIVITIES

Project Component	Date and Location	Stakeholders	Gender Distribution of Participants
FGDs (4 FGDs)			
WTG	11 February 2025 Bilgeh bagh, Tsogttsetsii Soum	Herders	Male: 3 Female: 4
		Women	Female: 6

[124] During the ERM site visits, 25 structures were identified in WTG area, including 22 seasonal camps and three (3) temporary sites shared by the community. 15 owners were identified to own the 22 seasonal camps. 7 structures were identified within the 1km radius of OHL, owned by four (4) owners.
[125] The target was to achieve a 100% household survey coverage. However, surveys were completed with 77% of households. The remaining 23% were not surveyed as they were not present during the field visits and ESIA disclosure (Feb and June 2025; Sep 2026) and could not be reached through follow-up phone calls.

Project Component	Date and Location	Stakeholders	Gender Distribution of Participants
OHL	12 February 2025 Gavilud bagh, Khanbogd Soum	Herders	Male: 1 Female: 7
OHL	12 February 2025 Javhlant bagh, Khanbogd Soum	Women	Female: 3
KIIs (6 KIIs in September 2024)			
WTG	10 September 2024 Tsogttsetsii soum	Tsogttsetsii Chairman of the Citizens' Representative	Male: 1
WTG	10 September 2024 Tsogttsetsii soum	Tsogttsetsii Statistical Officer	Male: 1
WTG	10 September 2024 Tsogttsetsii soum	Tsogttsetsii Environmental Inspection Officer,	Male: 1 Female: 1
WTG and OHL	12 September 2024 Dalanzadgad, Umnugobi Aimag	Head of Division of Natural Resources Monitoring, Department of Environment and Tourism, Umnugobi Aimag	Female: 1
WTG and OHL	12 September 2024 Dalanzadgad, Umnugobi Aimag	Umnugobi Aimag Head of Development Policy, Planning And Investment Division,	Male: 2
WTG and OHL	12 September 2024 Dalanzadgad, Umnugobi Aimag	Umnugobi Aimag Meteorology and the Environmental Monitoring Department	Male: 1
KIIs (10 KIIs in February 2025)			
WTG	10 February 2025 Tsogttsetsii soum	Tsogttsetsii Chairman of the Citizens' Representative	Male: 1
	10 February 2025 Tsogttsetsii soum	Tsogttsetsii Land Officer	Female: 1
	10 February 2025 Tsogttsetsii soum	Tsogttsetsii Social Officer	Female: 1
	10 February 2025 Tsogttsetsii soum	Tsogttsetsii Labor and Welfare Specialist	Female: 1
OHL	12 February 2025 Khanbogd Soum	Khanbogd Soum Land Officer	Female: 1
OHL	12 February 2025 Khanbogd Soum	Khanbogd Soum Deputy Governor	Male: 1
OHL	13 February 2025 Gavilud Bagh Khanbogd Soum	Governor of Gavilud Bagh	Male: 1
OHL	14 February 2025 Manlai Soum	Deputy Governor of Manlai Soum	Female: 1

Project Component	Date and Location	Stakeholders	Gender Distribution of Participants
OHL	14 February 2025 Manlai Soum	Manlai Labor and Welfare Specialist	Female: 1
OHL	14 February 2025 Manlai Soum	Manlai Land Officer	Female: 1
KIIs (4 KIIs in February 2025)			
WTG	18 June 2025, Tsogttetsii soum governor's office	Tsogttetsii Soum Governor	Male: 1
OHL	19 June 2025, Gaviluud Bagh Khanbogd soum	Governor of Gaviluud Bagh	Male: 1
OHL	19 June 2025 Khanbogd Soum	Khanbogd Soum Governor	Male: 1
OHL	19 June 2025 Khanbogd Soum	Khanbogd Soum Land Officer	Female: 1
HH Survey			
WTG	Bilgeh Bagh, Tsogttetsii Soum	9 households surveyed	Not available
OHL	Jargalant Bagh, Manlai Soum	1 household surveyed	Not available
OHL	Gavilud Bagh, Khanbogd Soum	3 households surveyed	Not available

Participants for Focus Group Discussions (FGDs)and Key Informant Interviews (KIIs) and were identified through a purposive sampling approach. Selection was carried out according to the following criteria, agreed upon with the aimag, soum, bagh governor or community leader:

- Relevance to the project's area of influence;
- Knowledge of local socio-economic conditions;
- Direct or indirect exposure to project impacts; and
- Representation of key demographic groups (women, herders, youth, vulnerable households)

For FGDs, participants were selected through:

- Soum and Bagh-level announcements through direct phone calls, local community Facebook groups;
- Coordination with local authorities;
- Direct outreach to ensure inclusion of women, youth, and herders; and

Voluntary participation, with no incentives offered.

For KIIs, individuals were selected because they hold:

- Administrative roles (soum/bagh officials);
- Sectoral responsibilities (land, health, education, social welfare and development policy and planning etc.); and
- Community leadership positions (bagh governors, herder group leaders, women's group representatives).

For HH Surveys, all households living within the Project WTG Area and within 1km of the OHL were targeted for interviews. Although a 100% survey rate was targeted, the actual achievement was 77%, primarily due to the unavailability of 23% household owners.

6.3.3 LIMITATIONS

6.3.3.1 SOCIAL BASELINE DATA COLLECTION

All structures located in the Project area have been visited during the February and June site visit in 2025, but there was a challenge accessing all the household owners during the site visits. While firm efforts were made to achieve a comprehensive survey, 23% of the owners (5 owners) could not be reached out due to their unavailability during the two site visits in February and June 2025, as well as then ESIA disclosure in September 2026 (due to the high-level of mobility of herders). Contact details were recorded for the absent owners, and multiple follow-up telephone attempts were made, however, none of the calls were successfully connected.

6.3.4 POPULATION AND DEMOGRAPHICS

Mongolia is comprised of 21 aimags (provinces) and the capital city of Ulaanbaatar. As of 2023, Mongolia's total population is estimated to be around 3.4 million, with a very low density of 2.2 people per square kilometer, making it one of the least densely populated countries in the world. Over 70% of the population lives in urban areas, and nearly half of them, around 1.5 million people, reside in the capital city, Ulaanbaatar.

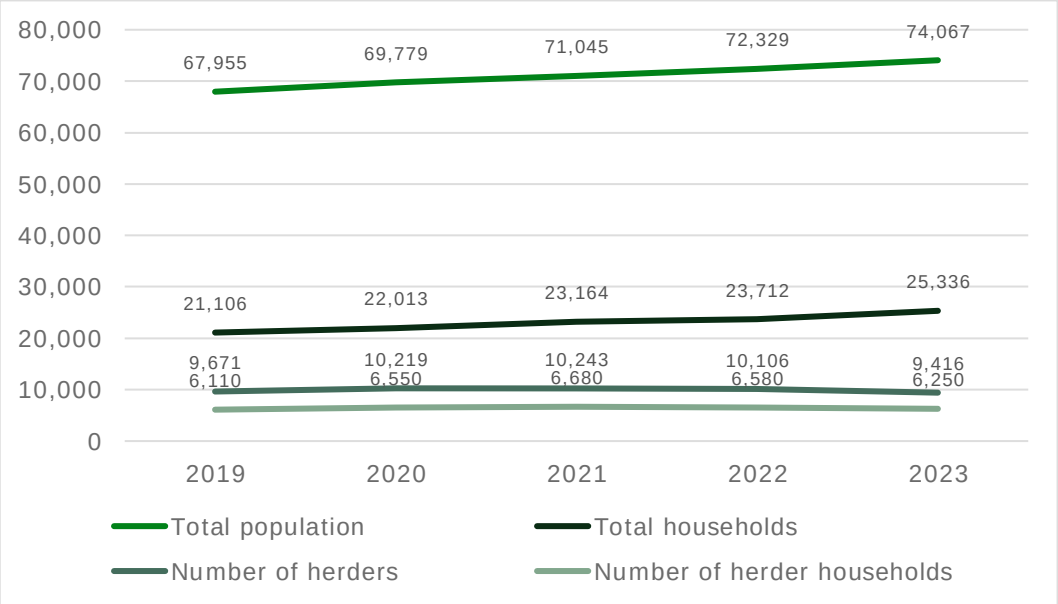
The country has a balanced gender ratio, with approximately 0.99 males per female, and a median age of 28 years. About 63% of the population falls within the working-age group of 15 to 64 years.

Umnugobi Aimag (Province)

Umnugobi aimag hosts 15 soums with a population of 74,067 in 2023, accounting for 2% of the total population in Mongolia. The population grew steadily by 8.3% between 2019 and 2023, averaging a 1.66% annual increase. The aimag has 25,336 households and an average household size of three people[126].

Around 14% of Umnugobi's population are herders, and one in four households is a herder household. Detailed figures on population, households, and herder statistics from 2019 to 2023 are shown in ***Figure 6-153.***

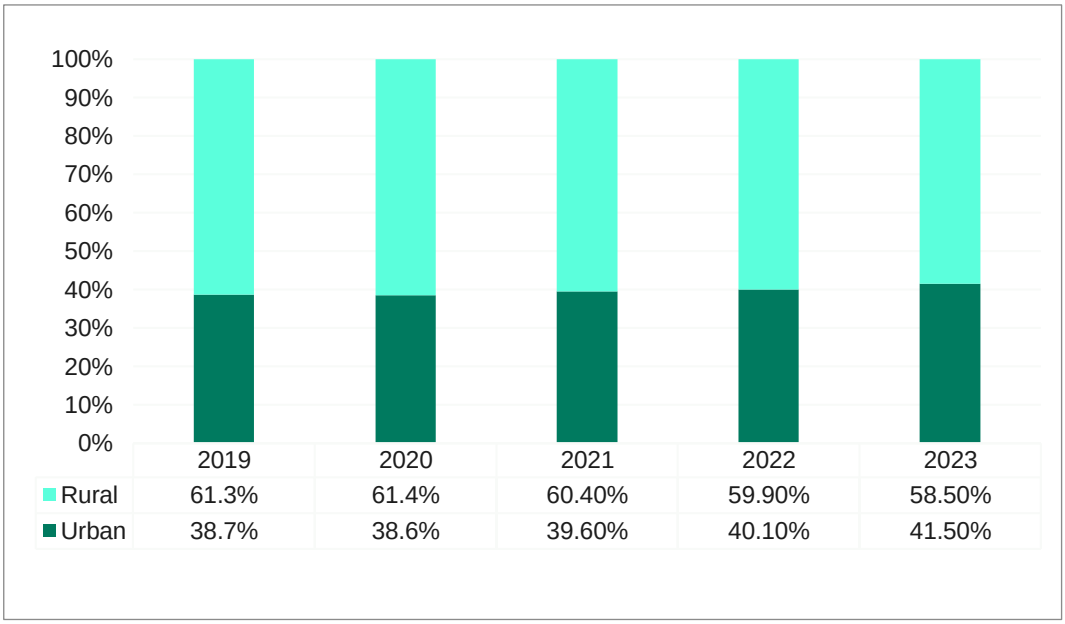
[126] National Statistical Office of Mongolia, www.1212.mn



Source: National Statistical Office of Mongolia

FIGURE 6-153: POPULATION INDICATORS IN UMNUGOBI AIMAG

From 2019 to 2023, Umnugobi aimag experienced steady urbanization, with the urban population percentage rising from 38.7% in 2019 to 41.5% in 2023. *Figure 6-154* illustrates the population distribution between urban and rural areas during this period.



Source: National Statistical Office of Mongolia

FIGURE 6-154: RURAL AND URBAN POPULATION IN UMNUGOBI AIMAG

Soum (City)

Tsogttsetsii Soum's population grew significantly between 2019 and 2023, rising from 8,119 to 10,194. This represents an average annual growth rate of 5.1% and a total increase of about 25.6% over five (5) years. In 2023, the population of Tsogttsetsii Soum accounts for 13.8% of the population in Umnugobi aimag. Household size remains around three (3) people, and population density increased slightly from 1.1 to 1.4 persons per square kilometer (sq.km).

Manlai Soum has a population of 2,575 by 2023, accounting for 3.4% of the population in Umnugobi aimag. Its population rose from 2,625 in 2019 to 2,735 in 2021 but declined to 2,575 by 2023, reflecting an overall decrease of about 1.9%. Household size is similar at three (3) people, and it has the lowest population density among the three (3) soums—just 0.2 persons per sq.km.

Khanbogd Soum's population remained relatively stable. After a slight dip from 8,660 in 2019 to 8,385 in 2020, it rebounded to 8,941 in 2023, marking a modest growth of 3.24% over five years. Households here are larger, averaging four people, and the population density is 0.6 persons per sq.km.

According to the National Statistical Office of Mongolia, all soum and bagh populations are classified as rural, meaning rural residents account for 100% of these areas..

The detailed number of resident populations, number of households and population density in Tsogttsetsii, Manlai, and Khanbogd soum is shown in ***Table 6-81***.

TABLE 6-81: POPULATION INDICATORS AT SOUM LEVEL

Soum	Indicator	2019	2020	2021	2022	2023
Tsogttsetsii	Resident population	8,119	8,425	8,599	9,149	10,194
	Number of herdsmen	523	568	572	584	552
	Number of households	2,445	2,573	2,643	2,813	3,225
	Population density	1.1	1.2	1.2	1.3	1.4
Manlai	Resident population	2,625	2,675	2,735	2,654	2,575
	Number of herdsmen	773	793	847	805	811
	Number of households	719	743	762	764	769
	Population density	0.2	0.2	0.2	0.2	0.2
Khanbogd	Resident population	8,660	8,385	8,404	8,533	8,941
	Number of herdsmen	573	640	669	696	688
	Number of households	1,956	2,031	2,116	2,145	2,193
	Population density	0.6	0.6	0.6	0.6	0.6

Source: National Statistical Office of Mongolia

Bagh (Village)

The populations of Bilgeh Bagh, Jargalant Bagh, and Gavilud Bagh showed an increasing trend from 2019 to 2023, with respective growth rates of 43.6%, 3.5 %, and 8.5%[127]. It is noted that the population in Bilgeh Bagh nearly doubled during this period. According to the ILO Report in 2022, 58% of the employed population in Tsogttsetsii soum where Bilgeh Bagh is located, is engaged in mining sector [128]. Therefore, it is anticipated that the population growth in Bilgeh is likely linked to mining-related population inflows, including workers employed in the mining sector, contractors and support services, family members and relatives relocating with work opportunities in local areas, and businesses supporting mining operations. Javhlant Bagh is the only bagh that experienced a population decrease, dropping from 3,062 in 2019 to 2,895 in 2023, a decline of 5.5%, which may result from residents not returning after completing their education, as well as out-migration to Ulaanbaatar and aimag centres in search of better employment and livelihood opportunities.

According to the data of National Statistical of Mongolia, herders in Bilgeh Bagh, Gavilud Bagh, Jargalant Bagh and Javhlant Bagh constitute 9.3%, 11.2%, 29.4% and 6.4% of their respective populations. It is noted that all herders in Mongolia are registered as registered herders are entitled to receive certain social benefits (e.g. the state covers 50% of their pension insurance contributions and access to discounted loans etc.). Herder population is registered under the same aimag (Umnugobi Aimag).

The resident population and herder population of the four (4) baghs are presented in ***Table 6-82.***

TABLE 6-82: POPULATION INDICATORS AT BAGH LEVEL

Bagh	Indicator	2019	2020	2021	2022	2023
Bilgeh bagh	Resident population	1,496	1,587	1,681	1,845	2,148
	Herder population	189	204	191	230	218
Jargalant bagh	Resident population	629	644	664	667	650
	Number of households	189	199	237	200	190
Gavilud bagh	Resident population	1,768	1,844	1,875	1,858	1,918
	Number of households	161	196	211	209	223
Javhlant bagh	Resident population	3,062	2,857	2,636	2,705	2,895
	Number of households	187	209	205	212	194

Source: National Statistical Office of Mongolia

6.3.4.2 AGE STRUCTURE

The majority of Umnugobi's population is in the working-age group (15–64 years), totalling 47,824 individuals. Children aged 0–14 account for 25,078 people, while the elderly population

[127] National Statistical Office of Mongolia, www.1212.mn
[128] International Labor Organization (ILO) 2022. Mongolia: Monitoring mobility in Umnugovi Aimag. Available at: https://dtm.iom.int/sites/g/files/tmzbdl1461/files/reports/UG%20February_Finalised_ENG_final_0.pdf

(65+) is much smaller at 3,251. ***Table 6-83*** highlights a predominance of the working-age population and a relatively small proportion of elderly residents across the aimag and its subdivisions.

Among the soums in the Project area, Khanbogd has the largest working-age population at 6,085, closely followed by Tsogttsetsii with 5,971. According to the ILO Report in 2022, 58% of the employed population in Tsogttsetsii soum is engaged in mining sector, compared to 68% for Khanbogd soum[129]. During the Project construction phase, it is anticipated that approximately 35% of the total labour requirements — primarily unskilled labour, amounting to up to 105 workers—will be sourced locally. While a large share of the local labour force is currently employed in the mining sector, the Project's construction activities are not expected to require a large number of highly skilled workers. As such, local availability of unskilled and semi-skilled labour is considered sufficient to meet the Project's construction needs without placing substantial pressure on the local labour market.

At the bagh level, Javhlant stands out with the highest working-age population (2,151) and a significant number of children (796). In contrast, Jargalant has the smallest population across all age groups, with only 197 children, 412 working-age individuals, and 30 elderly residents.

TABLE 6-83: POPULATION AGE STRUCTURE AT AIMAG, SOUM AND BAGH LEVEL 2023

		0-14 years old	15-64 years old	65 years old and above
aimag	Umnugobi	25,078	47,824	3,251
soum	Tsogttsetsii	4,026	5,971	197
	Manlai	789	1,657	129
	Khanbogd	2,639	6,085	217
bagh	Bilgeh bagh	921	1,365	52
	Jargalant bagh	197	412	30
	Gavilud bagh	619	1,313	54
	Javhlant bagh	796	2,151	70

Source: National Statistical Office of Mongolia

[129] International Labor Organization (ILO) 2022. Mongolia: Monitoring mobility in Umnugovi Aimag. Available at: https://dtm.iom.int/sites/g/files/tmzbdl1461/files/reports/UG%20February_Finalised_ENG_final_0.pdf

6.3.4.3 GENDER

Gender Distribution

Mongolia has a balanced gender ratio of 0.99 males to one (1) female. However, the gender ratio varies among the aimag, soums and baghs in the study area, as shown in ***Table 6-84***. It is noted that males outnumber females in Umnugobi aimag, with a ratio of 1.04 males to one (1) female. Among the soums, Khanbogd stands out with male-female ratio of 1.46:1. reflecting a significant male surplus. This imbalance is likely linked to the labour demands of large-scale mining operations in the area, particularly the Oyu Tolgoi project located in Khanbogd soum and 50 km from the proposed WTG area.[130] In Bilgeh bagh, female has a slight dominance, while Gavilud bagh has more males than females. Notably, Javhlant Bagh has the highest ratio at 1.86, suggesting pronounced male dominance. The male-dominated gender ratio observed in Gavilud Bagh and Javhlant Bagh is consistent with that of the host soum, Khanbogd soum, and is largely attributable to the presence of the Oyu Tolgoi Mine, where employment in the mining sector is predominantly male.

TABLE 6-84: POPULATION GENDER DISTRIBUTION AT AIMAG, SOUM AND BAGH LEVEL 2023

		Male	Female	Male-Female Ratio
aimag	Umnugobi	38,903	37,250	1.04:1
soum	Tsogttsetsii	5,290	4,904	1.07:1
	Manlai	1,345	1,230	1.02:1
	Khanbogd	5,304	3,637	1.46:1
bagh	Bilgeh bagh	1,145	1,193	0.96:1
	Jargalant bagh	337	302	1.11:1
	Gavilud bagh	1,146	840	1.36:1
	Javhlant bagh	1,957	1,060	1.86:1

Source: National Statistical Office of Mongolia

Gender and Gender-Based Violence

Historically, Mongolia has been a patriarchal society, with men typically responsible for herding, hunting, and other physically demanding tasks. Traditional Mongolian families often follow

[130] According to the Statistics Department of Umnugobi Aimag, by the end of 2024 the Labor Department had received orders for 1,778 job positions, of which 1,072 (60.3%) were in the mining and quarrying sector. https://medee.nso.mn:3005/api/articles/imagesCk/1750656416184-nso-amidarch_bui_orchin_taniltsuulga-2024_1.pdf

patrilineal descent, with inheritance and family leadership passing through the male line. Females usually plays the role of a caregiver in the household. The number of single mother-headed households in Mongolia is about five times that of single father-headed households. In Umnugobi aimag, there are 1,460 single mother-headed households and 413 single father-headed households[131], suggesting that child-rearing responsibility tend to falls on women when households become single-parent households.

Based on the KII with women group in Bilgeh bagh of Tsogttsetsii soum, livestock and livestock products serve as the primary income source for women, and there are no gender differences in this regard. In Javhlant bagh, women's income can come from pension, retailing, and livestock. Women observed that males in the family earn more, largely due to their work in mining.

Gender-based violence (GBV) is widespread in Mongolia, with domestic violence being the most common form. According to a 2017 national survey, 48% of women reported experiencing some form of violence in their lifetime including domestic violence (physically or sexually), emotional violence (e.g. controlling behaviours) and economic violence (e.g. limiting access to bank accounts and cash etc.) [132].

Social Officer of Tsogttsetsii Soum noted during the KII that three (3) sexual violence cases against teenage girls are reported in Tsogttsetsii soum since the beginning of 2025. Through the engagement with the local community, it is understood that there are certain Gender-based violence (GBV) report pathways. GBV cases are reported through specialized hotlines operating at the aimag and soum levels. Upon receiving a report, hotline operators register the complaint, assess the type of incident, and determine whether urgent intervention is required. In cases requiring immediate action, local police respond promptly. Social workers then follow up with the victim by contacting the reporting phone number to provide support and assess further needs. While some cases involve sexual violence, most reported incidents relate to neglect and domestic violence. Where domestic or child abuse poses protection risks, survivors are referred to shelters located in the aimag centre. Capacity-building is supported through regular training: soum specialists participate in aimag-organized programs and also receive independent training from NGOs to strengthen GBV response and case management. The anticipated influx of approximately 250–300 workers—primarily male—during the Project's construction phase may increase the potential for certain community health, safety, and social challenges, including those related to gender dynamics.

6.3.5 LAND USE

Mongolia has one of the most extensive grasslands globally and covers an estimated 1.2 million km² with arid rangelands[133], which make up around 80% of Mongolia's land[134]. The rest includes forest land (around 11%), arable land (less than 1%), and other types of land (8%),

[131] National Statistical Office of Mongolia, www.1212.mn. A mother and father headed household refers to marries or divorced single mother and father with legitimated or adopted children, whose husband/partner has died, missing or no legal capacity, parental rights are limited under a court decision.
[132] UNFPA. Breaking the silence for equality: 2017 National Study on Gender-based Violence in Mongolia. Available at: https://mongolia.unfpa.org/en/publications/breaking-silence-equality-2017-national-study-gender-based-violence-mongolia
[133] Khishigdelger, Enkhtur. Diversity and distribution of macro-moths in Mongolia. Available at: https://www.researchgate.net/figure/Land-use-types-in-Mongolia-National-Statistical-Office-2020_fig1_359583141
[134] Sheehy, D. et al, "Mongolia: Livestock and Wildlife in the Southern Gobi Region, with Special Attention to Wild Ass", World Bank, 2010.

such as urban regions, reserves, and water bodies[135]. Around 27% of Mongolia's rangeland is categorized as forest or mountain steppe. While 30% is dry steppe grassland, the remaining 43% consists of Gobi Desert steppe and desert, which is suitable for grazing camels but not other livestock[136]. Mongolian grasslands experience a brief growing season due to cold temperatures and inconsistent precipitation. Pasture growth starts in mid-May and ends by mid-August[137].

The Mongolian Constitution (1992) states that all land, except for land under private ownership, belongs to the state[138]. The Law on Land of Mongolia (2002) allows soum Governors to issue land possession contracts to herders for winter shelters[139]. According to the KII with the Khanbogd soum land officer, herders apply for certificates of tenure for their winter and spring camps from the soum's land office. The decision to grant the certificates for winter and spring camps is influenced by the traditional land use. For example, the Land Officer of Tsogttsetsii Soum noted that "16 new requests for winter and spring camps were submitted within two months, and most ownership requests are approved as the owners have been living there for years."

In the meantime, summer pastures are not formally allocated and are considered open for access by any herder, regardless of their winter shelter location or residence origin. These pastures, along with water sources and mineral licks, must remain accessible to all. According to the HH surveys, the water use for animals is usually extracted from the wells. Location of wells within the Project area are presented in ***Figure 6-30*** under ***Section 6.1.8.2***. Meetings with Soum and Bagh governors indicate that the summer pasture land use are regulated through local collective decision-making during soum and bagh citizen representative meetings. However, this is not formalized through official documentation. While herders have open access to the summer pastures, they prioritize decisions made at the bagh level by the Bagh Citizens' Representative.

6.3.5.1 UMNUGOBI AIMAG

Umnugobi aimag covers an area of 165,400 km², with the majority (72%) of its land being utilized as grazing land by livestock herders. The remaining land is made up of forest lands, water areas, residential areas, roads and communications infrastructure[140].

6.3.5.2 SOUM

According to KII with Khanbogd land officer in February 2025, herders hold certificates of tenure for their winter and spring camps in Khanbodg soum, each covering 1600 square meters (sq. m). A herder can possess multiple winter and spring camps. However, the size of these camps is determined differently by each soum. Tsogttsetsii soum land officer reported that the winter camp area in Tsogttsetsii soum ranges from 2,500 to 3,500 sq. m, with an

[135] Ibid.
[136] Ibid.
[137] Oyu Tolgoi Project – ESIA.
[138] The Constitution of Mongolia. Available at: https://lehmanlaw.mn/wp-content/uploads/2016/04/Constitution1992.pdf
[139] Upton, C., "'Custom' and Contestation: Land Reform in Post-Socialist Mongolia", *World Development*, vol. 37, no. 8, 2009, p. 1405. Available at: https://www.sciencedirect.com/science/article/pii/S0305750X09000552
[140] Oyu Tolgoi Project – ESIA.

annual fee for the certificate around USD 5 and a service fee of approximately USD 2.5 for the whole winter camp.

The land officer in Khanbogd also noted that border disputes between soums are a common occurrence. Some herders who have lived for generations in the northern part of Khanbogd soum are now living within the territories of Manlai and Tsogtsetsii soums. According to Khanbogd land officer, disputes sometimes arise, such as herders from other soums driving livestock off pastures or seizing wells. Representatives from each soum, including herders, the Bagh governor, and local authorities, discuss and resolve these disputes. Khanbogd land officer also disclosed that 52 households have been reported to be affected by soum border issues in Khanbogd soum. According to the KII with Manlai land officer, disputes among herders are rare, as people know each other well and are closely connected. Delayed issuance of official documents are common. Some herders receive the winter and spring pasture certificate only after relocating.

6.3.6 SETTLEMENT PATTERN AND SEASONAL MOVEMENT OF HERDERS

There are overall 32 structures identified in the Project area (including 25 structures within the WTG area and 7 structures within 1km of OHL route). The location of the structures in the Project area is presented in ***Figure 6-15.*** The details of the structures and concerned owners are provided as follows:

Within the WTG area, a total of 25 structures were identified:

- Three structures (HH01, HH02, and HH13) have no confirmed owners; and
- The remaining 22 structures are associated with 15 owners.

Of these identified 15 owners:

- Fourteen (14) were successfully interviewed; and
- One (1) declined to participate

Within 1km of the OHL area, seven (7) structures have been identified with seven (7) owners.

- Five (5) owners owning five (5) structures were interviewed.
- Owners of the rest two (2) structures could not be reached out.

Structure type and usage status of structures in the project area are listed in ***Table 6-85***.

TABLE 6-85: HOUSEHOLD STRUCTURES IN THE PROJECT AREA

HH Number	Structure Type	Usage Status	Interview	The nearest Project facility	Distance
WTG Area					
[redacted]	Temporary summer camp without owner	Shared usage among the community	No (no owner)	WTG 14	1.6 km
[redacted]	Temporary summer camp without owner	Shared usage among the community	No (no owner)	WTG 18	1.2 km
[redacted]	Autumn-spring camp	Inhabited	Yes	WTG 19	1.3 km

HH Number	Structure Type	Usage Status	Interview	The nearest Project facility	Distance
[redacted]	Livestock fence	Uninhabited and usage pattern not identified due to unavailability of owner	No (owner declined to participate in the survey)	WTG 19	2.8 km
[redacted]	Winter camp with livestock shelter, small stone house and big container	Inhabited	Yes	WTG 19	2.4 km
[redacted]	Winter camp with ger, kiosk, livestock fence and livestock winter shelter	Inhabited	Yes	WTG 9	2.2 km
[redacted]	Winter camp with ger, kiosk, livestock fence and livestock winter shelter summer house with wheels	Inhabited	Yes	WTG 22	4.5 km
[redacted]	Winter camp with two livestock winter shelter, broken vehicles, and two kiosks	Inhabited	Yes	WTG 22	7.5 km
[redacted]	Winter camp with ger, kiosk and livestock winter shelter	Inhabited	Yes (interviewed through phone)	WTG 22	8.4 km
[redacted]	Autumn camp with livestock fence	Inhabited	Yes (interviewed through phone)	WTG 22	9.3 km
[redacted]	Winter camp with ger, kiosk, and livestock winter shelter	Inhabited	Yes	WTG 22	7.7 km
[redacted]	Winter camp with two kiosks and livestock winter shelter	Inhabited	Yes (interviewed through phone)	WTG 2	7.4 km
[redacted]	Temporary summer camp without owner	Shared usage among the community	No (no owner)	WTG 2	6.2 km
[redacted]	Spring camp with livestock fence made of machine wheels	Inhabited	Yes	WTG 2	3.7 km

HH Number	Structure Type	Usage Status	Interview	The nearest Project facility	Distance
[redacted]	Summer camp with few machines wheels	Uninhabited	Yes	WTG 22	1.4 km
[redacted]	Winter camp with 2 gers, kiosk, and livestock winter shelter	Inhabited	Yes	WTG 2	1.5 km
[redacted]	Winter camp with ger and livestock winter shelter	Inhabited	Yes	WTG 2	2.8 km
[redacted]	Winter camp with ger, kiosk, and livestock winter shelter	Inhabited	Yes	WTG 4 / WTG 5	1.8 km
[redacted]	Winter camp with two kiosks and livestock broken fence	Inhabited	Yes	WTG 3	1.4 km
[redacted]	Winter camp with ger and livestock winter shelter	Uninhabited	Yes	Storage Area	1.3 km
[redacted]	Winter camp with livestock fence made with machine wheels and barn made with stone	Uninhabited	Yes	Internal Access Road (near Substation Area)	90 m
[redacted]	Broken fence	Uninhabited	Yes	WTG 22	4.8 km
[redacted]	Winter camp with kiosk, remnants of vehicles and broken fence	Uninhabited	Yes	WTG 10	1.8 km
[redacted]	Abandoned stove	Uninhabited	Yes	WTG 16	1.1 km
[redacted]	A piece of rounded stone	Uninhabited	Yes	WTG 15	920 m
Structures located within 1km from OHL					
[redacted]	Winter camp with ger, two kiosks, and livestock winter shelter	Inhabited	Yes	OHL	390 m
[redacted]	Winter camp with ger, kiosk,	Inhabited	Yes	OHL	270 m

HH Number	Structure Type	Usage Status	Interview	The nearest Project facility	Distance
	fence, broken vehicle, and two livestock winter shelter				
[redacted]	Broken livestock fence and broken kiosk	Uninhabited and usage pattern not identified due to unavailability of owner	No	OHL	770 m
[redacted]	Bagh centre building, with four house, three gers, livestock winter shelter, livestock stone fence, and water well	Inhabited	Yes	OHL	300 m
[redacted]	House with two garage, livestock winter shelter, summer house with wheels	Inhabited	Yes	OHL	530 m
[redacted]	Livestock winter shelter, broken vehicles, livestock fence	Inhabited	Yes	OHL	990 m
[redacted]	Summer house with wheels, ger, kiosk, livestock winter shelter, livestock fence made with machine wheels	Uninhabited and usage pattern not identified due to unavailability of owner	No	OHL	280 m

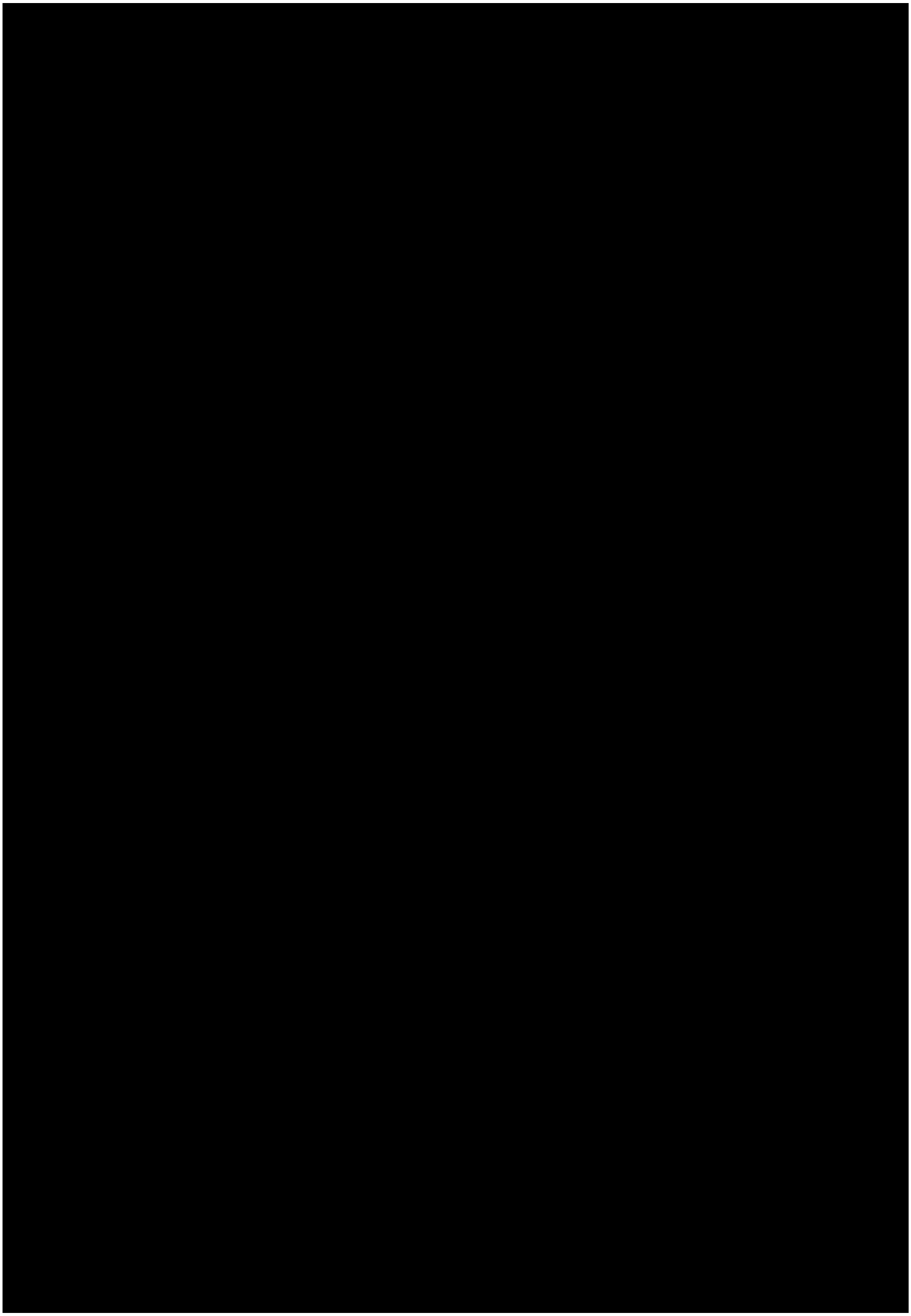


FIGURE 6-155:

The following structures have been identified within the general AoI (500m) of the WTG and OHL, based on the updated Project layout in ***Figure 6-155***:

General AoI of WTG:

- [redacted]
- [redacted] and
- [redacted]

General AoI of OHL:

- [redacted]
- [redacted] and
- [redacted]

Photos of some of these structures can be seen in ***Figure 6-156***.

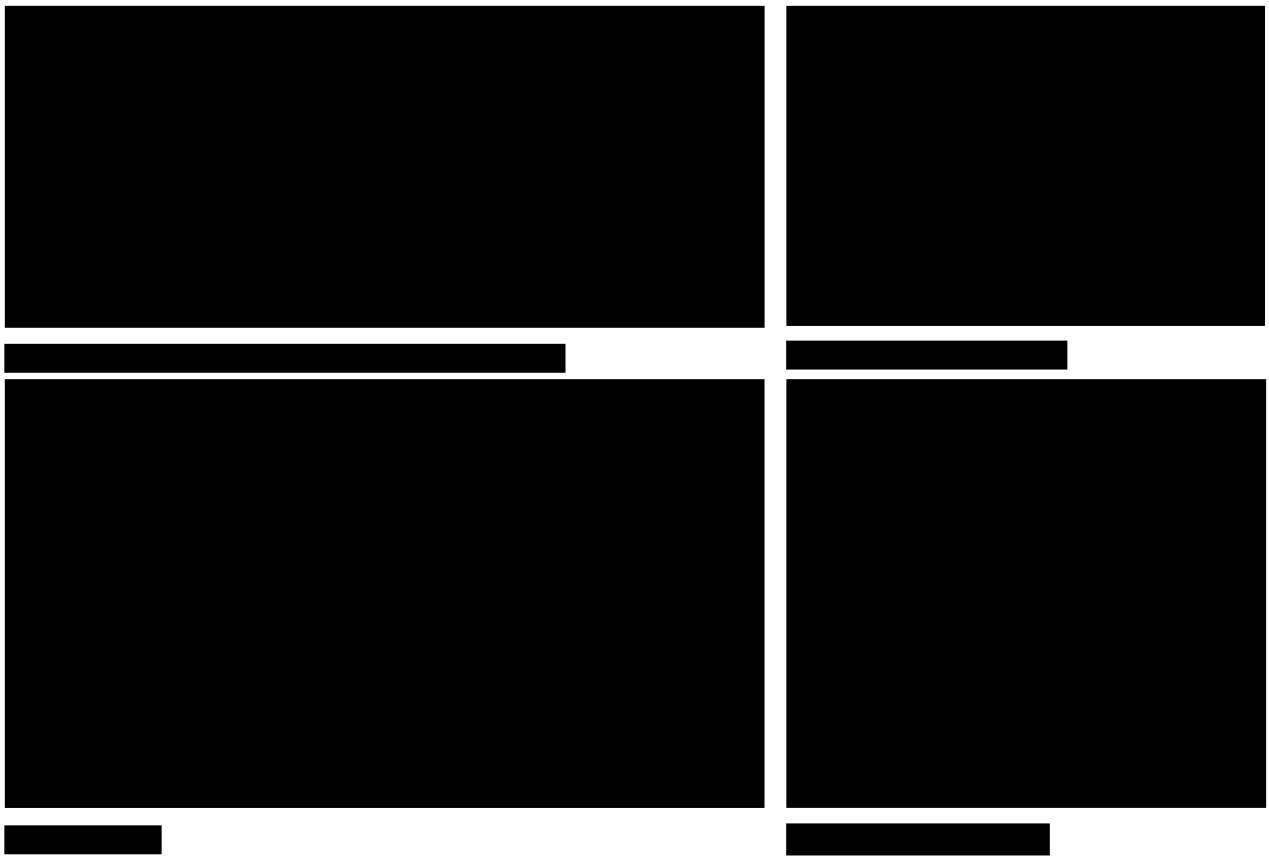


FIGURE 6-156: [redacted]

According to the HH surveys, the average grazing radius for small ruminants is 4km, while large herbivores typically graze at greater distances, with an average radius of 10km from the seasonal camps. Notably, one herder reported that grazing distances for large herbivores can occasionally reach up to 40 kilometres depending on pasture condition. Each herder household maintains a customary grazing area that is generally well understood and respected by neighbouring herders and local communities through long-established grazing practices and informal agreements. While these customary grazing areas are not formally demarcated on the ground and are rarely recorded through official mapping, herders possess knowledge of their

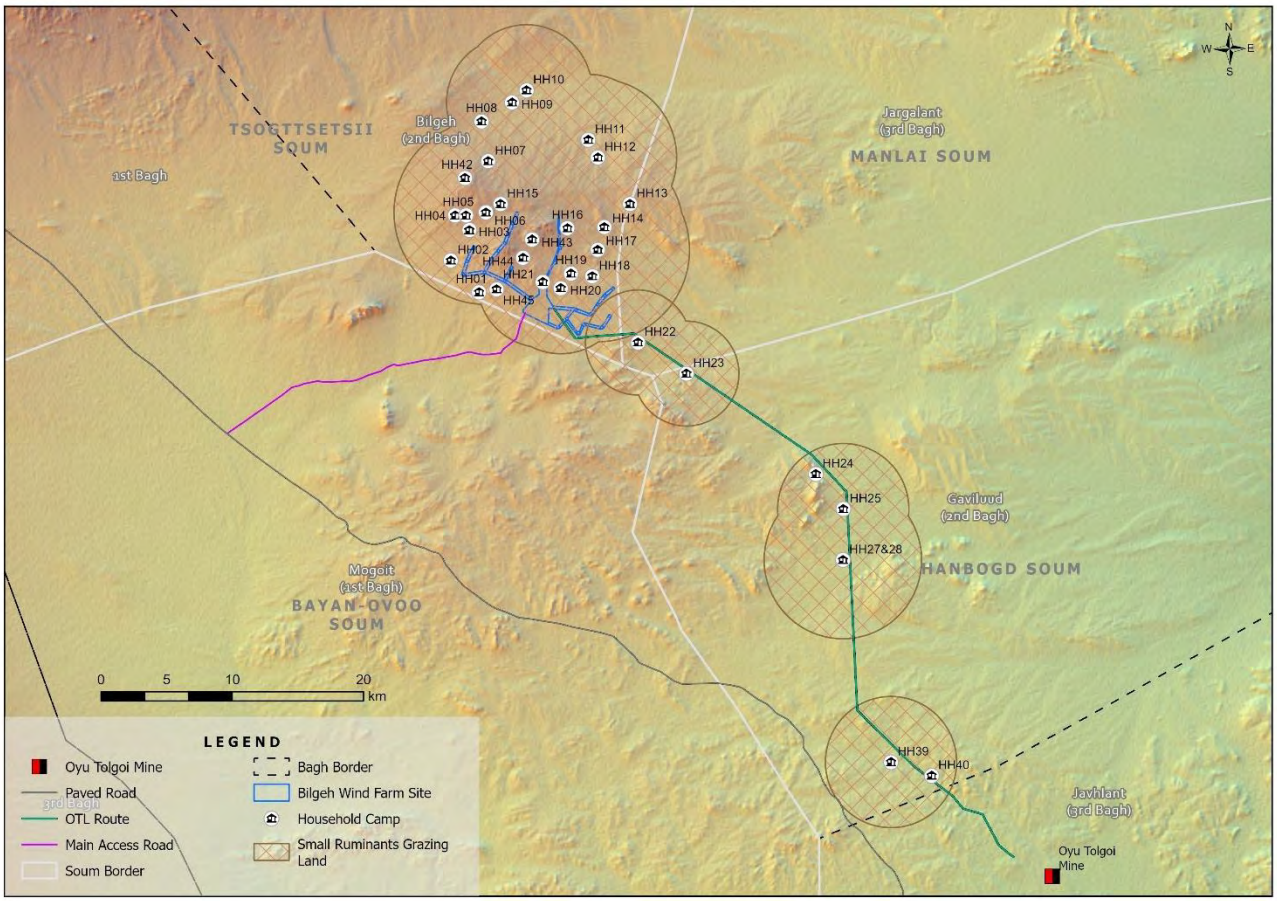
[141] It is noted from a local herder that the last time HH20 and Well 6 were used was about three years ago. Since then, neither the camp nor the well has been used.

movement routes and areas of regular use based on generations of traditional land use. During the household surveys, respondents were generally unable to delineate precise grazing boundaries on printed maps or GIS imagery, largely because they are not accustomed to interpreting spatial information in this format and because customary grazing areas are typically identified through landscape features, local knowledge and livestock movements rather than fixed coordinates.

Household survey findings in June 2025 reveal that, during drought years, herders may travel distances ranging from 50 to 200 kilometres in search of viable pastureland including the territories of Govi Sumber and Dundgovi Aimags. The specific distance travelled varies annually, depending on the severity and geographic extent of drought conditions. This migration is primarily driven by the depletion of local pasture resources, necessitating the search for alternative grazing areas to sustain livestock. Such long-distance movements frequently involve crossing administrative boundaries and may take several days to weeks, depending on pasture availability along the route.

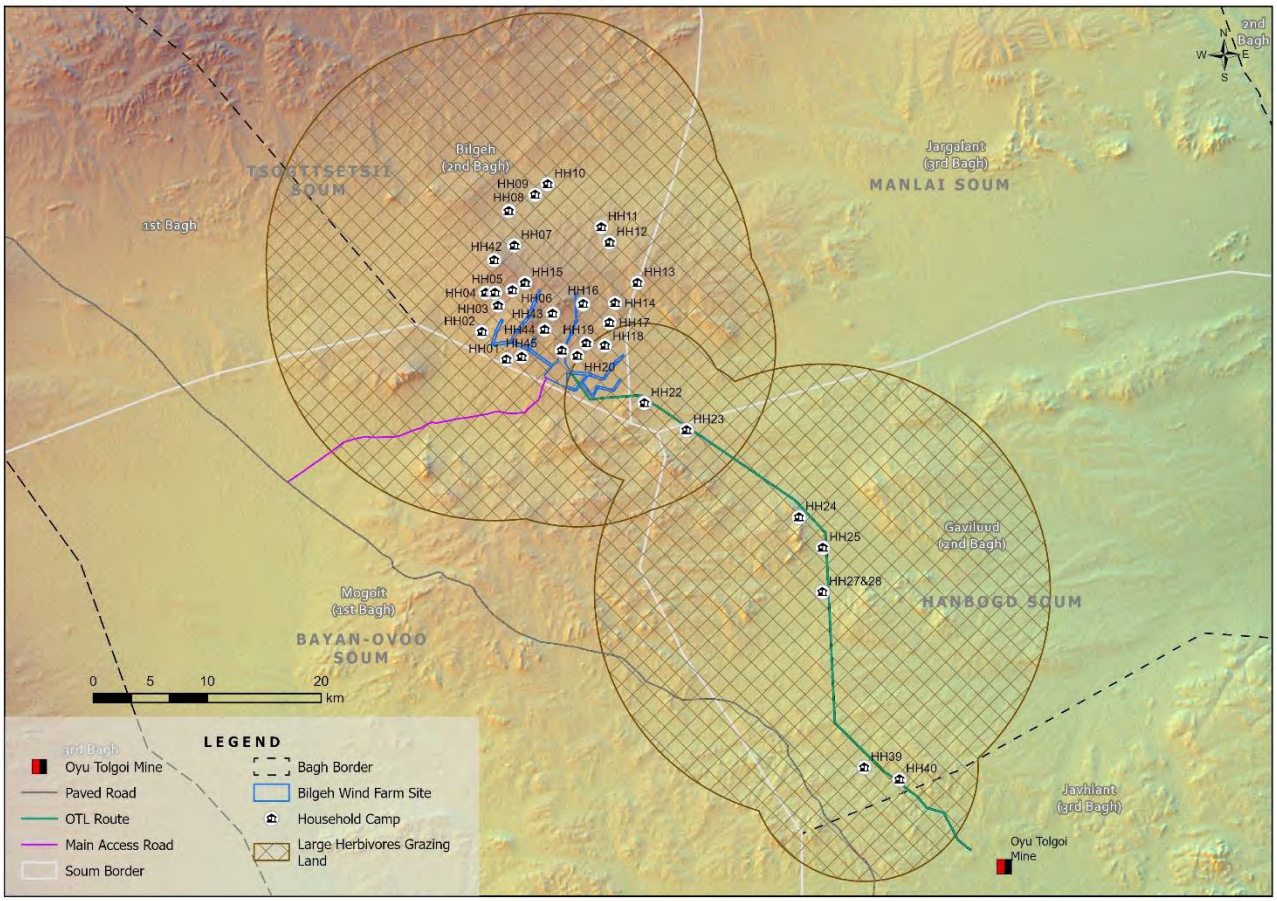
It is noted from the engagement with the local community that the migration decisions are typically informed through that year's pasture carrying capacity shared to all citizens during the Bagh's Citizen Public Meetings. When herders need to migrate to other soums or baghs for pasture during the difficult years, they submit a request to use pastureland to the administration of the destination soums for resolution. Traditionally, herders also reach agreement with the herders of the destination bagh to share the pasture. This tradition of pasture regulation and harmonious co-utilization among herders has been passed down for decades. As herders deeply understand the hardships of difficult times, they share areas with good pasture among themselves. In addition, it is uncommon that new herders without prior ties to the area to move into the region. Those who move into the region are usually individuals or families who have previously stayed there. As a result, conflicts or misunderstandings related to pasture use are relatively rare.

Figure 6-157 and ***Figure 6-158*** illustrates the seasonal movements of herders and their patterns of pasture usage by small ruminants and large herbivores in the vicinity of the project area based on the information provided by herders during the engagement in June. Grazing area for sheep and goat is approximately 70,428 hectares, and around 305,612 hectares for cattle, horses and camels. It is noted that a maximum of 0.1% of the grazing land will be utilized by the Project activities during construction phase.



Source: EcoTrend

FIGURE 6-157: THE SEASONAL PASTURE USAGE BY SMALL RUMINANTS



Source: EcoTrend

FIGURE 6-158: THE SEASONAL PASTURE USAGE BY LARGE HERBIVORES

6.3.7 LIVELIHOOD AND ECONOMY

The primary livelihood in the Project area is livestock herding. In addition to herding, one member of each household is typically engaged in employment within the mining sector, other types of companies, or public services located in the soum centre. During meetings with herders in Bilgeh bagh, the following types of employment were observed aside from herding:

- Employment in the soum centre's public utility service;
- Kindergarten staff;
- Workers in the mining industry;
- Housekeeping staff in state-owned buildings;
- Grocery store staff;
- Hotel housekeeping;
- Employment at the Tsetsii Wind Farm; and
- Assistant workers at the power plant in the Uhaa Khudag mine



Source: EcoTrend (April 2025)

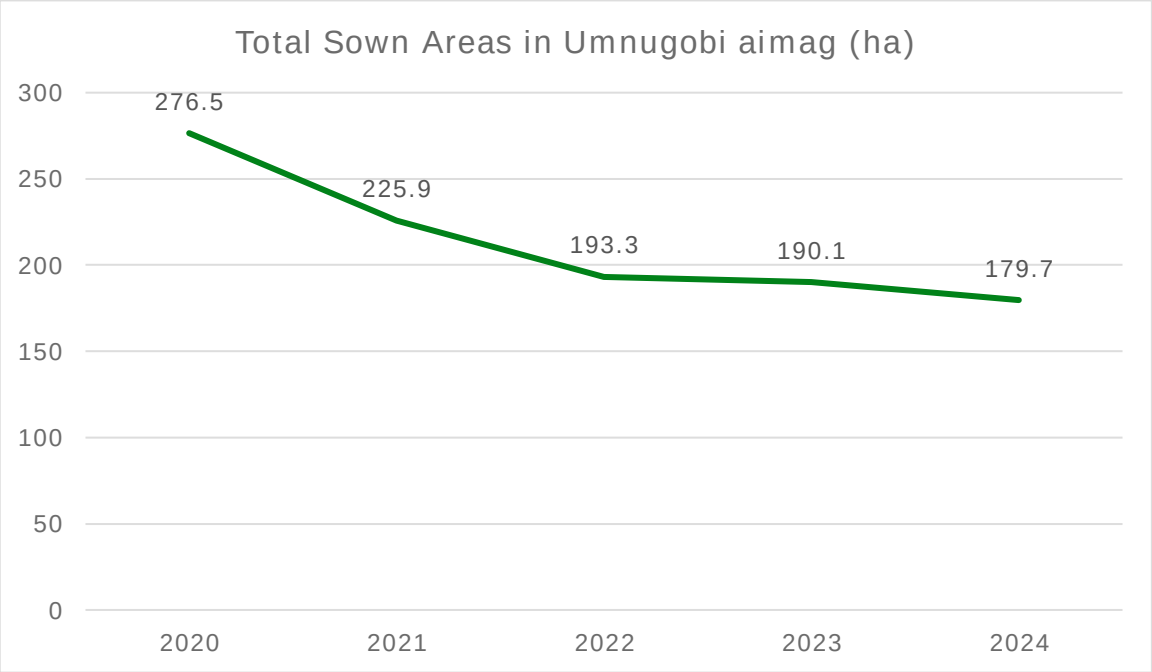
FIGURE 6-159: GROCERY STORE IN KHANBOGD SOUM

6.3.7.1 AGRICULTURE AND LIVESTOCK

Aimag

Agriculture in Umnugobi is limited due to its arid climate and desert terrain[142]. Among the 16,538,047 hectares of Umnugobi area, 179.7 hectares (ha) or only 0.0003% is sown as of 2024. The sown areas in Umnugobi experienced a considerable drop from 276.5 ha to 225.9 ha from 2020 to 2021, and then it gradually decreased to 179.7 ha in 2024, which marks a 35% decrease in total from 2020 to 2024. ***Figure 6-160*** further demonstrates gradual reduction of the size of sown areas.

[142] Mongolia: A Country Study: Agriculture. Available at: https://countrystudies.us/mongolia/53.htm



Source: National Statistical Office of Mongolia

FIGURE 6-160: TOTAL SOWN AREAS IN UMNUGOBI AIMAG

A large part of the region's agricultural efforts revolves around cultivating fodder crops such as soiling food, perennial plant, silage plant and maize corn to support the livestock sector. The main crop type in Umnugobi aimag are potatoes, vegetables, fodder crops and hay. Notably, hay production shows significant fluctuations, peaking in 2022 at nearly 9,679 tons before declining sharply to 5,966 tons in 2024. Fodder production exhibits a notable increase of more than two (2) times from 2020 to 2021, suggesting an emphasis on livestock support during that period. Potato and vegetable yields have generally decreased. The total volumes of plant harvest in the last five years are shown in ***Table 6-86.***

TABLE 6-86: TOTAL HARVEST OF DIFFERENT PLANTS IN UMNUGOBI AIMAG 2024

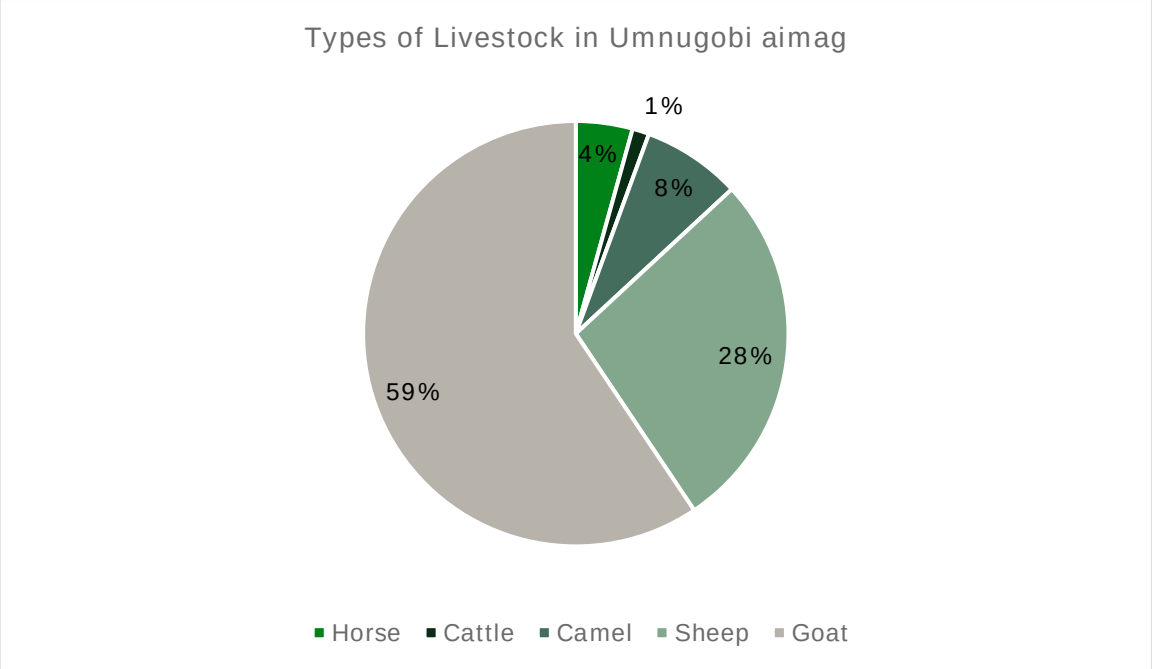
Plant type	**Total harvest of different plants in Umnugobi aimag 2024 (ton)**				
	2020	**2021**	**2022**	**2023**	**2024**
Potatoes	547.9	476.79	435.99	423.79	368
Vegetables	1017.9	990.24	721.79	682.51	663.1
Fodder (including fodder crops, handmade fodder and mineral fodder)	1034.5	2444.41	2355.4	1505.75	1507.2
Hay	8,298.5	7,659.3	9,678.99	8,349.3	5,966

Source: National Statistical Office of Mongolia

Livestock herding is the major livelihood in Umnugobi aimag. According to the 2024 data from the National Statistical Office of Mongolia compiled in ***Figure 6-161,*** it is noted that the majority of the livestock in Umnugobi aimag is goat. The number of goats accounts for

approximately 59% of the total livestock heads, followed by the sheep (28%), camel (8%), horse (4%) and cattle (1%)[143].

Goats in Umnugobi are primarily raised for their cashmere and meat production. Additionally, Umnugobi is renowned for its large population of Bactrian camels, and many families rely on camel breeding and milk production for their income.



Source: National Statistical Office of Mongolia

FIGURE 6-161: TYPES OF LIVESTOCK IN UMNUGOBI AIMAG IN 2024

[143] National Statistical Office of Mongolia, www.1212.mn

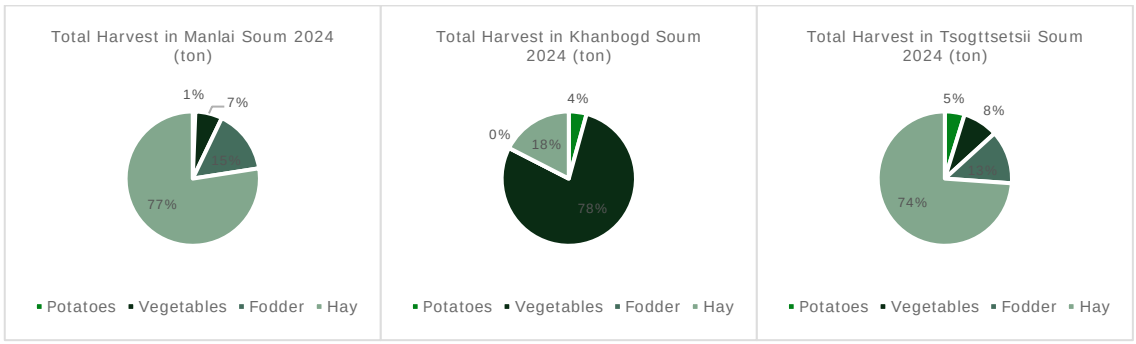


Source: ERM Site Visit (February 2025)

FIGURE 6-162: LIVESTOCK IN UMNUGOBI AIMAG

Soum

Hay and fodder crops are major sources of food for livestock. In Manlai soum, hay and fodder crops account for 92% of the total harvest, with vegetables making up 7% and potatoes 1%. In Tsogttsetsii soum, hay and fodder crops also dominate the harvest at 87%, while vegetables and potatoes constitute 8% and 5%, respectively. This further demonstrates that the agricultural activity in Manlai and Tsogttsetsii soum revolves around livestock raising. Khanbogd soum predominantly harvests vegetables at 78%, followed by hay at 18% and fodder at 4%. ***Figure 6-163*** demonstrates the total harvest of different plants in the three (3) soums in 2024.



Source: National Statistical Office of Mongolia

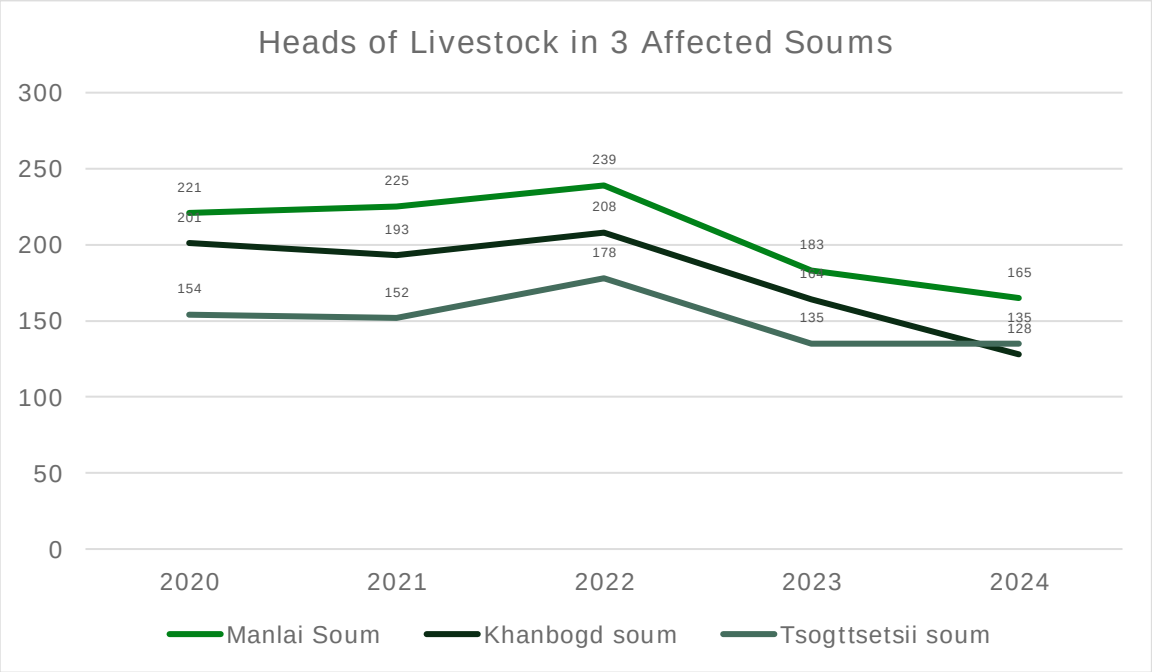
FIGURE 6-163: TOTAL HARVEST BY PLANT TYPE IN MANLAI, KHANBOGD, AND TSOGTTSETSII SOUMS 2024



Source: ERM Site Visit (February 2025)

FIGURE 6-164: HAY TRANSPORTATION

The number of livestock shows a trend of decrease in Tsogttsetsii, Manlai, Khanbogd soums, and Umnugobi aimag from 2020 to 2024 as shown in ***Figure 6-165***. Between 2020 and 2024, Khanbogd saw the largest decline in livestock by percentage, which falls at 36%, followed by Manlai at 25% and Tsogttsetsii at 12%.



Source: National Statistical Office of Mongolia

FIGURE 6-165: HEADS OF LIVESTOCK IN TSOGTTSETSII, MANLAI, AND KHANBOGD SOUMS

During KII with Khanbogd soum deputy governor, he mentioned that the number of camels in the soum dropped from 31,000 at the end of 2023 to 2,000 in the spring of 2024 due to drought and dzud. According to the Statistics Department of Umnugobi Province[144], in 2024 the total number of livestock in the districts also decreased between 500 and 36,600, with Khanbogd soum experiencing the largest decline of 36,600 thousand and Tsogtsetsii 500. The 2024 Mongolia Dzud Response Plan reported that as of December 2023, approximately 90 per cent of Mongolia's territory, including Umungobi Aimag and the Project area was categorized as being at high or extreme dzud risk, as presented in Source: ***Mongolia:*** Dzud Response Plan (Dec 2023 – June 2024)

Figure 6-166 . As of February 2024, 266 soums, of 21 provinces, covering 81 per cent of the nation, were in dzud or near-dzud conditions, excluding the Project area as presented in ***Figure 6-167***. As of March 2024, the livestock mortality rates reached 8.1 per cent (out of the total number of 64.7 million livestock), with 2,257 herder households had lost more than 70 per cent of their livestock[145].

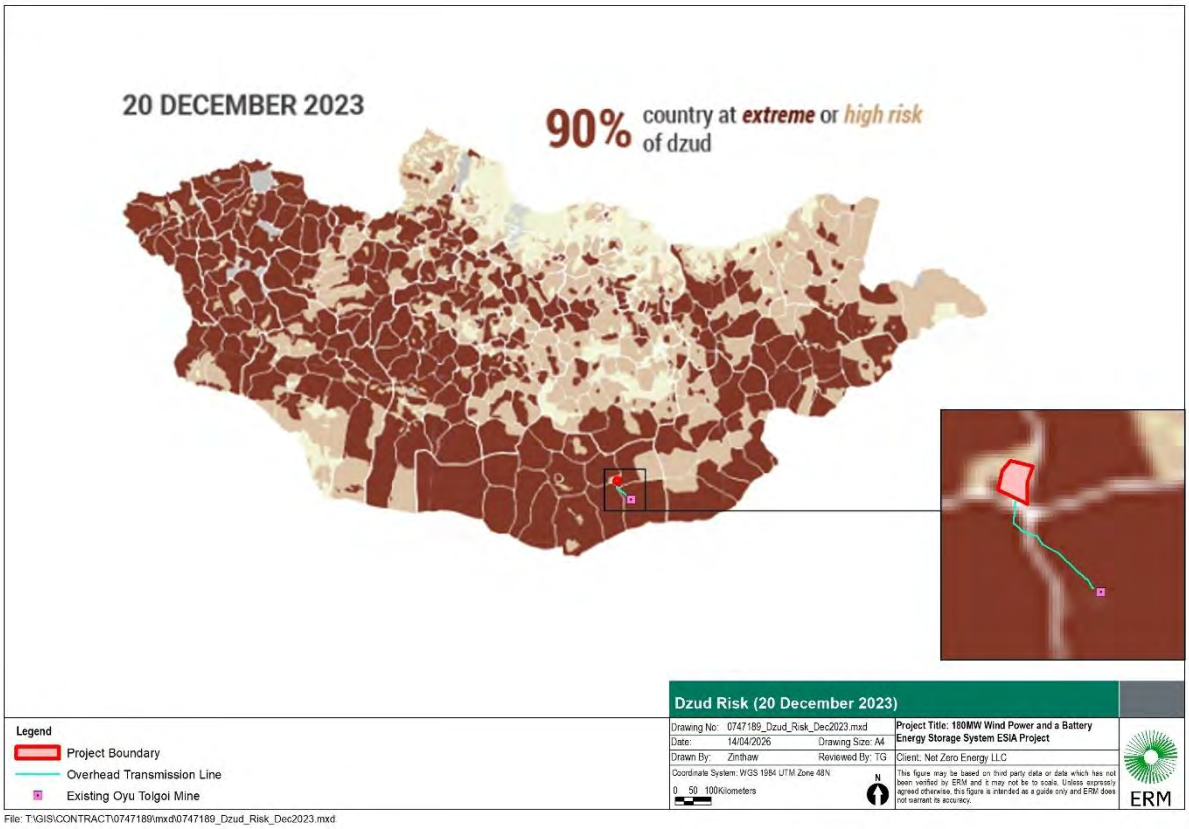
The Government of Mongolia adopted a multi-pronged approach to manage and mitigate the impacts of the severe dzud, focusing on coordination, preparedness, livestock management, and essential service delivery. An Emergency Operation Centre and emergency task forces were established at national, provincial, and soum levels to strengthen coordination and crisis

[144] Available at: https://medee.nso.mn:3005/api/articles/imagesCk/1750983220654-nso-2024%20%D0%BE%D0%BD%D1%8B%20%D0%A5%D0%90%D0%90%20%D1%82%D0%B0%D0%BD%D0%B8%D0%BB%D1%86%D1%83%D1%83%D0%BB%D0%B3%D0%B0.pdf

[145] Mongolia: Dzud Response Plan (Dec 2023 – June 2024). Available at: https://reliefweb.int/report/mongolia/mongolia-dzud-response-plan-dec-2023-june-2024-issued-25-march-2024?_gl=1*4u3t7s*_ga*MjAxODYxODY0LjE3NzQ2MDM1OTc.*_ga_E60ZNX2F68*czE3NzQ2MDM1OTYkbzEkZzAkdDE3NzQ2MDM1OTYkajYwJGwwJGgw

response. To improve winter preparedness, the Government set fodder reserve targets, restricted hay and fodder exports for domestic security, and distributed subsidized fodder and hay through multiple Cabinet resolutions, achieving almost 80% of national requirements. To reduce pressure on grazing resources, the Government actively implemented livestock destocking measures, significantly lowering the national herd through expanded meat exports and financial support to meat processing enterprises to purchase livestock from herders. Parallel efforts ensured continuity of basic services by regulating transhumance movements, clearing snow-blocked roads, and allocating vehicles, fuel, food, and medical supplies to affected areas. Additional measures included the temporary elevation of national readiness levels, postponement of herder loan repayments, and the provision of large-scale humanitarian assistance. Collectively, these actions demonstrate a comprehensive and proactive strategy aimed at safeguarding herder livelihoods, maintaining public services, and strengthening resilience against extreme winter conditions.[146]

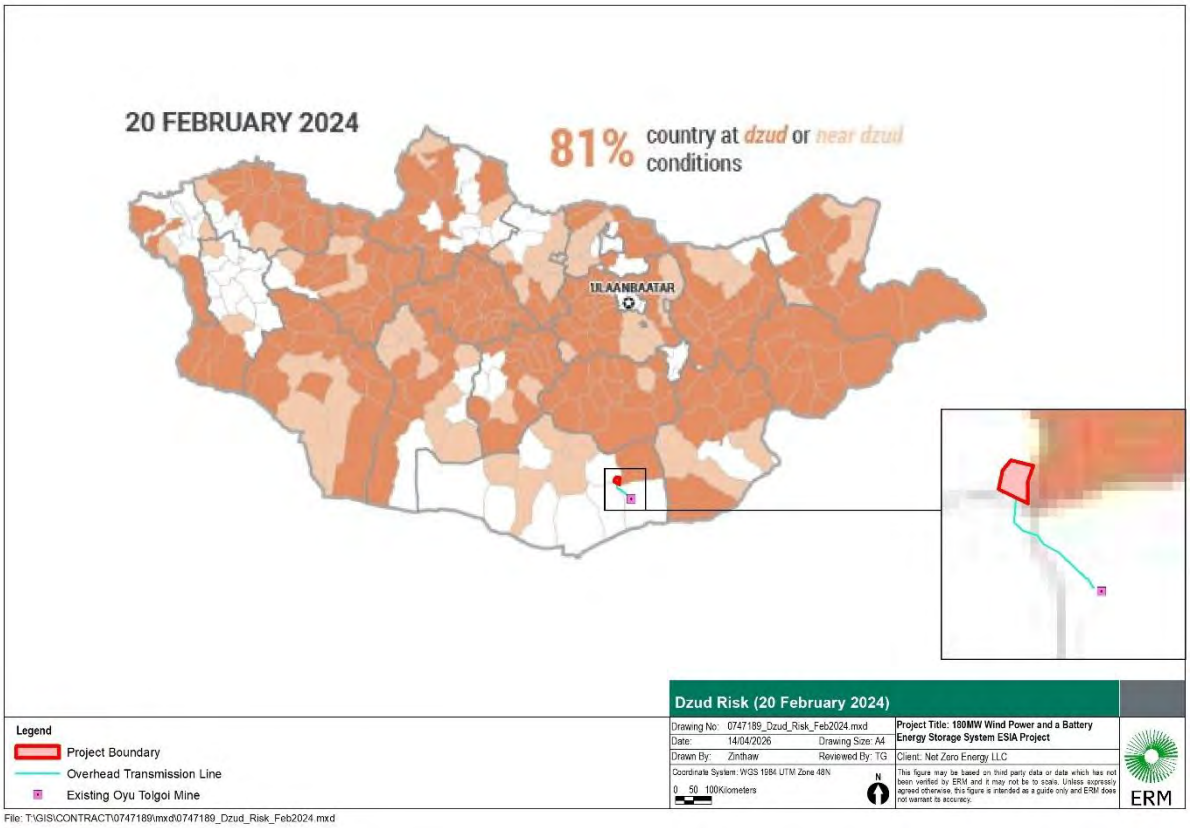
The 2024 Mongolia Dzud Response Plan also classified vulnerable herder households as whose livestock mortality rate reached above 3.5 per cent and owns up to 400 livestock. Priority is given for households with lactating or pregnant women, single headed households with three or more children under secondary school age, persons with disability, widowed elderly, and young herder households with limited social welfare benefits. Based on these standards, it is noted that four surveyed households in the Project area is classified as vulnerable households towards dzud.



Source: Mongolia: Dzud Response Plan (Dec 2023 – June 2024)

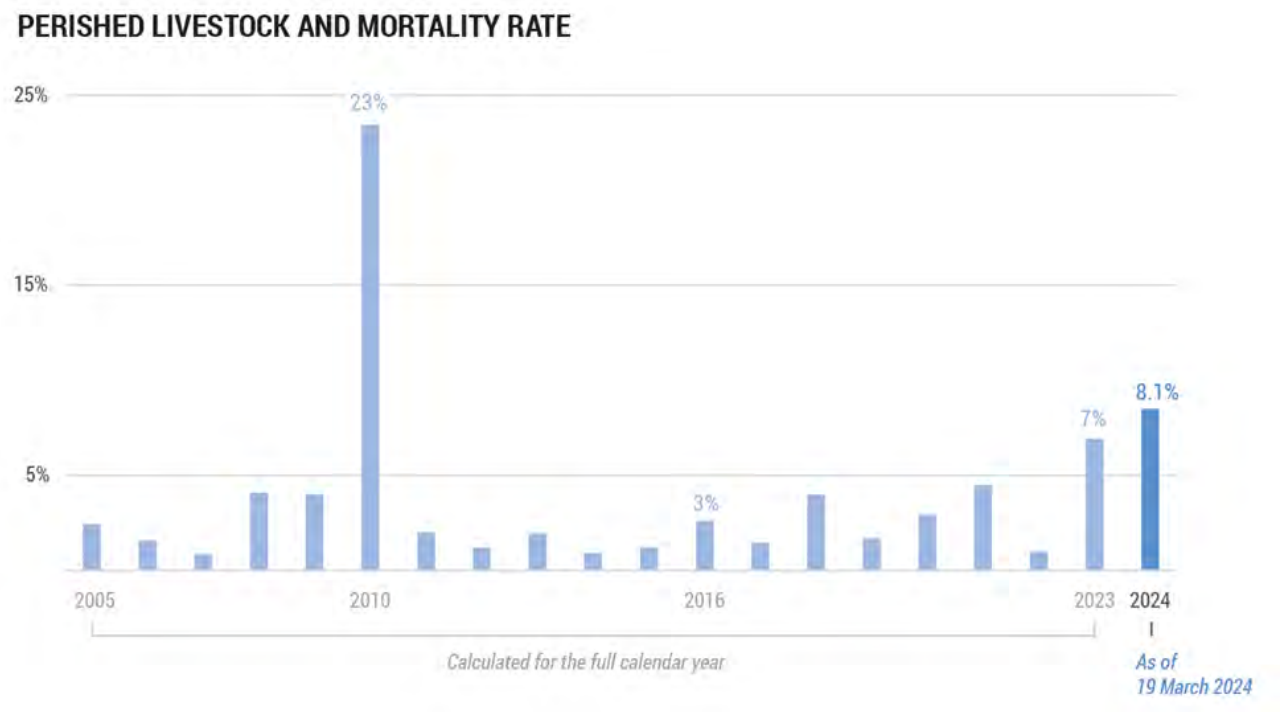
FIGURE 6-166: MONGOLIA DZUD RISK MAP 2023

[146] Ibid.



Source: Mongolia: Dzud Response Plan (Dec 2023 – June 2024)

FIGURE 6-167: MONGOLIA DZUD CONDITION MAP 2024



Source: Mongolia: Dzud Response Plan (Dec 2023 – June 2024)

FIGURE 6-168: MONGOLIA LIVESTOCK MORALITY RATE 2024

Bagh

FGD with the herders in Bilgeh bagh highlighted that the main source of income is livestock and the sale of livestock products, including meat, cashmere, milk, dairy products etc. According to the FGDs conducted with the herders in Bilgeh bagh and Gavilud bagh during February site visit, it is informed that the main livestock in Bilgeh bagh are sheep, goats, and horses, with a few households also raising cattle. Sheep and camels are being raised more prominently in Gavilud bagh.

[redacted] It is noted that livestock raising contributes to a majority 95% of the households' annual income since only one household reported wage and another household reported pension as alternative source of income during the survey. Spring is usually the busy season for livestock raising due to protecting newborn animals from cold snaps and storms and provide supplementary feeding due to weak pasture after winter.

According to the HH survey, livestock products are mainly for household consumption and/or sold at the soum market. Low price for selling livestock, long travel distance to the market, high competition with other suppliers are identified as main challenges to sell home-produced livestock products.

Table 6-87 presents the number of livestock in Bilgeh bagh, Javhlant bagh and Jargalant bagh. Sheep and goats are the predominant livestock across all three baghs. However, cattle and camels constitute a larger proportion in Javhlant bagh compared to the other two baghs, with cattle accounting for 4% and camels for 17.3% of the total livestock in Javhlant bagh.

TABLE 6-87: LIVESTOCK NUMBER AT BAGH LEVEL

	Bilgeh Bagh	Javhlant Bagh	Jargalant Bagh
Total livestock	51,120	33,640	37,540
Horse	3,880	1,490	2,900
Cattle	910	1,340	540
Camel	1,200	5,830	1,550
Sheep	20,230	8,570	14,880
Goat	24,910	16,410	17,670

Source: National Statistical Office of Mongolia

Based on the household survey updated by October 2026, all of the 19 surveyed household owners reported owning livestock, while 17 owners herd their animals in the Project area. However, only 46% of households disclosed detailed information on herd size, indicating some limitations in livestock data completeness, potentially due to privacy concerns or seasonal herd movements. [redacted] reflecting differences in household wealth, grazing access, and production capacity.

[redacted] Dzud was identified as the major cause of livestock death during the household survey in 2025. No crops are currently cultivated at the bagh level.

6.3.7.2 INDUSTRY AND ECONOMY

Copper and Gold Mining

Umnugobi aimag is primarily known for its mining industry. The region is rich in mineral deposits including gold and copper[147].

Oyu Tolgoi (OT) copper and gold mine located in Khanbogd soum is one of the largest known copper and gold deposits in the world. Oyu Tolgoi was discovered in 2001 and it has been developed as a joint venture between Turquoise Hill Resources and the Government of Mongolia. The mine began construction in 2010 and the Project has created thousands of jobs for Mongolians[148].

The OT copper and gold mine offers a substantial and reliable income source for households in the region. In fact, 73.9% of OT employees earn salaries above the national average, exceeding 1.5 million MNT (USD 431) per month. Household incomes for OT employees saw an increase in 2020 compared to 2019. Additionally, the incentives and support provided by OT have contributed to maintaining stable household incomes[149].

Coal Mine

Tavan Tolgoi is one of the world's largest untapped coal deposits located in Tsogttsetsii soum. It is 15 km southwest from Tsogttsetsii soum centre, 150 km from Oyu Tolgoi, and approximately 240 km north of the Chinese border. Tavan Tolgoi is viewed as a key source of revenue for the Mongolian government through coal exports, primarily to China[150].

Tavan Tolgoi represented over 10% of the state budget revenue, 4.6% of export revenue, 1% of mining tax, and 2.2% of household income in 2011-2013 in Mongolia. It is estimated that the Tavan Tolgoi will be the second biggest contributor to the Mongolian economy after Oyu Tolgoi[151].

[147] Mongolia: Human Settlements Development Program. Available at: https://www.adb.org/sites/default/files/project-documents/51106/51106-001-tacr-en_4.pdf
[148] Rio Tinto. Available at: https://www.riotinto.com/en/Operations/mongolia/oyu-tolgoi
[149] National University Of Mongolia Economic Institute, 2021. Socio-Economic Impact Assessment of Oyu Tolgoi In Mongolia During Covid-19 Pandemic. Available at: https://cdn.greensoft.mn/uploads/users/1804/files/SOCIO-ECONOMIC%20IMPACT%20ASSESSMENT%20OF%20OYU%20TOLGOI%20IN%20MONGOLIA%20DURING%20COVID-19%20PANDEMIC.pdf
[150] Tavan Tolgoi Coal Mine. Available at: https://www.gem.wiki/Tavan_Tolgoi_Coal_Mine
[151] An Economic Impact Assessment of the Erdenes Tavan Tolgoi Coal Mining. Available at: https://resource4.sodonsolution.org/enminingjournal/file/2014/11/73b14fe7261db9cb/6818f27be7bb2658.pdf

According to an interview with the Deputy Governor of Manlai soum, one member of each household works in the mining industry in Manlai soum. According to the HH survey conducted among residents within the Project area, the majority of respondents are engaged in livestock raising, while only one HH reported wage employment as its primary livelihood source.

6.3.7.3 LABOUR

According to the Mongolia Statistical Yearbook 2022, 294,000 people (25%) of the workforce in Mongolia are engaged in agriculture, forestry, fishing and hunting in 2022, which dominates the working population in Mongolia. It is followed by 146,200 people working in wholesale and retail trade, repair of motor vehicles and motorcycle sector, which accounts for 12.4% of the workforce. Manufacturing sector is the third largest recruiter in Mongolia that employs 112,700 people in 2022, which makes up 9.5% of the workforce.

Table 6-88 shows the employed population over the age of 15 by different economic sectors. It is also worth noting that although a large proportion of people reply on agriculture, forestry, fishing and hunting for livelihood, the number of people working in this sector has decreased 12% from 2018 to 2022[152].

TABLE 6-88: EMPLOYED AGED 15 YEARS AND OVER IN MONGOLIA BY CLASSIFICATION OF ECONOMIC ACTIVITIES (IN THOUSAND)

Division	2018	2019	2020	2021	2022
Total	1253.0	1146.2	1162.9	1125.6	1180.5
Agriculture, forestry, fishing and hunting	334.1	290.2	276.5	291.7	294.0
Mining and quarrying	57.7	57.9	51.5	56.0	60.3
Manufacturing	100.8	90.4	89.7	84.7	112.7
Electricity, gas, steam and air conditioning supply	16.3	19.3	14.4	18.5	22.0
Water supply; sewerage, waste management and remediation activities	6.9	10.8	8.3	7.7	6.8
Construction	76.6	68.8	77.3	82.2	77.5
Wholesale and retail trade, repair of motor vehicles and motorcycles	211.2	160.4	166.6	149.2	146.2
Transportation and storage	73.6	61.1	66.6	57.8	68.2

[152] Mongolia Statistical Yearbook 2022. Available at: https://downloads.1212.mn/XAwDOK2kREX51d_fl68Uw-r1_ye--nOFrsKek_OF.pdf#pdfjs.action=download

Division	2018	2019	2020	2021	2022
Accommodation and food service activities	37.4	36.3	30.0	37.6	32.0
Information and communication	14.1	13.0	18.8	15.8	19.2
Financial and insurance activities	25.7	24.3	29.3	26.8	22.6
Real estate activities	0.8	1.2	3.4	2.0	2.5
Professional, scientific and technical activities	14.6	18.0	11.6	11.9	15.1
Administrative and support service activities	18.2	20.2	18.1	17.7	13.9
Public administration and defence; compulsory social security	76.2	86.0	83.4	85.6	82.1
Education	98.7	96.1	110.7	99.1	104.4
Human health and social work activities	49.4	44.4	60.2	46.8	49.7
Arts, entertainment and recreation	13.8	18.0	10.8	7.8	14.1
Other service activities	23.4	24.5	29.8	24.4	34.2

Source: Mongolia Statistical Yearbook 2022

A total of 63.1% of Umnugobi's workforce is in livestock production, followed by wholesale and retail sale (8.9%), public administration/government (8.2%), education (4.7%) and mining (4.2%)[153].

The majority of the Umnugobi aimag's labour force fall to the age group between 30 and 45. In 2023, the share of population aged 30-45 accounted for 52.6% of the total labour force. The employment rate in Umnugobi aimag's is 67.5%, higher than the national employment rate of 56.3%. Male employment rate in Umnugobi aimag is higher than that of females: 78.8% of males are employed compared to employment of 57.6% of female. The top three (3) reasons for people being outside of the labour force are: education (36.2%), retirement (29.1%) and pregnancy (21.9%). 12,868 people worked in informal jobs, which takes up 38.5% of the employed population in Umnugobi aimag[154]. The majority of informal workers are engaged in

[153] Oyu Tolgoi Project - ESIA
[154] National Statistical Office of Mongolia, www.1212.mn

agriculture, forestry, fishing, and hunting, which collectively account for 76.8% of total informal employment. Other significant informal activities include wholesale and retail trade, repair of motor vehicles and motorcycles, transportation and storage, construction, and various service-related occupations, as presented in ***Table 6-89*** [155].

TABLE 6-89 INFORMAL SECTOR OF UMNUGOBI AIMAG, 2023

Informal Sector of Umnugobi Aimag	Percent
Agriculture, forestry, fishing and hunting	76.80
Wholesale and retail trade, repair of motor vehicles and motorcycles	9.06
Other service activities	2.70
Manufacturing	5.07
Transportation and storage	2.79
Construction	1.55
Administrative and support service activities	0.97
Water supply; sewerage, waste management and remediation activities	0.39
Accommodation and food service activities	0.36
Mining and quarrying	0.33

Source: National Statistical Office of Mongolia

In terms of issues of child labour, the head of Citizen's Representative Meeting of Tsogttsetsii soum reported during the KII that there is no officially registered information on child labour and forced labour in Tsogttsetsii soum. In Mongolia, it is common for children, particularly those from herding households, to participate in family work as part of traditional upbringing. This "voluntary family work" typically includes basic household chores and daily herding-related activities, such as tending livestock or fetching water from wells. In herding communities, these tasks are viewed as an integral part of skill development, as children learn livestock management and other cultural practices through hands-on participation. Based on this view, children's participation is typically limited to voluntary household and family-based tasks, which are not considered child labour under the ILO definition, as long as the activities are non-hazardous, age-appropriate, and do not affect school attendance.

6.3.8 EDUCATION

The educational system in Mongolia includes pre-school education (kindergarten), general education (primary, secondary and high school education) and university education. Each soum has multiple nursery and kindergarten schools, including both public and private institutions. Primary and secondary education together last 12 years.[156]

The National University of Mongolia is the country's oldest and most prestigious university located in Ulaanbataar. Other notable universities in Mongolia include the Mongolian University

[155] https://www.1212.mn/en/statcate/table-view/Labour,%20business/Labour/DT_NSO_0400_082V6.px
[156] National Statistical Office of Mongolia, www.1212.mn

of Science and Technology, Mongolian Academy of Sciences, the Mongolian Technical University and the Mongolian Business Institute.

6.3.8.1 AIMAG

The gross enrolment ratio for primary education (1st to 5th grades) has consistently been slightly higher than that for secondary education (6th to 9th grades). Secondary education displays a consistent trend of higher gross enrolment ratio for females compared to males, although both genders experienced a slight decrease in 2020. The gross enrolment ratio for basic education (1st to 9th grades) in Umnugobi aimag has remained high over the past five years. Although there was a decline in 2020, the enrolment rate gradually increased from 2021 to 2023. In 2019 and 2020, female enrolment rates were slightly higher than those of males, but this trend reversed starting in 2021. ***Table 6-90*** shows the gross enrolment ratio in Umnugobi aimag by different school level and gender. [157]

TABLE 6-90: GROSS ENROLLMENT RATIO IN UMNUGOBI AIMAG

School level	Gender	2019	2020	2021	2022	2023
Primary /1-5th grades/	Total	97.4	97.1	96.8	98.7	99.3
	Male	97.2	96.6	96.6	99.2	99.4
	Female	97.6	97.6	97	98.2	99.3
Secondary /6-9th grades/	Total	96.6	94.6	94.9	94	96
	Male	95.8	94.9	95.4	94.6	96.4
	Female	97.4	94.3	94.3	93.4	95.7
Basic /1-9th grades/	Total	97.1	96.1	96.1	96.8	98
	Male	96.7	96	96.2	97.4	98.2
	Female	97.5	96.3	96	96.3	97.8

Source: National Statistical Office of Mongolia

Regarding school infrastructure in Umnugobi aimag in 2024, there are 32 kindergartens and 24 general education schools. The number of full-time teachers in general education schools increased from 720 in 2020 to 812 in 2024, reflecting efforts to strengthen educational capacity. Over the same period, full-time students enrolment rose from 14,134 in 2020 to 17,373 in 2024, representing an increase of approximately 23% .[158] This growth highlights rising demand for educational services and places increasing pressure on existing school infrastructure and teaching resources.

[157] National Statistical Office of Mongolia, www.1212.mn
[158] National Statistical Office of Mongolia, www.1212.mn

6.3.8.2 SOUM

There is one general education school in Manlai soum, two in Tsogttsetsii soum and two in Khanbogd soum. While the nominal number of schools suggests basic coverage across the affected soums, the adequacy of education services varies due to differences in infrastructure quality, accessibility, and supporting services, which are critical factors in rural and mining-influenced areas.

The number of full-time students in general educational schools in Tsogttsetsii soum increased 30 % from 2020 to 2024, while the number of teachers increased 24.5 % with a student-to-teacher ratio of approximately 22:1. The number of full-time students and teachers at general educational schools in Manlai soum remains relatively stable from 2020 to 2024. It has a student-to-teacher ratio of around 17:1. There was a 31 % increase of full-time students from 2020 to 2024 in Khanbogd soum, and the number of teachers increased 44 %, which lowered the student-to-teacher ratio from 20:1 to 18:1 as shown in ***Table 6-91***.

Although smaller classes are widely regarded as beneficial because they allow teachers to provide more individualized attention and minimize time spent managing disruptions, the student-teacher ratios in the potentially affected soums remain below 30:1, which is generally considered a healthy and balanced level [159] and not considered overcrowded.

Nevertheless, student-teacher ratios alone do not fully reflect service quality and adequacy, as classroom availability, school infrastructure condition, availability of dormitories, utilities, and learning materials also shape education outcomes and vulnerability.

While the majority of schools in the soums are reported to have generally suitable facilities, services, and learning conditions, two (2) schools and four (4) kindergartens in Tsogttsetsii soum face notable infrastructure constraints that indicate underlying service adequacy issues. These include frequent power outages and the absence of a reliable drinking water supply in one school, which has necessitated the use of rented buildings and rotational study arrangements, as reported by the Head of the Citizen's Representative Meeting (CRM). Such conditions likely disrupt the continuity of teaching and learning, reduce effective instructional time, and place additional organisational burdens on teachers who must adapt to shared or temporary facilities. For students, particularly younger children, the use of rented or multiple locations may affect attendance, concentration, and overall learning outcomes.

Comparatively, there is good accessibility to the school and kindergarten in Manlai soum. According to the KII with Labor and Welfare Specialist at Manlai Soum, the general education school in Manlai soum consists of two buildings: one for primary students with a capacity of 320 children, and another for secondary students accommodating 280 children. The kindergarten in the soum has eight (8) groups, serving a total of 300 children.

[159] OECD. Class size and student-teacher ratios. Available at: https://www.oecd.org/en/topics/class-size-and-student-teacher-ratios.html

TABLE 6-91: NUMBER OF STUDENTS AND TEACHERS IN GENERAL EDUCATIONAL SCHOOLS IN TSOGTTSETSII, MANLAI AND KHANBOGD SOUM

Soum	Indicator	2020	2021	2022	2023	2024
Tsogttsetsii	Full-time students at general educational schools	2,252	2,417	2,594	2,778	2,946
	Full-time teachers in general educational schools	102	109	109	117	127
	General educational schools student teacher ratio	22:1	22:1	24:1	24:1	23:1
Manlai	Full-time students at general educational schools	382	395	393	369	380
	Full-time teachers in general educational schools	21	21	22	22	23
	General educational schools student teacher ratio	18:1	19:1	17:1	17:1	17:1
Khanbogd	Full-time students at general educational schools	1,419	1,537	1,655	1,726	1,858
	Full-time teachers in general educational schools	71	78	84	98	102
	General educational schools student teacher ratio	20:1	20:1	20:1	18:1	18:1

Source: National Statistical Office of Mongolia



Source: EcoTrend (April 2025)

FIGURE 6-169: KINDERGARTEN AND GENERAL EDUCATION SCHOOL IN TSOGTTSETSII SOUM

Across the Project AoI, engagement with local communities indicates that kindergarten children generally live with their families and commute daily to school. Students attending general education schools typically reside in school dormitories when their homes are located far from the soum centre. In addition, some herding households maintain a secondary residence in the soum centre to enable their children to attend school more conveniently.

Due to the dispersed and semi-nomadic settlement patterns of herder households, access to education is subject to pronounced seasonal constraints, particularly for students from remote winter and spring camps. Such seasonal disruptions disproportionately affect economically vulnerable households, who may not have a residence in the soum centre. During the winter months, road conditions frequently deteriorate due to snow accumulation, ice, and extreme cold, limiting vehicular access and increasing travel times to schools. These conditions can disrupt regular attendance, especially for kindergarten children who rely on daily travel rather than boarding arrangements. While formal education infrastructure is generally present at the soum level, these seasonal and geographic factors create uneven access to education services for herder communities and represent an important contextual vulnerability to be considered in relation to Project-related changes in mobility and traffic patterns.

Potential increase in school enrolment due to in-migration of the Project workforces' families, without corresponding expansion of education capacity, could disproportionately affect children from poorer and more remote households. This is assessed in the Social Impact Assessment presented in ***Section 8.6.4.2***.

With regards to gender dynamics in education, women in Javhlant bagh suggested that girls tend to be more educated than boys, since boys are more interested in working in the Oyu Tolgoi mining after graduating from secondary school and earning a living, while girls tend to continue their studies at university. While there is no secondary data available about the educational outcomes of men and women in the AoI, this gender-differentiated education outcome noted by the local stakeholder reflects broader livelihood dynamics where industrial employment offers short-term income opportunities predominantly for boys but may incentivize early labour market entry at the expense of higher education. This trend raises potential child labour and early school-dropout risks, particularly if project-related employment or contractor demand increases. Conversely, higher female education attainment contributes positively to long-term human capital development; however, limited local professional employment opportunities may constrain the realization of these gains unless linked to inclusive workforce planning and skills development programs.



Source: EcoTrend (April 2025)

FIGURE 6-170: KINDERGARTEN AND GENERAL EDUCATION SCHOOL IN KHANBOGD SOUM

6.3.9 PUBLIC HEALTH

The public healthcare system in Mongolia is structured into primary, secondary, and tertiary levels of care. Primary healthcare services are delivered through Family Health Canters (FHCs) in urban areas and Soum Health Canters (SHCs) in rural and remote areas. Secondary healthcare is provided by inter-soum hospitals and aimag (provincial) general hospitals. Tertiary healthcare services are concentrated mainly in Ulaanbaatar and include state central hospitals and national specialized centres[160].

Despite universal coverage, significant disparities remain between urban and rural areas in terms of accessibility, service readiness, availability of medical equipment, and health workforce capacity. Rural soum health centres often face challenges related to long travel distances, harsh climatic conditions, workforce shortages, and limited diagnostic and pharmaceutical supplies, which constrain effective access to healthcare for remote and vulnerable populations, particularly herder households[161]. The following sections present the baseline healthcare facilities at different administrative level of the Project area.

6.3.9.1 AIMAG

Healthcare facilities have been improved in in Umnugobi aimag. The number of health institutions has increased from 108 in 2019 to 132 in 2023, with a total of 767 beds currently available[162].

The number of healthcare personnel has also risen and reducing the medical burden in the region. The number of nurses gradually increased from 443 in 2019 to 470 in 2023. Meanwhile, the number of physicians also shows a steady rise, from 227 in 2019 to 256 in 2023, reflecting a strengthening of physician availability. The number of people per physician remained relatively stable, with a slight decrease from 306 to 293. The information reviewed indicates an overall increase in the availability and accessibility of healthcare facilities and

[160] Asian Development Bank. *Mongolia Health Sector Fact Sheet*. Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC11906202/https://www.adb.org/sites/default/files/publication/322751/health-fact-sheet-mongolia.pdf
[161] The strength and weakness of Mongolian healthcare: from nomadic Gobi to Ulaanbaatar. Available at:
[162] National Statistical Office of Mongolia, www.1212.mn

resources. Detailed numbers of persons per healthcare personnel (nurse and physicians) are shown in ***Table 6-92.***

TABLE 6-92: HEALTHCARE PERSONNEL IN UMNUGOBI AIMAG

Indicator	2019	2020	2021	2022	2023
Number of nurses	443	443	458	470	470
Number of persons per nurse	366	344	375	369	332
Number of physicians	227	235	246	244	256
Number of persons per physician	306	300	293	301	293

Source: National Statistical Office of Mongolia

The total number of live births in Umnugobi aimag shows a declining trend, starting at 1,680 in 2020 and decreasing to 1,198 in 2024, with a notable dip to 1,259 in 2022 before a slight recovery in 2023. Infant mortality per 1,000 live births has been increased from 140 in 2020 to 210 in 2024 and it indicates the challenges in infant health. Prematurity is cited as the leading cause for infant mortality according to Mongolia Health Industry[163]. Maternal mortality remains consistently at zero across all years. The available information indicates that maternal mortality remains at zero; however, the infant mortality rate has increased between 2020 and 2024. The number of live births, infant mortality and maternal morality in Umnugobi aimag is shown in ***Table 6-93.***

TABLE 6-93: LIVE BIRTHS, INFANT MORTALITY AND MATERNAL MORALITY NUMBERS IN UMNUGOBI AIMAG

Indicator	2020	2021	2022	2023	2024
Live births	1,680	1,639	1,259	1,397	1,198
Infant mortality per 1000 live births	140	137	193	121	210
Maternal mortality	0	0	0	0	0

Source: National Statistical Office of Mongolia

Common health issues include respiratory diseases, waterborne illnesses, and occupational health risks due to mining activities[164]. Construction is considered a high risk sector in terms of Occupational Health and Safety (OHS) in Mongolia[165]. According to the National Statistical Office of Mongolia, occupational health accidents at the aimag level have increased markedly, rising from 33 cases in 2019 to 93 cases in 2023. This upward trend is considered to be associated with increased mining activities in the area[166].

[163] AKIPress. *Health Ministry to address issues of child mortality in Mongolia*. Available at: https://m.akipress.com/news:804932:Health_Ministry_to_address_issues_of_child_mortality_in_Mongolia/
[164] ESIA Report of Oyu Tolgoi Project.
[165] International Labor Organization, 2006. National Occupational Safety and Health Profile of Mongolia. Available at: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@asia/@ro-bangkok/documents/policy/wcms_bk_pb_303_en.pdf
[166] National Statistical Office of Mongolia. https://www.nso.mn/en/statistic/statcate/573055/table-view/DT_NSO_0400_039V3

TABLE 6-94: OCCUPATIONAL ACCIDENT IN UMNUGOBI AIMAG

	2019	2020	2021	2022	2023
Umnugobi	33	21	3	5	93

6.3.9.2 SOUM

Unlike Aimag level, healthcare facilities in Tsogttsetsii, Manlai, and Khanbogd Soums are limited. According to the National Statistical Office of Mongolia, each soum has only one health institution and no pharmacists. However, this information is proven to be inaccurate based on site observation and local source of information. Based on the FGD with the local communities, medicines are accessed through the health institutions and pharmacies, and medical equipment is considered good. The number of physicians is in constraint compared to the general population of these soums. The number of hospital beds in the three soums is 45, 12, and 37, respectively, which can be considered insufficient compared to their respective population of 10,194, 2,575 and 8,941(***Table 6-95***). It is also noted from the engagement with the local community that during bagh meetings or public information events, bagh and soum doctors organize health check-ups and provide consultations to the general public.

TABLE 6-95: HEALTHCARE FACILITIES AND PERSONNEL IN TSOGTTSETSII, MANLAI AND KHANBOGD SOUM 2023

Soum	Number of health institutions	Number of hospital beds	Number of pharmacies	Number of physicians
Tsogttsetsii	1	45	9	14
Manlai	1	12	N/A	19
Khanbogd	1	37	7	4

Source: National Statistical Office of Mongolia; EcoTrend

Tsogttsetsii Soum

Women in Bilgeh bagh expressed concerns for the skills of the healthcare personnel in the soum's hospital during FGD. Besides, the hospital infrastructure appears weak to some extent as the Head of CRM of Tsogttsetsii soum reported that the hospital building's basement was flooded due to heavy rainfall last year. Social Officer at Tsogttsetsii soum reported that there is a rapid increase in the number of children with disabilities in Tsogttsetsii soum and the disabilities with cerebral palsy and autism being the most common conditions. The Social Officer also shared that some households in Tsogttsetsii soum face severe problem of mental health. Factors such as migration and working in the mining field often lead to parental neglect, increasing the risk of suicide among adolescents. Since the beginning of 2025, there have been two recorded suicide attempts by teenagers in Tsogttsetsii soum. The findings indicate cumulative pressures on health, social welfare, and mental health systems at the soum level. It is considered that without adequate capacity strengthening, infrastructure improvement, and targeted psychosocial support, these challenges may be exacerbated by ongoing demographic and economic changes linked to mining-driven development. The issues raised highlight the need for integrated health and social interventions, with particular

attention to women, children with disabilities, and adolescents, to mitigate risks and enhance community resilience.

In terms of elderly care, the social officer at Tsogttsetsii soum mentioned that there is an elder citizen's centre in the soum, where events are usually self-organized by the old people in groups of ten and one hundred participants.

Manlai Soum

According to the KII with Labor and Welfare Specialist at Manlai Soum, cancer and internal diseases prevail among the citizens in Manlai soum. Since the district has a small population, an increase of two to three diagnose per year is significant.

Similarly, there is a growing number of children with disabilities reported in Manlai soum. Labor and Welfare Specialist at Manlai Soum reported that there were less than ten (10) children with disabilities in 2023. By the beginning of 2024, this number had increased to 12, and by the beginning of 2025, it had risen to 19. The increased child disability is largely attributed to a mix of preventable accidents, a high prevalence of mental disabilities, cerebral palsy and autism. Mongolia is implementing a policy to include children with disabilities in mainstream schools. Development centres for children with disabilities are available at the Aimag level. However, challenges remain in accessibility, environmental adaptation, and the shortage of specialized teachers[167].

Khanbogd Soum

The Gavilud bagh governor mentioned during the KII that the quality of the soum's hospital services are good, but there is a lack of medical personnel. FGD with herders of Gvilud bagh and women of Javhlant bagh in Khanbogd soum also mentioned the insufficient skills of the staff in the soum’s central hospital. It is observed that health service staffing is generally considered adequate at the soum level, stakeholder feedback indicates that the number of medical personnel in Khangbogd soum remains insufficient to meet current and growing demand. Respiratory and joint diseases are relatively common among residents in the area, largely attributed to the region's harsh natural climate. For example, herders often injure their joints while tending to their livestock during natural disasters.

In the context of limited healthcare capacity, the temporary influx of Project workers has the potential to increase demand for health services, which may place strain on the local health system if not adequately managed.

[167] Asian Development Bank (2019). *Living with Disabilityin Mongolia Progress toward Inclusion*. Available at: https://www.adb.org/sites/default/files/publication/548006/living-disability-mongolia.pdf



Source: Ecotrend (February 2025)

FIGURE 6-171: HOSPITAL IN KHANBOGD SOUM

6.3.9.3 EMERGENCY RESPONSE

Emergency response and disaster management in Mongolia are coordinated under the National Emergency Management Agency (NEMA), a central government authority responsible for disaster prevention, preparedness, response, and recovery nationwide.

In Umnugobi aimag, emergency response capacity is delivered through the Aimag Emergency Management Department, which oversees fire and rescue units, disaster response teams, and early warning dissemination across soums.

At the soum level, including Khanbogd, Manlai, and Tsogttsetsii soums, emergency response is primarily managed by Soum Emergency Units operating under the technical supervision of the Umnugobi Aimag Emergency Management Department. These units typically include fire brigades, emergency responders, and civil defence volunteers responsible for first response to local incidents, initial evacuation, fire control, and coordination with healthcare and police services. While soum-level capacity is essential for rapid local response, it remains constrained by limited equipment, long travel distances, and harsh climatic conditions, making escalation support from aimag and national NEMA units critical for large-scale emergencies or mining-related incidents[168].

According to engagement with the Tsogttsetsii soum governor, Tsogttsetsii soum operates a local emergency management unit and completed a disaster risk assessment for its territory in

[168] National Emergency Management Agency - The Government Of Mongolia. Available at: https://en.nema.gov.mn/

2023. Information on potential hazards is communicated to the public through official Facebook pages, including those of the Umnugovi Emergency Management Agency, Tsogttsetsii soum, and its baghs. Early warnings on severe weather are also delivered directly to herders via mobile text messages, accompanied by recommended precautionary measures.

Residents can access emergency medical assistance by contacting the soum or aimag health centres, while herders typically reach out to the general practitioner assigned to their bagh for urgent medical support.

6.3.10 INFRASTRUCTURE AND PUBLIC SERVICES

6.3.10.1 HOUSING

There are three (3) major types of dwellings in Mongolia: Ger, Single family house, and public dwelling. Ger is a traditional, portable, circular dwelling made of a wooden frame covered with felt. It is used by nomadic people in Mongolia for centuries. According to the data in 2019, 52% of the dwellings in Mongolia are Gers[169].



Source: ERM Site Visit (September 2024)

FIGURE 6-172: GER

[169] National Statistical Office of Mongolia, www.1212.mn



Source: ERM Site Visit (February 2025)

FIGURE 6-173: DWELLING AREA IN KHANBOGD SOUM

It is noted that the number of households living in centralized apartments in Tsogttsetsii, Manlai and Khanbogd soum has increased significantly from 2010 to 2020 as shown in ***Table 6-96***. The most significant increase is seen in Tsogttsetsii, where the number of households rose from 170 in 2010 to 776 in 2020. This represents a remarkable increase of 456%, indicating substantial urban development and investment in infrastructure over this period. Manlai also experienced growth, with the number of households increasing from 80 to 171 and the increase rate of 113.75%. In Khanbogd, the number of households increased from 158 to 386, reflecting a growth of approximately 144.3%. It is also noted that no housing stress has been reported by local communities or authorities, nor has any evidence of housing-related pressure been identified through publicly available sources. Based on the household (HH) survey, it is also observed that families living in gers generally meet their basic living requirements and maintain a reasonable standard of living. The majority of surveyed households reported having traditional heating systems, cooking equipment, and adequate household furniture, including beds, within the ger.

Overall, it is noted that the increase in centralized apartment living across all three soums highlights a broader urbanization process within the region. While this development reflects improved infrastructure and housing availability, it is necessary to ensure that public utilities, healthcare, education, and social services keep pace with development and do not adversely affect living conditions or service accessibility, particularly as additional development projects are established in the region.

TABLE 6-96: HOUSEHOLDS WHO LIVE IN APARTMENT WITH CENTRALIZED AND INDEPENDENT ENGINEERING SYSTEMS

Soum	Number of households who live in apartment with centralized and independent engineering systems	
	2010	2020
Tsogttsetsii soum	170	776
Manlai soum	80	171
Khanbogd soum	158	386

Source: National Statistical Office of Mongolia



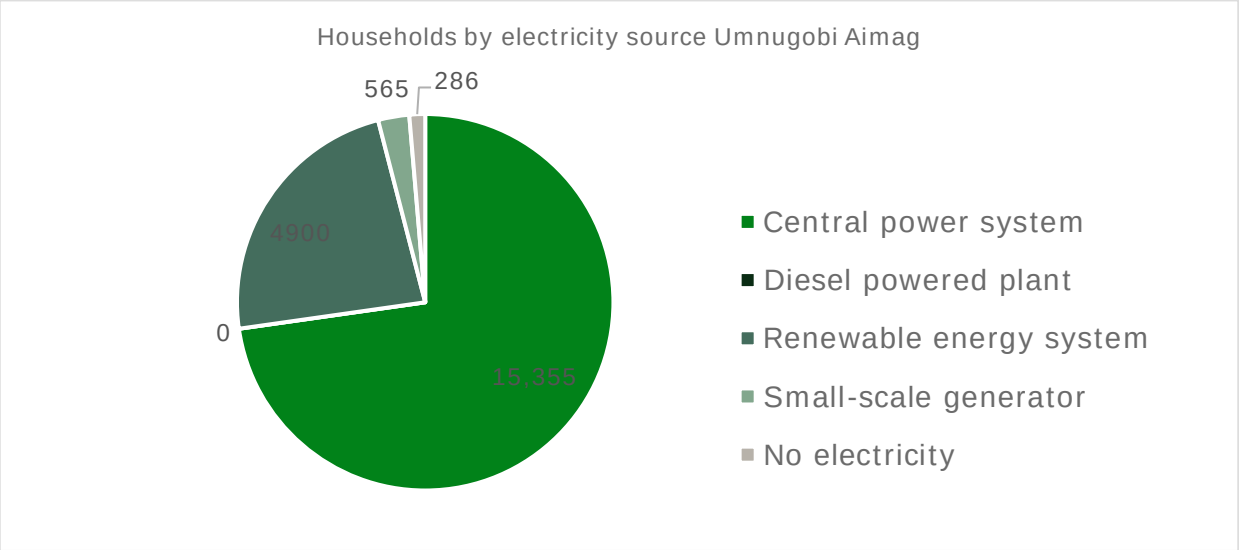
Source: Ecotrend (February 2025)

FIGURE 6-174: KHANBOGD APARTMENT BLOCK

6.3.10.2 ELECTRICITY AND WATER SUPPLY

Aimag

There are four (4) major power system in Mongolia: central power system, diesel power plant, renewable energy system and small-scale generator. In Umnugobi aimag, central power system is the most common one that benefits 73% of the households in the aimag, followed by the renewable energy system that applies to 23% of the households, and the small-scale generators that are utilized by 3% of the households. There are 286 households in Umnugobi aimag having no access to electricity, which accounts for 1% of the households. While this proportion is relatively small, it is considered that persistent gaps in electricity access among the most remote and vulnerable households. Overall, the data indicate that Umnugobi aimag has relatively high overall electricity coverage, with a strong reliance on the central power system complemented by renewable energy solutions. ***Figure 6-175*** shows the number of households using different electricity types in Umnugobi aimag.



Source: National Statistical Office of Mongolia

FIGURE 6-175: HOUSHOLDS BY ELECTRICITY TYPE IN UMNUGOBI AIMAG 2020

Households in Mongolia use water from the following sources: central and individual water supply system, piped water, well, spring, river, dam, lake, bottled water and tanker truck. In 2020, the majority of households in Umnugobi Aimag (9,457) sourced water from protected wells. This was followed by other sources such as rivers, dams, lakes, unprotected wells, springs (7,206), and central and individual water supply systems (3,153). 371 households were not connected to piped water in Umnugobi aimag [170]. The data suggest that while basic access to water is generally maintained through alternative sources, the limited coverage of centralized and piped water systems, together with a high reliance on protected well presents challenges for water quality assurance, reliability, and long-term sustainability. These conditions emphasize the importance of improving water supply infrastructure, strengthening protection and monitoring of groundwater sources, and ensuring that future development and population growth do not exacerbate existing water access constraints.

The number of households based on different water supply type is shown in ***Table 6-97***.

TABLE 6-97: NUMBER OF HOUSEHOLDS BY WATER SUPPLY TYPE IN UMNUGOBI AIMAG 2020

Water supply type	Number of households
Central and individual water supply system	3,153
Connected with piped water kiosk	724
Protected well	9,457
Protected springs	6
Bottled water	175
Not connected with piped water	371
Tanker truck	14
River, dam, lake, unprotected well and springs, other sources	7,206

[170] National Statistical Office of Mongolia, www.1212.mn

Source: National Statistical Office of Mongolia

Soum

The electricity access profile across Tsogttsetsii, Khanbogd, and Manlai soums shows notable variation in the level of connectivity to the central power system and reliance on alternative energy sources, reflecting differing levels of infrastructure development and service coverage.

Tsogttsetsii exhibits the highest level of electricity access among the three soums. Approximately 90% of households (2,197 households) are connected to the central power system, indicating a well-established and reliable electricity infrastructure. A small proportion of households rely on renewable energy systems (5%) and small-scale generators (5%), suggesting targeted use of alternative energy sources, potentially in peripheral or less accessible areas. According to the KII with Labor and Welfare Specialist at Tsogttsetsii Soum, key challenges remain that the electricity supplied by centralized system often has heavy loads, causing frequent power outages. During the FGD with women in Bilgeh bagh, they mentioned that electricity bills are extremely high, and households located far from the central grid are unable to connect to it. These qualitative findings also suggest that while grid coverage exists in Tsogttsetsii soum, system capacity, service reliability, and affordability remain significant challenges. Khanbogd demonstrates a mixed energy profile. While a substantial majority of households (82% or 1,602 households) are connected to the central power system, a relatively higher share (16%) depends on renewable energy systems, and a smaller proportion (2%) uses small-scale generators. Only a very limited number of households lack electricity. This diversified energy mix indicates generally good access to electricity, while also reflecting the role of renewable energy solutions in supplementing grid supply particularly for households in dispersed or remote locations.

In contrast, Manlai soum faces comparatively greater challenges in electricity access. Less than half of households (47% or 337 households) are connected to the central power system, which is significantly lower than in Tsogttsetsii and Khanbogd. A majority of households (51% or 365 households) rely on renewable energy systems, highlighting a strong dependence on off-grid or decentralized energy solutions. Although the proportion of households without electricity remains relatively small (1%), Manlai records the highest absolute number of households without power among the three soums, underscoring persistent gaps in service coverage.

The data indicates that Tsogttsetsii is the most well-served, Khanbogd moderately well-connected with diversified energy sources, and Manlai the least connected to the central grid. The reliance on renewable energy systems in Khanbogd and, more prominently, in Manlai reflects the importance of alternative energy in addressing geographic and infrastructural constraints. The number and percentage of households by different electricity source in the three soums is shown in ***Table 6-98.***

TABLE 6-98: HOUSEHOLD NUMBER BY ELECTRICITY TYPE IN THE SOUMS 2020

	Central power system	Diesel powered plant	Renewable energy system	Small-scale generator	No electricity
Tsogttsetsii	2,197 (90%)	0 (0%)	123 (5%)	115 (5%)	10 (0%)

	Central power system	Diesel powered plant	Renewable energy system	Small-scale generator	No electricity
Khanbogd	1,602 (82%)	0 (0%)	315 (16%)	35 (2%)	4 (0%)
Manlai	337 (47%)	0 (0%)	365 (51%)	6 (1%)	11 (1%)

Source: National Statistical Office of Mongolia

The water supply profile across Tsogttsetsii, Manlai, and Khanbogd soums demonstrates a heavy reliance on non-piped and alternative water sources, highlighting variability in access to centralized and protected water infrastructure and potential concerns related to water quality, reliability, and household burden.

In Tsogttsetsii soum, a limited number of households (475 households) are served by centralized or individual water supply systems, indicating partial coverage of formal water infrastructure. An almost equivalent number of households (473) rely on protected wells, which provide a relatively safer but still decentralized source of water. However, a notable proportion of households (1,286 households) depend on surface water, unprotected wells, springs, or other sources. Reliance on these sources may present water quality and health risks, particularly where treatment and protection measures are limited. Additionally, 186 households are not connected to piped water systems, and only a small number rely on bottled water, indicating that safe and convenient access to potable water remains uneven.

Khanbogd shows moderately better access to protected water sources compared to the other soums. A majority of households rely on protected wells (485 households), and a portion are connected to piped water kiosks (74 households) or central and individual supply systems (46 households). Despite this, a considerable number of households (1,327) still obtain water from rivers, dams, lakes, or other unprotected sources, suggesting continued dependence on informal or unimproved water sources. The limited reliance on tanker trucks and bottled water indicates that households primarily depend on local water sources, which may be vulnerable to seasonal variability and contamination risks.

Manlai soum appears to experience the greatest constraints in access to improved water supply services. Only 34 households are connected to central or individual water supply systems, while the majority rely on protected wells (238 households) or unprotected surface and other sources (405 households). A small number of households are served by piped water kiosks (35 households), and reliance on tanker trucks or springs is minimal. The heavy dependence on decentralized and, in some cases, unprotected water sources indicates potential challenges related to water safety, availability, and accessibility, particularly for households located farther from formal infrastructure.

Overall, the data suggest that centralized and piped water supply coverage is limited across all three soums, with households predominantly relying on protected wells and unprotected surface or groundwater sources. Tsogttsetsii and Khanbogd show relatively higher—but still limited—levels of access to centralized systems, while Manlai exhibits the lowest level of improved water supply coverage.

This reliance on alternative and unprotected water sources may have implications for public health, household water security, and resilience to climatic variability, particularly in arid and

semi-arid conditions. The findings underscore the importance of strengthening water infrastructure, promoting safe water management practices, and ensuring that potential project-related demands do not exacerbate existing pressures on local water resources.

The number of households by water supply type in the three soums is provided in ***Table 6-99.***

TABLE 6-99: NUMBER OF HOUSEHOLDS BY WATER SUPPLY TYPE IN TSOGTTSETSII, MANLAI AND KHANBOGD SOUM 2020

Water supply type	Number of households		
	Tsogttsetsii soum	Manlai soum	Khanbogd soum
Central and individual water supply system	475	34	46
Connected with piped water kiosk	0	35	74
Protected well	473	238	485
Protected springs	0	1	0
Bottled water	25	0	20
Not connected with piped water	186	5	3
Tanker truck	0	1	1
River, dam, lake, unprotected well and springs, other sources	1,286	405	1,327

Source: National Statistical Office of Mongolia



Source: EcoTrend (April 2025)

FIGURE 6-176: WATER WELLS IN TSOGTTSETSII SOUM

Bagh

Solar power is the most common source of electricity for herder households in the baghs. Household surveys in Bilgeh bagh, Gavilud bagh, and Jargalant bagh highlighted that around 89% of households rely on solar systems as their primary electricity source. Herders in Bilgeh bagh mentioned that the solar electricity supply is generally reliable and sufficient to meet their household needs, suggesting that solar systems play an effective role in supporting off-grid electricity access in rural area. However, women in Javhlant bagh expressed concern over high electricity bills, noting that while electricity bills have increased by approximately 30%

nationwide, electricity cost in Khanbogd soum is reportedly tripled. This discrepancy suggests localized cost escalation, potentially linked to higher demand, grid pressure, or service-related charges.

The findings highlight that while access to electricity, particularly through renewable energy, has improved for herder households, cost burdens and uneven grid connectivity persist, especially in soums experiencing rapid development and increasing energy demand.



Source: EcoTrend (April 2025)

FIGURE 6-177: HOUSEHOLD WITH SOLAR POWER NEAR PROJECT SITE

According to the FGD in Bilgeh bagh, households obtain water from a combination of wells, the soum centre, and bottled water. Herders commonly store well water in containers for livestock use, reflecting the absence of separate infrastructure for domestic and animal water supply. The women's group also noted that water availability and quality are problematic, with water often having a strange taste and sometimes appearing rusty.

In Gavilud bagh, herders reported that some residents collect purified water from the smart well at the soum centre or use household water purifiers. For livestock watering, herders often move seasonally closer to wells and water sources, indicating adaptive strategies to cope with limited water accessibility.

Household survey results further confirm that the majority of households in the Project area (78%) rely on hand-dug wells throughout all seasons for both drinking water and livestock. The remaining households source water from engineered wells or rivers, with an average travel distance of approximately 2 km, which may impose additional time and labour burdens, particularly for women and children. Water shortages and unreliability in clean water supply remain a key challenge for the local community. Nearly 60% of surveyed households (5 households) reported experiencing temporary delays in water availability during peak demand. During the site visit, some families mentioned that water-refill period gets longer if many households use one well to water their animals. Perceptions of water accessibility vary: 44% of households considered access to be good, while 33% assessed it as poor, reflecting spatial and seasonal differences in water availability. The challenge is further compounded by the fact that

drinking water and livestock water are not sourced separately, increasing the pressure on limited water points and heightening the risk of contamination.

Concerns regarding water quality were raised during FGDs, particularly by the women's group in Bilgeh bagh, who noted that water sometimes has a strange taste and may appear rusty, raising concerns about safety and potability. Despite these challenges, the majority of households acknowledge that the quality of drinking water is generally good, suggesting a potential discrepancy between perceived and accepted quality or limited alternatives forcing reliance on existing sources regardless of concern.

22% of the household (2 households) reported occasional disputes over wells and water access, primarily arising from multiple herders using the same wells for livestock watering. While currently limited, such disputes may increase without the support and mediation of local government and/or herder groups.

The findings indicate that while most households maintain basic access to water, with notable challenges related to seasonal shortages, quality concerns, and combined domestic–livestock use. Although conflict over water is currently limited, reliance on shared and unprotected sources suggests underlying vulnerability that may be exacerbated by environmental stressors or increased water demand. These baseline conditions highlight the importance of safeguarding water quality, ensuring sustainable water use, and avoiding additional pressure on existing water sources under any project-related activities.



Source: ERM Site Visit (February 2025)

FIGURE 6-178: WELL STRUCTURE NEAR PROJECT SITE

Overall, the electricity supply within the Project AoI is considered generally sufficient and reliable, with no significant shortages or systematic instability reported during community engagements activities. Nevertheless, households expressed concern regarding the high cost of electricity, indicating that affordability remains a key issue, particularly for low-income and vulnerable group.

However, existing water scarcity issues represent a more pronounced constraint. Given current reliance on limited and, in some cases, unprotected water sources, the Project's water demand has the potential to further exacerbate pressure on local water resources if not appropriately managed. The potential impacts on local infrastructure are assessed in ***Section 8.6.4.2***.

6.3.10.3 TRAFFIC AND TRANSPORTATION

The public transportation system in Umnugobi Aimag is relatively limited due to its vast and sparsely populated landscape. Major public transportation is comprised of inter-city buses and local buses. The daily bus services from Ulaanbaatar to Umnugobi takes about ten (10) hours. Within the aimag, transportation options include local buses and shared taxis, which connect the main towns and soums.[171]

During the KIIs with soum governor, he shared that there are no public transportations available in Tsogttsetsii, Manlai and Khanbogd soum. Social officer of Tsogttsetsii soum mentioned that transportation options are limited, with only two buses operating exclusively for schoolchildren and four daily buses to Ulaanbaatar. For travel to the aimag, unregistered taxis are the only available means of transport.

The local road network includes the Heavy Duty Coal Transport Road, existing unpaved roads and unclassified roads as shown in ***Figure 6-179***. During the ERM site visit, the unclassified roads have been identified to be informal dirt track corridors created by vehicles repeatedly diverting from the existing tracks onto undisturbed grasslands. According to the FGD with herders in Bilgeh bagh, the Heavy-Duty Coal Transport Road is inaccessible from Tsogttsetsii soum to the winter camp. Women group in Javhlant bagh expressed that the Heavy-Duty Coal Transport Road is extremely dangerous as heavy trucks carrying coal travel on this road, which also led to the poor condition of this road. Therefore, the dirt roads are commonly utilized to connect Tsogttsetsii soum and the winter camps.

Research has shown that the expansion of these dirt roads due to unregulated use of road transportation has led to land degradation and damaged the grassland ecosystem in Mongolia, impacting the sustainability of livestock herding[172].

[171] IOM, 2022. Mongolia: Monitoring mobility in Umnugovi Aimag. Available at: https://dtm.iom.int/sites/g/files/tmzbdl1461/files/reports/UG%20February_Finalised_ENG_final_0.pdf?iframe=true

[172] Keshkamat, S. S., et al. "Understanding transportation-caused rangeland damage in Mongolia." *Journal of Environmental Management* 114 (2013): 433-444. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0301479712005488

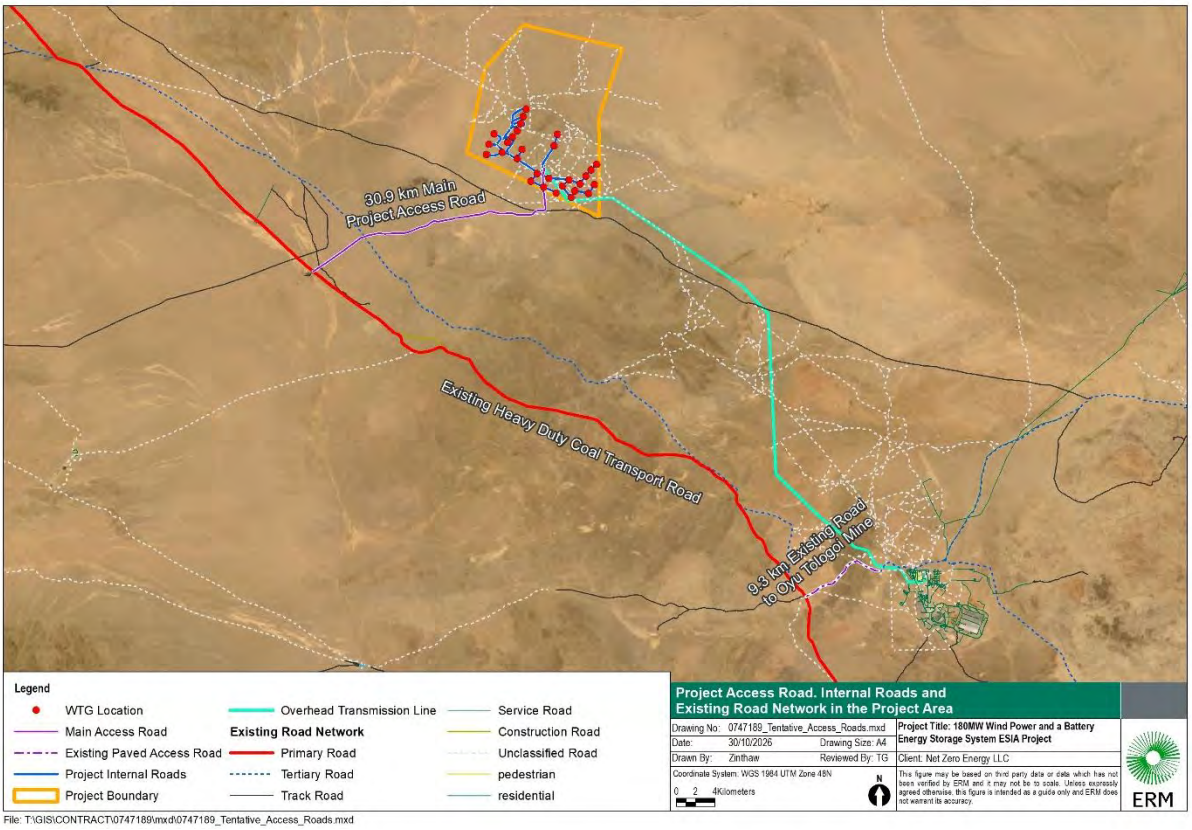


FIGURE 6-179: EXISTING ROAD NETWORK IN THE PROJECT AREA

6.3.10.4 AVIATION

The nearest airport is the Oyu Tologoi mine airport formally known as Khanbumbat serving mine workers at Khanbogd. The airport is reported to operate to international standards with runway length of 3.2 km, and a width of 45 meters. It is reported to be able to receive Boeing-737 and Airbus A320 aircraft. At its nearest, the airport is located about nine (9) km away from the TL alignment. The orientation of the runway is northwest-southeast (i.e. parallel with the TL alignment) such that aircraft landing approach and take-off path are not toward the TL (***Figure 6-180***).

Air traffic control by the Mongolian Civil Aviation Authority, in remote regions such as at South Gobi is mainly through ground-based and space-based Automatic Dependent Surveillance – Broadcast (ADS-B) technology. Navigation aids at Khanbumbat include a Non-Directional Beacon (NDB), which is a ground-based radio navigation aid. These technologies are not affected by the presence of WTGs.

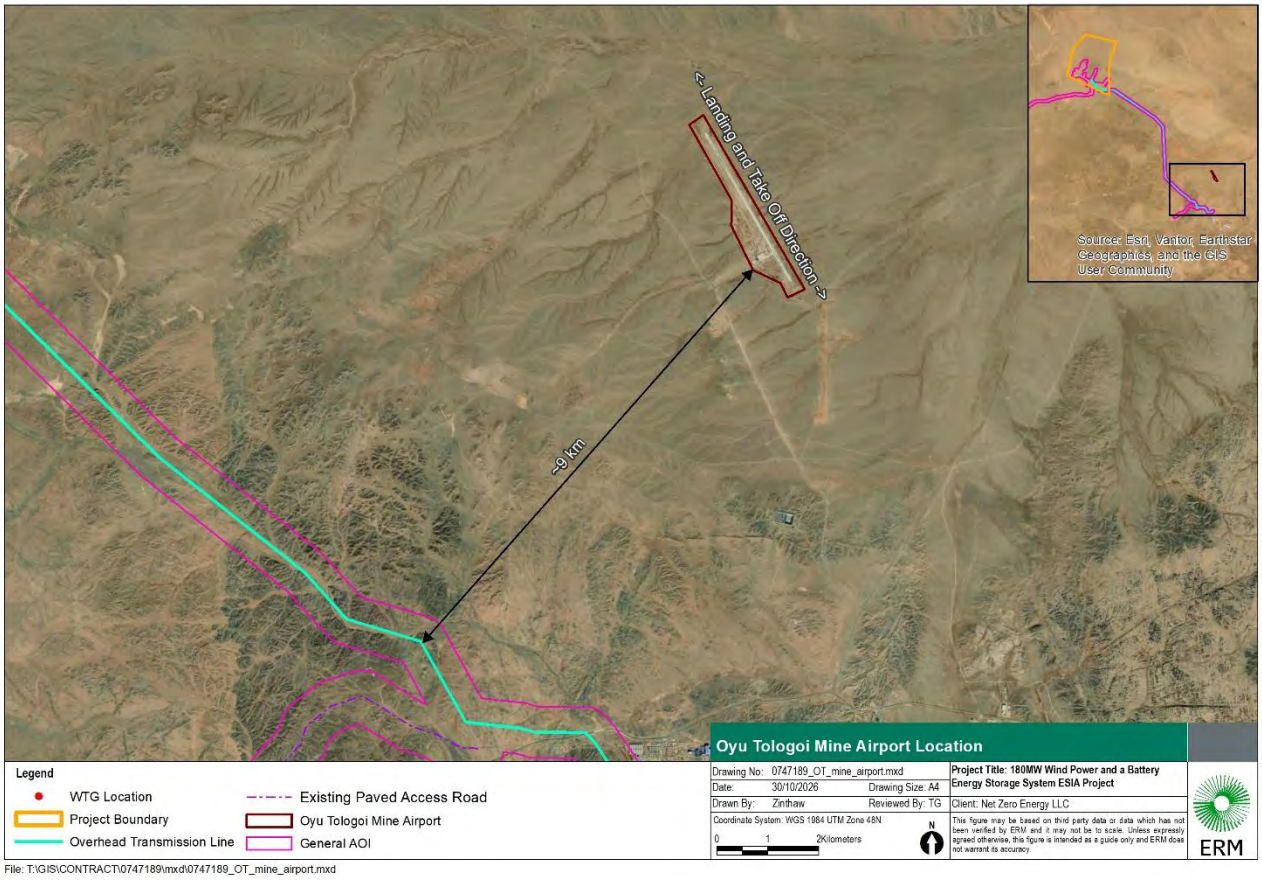


FIGURE 6-180: OYU TOLOGOI MINE AIRPORT LOCATION

6.3.10.5 WASTE MANAGEMENT

Rubbish-dump and solid waste disposal trucks are the two (2) main ways of solid waste disposal in Mongolia.[173] The Environmental Specialist in Tsogttsetsii soum reported during ERM site visit that waste management is handled by [redacted] which is responsible for cleaning and transporting waste from the soum centre. There was one landfill site in the soum, but it reached full capacity (***Figure 6-181***). Recently a new landfill site was established and operated by this company at Siirst bagh near Tsogttsetsii. Herders in the area typically manage waste from their winter camps by either burning it or burying it.

For hazardous waste, companies operating in the soum compile an inventory and arrange for its transportation to Ulaanbaatar, as there is no integrated hazardous waste management system in Tsogttsetsii soum. Due to the significant volume of used tires and oil generated by mining activities, a plant for processing these materials is being constructed near the soum's landfill.

[173] National Statistical Office of Mongolia, www.1212.mn



Source: ERM Site Visit (September 2024)

FIGURE 6-181: LANDFILL SITE AT TSOGTTESII SOUM

6.3.10.6 TELECOMMUNICATIONS

Observations during site visit indicate there are no broadcast infrastructure near the Project. Liaison by NZE with telecommunication providers indicates operation of the Project will not result in interference with services or connectivity and is not discussed further.

6.3.11 ETHNIC GROUPS AND RELIGION

Religion

Buddhism is the main religion in modern Mongolia. Shamanism is also widely practiced among groups such as the western Buriads, Daurs, Old Barga, Darkhad, and Khori Buriads. Sunni Muslims, primarily ethnic Kazakhs in the western region, make up about 5% of the population. Following missionary activities in the 1990s, the Christian population has grown to several thousand, but Buddhism continues to be the most prevalent religion[174].

As of 2023, Umnugobi aimag has one registered Buddhist temple with 13 monks and one registered Christian church[175]. Although Christianity started at later stage in the region, it is practiced in all soums of Umnugobi aimag. Currently, there are nine (9) Christian churches operating across eight (8) soums. The funding for these Christian groups comes from

[174] Oyu Tolgoi Project ESIA, 2012, Section B: Baseline Assessment, Chapter B8: Population and Demographics
[175] National Statistical Office of Mongolia, www.1212.mn

believers, as well as donations from organizations such as the Mongolian Evangelism Organisation, World Vision, and other religious forums like Eternal Truth[176].

Table 6-100 shows the religious distribution in Tsogttsetsii, Khanbogd, and Manlai soums. Buddhism holds a significant majority in all three soums, followed by non-religious individuals. Christians make up a small percentage, with 1.7% in Tsogttsetsii soum and 1.8% in Khanbogd soum.

TABLE 6-100: RELIGIOUS DISTRIBUTION AT SOUM

Soums	No Formal Religion (%)	Buddhist (%)	Christian (%)	Other (%)
Tsogttsetsii	**18.3**	**80.0**	**1.7**	N/A
Khanbogd	**11.9**	**86.2**	**1.8**	N/A
Manlai	**26.6**	**73.4**	N/A	N/A

Source: Oyu Tolgoi Project. Social, Economic and Environmental Subset. Centre for Policy Research. Population Training and Research Centre. 2009.

Ethnicity

Mongolia is home to 19 different ethnic groups. The largest ethnic group, Khalh, makes up approximately 80% of the ethnic Mongol population. The remaining 20% includes Kazakhs, Durved, Buryats, Baya, Dariganga, Urianhai, Zakhchin, Darhad, Torguud, Uuld, Khoton, Myangad, Barga, Uzemchin, Russian, Chinese and others[177].

The majority of the population in Umnugobi aimag is Khalh Mongols, which is the predominant ethnic group in Mongolia. There are also small communities of other ethnic groups, such as Kazakhs and Buryats[178], but they are less prominent compared to western provinces like Bayan-Ölgii.

IFC Performance Standard 7 on Indigenous Peoples states that "indigenous Peoples are social groups with identities that are distinct from mainstream groups in national societies[179]." Since Khalh Mongols is the mainstream group that constitutes 80% of the population in Mongolia, and it is also the majority group in Umnugobi aimag, the term "indigenous peoples" does not apply to the region. According to the ERM site visit's observation, no evidence has shown that there is indigenous peoples' presence in the Project area. KIIs with government officials and FGD with women and herders also confirmed that there is no IP presences in the Project and its AoI.

Based on the available information and local insights, no evidence of IP's presence was identified during site visits and stakeholder engagement activities and no distinct Indigenous Peoples communities, as defined under IFC PS7, were identified within Umnugobi aimag or the Project area. The dominant Khalh Mongol population does not meet the PS7 criteria, as they

176 Oyu Tolgoi Project ESIA, 2012, Section B: Baseline Assessment, Chapter B8: Population and Demographics
177 National Statistical Office of Mongolia, www.1212.mn
178 National Statistical Office of Mongolia, www.1212.mn
179 IFC Performance Standard 7 Indigenous Peoples. Available at: https://www.ifc.org/content/dam/ifc/doc/2010/2012-ifc-performance-standard-7-en.pdf

constitute the national ethnic majority and do not experience marginalization consistent with PS7 intent.

Minority ethnic groups present in the area do not demonstrate collective attachment to distinct ancestral territories, nor maintain separate institutions or governance structures that would trigger PS7 requirements, however, culturally appropriate engagement is required to continue in accordance with IFC PS1.

6.3.12 CULTURAL HERITAGE AND HISTORICAL MONUMENTS

6.3.12.1 AIMAG

Located in the Asia's largest desert, the Gobi desert, Umnugobi aimag celebrates vibrant culture, traditions, and cultural heritage. It is famous for its nomadic culture**,** ancient human settlements and prehistoric fossils. Under Mongolian legislation, palaeontological resources are classified as tangible cultural heritage. Their protection and research are governed by the Law on the Protection of Cultural Heritage and other relevant laws.

Significant sites located in Umnugobi Aimag includes Bayanzag, also called the flaming cliffs. Bayanzag is known for its red sandstone formations and significant paleontological discoveries, including world's first discovery of fossilized dinosaur eggs. The project site is located 220 km from that area. Gobi Gurvansaikhan National Park in Umnugobi Aimag is the host to Khongoryn Els, also known as the Singing Sand Dunes. There are 14 cultural centres in Umnugobi aimag that have all together 80 employees[180].

6.3.12.2 SOUM

Tsogttsetsii soum

The head of CRM of Tsogttsetsii soum reported during ERM site visit that the Shanhi horse breed is a significant part of the soum's cultural legacy, and three (3) traditional long songs are recognized as part of the intangible heritage. The tourist area includes a monument or mountain named after Bor, a hero of the revolutionists. In the event that any cultural heritage is affected by project activities, priority will be given to local protection, and measures will be taken to preserve it within the locality.

Additionally, there is one cultural centre in each of the Tsogttsetsii soum, Khanbogd soum and Manlai Soum.

[180] National Statistical Office of Mongolia, www.1212.mn



Source: EcoTrend (April 2025)

FIGURE 6-182: CULTURAL CENTER IN TSOGTTSETSII SOUM

Khanbogd soum

There are several sites of cultural heritage significance within the Khanbogd soum. The Khanbogd mountains have long been worshiped as a mountain with 108 natural springs and white stone "ovoos", sacred stone cairns used in Mongolian shamanistic and Buddhist rituals. The Khanbogd Khairkhan Uul ritual was initiated by the Governor's Office in 1992 and is performed annually, typically in the summer months. This ritual is an important cultural event for the local community to celebrate the spiritual significance of the Khanbogd mountains.

Other identified cultural heritage in Khanbogd soum include Javkhlant Mountain as well as ruins of the Tsogtsol Monastery, Tsagaan Tolgoi Monastery, Demchig monastery and Ereet Monastery as can be seen in ***Table 6-101***.

TABLE 6-101:LOCATION OF CULTURAL HERITAGES

NAME	Soum name	Distance from project site, km		Coordinate, Decimal degree	
		Project site	Distance, km	N	E
Munkh Ovoo	Khanbogd	OHL route	4	[redacted]	[redacted]
Tsogtsol Monastery	Khanbogd	OHL route	56	[redacted]	[redacted]
Tsagaan Tolgoi Monastery	Khanbogd	OHL route	41	[redacted]	[redacted]
Demchig monastery	Khanbogd	OHL route	29	[redacted]	[redacted]

NAME	Soum name	Distance from project site, km		Coordinate, Decimal degree	
		Project site	Distance, km	N	E
Ereet Monastery	Khanbogd	OHL route	36	[redacted]	[redacted]
Javkhlant Mountain	Khanbogd	OHL route	18	[redacted]	[redacted]
Ruins of Shireet Monastery (Bichigt Khiid)	Tsogttsetsii	WTG	22	[redacted]	[redacted]

Source: EcoTrend (April 2025)

[redacted]

Source: EcoTrend (April 2025)

FIGURE 6-183: [redacted]



Source: EcoTrend (February 2025)

FIGURE 6-184: DEMCHIG TEMPLE OUTSIDE OF KHANBOGD

Manlai soum

According to the KII with the Manlai deputy governor, there are no protected areas in the Project Area. However, there is a tourist area called 'Shar Tsav,' located 80 km northeast of Khanbogd soum and 100 km southeast of Manlai soum. This area is home to some dinosaur tracks, and a dinosaur exhibition facility built by the Paleontology Department is located nearby.

During the EcoTrend's site visit in June, a [redacted] was observed [redacted] According to the cultural heritage office of Manlai soum, these sites are not listed in the official List of Historical and Cultural Heritage Sites. Consulted community members reported that the tomb has previously been disturbed and looted and is not considered to hold cultural, spiritual, or historical significance. No households claimed custodianship of the tomb or reported visiting the site, leaving offerings, observing avoidance practices, or associating it with seasonal activities, rituals, or traditional customs. Furthermore, no specific beliefs, cultural practices, or notification procedures were identified in relation to the site. Based on these findings, the tomb is not considered to have cultural heritage significance.

[181] Khirgisuur-type burial site is a large, central mound made of a heap of unconsolidated rocks covering a single burial chamber. It is a complex Late Bronze Age (c. 1200–700 BCE) monumental and ritual site found across the steppes of central and northern Mongolia.



FIGURE 6-185:

6.3.12.3 BAGH

According to the archaeological examination work conducted on a 20,438 hectare area of the "Bilgeh 180 MW Wind Power Plant" project, located in Bilgeh Bagh, Tsogttsetsii soum, Umnugovi aimag by the Institutes of the Mongolian Academy of Sciences, in accordance with Sections 8, 9, and 10 of Article 27 of Chapter 5 of the Mongolian Law "On Cultural Heritage Protection", no historical and cultural relics were discovered or recognized above the surface of earth.

Bilgeh Bagh

During the site visit in February 2025, herders group in Bilgeh bagh mentioned the ruins of Bichigt Khiid and Sangiin Khiid[182], and a " Zogdor Mountain Ovoo" in the area as important cultural heritage (***Figure 6-186***). The Zogdor Mountain Ovoos are jointly constructed and maintained by nearby herder households in Bilgeh Bagh. An annual worship ceremony is held during the summer, reflecting the ovoo's cultural and spiritual significance. While there is no formal legal entity responsible for the possession or protection of the ovoo, the herders who participate in these rituals voluntarily assume stewardship of the site.

The worship ceremony is traditionally understood as a means of preserving the natural and pristine condition of the surrounding landscape. It is believed that honouring the spiritual "lords" of the land and water helps ensure timely summer rains, healthy vegetation growth, and favourable grazing conditions for livestock.

Given the cultural importance of the ovoo and its role in maintaining community identity and connection to the land, it is essential for the Project to respect local customs and traditions throughout its planning and implementation.

[182] Khiid is the Mongolian word for "monastery".

Figure 6-183 *is presented the* Ruins of Shireet Monastery (Bichigt Khiid) which is located 22km north of the WTG area of the Project. However, no information was found regarding Sangiin Khiid during the site screening of EcoTrend.



Source: ERM Site Visit (September 2024)

FIGURE 6-186: OVOO IDENTIFIED NEAR WTG AREA IN BILGEH BAGH

Gavilud Bagh

Gavilud bagh governor noted during KII that people of Gavilud bagh worships the Munkh-Ovoo Mountain every year, which is located approximately 4km from the planned OHL. Some herder families also have mounds near their residences to worship. Although no culturally significant sites have been identified within the Project AoI, both tangible and intangible cultural heritage are present within the wider Tsogttsetsii, Khanbogd, and Manlai soums. The findings indicate that cultural heritage in the Project area is largely protected and managed through local customs and community practices rather than formal institutions. As such, the Project will adopt a precautionary and culturally respectful approach during planning and implementation, including recognition of undocumented heritage, avoidance of physical disturbance where practicable, support for local protection efforts, and respect for customary practices, to minimize potential direct, indirect, and cumulative impacts on cultural heritage and community identity.

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