Initial Environmental Examination

PUBLIC

Project Number: 50088-002
May 2025

Mongolia: Upscaling Renewable Energy Sector Project:

Myangad 19.8 MW Solar Power Plant Subproject

Prepared by the Ministry of Energy for the Asian Development Bank (ADB).

CURRENCY EQUIVALENTS

(as of 24 September 2024)

Currency Unit	–	Mongolian Tughrik (MNT)
MNT 1.00	=	$0. 0002958
$1.00	=	MNT 3,380.99

ABBREVIATIONS

AC	Alternating Current
ADB	Asian Development Bank
AEP	Annual Energy Production
AP	Affected Person
APLIC	Avian Power Line Interaction Committee
AUES	Altai-Uliastai Region Energy System
BES	Battery Energy Storage
BES	Baseline Environmental Survey
CEMP	Construction Environmental Management Plan
COVID-19	Coronavirus Disease
CRKh	Citizens Representative Khural
CRVA	Climate Risk Vulnerability Assessment
DC	Direct Current
DECC	Department of Environment and Climate Change (current name)
DEIA	Detailed Environmental Impact Assessment
DET	Department of Environment and Tourism (previous name)
DMC	Developing Member Country
EA	Executing Agency
EARF	Environmental Assessment and Review Framework
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EIS	State Environmental Information Database
EMP	Environmental Management Plan
EN	Endangered
ERP	Emergency Response Procedures
ESSS	Environmental and Social Safeguards Specialist (PMU)
FSR	Feasibility Study Report
GDP	Gross Domestic Product
GEIA	General Environmental Impact Assessment
GFDRR	Global Facility for Disaster Reduction and Recovery
GHI	Global Horizontal Irradiance
GL	Guideline
GoM	Government of Mongolia
GRDP	Gross Regional Domestic Product
GRM	Grievance Redress Mechanism
GSHP	Ground Source Heat Pump
IA	Implementing Agency
IBA	Important Bird Area
IBAT	Integrated Biodiversity Assessment Tool
IEE	Initial Environmental Examination
IT	Interim Target
IUCN	International Union for the Conservation of Nature

LC	Least Concern
LEIA	Law on Environmental Impact Assessment
masl	meters above sea level
MECC	Ministry of Environment and Climate Change (current name)
MET	Ministry of Environment and Tourism (previous name)
MM	Modified Mercalli
MNS	Mongolian National Standard
MoE	Ministry of Energy
MoF	Ministry of Finance
NAMHEM	National Agency of Meteorology and Environmental Monitoring
NGO	Non-Governmental Organization
NM	National Monument
NP	National Park
NREC	National Renewable Energy Center
NUM	National University of Mongolia
OCHA	Office for the Coordination of Humanitarian Affairs
OM	Operations Manual, ADB
PCR	Physical Cultural Resources
PIU	Project Implementation Unit
PMU	Project Management Unit
PPE	Personal Protective Equipment
PSC	Project Steering Committee
PV	Photovoltaic
RE	Renewable Energy
SLD	Single Line Diagram
SPA	Strictly Protected Area
SPS	Safeguard Policy Statement, ADB
STC	Standard Test Conditions
TA	Technical Assistance
TL	Transmission Line
TRTA	Transaction Technical Assistance
UNEP	United Nations Environment Programme
UREP	Upscaling Renewable Energy Project
US EPA	United States Environmental Protection Agency
VU	Vulnerable
WCS	Wildlife Conservation Society of Mongolia
WDPA	World Database on Protected Areas
WES	Western Energy System
WHO	World Health Organization
WTO	World Trade Organization

WEIGHTS AND MEASURES

$\mu g/m^3$	Micrograms per Cubic Meter
BOD_5	Biochemical Oxygen Demand, five days
$CaCO_3$	Calcium Carbonate
cm	Centimeter
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_{2e}	Carbon Dioxide Equivalent
COD	Chemical Oxygen Demand

dB(A)	A-weighted sound pressure level in decibels
DO	Dissolved Oxygen
GWh	gigawatt-hour
ha	Hectare
kg	Kilogram
km	Kilometer
kV	Kilovolt
Leq	Equivalent Continuous Noise Level
$LiFePO_4$	Lithium Iron Phosphate
m	Meter
m/s	Meters per Second
m^2	Square Meters
m^3	Cubic Meters
masl	Meters Above Sea Level
meq	milliequivalent
mg/l	Milligrams per Liter
mg/m^3	Milligrams per Cubic Meter
mm	Millimeter
MVA	megavolt-amperes
MW	Megawatt
MWh	Megawatt-hour
MWh/y	Megawatt-hours per year
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
O_3	Ozone
°C	Degrees Celsius
pH	A measure of the acidity or alkalinity of a solution
PM	Particulate Matter
PM_{10}	Particulate Matter smaller than 10 micrometers
$PM_{2.5}$	Particulate Matter smaller than 2.5 micrometers
SO_2	Sulfur Dioxide
TDS	Total Dissolved Solids
TSP	Total Suspended Particulates

GLOSSARY

aimag	province
soum	district, administrative unit of aimag
khoroo	smallest administrative unit of district
bag	smallest administrative unit of soum

NOTES

(i) The fiscal year (FY) of the Government of Mongolia and its agencies ends on 31 December.
(ii) In this report, "$" refers to US dollars.

TABLE OF CONTENTS

List of Tables

List of Figures

EXECUTIVE SUMMARY

A. Introduction

1. This is the initial environmental examination (IEE) report for the proposed Myangad Solar Photovoltaic (PV) Power Plant Subproject (the subproject) in Khovd Aimag, Mongolia. The subproject is being developed under Phase II of the ongoing *Upscaling Renewable Energy Project* (UREP, the Project), and is described in the subproject Feasibility Study Report (FSR).[1]

2. ADB's environmental safeguard requirements are specified in the Safeguard Policy Statement (SPS 2009). The subproject has been screened and classified by ADB as Environment Category B, requiring the preparation of an IEE report including an environmental management plan (EMP).

B. Environmental Policy, Legal and Administrative Framework

3. **Mongolian Requirements.** Mongolia has enacted a comprehensive policy and legal framework for environmental assessment and management. The hierarchy of policies and legislative provisions for environmental management includes the Constitution, international treaties, policies, and environment and resource protection laws, regulations and standards.

4. The *Law on Environmental Protection* (2012) is the principal law that regulates activities associated with the protection of the environment. The *Law on Environmental Impact Assessment* (2012) focusses on environmental protection, the prevention of ecological imbalance, the regulation of natural resource use, procedures for decision-making regarding the implementation of projects, and the assessment of environmental impacts of projects including EIA requirements.

5. There are two types of EIAs defined in the *Law on Environmental Impact Assessment*, general screening EIA (GEIA) and detailed EIA (DEIA). To initiate a GEIA, the project implementer submits a brief description of the project including a feasibility study, technical details, drawings, and other information to the Ministry of Environment and Climate Change (MECC), the agency primarily responsible for the implementation of environmental policy in Mongolia. The MECC review will lead to one of four conclusions: (i) a DEIA is not required; (ii) the project may be completed pursuant to specific conditions; (iii) a DEIA is necessary; or (iv) cancellation of the project.

6. The *Law on Specially Protected Areas* (2014) regulates the use and procurement of land for state protection, fosters scientific research, and preserves and conserves the land's original condition in order to protect specific characteristics, unique formations, rare and endangered plants and animals, historic and cultural monuments, and natural beauty. The law establishes four protected area categories: Strictly Protected Areas (SPAs), National Parks (NP), Nature Reserves (NR) and National Monuments (NM).

[1] Technical and Economic Feasibility Study Report for the Construction of a Solar Plant, Myangad Soum. Prepared for the Ministry of Energy, by D. Bayasgalan. 2024. Prepared as part of the Ministry of Energy's Renewable Energy Expansion Project.

7. Mongolia has enacted a number of environmental standards for ambient air, water, and noise, and applicable standards have been utilized in this IEE. In addition, there are also applicable Mongolian occupational health and safety laws and regulations, and Mongolia has signed on to a number of international environmental conventions.

8. **ADB Requirements**. The major applicable ADB policies, regulations, requirements and procedures for environmental safeguards are the SPS (2009), and *Environmental Safeguards – A Good Practice Sourcebook* (2012), which jointly provide the basis for this IEE. The SPS promotes good international practice as reflected in internationally recognized standards such as the World Bank Group's *Environment, Health and Safety (EHS) Guidelines*. The *EHS Guidelines* contain discharge effluent, air emissions, and other numerical guidelines and performance indicators as well as prevention and control approaches that are normally acceptable to ADB and are generally considered to be achievable at reasonable costs by existing technology. In some cases these exceed relevant Mongolian standards, and have been adopted for the subproject.

C. Subproject Description

9. The proposed 19.8 MW solar PV plant will be developed in Bayankhoshuu Bag at Myangad Soum town center, in the north of Khovd Aimag, western Mongolia. The PV plant will be located on a 55.18 ha empty plot of land on the northern perimeter of the soum center, immediately to the east of the Khovd Nar 10 MW solar plant, recently constructed by the Government of Mongolia with World Bank support, and operational since June 2023.

10. The solar PV plant will be comprised of over 33,000 modern, ground-mounted, high-efficiency PV modules. It will also be equipped with a 4 megawatt (MW) / 8 megawatt hour (MWh) lithium-ion containerized battery system which will store solar energy to help balance the power grid and reduce electricity costs. The solar power plant will be connected to the existing Myangad 110/35/6 kilovolt (kV) substation via a short double-circuit 110 kV transmission line. A flood channel will be included to provide site drainage and flood protection. Flood mitigation requirements will be assessed further during detailed design.

11. The installed capacity of the solar plant on the direct current (DC) side will be 23.13 MW, while the capacity on the alternating current (AC) side will be 19.8 MW, giving a ratio of DC to AC capacity of 1.17. The estimated average annual production of the solar power plant is 39,844 MWh/y[2].

12. Construction will start in 2025 and be completed by the third quarter of 2026. Once construction is complete the solar plant will be owned and operated by the Western Energy System (WES).

D. Description of the Environment

13. **Topography.** The subproject site is on a plateau and slopes down gently from north to south. The site is steepest on the northern side but is generally flat, with elevations ranging from 1,189 to 1,176 meters above sea level (masl) and an average slope of 1.9%. There are small hills to the north of the site with a maximum elevation of 1,262 masl. There is also a low range of hills

[2] Based on PVsyst - Simulation Report in FSR.

running parallel to Khovd Rover between the site and the river which provide protection from river flooding.

14. **Land Use.** The land at the site is unoccupied, and there are no residences or other structures. The site has been heavily grazed, but there are no winter camps for livestock. It is crossed extensively by a series of informal dirt road tracks, typical to many peri-urban areas of Mongolia.

15. **Soils.** The subproject site is uniformly covered with low fertile sandy brown mountain desert steppe soils. Soil heavy metal levels are well below Mongolian standards.

16. **Earthquake Risks.** According to the Mongolia earthquake risk Modified Mercalli (MM) scale map the site is in a Degree VI zone, where there is a probability of 20% that the strong intensity shown on the map will be exceeded in 50 years. The map indicates that the site is in a medium risk zone but not in the higher risk areas of western Mongolia (e.g. Degree IX and above). The World Bank hazard screening tool ThinkHazard also indicates that the site is in a medium earthquake hazard risk zone, meaning that the potential impacts of earthquakes should be considered during design and construction.

17. **Climate.** The subproject site has a northern continental climate characterized by long cold winters and short moist summers. The average annual temperature is 1.4 °C. The coldest month is January with an average low temperature of -23.4 °C and the hottest month is July with an average temperature of 21.1 °C. Average annual relative humidity is 49% and average annual precipitation is only 58 mm. Approximately 83% of average annual precipitation falls in summer months, and there is little precipitation in the winter. The average wind speed at the site is 1.6 m/s, with the prevailing wind directions being from the north-northwest. The site receives an average of 2,920 hours of sunlight per year. Average monthly sunshine duration is 145 to 170 hours in winter months, and 300 to 320 hours in spring, summer and autumn months. Average annual Global Horizontal Irradiance (GHI) is 1,532 kWh/m^2 and Diffuse Irradiance is 566.9 kWh/m^2.

18. **Water Resources.** There are no permanent surface water resources such as lakes or rivers on the subproject site. The closest surface water is the Khovd River, two km to the west. There is a seasonal flood channel running from the north to the south on the eastern side which poses a potential flood risk.

19. **Air Quality.** Air quality in terms of particulate matter, even during the winter heating period, is good and in compliance with the relevant Mongolian standards.

20. **Noise.** Noise levels within the subproject area are low, ranging from 7.2 to 8.0 dBA, far lower than the relevant Mongolian standards.

21. **Protected Areas.** There are no NPs, PAs or NRs within or adjacent to the subproject site. There are two NPs in Myangad Soum, Khar Us Nuur NP and Altan Khakhui Uul NP. Khar Us NP overlaps with Birdlife International Import Bird Area (IBA) MN014. The park and IBA boundary are over 7 km to the southeast at nearest, and the Khar Us Lake shoreline is 25 km to the east. Altan Khakhui Uul NP is located approximately 40 km away.

22. **Flora.** The subproject site is on the outskirts of Myangad Soum center town. It has been crossed by numerous dirt trails and is heavily grazed by cattle, sheep and horses. A vegetation survey determined that the subproject site is a typical, but heavily degraded and sparse, desert

steppe grassland. A total of 30 plant species were recorded, including grasses, fungi, annual and perennial plants, and one shrub. All species are common to the area, and surveys found no areas of critical habitat or rare, endangered or protected species under regional (e.g. Mongolian) or IUCN Red Lists.

23. **Fauna.** The subproject site is a modified environment affected by presence of the nearby settlement, heavy vehicle traffic across informal dirt tracks, and livestock grazing. There are no large wild mammals utilizing the site, and although rare and endangered wildlife species have been recorded in Myangad soum, they are not found near the subproject area. Common species in the subproject area that are often found in peri-urban areas include small carnivores such as Red fox (*Vulpes vulpes,* Least Concern (LC) IUCN Red List status), and Corsac fox (*Vulpes corsac*, LC status); small herbivores such as the Tolai hare (*Lepus tolai*, LC status), Mongolian gerbil (*Meriones unguiculatus*, LC status); and low conservation status common mice and moles, as can be seen from the occurrence of tracks, holes, and droppings. Gray wolf (*Canis lupis,* LC status) can be found in the hills north of the subproject site.

24. **Avifauna**. The subproject site is over 7 km west of the outer boundary of Khar Us National Park, which also overlaps with Birdlife International IBA MN014. Khar Us Lake and its surrounding areas contain a diverse range of habitats, which in turn have a high bird species richness. Because of its proximity to this important bird habitat, an ornithological survey was undertaken in September 2024 covering wetlands along the Khovd River and dry steppe habitats near the subproject site. In addition, previous surveys conducted in 2021 and 2022 were reviewed.

25. The previous surveys recorded 59 species, with the most numerous observed being the Carrion crow (*Corvus corone*) and the Black kite (*Milvus migrans*). These birds are low conservation status (LC IUCN, LC Regional) urban-dwelling species, and the presence of a settlement and waste disposal site near the subproject site were the likely reason for the high number of observations. During the surveys Carrion crow and other crows were observed nesting in the willow and hawthorn thickets of the Khovd River, and were actively migrating between nesting habitats and the waste disposal site.

26. The September 2024 transect survey recorded 78 species. The most common were the Barn swallow (*Hirundo rustica*), the Mallard duck (*Anas platyrhynchos*), the Carrion Crow (*Corvus corone*), the Eurasian tree sparrow (*Passer montanus)*, and the Bar-headed Goose (*Anser indicus*), accounting for 40% of the observed species. All are low conservation status (LC IUCN, LC Regional). The survey showed a high number of wetland birds, likely due to the transect being conducted along the Khovd River. Of the total number of species recorded, 76% were migratory and 24% were resident, indicating that the Khovd River habitat is used primarily by breeding birds during the spring, summer, and fall seasons. One transient species (Temminck's Stint, *Calidris temminckii*) was recorded.

27. The transect survey found three species classified as near threatened (NT), two classified as vulnerable (VU), and two classified as endangered (EN) according to the IUCN Red List. Of these, the Swan goose (*Anser cygnoides*), Common Pochard (*Aythya ferina*), Common crane (*Grus grus)*, and Northern lapwing (*Vanellus vanellus*) occur in wetland habitats and are at low risk of being negatively impacted by the subproject infrastructure and activities. The other six species are birds of prey that may enter the subproject area due to the abundance of food at the waste disposal site. In particular, the Saker falcon (*Falco cherrug*) and the Lesser kestrel (*Falco naumanni*) may use infrastructure such as fences and power transmission poles to monitor their prey, feed, and rest. This risk will be reduced when the waste disposal site is closed in the near future and replaced by a new Category 3 Controlled Landfill.

28. **Socioeconomic Profile.** Myangad Soum has an area of 3,258 km^2, and a population of 3,731. There was a slight decrease in population over the 2021 to 2023 period. Soum facilities include the governors office, schools, a cultural center, a health center, hydrometeorological service, gas station, branches of the Khan and Savings Bank, and four brick factories. Minerals in Myangad Soum include gold, silver, copper, limestone, phosphate, coal, yellow clay, gypsum, and rare earth metals.

29. Administratively Myangad Soum is divided into 5 bags: Chatsargant, Bayanbulag, Gakhait, Tsagaanbulan, and Bayankhoshuu where the subproject is located. Bayankhoshuu Bag has also seen a population decrease, from 925 persons in 2021 in 232 households to 899 persons in 2023 in 235 households.

30. The agricultural sector is very important to the Bayankhoshuu Bag economy, and in 2023 there was a total of 27,953 livestock in the bag, including 1,027 horses, 2,465 cattle, 6 camel, 7,656 sheep, and 16,799 goats. In 2023 Bayankhoshuu Bag had 79 herders, a significant decline from 113 in 2021.

31. **Physical Cultural Resources.** There are no known PCRs within the subproject site. However, immediately beyond the northern perimeter there is a Khirgisuur (a bronze or iron age burial mound with external stone rings) and burial tombs. The site layout previously included these PCRs, but the boundary was later modified such that they were excluded.

32. **Sensitive Receptors.** There are no human settlement structures, buildings or homes within or adjacent to the subproject site; the nearest house is over 2 km away. It is not a wintering area for herders, so there are no nomadic winter shelters. There are thus no permanent sensitive receptors in the subproject area of influence.

E. Anticipated Impacts and Mitigation Measures

33. The subproject area of influence, i.e., the total area which might be subject to adverse impacts, is defined as a zone: i) 500 m perpendicular to each side of the perimeter of the Solar plant site; ii) 200 m perpendicular to each side of the substation site; iii) 100 m perpendicular to either side of the 300 m 110 kV transmission line; iv) 50 m around borrow pits and spoil disposal sites (locations not yet identified); and, v) 100 m around the worker camp (location not yet identified).

34. Anticipated positive and negative environmental impacts of the subproject were assessed based on the domestic subproject FSR; a screening utilizing the Integrated Biodiversity Assessment Tool (IBAT) developed by BirdLife International, Conservation International, IUCN and UN Environment's World Conservation Monitoring Centre; a screening utilizing the World Bank GFDRR hazard screening tool ThinkHazard; a screening utilizing the Mongolia earthquake risk Modified Mercalli (MM) scale map produced by the United Nations OCHA; a Baseline Environmental Survey (BES) prepared by a team of qualified EIA, botany, soil, hydrology, zoology and sociology experts; a General Environmental Assessment (GEIA) conducted by the MECC[3]; multiple site visits conducted by TA environmental, biological and resettlement consultants; and, stakeholder and public consultation meetings.

[3] See Appendix 2. Note – at the time of writing this has not yet been conducted.

35. **Pre-construction Phase**. Pre-construction phase negative impacts are typically associated with any permanent land acquisition and associated loss of land and/or structures. The solar plant is located on government owned unoccupied land that does not have any residents, houses or other structures, farm plots, mining plots, etc. and there will be no land acquisition. Thus, there are no associated impacts or mitigation measures required.

36. A number of environmental management measures will be implemented in the pre-construction phase during detailed design, including IEE and EMP updating (if necessary); an assessment of earthquake and flooding risks; incorporation of environmental mitigation measures into contractor's bidding documents, technical specifications, and contracts for civil construction and equipment installation; obtaining permits and approvals; implementation of the GRM; training and capacity building; and public outreach. Pre-construction phase environmental management measures are presented in detail in the subproject EMP (**Appendix 1**).

37. **Construction Phase**. Potential negative subproject construction phase environmental impacts are low in magnitude, short to medium term in duration, and very localized in scale. They are associated with land preparation for the solar plant, installation of the PV equipment, and other construction activities. Localized impacts may include soil erosion, construction noise, fugitive dust, wastewater, solid and hazardous waste, and risks to worker and community health and safety, and risks to cultural heritage sites. Potential negative construction phase impacts can be effectively mitigated through the application of appropriate good international construction practices and compliance with national laws and regulations and international guidelines, including the *General EHS Guidelines* and the *EHS Guidelines for Electric Power Transmission and Distribution* (2007). Construction phase mitigation measures are presented in detail in the subproject EMP (**Appendix 1**).

38. **Operation Phase.** Operation of the subproject will not produce any air, noise or water pollution. There are some moderate potential negative operation phase impacts, including the risk of glare from the solar panels, risks to worker health and safety, and risks to community health and safety. Potential operation phase impacts can be effectively mitigated through good design, the application of appropriate good operational management practices, compliance with relevant GoM standards, and compliance with good international practices including the *General EHS Guidelines* and the *EHS Guidelines for Electric Power Transmission and Distribution*. Used panels and batteries will be recycled, either in Mongolia in licensed facilities if they become available during operation, or through transport to a licensed facility in another country in the region. All exports of hazardous wastes must be with the review and approval of the MECC and in accordance with all relevant requirements of the Basel Convention, and all necessary export licenses must be obtained. Operation phase mitigation measures are presented in detail in the subproject EMP (**Appendix 1**).

39. **Climate Risk.** A separate Climate Risk Vulnerability Assessment (CRVA) was undertaken for UREP. The assessment was conducted by analyzing baseline climate data, historical climate trends, and projected climate trends for each of the subproject areas; assessing the projected climate change risks for each subproject; and, based on these analyses, recommending adaptation measures.

40. Given the location in a land locked arid region, the subproject is not threatened by some of the most serious effects of climate change such as sea level rise and coastal flooding. However, extreme weather events such as high winds may pose a risk to PV structures and flash flooding also poses a risk. The impact of these risks is generally low, and suitable adaptations have already been incorporated into the subproject design. These include:

- design parameter for all solar array supports be increased to a range of -45 to +40 °C;
- heat resistant materials and products to be used where available;
- solar arrays designed to withstand future projected extreme wind speed events;
- solar arrays monitored for dust accumulation, and cleaned on a regular (if required) or as necessary basis; and
- flood dikes and site drainage to be installed to protect sites from flash flooding if required.

41. Overall, with the adoption of these measures, the subproject is anticipated to be able to effectively withstand observed and projected climate charges.

42. **Cumulative, Induced and Indirect Impacts.** Cumulative impacts are the combination of multiple impacts from existing projects, the proposed subproject, and anticipated future projects that may result in significant adverse and/or beneficial impacts that cannot be expected in the case of a stand-alone project. Negative cumulative impacts are not expected as it is unlikely that another solar project will occur in the subproject area of influence due to its remote location.

43. Induced impacts are adverse and/or beneficial impacts on areas and communities from unintended but predictable developments caused by a project, which may occur later or at a different location. Operation of the subproject is expected to result in positive induced impacts, including expansion of renewable energy in remote areas of Mongolia and improved economy in western Mongolia through stable energy supply and lowered energy costs.

44. Indirect impacts are adverse and/or beneficial environmental impacts that cannot be immediately traced to a project activity but can be causally linked. Subproject operation is expected to have positive indirect impacts on human health. Coal-fired boilers emit sulfates, nitrogen oxides, and particulates (at levels that vary with fuel quality and the pollution control technology used, among other parameters), all of which are associated with significant impacts on the human respiratory and cardiovascular systems. Subproject operation will allow for the production of an average of 39,844 MWh/y of non-polluting renewable energy.

45. **Benefits.** Mongolia's energy system is currently heavily reliant on coal-fired power generation. The subproject will produce an average of 39,844 MWh per year of clean non-polluting renewable energy, and an estimated 796,880 MWh of electricity over the life span of the subproject. In addition, operation will reduce green house gas emissions compared to grid supplied energy by an estimated 615,200 tons of carbon dioxide equivalent (CO_{2e}).

46. **Project Decommissioning.** The lifespan of the subproject facilities is expected to be 20+ years. Before any closure and decommissioning activities are undertaken a decommissioning plan will be developed in accordance with good international practices and relevant domestic regulations and standards in force at that time. Machinery, steel and dismantled materials should be recycled where possible and/or disposed of at licensed disposal sites.

F. Alternative Analysis

47. An analysis of subproject alternatives was undertaken during the feasibility stage to determine the most financially and technically feasible way of achieving the subproject objectives while minimizing environmental and social impacts and maximizing environmental and social benefits.

48. **Renewable Power Type Options - Wind vs Solar**. It was originally proposed that Phase II of UREP would include a 15 MW wind power subproject in Taishir Soum of Gobi-Altai Aimag However a wind power subproject was ultimately rejected due to the presence of PCRs (petroglyphs were discovered on the northern perimeter of the proposed site, and a Khirgisuur was also observed), poor wind resources at the site (average long-term wind speeds are around 5.4 meters/second (m/s), requiring the use of low wind speed turbines and reducing the predicted the average power output from the wind farm to only 2.6 MW, or 17% of the wind farm's installed capacity), and poor economic viability compared to a solar plant. For these reasons the Taishir 15 MW wind subproject FSR recommended that the subproject not proceed. Instead, a new 15 MW solar subproject was recommended by the PMU.

49. **Solar Plant Site Options**. Two sites were considered for a solar plant to replace the canceled Taishir Wind subproject: i) a 65 ha site in Umnugovi Soum, Uvs Aimag; and ii) a 55.18 ha site in Myangad Soum, Khovd Aimag, located immediately to the east of the existing World Bank funded 10 MW Khovd Nar Solar Plant. The Myangad Soum option was selected as it has better energy production, income generation, green house gas (GHG) reduction, and internal rate of return (IRR).

50. **Myangad Soum Site Layout Options**. The Myangad Soum original site layout included a Khirgisuur and a burial tomb. The layout was subsequently modified such that the PCRs are now entirely outside of the plant area.

51. **Solar Panel Technology Options**. After a review of panel options, bifacial solar panels were selected for utilization in the subproject will utilize. Bifacial solar panels are an innovative solar technology and can produce substantially more power than standard panels. They feature a distinct solar cell structure that differs from traditional solar modules, incorporating a dual-sided design that can capture sunlight from both the front and rear sides, harnessing reflected light from the surface beneath the panel. This optimizes energy production, making the most of the available sunlight throughout the day. In addition, the use of transparent back sheets or glass allows for better light penetration and improved durability compared to traditional solar panels.

52. **No Project Alternative**. The "no project" alternative addresses the likely consequences of not undertaking the proposed action. Based on the important of the anticipated environmental and social benefits, the "no project" alternative was rejected.

53. **Overall Alternative Analysis**. Based on the analysis of alternatives, the subproject has selected the most appropriate location, layout and technologies.

G. Grievance Redress Mechanism

54. A grievance redress mechanism (GRM) has been developed to receive and facilitate resolution of complaints on social and environmental issues about the subproject during the construction and operation phases. The GRM includes procedures for receiving grievances, recording/ documenting key information, and evaluating and responding to the complainants transparently and in a reasonable time period.

H. Information Disclosure and Public Consultations

55. A Myangad Soum All Citizens public consultation meeting was held on 20 March 2025, at Bayankhoshuu Bag. The meeting was publicized in advance via soum communication channels including announcements at the Soum Government Building and Bayankhoshuu Bag Cultural

Center, postings in soum social media groups, and phone messages.

56. Information was provided in the meeting on (i) the Myangad Solar Power plant, both in the form of a written handout and in a presnetaion; (ii) the findings of the IEE and GEIA; (iii) the project's GRM, and (iv) the ADB SPS. The meeting was attended by 59 participants, representing 52.6% of all households in Bayankhoshuu Bagh.

57. At the end of the meeting a Citizens Khural Resolution to support the subproject was proposed. The citizen's support was unanimous – 100% of participants voted in support of the solar plant.

I. Environmental Management Plan

58. The subproject Environmental Management Plan (EMP) is presented in **Appendix I.** The objectives of the EMP are to ensure i) implementation of identified mitigation and management measures to avoid, reduce, mitigate, and compensate for anticipated adverse environment impacts; ii) implementation of monitoring and reporting; and iii) subproject compliance with the Mongolia's relevant environmental laws, standards and regulations, and ADB's SPS (2009).

J. Conclusion

59. Based on the analysis conducted in this assessment it is concluded that overall the subproject will result in significant positive environmental and socioeconomic benefits, and will not result in significant adverse environmental impacts that are irreversible, diverse, or unprecedented. Any adverse environmental impacts associated with the subproject can be prevented, reduced, or minimized through the appropriate application of mitigation measures. The designation of the subproject as Category B is confirmed. It is therefore recommended that:

- this IEE is considered sufficient to meet ADB's environmental safeguard requirements for the subproject, and no additional studies are required; and
- the subproject be supported by ADB, subject to the implementation of the commitments contained in the EMP and allocation of appropriate technical, financial and human resources by the EA and IA to ensure these commitments are effectively and expediently implemented.

I. Introduction

1. The Government of Mongolia (GoM), through the Ministry of Energy (MoE) as the Executing Agency (EA), has received financing from the Asian Development Bank (ADB) for the *Upscaling Renewable Energy Project* (UREP). The Project, ongoing since 2019, is being led by a Project Management Unit (PMU) on behalf of the MoE.

2. This is the initial environmental examination (IEE) report for the Myangad 19.8 MW Solar Photovoltaic (PV) Power Subproject (the subproject) in Khovd Aimag (**Figure 1**). The subproject is being developed under Phase II of the UREP, and is described in the subproject Feasibility Study Report (FSR).[4]

A. UREP

3. UREP is developing 41.0 megawatts (MW) of distributed solar and wind renewable energy (RE) in the Western and Altai-Uliastai Energy Systems of western Mongolia. The Project will: i) increase the RE capacity for electricity and heating supply in remote grid systems and ii) enhance the capacity of local public utilities in investment planning, project management and grid control. The successful completion of the Project will see the establishment of an institutional platform that encourages private sector investment in distributed RE to sustainably expand clean and affordable electricity supply in remote and less developed regions of Mongolia, and to decarbonize the energy sector in the country. The Project aggregate capacity is expected to generate 98.77 gigawatt-hour (GWh) of RE annually.

4. The Project has three outputs:

Output 1: Distributed renewable energy system developed. A total of 40.5 MW of solar photovoltaic and wind power subprojects will be set up in the western and Altai–Uliastai regions. The project will also demonstrate advanced battery storage technology with energy management systems, a first-of-its kind application in the country. The subprojects will be implemented in two phases: (i) core subprojects with 25.5 MW of capacity in the first batch (2019–2022); and (ii) noncore subprojects with 15 MW of capacity in the second batch (2020–2024).

Output 2: Ground source heat pump (GSHP) systems developed. In selected targeted regions, 500 kilowatts-thermal of GSHP capacity will be installed in public buildings in three batches. This will supply air pollutant-free space heating for 10,000 m^2 of floor area. The subprojects will demonstrate the performance of the GSHPs and increase experience in design, installation, operation, and maintenance for future scale-up.

[4] Technical and Economic Feasibility Study Report for the Construction of a Solar Plant, Myangad Soum. Prepared for the Ministry of Energy, by D. Bayasgalan. 2024. Prepared as part of the Ministry of Energy's Renewable Energy Expansion Project.

Figure 1: Mongolia map showing location of the proposed Myangad 19.8 MW Solar PV Power subproject.

Source: ADB 2024.

Output 3: Institutional framework strengthened and organizational capacity enhanced. This output will (i) enhance the technical capacity of local utilities and the national dispatching center for renewable energy investment planning, renewable electricity dispatching, and grid control and protection; (ii) support the preparation of a renewable energy investment plan (2023–2030) for the targeted regions; and (iii) support the PMU for project implementation. It will also support the evolution of the feed-in-tariff system into a more economically efficient tariff mechanism that reflects actual capital costs, while ensuring sufficient commercial financial viability.

5. The Myangad 19.8 MW Solar PV Power Plant subproject is being implemented under UREP Output 1.

6. The Ministry of Energy (MoE) is the Project Executing Agency (EA). The Western Region Energy System (WES) State Owned Joint Stock Company is the Implementing Agency (IA) for subprojects in Uvs and Khovd aimags, the Altai-Uliastai Region Energy System State Owned Joint Stock Company (AUES) is the IA for the subprojects in Gobi Altai and Zavkhan aimags, and the National Renewable Energy Center (NREC) is the IA for GSHP subprojects.

B. Report Purpose

7. ADB's environmental safeguard requirements are specified in the Safeguard Policy Statement (SPS 2009). The UREP project has been screened and classified by ADB as Environment Category B, requiring the preparation of an IEE including an environmental management plan (EMP).

8. An IEE has already been completed for UREP subprojects under Phase I, and an environmental assessment and review framework (EARF) provides guidance for the environmental assessment of Phase II subprojects, including the preparation of an IEE for each subproject. This report is a Phase II IEE.

II. Policy, Legal and Administrative Framework

A. Constitution and Governance

9. Mongolia is a parliamentary republic in which representatives of the State Great Khural (the National Parliament) are elected for four years by a mixed electoral system. There are 76 seats in the State Great Khural, and presidential elections take place every 4 years. The 4th Constitution of Mongolia, adopted on January 13, 1992, restructured the legislative branch of the government by creating a unicameral parliamentary legislature. It has been amended in 1999, 2001 and 2023. The most recent parliamentary elections were held on 28 June 2024 to determine the composition of the State Great Khural.

10. Governance of administrative and territorial units of Mongolia is organized by a combination of the principles of self-governance and central government. The self-governing bodies at the aimag (province) and soum (district) levels are called Citizens Representative Khurals (CRKhs). Representatives of the CRKhs of aimags, the capital city, and soums are elected for a term of four years. The self-governing bodies at bag (sub-district) level are called Public Khurals (PKhs).

11. The fundamental rights of Mongolian citizens are set out in the 1992 Constitution, including "the right to a healthy and safe environment, and to be protected against environmental pollution and ecological imbalance". The constitution imposes on its citizens a sacred duty "to protect nature and environment" and empowers the government "to undertake measures on the protection of the environment and on the rational use and restoration of natural resources". More specifically, the constitution imbues the State with the right to hold landowners responsible in connection with land, and to exchange or confiscate it with compensation on the grounds of special public need or if it is used in a manner adverse to the health of the population, the interests of environmental protection, or national security.

B. Environmental Policy, Legal and Institutional Framework

12. Mongolia has enacted a comprehensive policy and legal framework for environmental protection and management. It has policies, legislation, and strategies in place to manage protected areas, comply with its international obligations, and to protect the quality of the environment for the health and well-being of its citizens. The hierarchy of policies and legislative provisions for environmental management in Mongolia include the Constitution, international treaties, and environment and resource protection laws.

1. Environmental Policy Framework

13. A fundamental principle of the Mongolian state environmental policy is that economic development must be in harmony with the extraction and utilization of natural resources, and that air, water and soil pollution will be controlled. In 1996 Mongolia's National Council for Sustainable Development was established to manage and organize activities related to sustainable development. The country's sustainable development strategy is designed for environmentally friendly, economically stable and socially wealthy development, which emphasizes people as the determining factor for long-term sustainable development.

14. Mongolia has developed a number of key environmental policy documents, including:

- Biodiversity Conservation Action Plan, 1996, and National Biodiversity Program 2015-2025, 2015;
- State Environmental Policy, 1997;
- Mongolian Action Program for the 21st Century (Map21), 1998;
- National Water Program, updated in 2011;
- National Action Plan for Climate Change, 2000, updated in 2011;
- National Plan of Action to Combat Desertification, 2000, updated in 2010;
- National Plan of Action for Protected Areas, 1997;
- National Environmental Action Plan, 1996, 2000; and
- Green Development Policy of Mongolia, 2014-2030.

15. The Green Development Policy of Mongolia (2014) is one of country's main environmental policy documents, and is comprised of the policy and an action plan. Its purpose is to ensure that Mongolia evolves as a developed nation that has built conditions for environmental sustainability, so that it will be inherited by future generations who will gain benefits from participatory and inclusive economic growth based on the green development concept. The Green Development Policy established six strategic objectives with measurable targets:

1) Promotes a sustainable consumption and production pattern with efficient use of natural resources, low greenhouse gas emissions, and reduced waste.
2) Sustain ecosystem's carrying capacity by enhancing environmental protection and restoration activities, and reducing environmental pollution and degradation.
3) Increase investment in natural capital, human development and clean technology by introducing financing, tax, lending and other incentives for supporting a green economy.
4) Engrain a green lifestyle by reducing poverty and promoting green jobs.
5) Encourage education, science, and technology to serve as the catalyst for green development, and develop cultural values and livelihoods that are in harmony with nature.
6) Develop and implement a population settlement plan in accordance with climate change, while considering the availability of natural resources and the resilience of regions.

16. Other guidance documents with important environmental repercussions were developed under the auspices of other ministries and these include the Roads Master Plan, the Power Sector Master Plan, the Tourism Master Plan, and the Renewable Energy Master Plan. Other documents, such as the annual Human Development Reports, have increasingly incorporated environmental aspects.

2. Vison 2050[5]

17. The 2020 outbreak of the coronavirus (COVID-19) had a significant impact on the Mongolian economy. In the first quarter of 2020 the country witnessed an economic contraction of approximately 10 %, in addition to a significant increase in expenditures, causing a prospective drop in GDP compared to 2019. In May 2020, in the midst of lockdown, many households across Mongolia experienced wage loss, income reduction, lack of food security and a decrease in agricultural products demand, revealing the socio-economic vulnerability of the population,

[5] Source: European Institute for Asian Studies (EIAS), 2022.

particularly in the industrial sectors of cashmere and meat production.

18. In response to the setbacks caused by the pandemic, Mongolia's Long-Term Development Policy Vision 2050 was introduced. It aims at transforming the country into a leading regional power by 2050 by fighting poverty, creating a greener economy, improving the education system and gender equality for enhanced job access, and redefining Mongolian social strategy in a more citizen-centered way. The Mongolian Parliament approved the policy on 13 May 2020. It sets nine fundamental goals (Human Development, Good Governance, Peaceful and Safe Society, Green Growth, Shared Values of the Nation, Life quality and Middle Class, Regional Development and People's centered cities), as well as 50 specific objectives to be achieved in the medium-long term. The policy is to be carried out in three phases according to the current plan for urban development, scientific and technological advancement, economic and social growth. The first phase is to be implemented in 2020-2030, the second from 2031 to 2040, and the third and last from 2041 to 2050. If Mongolia succeeds and attains all of its Vision 2050 goals, this will involve a significant transformation of the country over the next decades.

3. New Recovery Policy[6]

19. In December 2021 the GoM passed the New Recovery Policy. The policy aims to address key economic constraints across six pillars: border ports, energy, industrialization, urban and rural development, green development, and state efficiency.

20. The New Recovery Policy aims to strengthen Mongolia's economic independence, reduce the negative impact of the COVID-19 pandemic on the economy, and promptly address development barriers. This policy is a medium-term target program for up to 10 years intended for creating the basic conditions for effective realization of Mongolia's long-term development policy and improving the economy, infrastructure and public productivity. Realization of the New Recovery Policy is meant to maintain economic growth at an average of 6 % in the long term, double the per capita national income, reach a labor force participation rate of 65 %, increase border port capacity by 3-fold, and increase energy sources by 2-fold.

4. Legal Framework

21. Environmental policy reform undertaken since the early 1990s has resulted in a large number of environmental laws, the ratification of many international environmental conventions, inclusion of a substantial area of the country in the protected area system, and an increased presence of Non-Governmental Organizations (NGOs). Many laws were also revised in 2012. A key feature of this environmental legal reform was the integration of the concepts of:

- Environmental auditing.
- Polluter pays principle.
- Involvement of local communities in environmental protection.
- Increased economic values of natural resources and capitals.
- Creation of sustainable sources for environmental protection measures.
- Promotion of sustainable natural resource management.[7]

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[6] Source: Unofficial Translation of New Recovery Policy, Government of Mongolia.
[7] Khuldorj, B. (Principal Author). 2012. Mongolia's Sustainable Development Agenda: Progresses, Bottlenecks and

22. A summary of relevant environmental legislation is presented in **Table 1**, and key legislation is discussed below.

Table 1: Applicable Mongolian environmental laws.

Current Laws	Latest Changes
Law on Environmental Protection	Amended, 2012
Law on Environmental Impact Assessment	Amended, 2012
Law on Development Policy Planning	Enacted, 2015
Law on Air	Amended, 2018
Law on Fees for Air Pollution	Amended, 2012
Law on Water	Amended, 2015
Law on Water Pollution Fees	Amended, 2019
Law on Fees for the Use of Natural Resources	Amended, 2015
Law on Energy Conservation	Amended 2016
Law on Forests	Amended, 2012
Law on Waste Management	Amended, 2017
Law on Hazardous Substances and Chemicals	Amended, 2017
Law on Land	Amended, 2015
Law on Land Fees	Amended, 2012
Law on Allocation of Land to Mongolian Citizens for Ownership	Enacted 2002
Law on the Development Policy and Planning, and its Management	Enacted 2020
Civil Code of Mongolia	Amended, 2014
Law on Cadastral Mapping and Land Cadastral	Amended, 2011
Law on Subsoil	Amended, 1995
Law on Soil Protection and Combating Desertification	Created, 2012
Law on Specially Protected Areas	Amended, 2014
Law on Specially Protected Area Buffer Zones	Enacted, 1997
Law on Protection of Plants	Amended, 2011
Law on Natural Plants	Amended, 2012
Law on Fauna	Amended, 2012
Law on Minerals	Amended 2015
Law on Fire Safety	Amended, 2015
Law on Disaster Protection	Amended, 2012
Law on Sanitation	Amended, 2012
Law on Protection of Cultural Heritage	Amended 2014
Law on Labor Safety and Hygiene	Amended, 2015
Law on Administrative and Territorial Units and Their Governance	Amended, 2020
Law on Construction	Amended, 2016
Law on Coronavirus Pandemic (COVID-19) Prevention, Fight, and Mitigation of its Socio-economic Impact	Enacted 2020, effective until December 2022
Law on Borders	Created, 2016

Source: TRTA consultants, 2024.

Vision for the Future. Ulaanbaatar: Government of Mongolia, Rio+20, and United Nations Development Programme Mongolia. Retrieved from: https://www.undp.org/content/dam/mongolia/Publications/Environment/rio_report_mongolia_eng.pdf.

a. Law on Environmental Protection

23. The *Law on Environmental Protection* (amended 2012) is an overarching law for all environmental legislation. It is the principal law that regulates activities associated with the protection of the environment with special emphasis on 'Natural Resource Reserve Assessment' and 'Environmental Impact Assessment'. It governs the land and subsoil, mineral resources, water resources, plants, wildlife and air, and requires their protection against adverse effects to prevent ecological imbalance. The environmental protection law regulates the inter-relations between the state, citizens, economic entities and organizations, with a guarantee for the human right to live in a healthy and safe environment. It aims for an ecologically balanced social and economic development, the protection of the environment for present and future generations, and the proper use of natural resources including land restoration and protecting land and soil from adverse ecological effects. Article 7 of the law requires the conduct of natural resource assessment and environmental impact assessment to preserve the natural state of the environment, and Article 10 requires environmental monitoring on the state of and changes to the environment. National policy to protect ecologically significant aspects of the environment and to restore natural resources is prepared under the *Law on Environmental Protection*.

24. The latest amendment to the law (2012) establishes the liability of polluters to pay compensation for damage caused to the environment and natural resources. The amount of compensation payable depends on the natural resources that have suffered the damage. The amendment also introduced new requirements for strategic environmental assessment (SEA), cumulative impact assessment (CIA), environmental audit and more effective public participation.

b. Law on Environmental Impact Assessment

25. The *Law on Environmental Impact Assessment* (LEIA, 2012) stipulates the EIA requirements of Mongolia (described further below).

c. Law on Water

26. The *Law on Water* (2015) regulates the effective use, protection and restoration of water resources. It specifies regular monitoring of the levels of water resources, quality and pollution, and provides safeguards against water pollution. The *Law on Water Pollution Fees* (2019) introduced fines and fees for the of water resource pollution.

d. Law on Land

27. The *Law on Land* (2015) regulates the possession and use of land by a citizen, entity and organization, and other related issues. It includes the requirement to rehabilitate or "immediately restore eroded and damaged land", and land users should "prevent adverse impacts to the environment and land due to use of the land".

e. Law on Subsoil

28. The *Law on* Subsoil (1995) regulates the use and protection of subsoil in the interests of present and future generations.

f. Law on Air

29. The *Law on Air* (2012) regulates the protection of the atmosphere, allows the Government

to set emissions standards, and provides for the regular monitoring of air pollution and impacts.

g. Law on Forests

30. The *Law on Forests* (2012) regulates protection, possession, sustainable use and production of forests in Mongolia. It defines prohibited activities in protected forest zones and regulates harvesting in forest utilization zones.

h. Law on Waste Management

31. The *Law on Waste Management* (2017) regulates waste disposal, recycling, import; cross-border transportation of hazardous wastes; and accountability for individuals and organizations that violate waste disposal regulations. The law aims to move away from the practice of open dumping towards more organized, planned, and regular waste collection and disposal, and emphasizes the importance of designated disposal locations and controlled landfill areas for waste storage, recycle, and disposal. It also aims to create a legal environment for hazardous waste management, as there are currently no hazardous waste disposal facilities in Mongolia.

32. According to the *Law on Waste Management*, there are three categories for waste disposal and controlled landfill sites:

- Category 1 Engineered Sanitary Landfill: highly engineered sanitary landfill with security and alarm system, registration office with weighing equipment and tools, control system monitoring, security camera, equipment and tools for determining composition of waste, fire protection system and alarm system, censoring system to detect faults in the operation process, equipment and tools for occupational health and safety, control system to monitor level of waste in air, soil and water, and either connection to a central engineering system or its own independent engineering system.
- Category 2 Controlled Landfill: less elaborately equipped thank a Category 1 Landfill, but still has various monitoring systems, including i) leachate drainage, collection and treatment system; ii) a system for release and collection of landfill gas generated by decaying organic wastes; and iii) an embankment system to prevent flood and rainwater.
- Category 3 Controlled Landfill: less elaborately equipped thank a Category 2 Landfill and most common at the soum level. It should have protective barriers, fences, equipment and machinery for waste control, drainage system for flood and rainwater, access roads and internal roads, and signage (ADB, 2019).

i. Law on Specially Protected Areas

33. The *Law on Specially Protected Areas* (2014) regulates the use and procurement of land for state protection, fosters scientific research, and preserves and conserves the land's original condition in order to protect specific characteristics, unique formations, rare and endangered plants and animals, historic and cultural monuments, and natural beauty. The law establishes five protected area categories, each managing land for a different purpose under a separate management directive:

- **Strictly Protected Area (SPA).** Wilderness areas with high scientific value. PAs are divided into: pristine zone (only research allowed); protected zone (conservation-related activities also allowed); limited use zone (tourism, religious ceremonies, plant collection allowed, hunting, logging and construction prohibited).
  In the pristine zone, only protection activities conformant with the need to preserve

original natural features may be conducted, and research and investigation activities may only be observation methods without causing any damage to the natural features. All other activities are prohibited within this zone. In the conservation zone, biotechnological measures that use environmentally safe technologies may be implemented to enhance flora and fauna reproduction and to mitigate damages caused by natural disasters. The following activities may be conducted in the limited use zone using environmentally safe technologies and with appropriate licenses or permits:

- soil and plant cover restoration;
- forest maintenance and cleaning;
- animal inventories and activities to regulate animal population numbers, age, sex and structure, following an approved program and methods;
- use of mineral water and other treatment and sanitation resources;
- ecotourism organized following designated routes and areas, according to appropriate procedures;
- use of accommodations according to appropriate procedures and designated for temporary residence, camping, observation, research or investigation by travelers or other people with permission;
- taking photographs, making audio and video recordings and using them for commercial purposes;
- worshipping natural sacred sites and conducting other traditional ceremonies; and,
- collect and use the associated natural resources and medicinal and food plants, according to established regulations, for household needs.

SPAs in Mongolia often also have outer buffer zone designated to protect larger landscapes and linkages between protected areas. Restrictions on land-use are minimal and normally not enforced. Most conservation experts do not count them as PAs, but officials often do (see section **II.B.4.j**, below).

- **National Park (NP).** Areas with natural, cultural, and educational values. NPs are divided into core areas (conservation and research allowed), ecotourism zone (tourism and related activities also allowed), limited use (or buffer) zone (in addition to what is allowed in the other zones, also allows for grazing and infrastructure construction with the NP's permission).

- **Nature Reserve (NR).** Includes ecosystem, biological, paleontological and geological categories. NRs allow for economic activities that do not harm values under protection.

- **Natural Monument (NM).** NMs protect unique landscapes, cultural sites, and sight-seeing attractions. They allow for many activities that do not conflict with protection objectives.

34. Mongolia currently has 120 protected areas covering 32.8 million ha.

j. Law on Specially Protected Area Buffer Zones

35. The *Law on Specially Protected Area Buffer Zones* regulates the determination of SPA Buffer Zones and activities therein. Buffer Zones consist of those areas established to minimize, eliminate and prevent actual and potential adverse impacts to SPAs and NPs, to increase public participation, to secure livelihoods and to establish requirements for the proper use of natural resources.

k. Important Bird Areas

36. Important Bird Areas (IBAs) constitute key sites for conservation identified by the IBA Program of BirdLife International. Often IBAs may be part of a protected-area network, but otherwise are not necessarily protected under domestic law.

l. Law on Natural Plants

37. The *Law on Natural Plants* (2012) regulates the protection, proper use, and restoration of natural plants other than forests and cultivated plants.

m. Law on Protection of Cultural Heritage

38. The *Law on Protection of Cultural Heritage (2014)* regulates the collection, registration, research, classification, evaluation, preservation, protection, promotion, restoration, possession and usage of cultural heritage including tangible and intangible heritage.

n. Law on the Development Policy and Planning, and its Management

39. The *Law on the Development Policy and Planning, and its Management* regulates relations in connection with ensuring sustainability and consistency of development policy making and planning process of Mongolia; establishes principles to be governed in development policy and planning nationwide; develops, planning, effectively implementing, carrying out monitoring and evaluation, informing, and building an integrated and clear system of the development policy; definiens rights and roles of stakeholders in policymaking, and planning processes; ensures proper partnership of stakeholders in development policy making and planning; coordinates types and forms of policy and planning documents; and strengthens development policy and planning, its management and structural organization. It is administered by the Ministry of Urban Development and Construction (MCUD).

o. Electricity Generation

40. The regulatory framework for electricity generation includes:

- The *Law on Energy* (February 2001) defines the legal framework of the sector; describes the duties and responsibilities of stakeholder like the Mongolian parliament, government, ministry and energy regulatory commission and other parties; and regulates ownership form, classification of energy facilities, and licensing and energy tariff issues. Based on this law the Mongolian energy sector was uncoupled and divided into generation, transmission grid, distribution grid, and dispatching.

- The *Law on Renewable Energy* (first adopted in 2007 and revised in 2015 and 2019) brought additional legal framework for the supply and utilization of electricity from renewable energy resources like wind, solar and hydropower. The law sets the maximum and minimum tariffs for electricity purchased from renewable sources connected to the integrated grid in US dollars. The 2015 amendment to the law provided for the addition of a support tariff to consumer tariffs in order to resolve the tariff gap between thermal power plants and solar and wind power plants. When the Law was first adopted, the tariff for solar power plants was 0.15-0.18 US dollars/kWh, but the 2019 amendment to the law revised the tariff to 0.12 US dollars/kWh, and also increased the tariff for newly built renewable energy plants.

- The Mongolian grid code provides information on terms and definitions and procedures, is one of the main legal frameworks for grid connected operation.

- The *Law on Construction* provides information on construction processes in Mongolia.

p. Health and Safety

41. Mongolian occupational health and safety laws and regulations are summarized below:

- Article 16 of the National Constitution of Mongolia states that every employee has the right to "suitable conditions of work".

- The *Mongolian Labor Code* (1999, amended 2012) is the main piece of legislation guiding employment in Mongolia. It sets out the rights and duties of employers and employees including collective agreement, collective bargaining, collective and individual labor disputes, labor conditions, terms and conditions of work, liabilities for breach of the legislation, and gender equality.
  The law provides for the rights of employees to be provided with labor conditions that comply with health and safety laws and regulations; to receive payment for work done; to holidays; to freely assemble with other employees for the purpose of protecting the rights and legitimate interests including through representative organizations and collective agreements; to strike in certain circumstances; and to receive a pension, an entitlement to social insurance and death in service benefits and to other benefits as may be provided in employment and collective agreements.
  Additionally, the law prohibits discrimination in the workplace based on nationality, race, sex, social origin or status, wealth, religion, or ideology. Women are prevented from undertaking certain forms of work as set out in separate regulations. Women with children are protected from discrimination and are entitled to maternity leave. Parents with children under three years old may take childcare leave and employers must re-engage such employees on their return to work.

- The *Law on Labor Safety and Hygiene* (2008, amended 2015) sets out provisions in relation to the rights of workers; rights and duties of employers; use of machinery and equipment; use of toxic chemicals, explosives, radioactive and biological substances; fire safety; medical examinations of workers; protective equipment; workers with disabilities; registration, handling and investigation of accidents and diseases; sanctions for non-compliance; and division of powers between different government bodies.
  Employers are required to maintain safe and healthy working conditions. The law has detailed instructions for employers with regard to the use of machinery and equipment, machinery for lifting, delivering and transporting as well as fire safety requirements. Employers are required to arrange free of cost preliminary and periodic medical check-ups (related to their work performance) for all workers. Workers also have a right to work at safe and healthy workplaces, have medical insurance to cover industrial accidents, and suspend work in the face of imminent danger.

- The government adopted a *National Program for Occupational Safety and Health Improvement* in 2001 and national standards were also adopted such as *the National Standard on Occupational Health and Safety* MNS 5002:2000.

- The *Law on Coronavirus Pandemic (COVID-19) Prevention, Fight, and Mitigation of its Socio-Economic Impact* (2020) regulates coronavirus (COVID-19) pandemic prevention, protection of public health, and limitations on certain issues for human rights; makes immediate government action on COVID-19 related issues; conducts measures to mitigate adverse socio-economic impact; and takes state emergency measures. It reflects regulations authorizing the Government to take necessary measures such as calling quarantine and traffic movement and time limits, as well as approving relevant regimes, procedures, and instructions to be followed during the COVID-19 pandemic.

q. Construction Safety

42. The *Construction Law* (2016) regulates construction operation, production of construction materials, and supervision and commissioning of construction. It also sets out provisions in relation to construction occupational health and safety.

5. Environmental Institutional Framework

43. **The State Great Khural** of Mongolia is the highest organ of State power and the supreme legislative power. The State Great Khural is unicameral and consists of 76 members elected by the mixed electoral system.

44. **The Ministry of Environment and Climate Change (MECC)**[8] is the agency primarily responsible for the implementation of environmental policy in Mongolia. Departments and agencies under the MECC with responsibility for environmental protection and management include:

(i) Department of Green Development Policy and Planning;
(ii) Department of State Administration and Management;
(iii) Department of Environment and Resources Management;
(iv) Department of Forest Policy and Regulation;
(v) Department of Water Policy and Regulation;
(vi) Department of Specially Protected Areas Management;
(vii) Department of Climate Change and Policy Planning;
(viii) Department of Tourism Policy and Coordination;
(ix) Department of Environmental Inspection; and,
(x) National Agency for Meteorology and Environmental Monitoring (NAMHEM).

45. The Department of Environment and Resources Management is responsible for planning and implementing actions to reduce environmental degradation and adverse environmental impacts. Functions include implementing environmental assessment laws and regulations; conducting, appraisal and approval of environmental assessments; maintaining a State Environmental Information Database; and organizing training and public awareness activities related to environmental conservation.

46. The NAMHEM is responsible for managing a national integrated hydrological, meteorological, and environmental monitoring network and establishing conditions to permit the

[8] In July 2024 the ministries' name was changed from Ministry of Environment and Tourism (MET) to Ministry of Environment and Climate Change (MECC).

full and complete use of meteorological and hydrological resources. All 21 aimags of Mongolia have NAMHEM branches/centers with environmental monitoring laboratories.

47. **Local Government.** Ulaanbaatar City, aimag, district and soum governors are responsible for environmental management at local levels. City and aimag governments issue local permits and licenses and deal with natural resource management. Regulation enforcement is the responsibility of environmental inspectors at the city/aimag and district levels, and rangers at the soum level.

48. City and aimags have their own departments of environment and climate charge (DECCs). They are responsible for conducting and approving environmental assessments for local projects, supervising the district and soum level inspectors and rangers, and reporting the results to the MECC. Assessment and approval for large scale and national level projects is undertaken by the MECC.

49. **Energy.** Mongolia's energy sector consists of five independent electric power systems: Central, Western, Eastern, Southern, and the Altai-Uliastai Energy System. The Central Energy System (CES) represents the biggest part of total electricity generation as it supplies power to major cities, the 13 provinces and about 150 soum centers. The Western Energy System (WES) where the subproject is located is the transmission and distribution operator of Uvs, Bayanulgii and Khovd Aimags. It imports large amounts of electricity from Russia. It suffers from high costs for imported electricity, high technical losses (about 30% at the time) and a low reliability of the technical equipment and frequent power cuts.

50. Electrical transmission and distribution systems are owned by Mongolian state-owned enterprises. The Western Energy System is managed by the Western Region Energy System State-Owned Joint Stock Company (WRES SOJSC).

6. International Environmental Commitments

51. Mongolia has acceded to a number of international environmental conventions (**Table 2**). Each convention places obligations on signatory governments including the provision of a legislative basis for implementation, adherence to the requirements and conditions of each convention, monitoring implementation performance, and reporting on a regular basis to the conference of parties.

Table 2: International environmental and other relevant conventions signed by Mongolia.

#	Convention	Accession Year
1	Paris Climate Accord	2016
2	Minamata Convention on Mercury	2015
3	Stockholm Convention on Persistent Organic Pollutants.	2004
4	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	2000
5	Kyoto Protocol	1999
6	Convention on the Conservation of Migratory Species of Wild Animals	1999
7	Convention on the Protection of Wetlands of International Importance (Ramsar)	1998
8	Convention on the Transboundary Movement of Hazardous Waste (Basel)	1997
9	United Nations Convention on Combating Desertification	1996
10	Vienna Convention for the Protection of the Ozone Layer	1996
11	Montreal Protocol on substances that deplete the ozone layer	1996

#	Convention	Accession Year
12	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	1996
13	UN Framework Convention on Climate Change	1994
14	Convention on Biological Diversity	1993
15	World Heritage Convention	1990
16	International labor Organization-Core labor Standards	1989

Source: ADB TA consultants, 2024.

52. There are no facilities in Mongolia for the recycling or disposal of Li-ion batteries. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, (the Basel Convention), regulates the transboundary movement of hazardous wastes, including used batteries, to ensure they are managed in an environmentally sound manner. It aims to prevent the improper disposal and recycling of such wastes, especially those containing potentially toxic materials like lead. The convention also encourages reducing, reusing, and recycling these materials and holds countries accountable for their waste management practices.

53. Key aspects of the Basel Convention regarding used batteries include:

- Transboundary Movement: The Convention regulates the movement of used batteries across national borders, ensuring that they are not exported for improper disposal.
- Hazardous Waste: Used batteries containing heavy metals like lead are classified as hazardous waste under the Basel Convention, requiring specific handling and management.
- Environmentally Sound Management: The Convention promotes the environmentally sound management of used batteries, including their collection, storage, transportation, and recycling.
- Technical Guidelines: The Basel Convention provides technical guidelines for the environmentally sound management of used lead-acid batteries and is developing similar guidelines for other types of batteries.

7. Environmental Impact Assessment Legal Framework and Procedures

54. Mongolian environmental assessment requirements are regulated by the *Law on Environmental Impact Assessment* (LEIA, 1998, amended in 2002[9] and 2012). The purpose of the LEIA is environmental protection, the prevention of ecological imbalance, the regulation of natural resource use, the assessment of environmental impacts of projects, and procedures for decision-making regarding the implementation of projects. The terms of the law apply to all new projects, as well as the rehabilitation and expansion of existing industrial, service or construction activities and projects that use natural resources. The most recent amendment to the law was adopted in 2012, brought into force in 2013, and implemented through EIA Regulation 5F.[10]

[9] Law of Mongolia on Environmental Impact Assessments (1998, amended in 2012). Unofficial translation available from http://cdm-mongolia.com.

[10] The new EIA Regulation revokes two Regulations and one Guideline document which do not meet the requirements of the EIA Law. The revoked legislation is: Regulation on the Environmental Impact Assessment Committee (2006); Guidelines on Formulating EPPs and EMPs (2000); and Regulation on Detailed EIA Appraisal (2006). These regulations are superseded by the EIA Law.

55. Government procedures related to project environmental impact assessment include:

- Procedure on Environmental Impact Assessment, Government Resolution (2023)
- Procedure on Public Participation in Environmental Impact Assessment, Environment and Tourism Minister's Order (2014);
- Procedure on Development, Review and Reporting of Environmental Management Plan, Environment and Tourism Minister's Order (2019);
- Parliament Resolution Occupational Safety and Health (2013);
- Procedure on Occupational Safety and Health Assessment, Labor Minister's Order (2015);
- Procedure on Storage, Transportation, Use and Disposal of Hazardous and Toxic Chemicals (Joint order of Minister for Environment and Tourism, Minister for Health, and Chairman of National Emergency Management Agency, 2009);
- Government Procedure on Approval of List of Hazardous Wastes (Joint order of Minister for Environment and Green Development, Minister for Health and Sports, 2015).

56. The EIA process in Mongolia is summarized in **Figure 2**, and consists of i) screening through a general environmental impact assessment (GEIA); and if required, ii) preparation of a detailed environmental impact assessment (DEIA).[11]

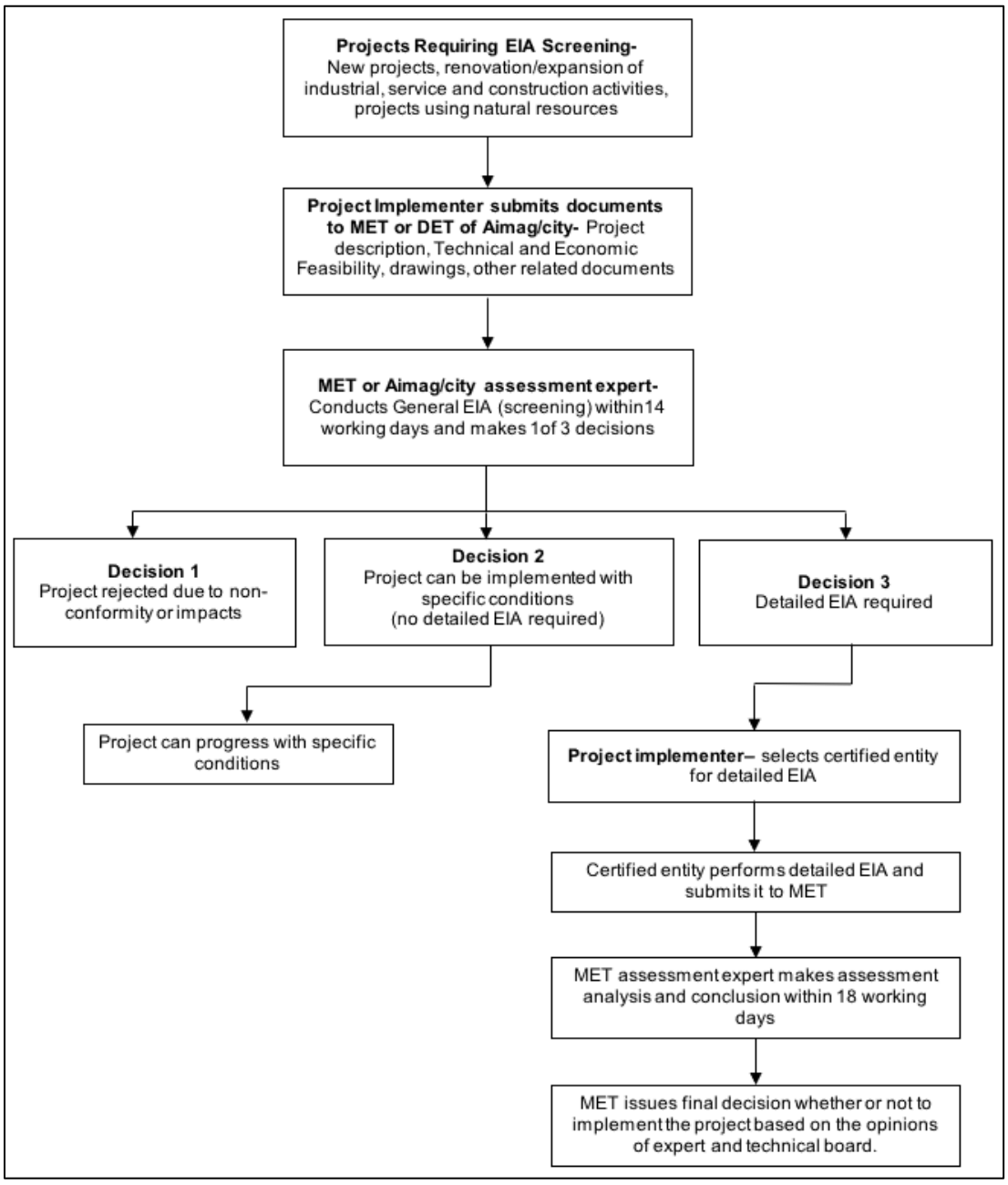
57. The type and size of the planned activity defines responsibility for a GEIA as either the MECC or city/aimag (provincial) government, as stated in the annex of the LEIA.

(i) **General EIA** (screening). To initiate a GEIA the project implementer submits to the MECC or DECC of an aimag/capital city a brief description of the project including feasibility study, technical details and drawings; a baseline description of the proposed project environment; a written opinion of the relevant soum and khoroo governor; and other related documents. The GEIA may lead to one of three conclusions: (i) the project is rejected due to non-conformity and impacts; (ii) the project can be implemented pursuant to specific conditions; and (iii) a DEIA is required. Issuance of the GEIA is free and is performed by an assessment expert who shall complete the assessment within 14 working days and issue a formal conclusion.

(ii) **Detailed EIA** (DEIA). If a DEIA is required, the scope of the assessment will be defined in the GEIA. The DEIA report must be produced by a certified Mongolian entity authorized by the MECC. The developer of the DEIA should submit it to the MECC. An expert of the MECC will appraise the DEIA within 18 working days and present the results to the MECC. If necessary, the Chief Assessment Expert of the MECC may appoint a team of experts to do a detailed appraisal of the assessment report, and may extend the appraisal period by an additional 18 days. Based on the appraisal the MECC issues a decision on approval or disapproval of the project. If the DEIA report is rejected by MECC, further guidance will be provided by MECC and the report may be submitted again. MECC may also provide comments and conditions on the approved report.

[11] Byambakhuu, I. 2022. Review of Environmental impact assessment procedure: Comparative study of International environmental impact assessment laws; Evaluation of implementation of Mongolian environmental impact assessment law; Recommendations for improvement of Mongolian environmental impact assessment law. MET. UNDP-SEPA project.

Figure 2: Environmental Impact Assessment Process in Mongolia.



Source: ADB TA consultants, 2024.

58. As specified in the DEIA guideline (MET Order No. A-117), the DEIA report should include the following:

a. Non-technical summary
b. Foreword
c. Scope of the DEIA
d. Project description
e. Assessment of potential adverse impacts of the project
f. Determination of measures to prevent, minimize, eliminate, and offset negative

impacts
g. Risk assessment and management
h. Main results and consolidation summary
i. Environmental management plans
j. References

59. The project implementer is responsible for the cost of conducting a DEIA.

60. In accordance with the LEIA, the MECC will disclose information on the DEIA to the public once it is finalized. The MECC maintains the State Environmental Information Database (EID) where summaries of DEIAs are accessible to the public through the MECC website.

8. Mongolian Subproject Environmental Assessment

61. As part of the Mongolian environmental assessment process a Baseline Environmental Study (BES)[12] and a Feasibility Study Report (FSR)[13] were prepared for the Myangad Solar Power Plant by a qualified licensed national consultant and were submitted to the MECC for a General Environmental Impact Assessment (GEIA) screening. The GEIA conclusion (**Appendix II**) required the preparation of a DEIA. The DEIA was subsequently prepared a qualified licensed national consultant and submitted to the MECC. The DEIA was approved by the MECC on 23 April 2025 (**Appendix II**).

C. Applicable Environmental Standards

62. Mongolian National Standards (MNS) prescribe allowable ambient and discharge standards for ambient air, noise, water and soil quality, and industrial effluent, wastewater, boiler emissions, and others. Relevant MNS are discussed below.

63. During the design, construction, and operation of a project, the ADB SPS 2009 requires the borrower to follow environmental standards consistent with good international practice as reflected in internationally recognized standards such as the World Bank Group's *EHS Guidelines*. The *EHS Guidelines* contain discharge effluent, air emissions, and other numerical guidelines and performance indicators as well as prevention and control approaches that are normally acceptable to ADB and are generally considered to be achievable at reasonable costs by existing technology. When host country regulations differ from these levels and measures, the borrower/client is to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the borrower/client is required to provide justification for any proposed alternatives. Relevant *EHS Guidelines* include *General EHS Guidelines* (covering environment; occupational health and safety; and community health and safety) and the *EHS Guidelines for Electric Power Transmission and Distribution* (2007)

64. The discussion below compares key relevant MNS with internationally recognized standards, such as the World Bank Group's *EHS Guidelines*, for air quality, water and wastewater

[12] Baseline Environmental Assessment Report for the 19.8 MW Solar Power Plant Project in Myangad Soum, Khovd Province. Ulaanbaatar, by Enkhbold Sumiya, 2025. Prepared as part of the Ministry of Energy's Renewable Energy Expansion Project.

[13] Technical and Economic Feasibility Study Report for the Construction of a Solar Plant, Myangad Soum. Prepared for the Ministry of Energy, by D. Bayasgalan, 2024. Prepared as part of the Ministry of Energy's Renewable Energy Expansion Project.

quality, soil, noise and hazardous wastes.

1. Air Quality

65. Mongolian ambient air quality standards are presented in MNS 4585: 2016 (replacing the 2007 version). The World Health Organization (WHO) Air Quality Guidelines are recognized as international standards and are adopted in the *EHS Guidelines*. In addition to guideline values, interim targets (IT) are given for each pollutant by the WHO as incremental targets in a progressive reduction of air pollution.

66. The WHO guidelines and corresponding MNS are presented in **Table 3**. Overall the WHO guidelines (and some IT values) exceed the MNS for ambient air quality, and are adopted for use in this EIA and subsequent environmental monitoring.

Table 3: Mongolian ambient air quality standards (MNS 4585: 2016) and WHO ambient air quality guidelines (and interim targets).

Pollutant	Averaging Period	Mongolian Standards (µg/m³)	WHO ambient air quality guidelines (GL) and interim targets (IT), (µg/m³)
Chemical impact			
Sulphur Dioxide (SO_2)	20 Minute	450	-
	24 hour	50	125 (IT-1) 50 (IT-2) 40 (GL)
	Annual	20	-
Carbon Monoxide (CO)	20 Minute	60,000	-
	1 hour	30,000	-
	8 Hour	10,000	-
	24-hour	-	7,000 (IT-1) 4,000 (GL)
Nitrogen Dioxide (NO_2)	20 Minute	200	
	24 hour	50	120 (IT-1) 50 (IT-2) 25 (GL)-
	Annual	40	40 (IT-1) 30 (IT-2) 20 (IT-4) 10 (GL)
Ozone (O_3)	8 hour	100	160 (IT-1) 120 (IT-2) 100 (GL)
	Peak Season	-	100 (IT-1) 70 (IT-2) 60 (GL)
Total Particulate Matter	20 minute	500	
	24 hour	150	
	Annual	100	
Particulate Matter (PM_{10})	24 hour	100	150 (IT-1) 100 (IT-2) 75 (IT-3) 50 (IT-4) 45 (GL)
	Annual	50	70 (IT-1) 50 (IT-2)

Pollutant	Averaging Period	Mongolian Standards (µg/m³)	WHO ambient air quality guidelines (GL) and interim targets (IT), (µg/m³)
			30 (IT-3) 20 (IT-4) 15 (GL)
Particulate Matter ($PM_{2.5}$)	24 hour	50	75 (IT-1) 50 (IT-2) 37.5 (IT-3) 25 (IT-4) 15 (GL)
	Annual	25	35 (IT-1) 25 (IT-2) 15 (IT-3) 10 (IT-4) 5 (GL)
Lead (Pb)	24 hour	1	-
	Annual	0.25	-
Benzo (a) pyrene ($C_{20}H_{12}$)	Benzo (a) pyrene	0.001	

For WHO guidelines, a= 99th percentile (i.e. 3–4 exceedance days per year). b= average daily maximum 8-hour mean O_3 concentration in the six consecutive months with the highest six-month running- average O_3 concentration.
Source: Mongolian Law on Air (2012, last amended in 2019), WHO Air Quality Guidelines (2021).

2. Water Quality

67. **Ambient Water Quality.** Mongolian ambient water quality standards are presented in **Table 4** (MNS 4586:1998). No comparable standard is given in the World Bank's *EHS Guidelines*, but the Mongolian standard is compared to the United States Environmental Protection Agency (US EPA) National Recommended Aquatic Life Criteria. The two systems are not directly comparable, and the US EPA criteria are limited to the protection of aquatic life. Therefore, the MNS water standard is adopted for use in this IEE and subsequent environmental monitoring.

Table 4: Mongolian ambient water quality standards (MNS 4586:1998).

Parameter	Unit	Standard	US EPA National Recommended Aquatic Life Criteria (freshwater, acute)
pH	-	6.5-8.5	6-9
Dissolved Oxygen (O_2)	mgO/l	not less than 6 or 4*	
BOD_5	mgO/l	3	
COD	mgO/l	10	
NH_4-N	mgN/l	0.5	
NO_2-N	mgN/l	0.02	
NO_3-N	mgN/l	9	
PO_4- P	mgP/l	0.1	
Chloride (Cl)	mg/l	300	860
Fluoride (F)	mg/l	1.2	
SO_4	mg/l	100	
Manganese (Mn)	mg/l	0.1	
Nickel (Ni)	mg/l	0.01	0.470
Copper (Cu)	mg/l	0.01	
Molybdenum (Mo)	mg/l	0.25	
Cadmium (Cd)	mg/l	0.005	0.0018
Cobalt (Co)	mg/l	0.01	

Parameter	Unit	Standard	US EPA National Recommended Aquatic Life Criteria (freshwater, acute)
Lead (Pb)	mg/l	0.01	0.065
Arsenic (As)	mg/l	0.01	0.340
Total Chromium (Cr)	mg/l	0.05	
Hexavalent chromium (Cr^{6+})	mg/l	0.01	0.016
Zinc (Zn)	mg/l	0.01	0.120
Mercury (Hg)	mg/l	0.1	0.0014
Mineral oil	mg/l	0.05	
Phenol	mg/l	0.001	
Organic surface-active agents	mg/l	0.1	
Benzo (a) pyrene	mkg/l	0.005	

* DO>6 mgO/l in summertime and DO>4 mgO/l in winter time.
BOD_5 = 5-day biochemical oxygen demand, COD = chemical oxygen demand, NH_4-N = ammonium-nitrogen, NO_2-N = nitrite-nitrogen, NO_3-N = nitrate-nitrogen, PO_4-P = phosphate, SO_4 = sulfate.

68. **Drinking Water Requirements**. The Mongolian standard MNS 900:2018 outlines the hygienic, quality and safety requirements for drinking water, which in Mongolia is largely groundwater.

69. The Mongolian standard is compared to the WHO guidelines for drinking water in **Table 5**. The majority of parameters in the WHO guidelines are not available for comparison to the national standard. Therefore, the national groundwater standard will be applied to the subproject with a few exceptions of Lead (Pb) and Chlorine (Cl); the WHO guidelines for Pb and Cl are more stringent and will therefore be used for the subproject.

Table 5: Mongolian drinking water standards (MNS 900:2018) and WHO Guidelines (2022).

Parameter	Unit	Maximum allowance	WHO Guidelines for Drinking Water Quality, 4th Edition (2022)
Chemical parameters			
Ammonia (NH_4)	mg/l	105	-
Ag	mg/l	0.1	-
Al	mg/l	0.5	-
As	mg/l	0.01	0.01
B	mg/l	0.5	2.4
Ba	mg/l	0.7	1.3
Ca^{2+}	mg/l	100	-
Cd	mg/l	0.003	0.003
Cl	mg/l	350	5
Cn	mg/l	0.01	-
Cr	mg/l	0.05	0.05
Cu	mg/l	0.1	2
F	mg/l	0.7-1.5	1.5
Fe	mg/l	0.3	-
Hardness	mg-eqv/l	7.0	-
Hg	mg/l	0.001	0.006
K^+	mg/l	200	-
Mg^{2+}	mg/l	30	-
Mn	mg/l	0.1	-
Mo	mg/l	0.07	-
Na	mg/l	200	-

Parameter	Unit	Maximum allowance	WHO Guidelines for Drinking Water Quality, 4th Edition (2022)
Ni	mg/l	0.02	0.07
Nitrate (NO_3)	mg/l	50	50
Nitrite (NO_2)	mg/l	1.0	3
Pb	mg/l	0.03	0.01
PO_4	mg/l	3.5	-
Se	mg/l	0.01	0.04
SO_4	mg/l	500	-
U	mg/l	0.03	0.03
Zn	mg/l	5	-
Physical parameters			
pH		6.5-8.5	-
Purity	NTU	5.0	-
Color	Degree	20	-
Odour	Mark	2	-
Electric conductivity	mCm/cm	1.0	-
Microbiological parameters			
E. Coli	number/100 ml	0	0

Source: MNS 900:2018 and WHO (2022).

70. **Water Quality Index.** The MET has developed a water quality index (WQI) to simplify complex water quality data. In the WQI surface water quality is divided into classes: class 1 - very clean; class 2 - clean; class 3 - slightly polluted; class 4 - moderately polluted; class 5 - heavily polluted; and class 6 - dirty water. The WQI is calculated as the sum of different sub-index scores:

$$WQI = \frac{\sum_i \left(\frac{C_i}{Pl_i} \right)}{n}$$

where;

WQI	water quality index
C_i	concentration of i variable
Pl_i	permissible level of i variable
n	number of variables

71. A Mongolian National Standard (MNS 4586-98), which developed by the National Standard Agency in 1998, specifies the Pli. In total, 27 variables have been included in the standard.

72. **Wastewater Discharge.** MNS 4943:2015 is the Mongolian standard for wastewater discharge to water bodies (**Table 7**). In most cases, the Mongolian standards for wastewater discharge are more stringent than the EHS Guidelines except for total nitrogen and total coliform bacteria. The EHS guidelines for total nitrogen and total coliform bacteria will be applied (**Table 8**).

Table 6: Mongolian surface water WQI.

WQI	Water quality		Uses and treatment
	degree	class	
≤0.30	1	Very clean	No treatment necessary. Suitable for all kinds of water usage.
0.31 - 0.89	2	Clean	After treatment, use for drinking and food production. Without treatment, use for fishery.
0.90 - 2.49	3	Slightly polluted	Unsuitable for drinking and food production. If no choice, use it after treatment. Without treatment, use for livestock, recreation and sport purposes.
2.50 - 3.99	4	Moderately polluted	Use for irrigation and industrial purposes after a proper treatment.
4.00 - 5.99	5	Heavily polluted	After an appropriate treatment, heavy industrial use without body contact.
6.00≤	6	Dirty	Unsuitable for any purpose. An extensive treatment requires.

Source: Journal of Water Resource and Protection, 2011, 3, 398-414.

Table 7: Mongolian national standard for wastewater discharge to water bodies (MNS 4943:2015, full parameters).

Parameter	Unit	Maximum allowance
Water temperature	C	20
Hydrogen ion activity (pH)	-	6-9
Odor		No bad smell
Total Suspended solids (SS)	mg/l	30
Biochemical Oxygen Demand (BOD)	mg/L	20
Chemical Oxygen Demand (COD)	mg/l	50
Permanganate	mg/l	20
Dissolved salt	mg/l	100
Ammonia Nitrogen (NH_4-H)	mg/l	6
Total Nitrogen (TN)	mg/l	15
Total phosphorous (TP)	mg/l	1.5
Organic Phosphorous (DOP)	mg/l	0.2
Hydrogen Sulphide (H_2S)	mg/l	1
Total Iron (Fe)	mg/l	1
Aluminum (AL)	mg/l	0.5
Manganese (MN)	mg/l	0.5
Total Chromium (Cr)	mg/l	0.3
Chromium^{+6} (Cr^{+6})	mg/l	0.01
Total cyanide (CN)	mg/l	0.05
Free cyanide (CN)	mg/l	0.05
Copper (CU)	mg/l	1.0
Boron (B)	mg/l	0.3
Lead (pb)	mg/l	0.1
Zinc (Zn)	mg/l	3.0
Cadmium (Cd)	mg/l	0.03
Antimony (Sb)	mg/l	0.05
Mercury (Hg)	mg/l	0.01
Total Arsenic (As)	mg/l	0.01
Nickel (Ni)	mg/l	0.2
Selenium (Se)	mg/l	0.02
Cobalt (Co)	mg/l	0.02
Barium (Ba)	mg/l	1.5
Vanadium(V)	mg/l	0.1
Uranium (U)	mg/l	0.05

Parameter	Unit	Maximum allowance
Mineral oil	mg/l	1
Fat oil	mg/l	5
Surface active agents	mg/l	2.5
Phenol (C_5H_2OH)	mg/l	0.05
Threchloretilen	mg/l	0.2
Tetrachloretilen	mg/l	0.1
Remained chlorine (CL)	mg/l	1

Source MNS 4943:2015, and IFC General EHS Guidelines, 2007.

Table 8: Comparison of select Mongolian and international wastewater discharge standards.

Parameter	Unit	MNS 4943:2015	IFC-EHC Guideline
pH	pH	6.5-8.5	6-9
BOD	mg/l	20	30
COD	mg/l	50	125
Total nitrogen	mg/l	15	10
Total phosphorus	mg/l	1.5	2
Oil and grease	mg/l	1-5	10
Total suspended solids	mg/l	50	50
Total coliform bacteria	MPM/100 ml	N/A	400

Source MNS 4943:2015, and IFC General EHS Guidelines, 2007.

73. **Groundwater.** The Mongolian standard outlining the general requirements for protection of groundwater (MNS 3342: 1982) indicates that the contamination of groundwater with industrial raw materials, products and municipal wastes during transportation and storage is prohibited. Relevant requirements in the standard include:

a. Raw materials and products for industrial and municipal waste storage tanks with potential to contaminate groundwater resources should comply with following:
   - Geological - hydrogeological investigations of the storage tank construction, potential soil infiltration estimates of geological materials, groundwater protection measures to be developed based on the amount and characteristics of the chemicals stored.
   - Storage tanks to be tested for leakage prior to use.
   - For areas at the base of mountains, loops of rivers, riverbeds and highly fractured parts of geological sediments which are used for drinking water, storage tanks cannot be established in these regions.

b. In case of ground water contamination due to accidents, the damaged area should be protected, spill gathered without further distribution, the prohibition of drinking water collection from this area, and quick organization and removal of traces of contamination.

c. In the event of ground water pollution or when the contamination reaches dangerous levels, the method of observation and control will depend on the ground water quality, its intended use and the potential consequences of the pollution.

74. There is no equivalent standard recommended in the *EHS Guidelines,* and the MNS standard is adopted for use in the subproject. However, for the purposes of wells used for drinking water, the Mongolian standard for the hygienic, quality and safety requirements for drinking water (MNS 900:2018) will apply, with the exception of Pb and Cl, where the more stringent WHO guidelines will apply (see above).

3. Soil

75. Mongolian standards for pollutants in soil are presented in **Table 9** (MNS 5850:2019). There are no comparable standards in the World Bank Group's EHS Guidelines, so the Mongolian standards are compared to an international standard, the Dutch soil intervention values.[14] The Mongolian maximum acceptable levels are in general stricter than the Dutch Intervention Values, with the exception of chromium and cobalt. The Mongolian standards are adopted for all metals except chromium and cobalt, for which the Dutch Intervention Values are adopted as aspirational targets to be achieved if relevant, and technically and financially feasible.

Table 9: Mongolian heavy metals standard (MNS 5850: 2019) and Dutch Soil Intervention Values (2013).

Parameter	Measuring unit	Soil Mechanical Composition			Maximum Acceptable Amount	Dutch Soil Intervention Values (standard soil: 10% organic matter and 25% clay)
		Clay	Loamy	Sandy		
Pb	mg/kg	100	70	50	100	530
Cd	mg/kg	3	1.5	1	3	13
Hg	mg/kg	2	1	0.5	2	36
As	mg/kg	20	15	10	20	76
Cr	mg/kg	150	100	60	150	
Cr^{6-}	mg/kg	4	3	2	4	78
Sn	mg/kg	50	40	30	50	
Sr	mg/kg	800	700	600	800	
V	mg/kg	150	130	100	150	
Cu	mg/kg	100	80	60	100	190
Ni	mg/kg	150	100	60	150	100
Co	mg/kg	50	40	30	50	190
Zn	mg/kg	300	150	100	300	720
Mo	mg/kg	5	3	2	5	190
Se	mg/kg	10	8	6	10	100
B	mg/kg	25	20	15	25	
F	mg/kg	200	150	100	200	
CN	mg/kg	25	15	10	25	

Source MNS 5850: 2019.

4. Noise

76. Mongolian noise standards are set out in the national standard MNS 4585: 2007 and are compared with relevant international guidelines from the WHO (as presented in the *EHS Guidelines*) in **Table 10**. The classes within the standards are not directly comparable, however WHO noise guidelines are more stringent than Mongolian standards for sensitive receptors.

[14] Source: Dutch Soil Remediation Circular 2009. The Dutch soil remediation intervention values indicate when the functional properties of the soil for humans, plants and animals are seriously impaired or threatened. They are representative of the level of contamination above which a serious case of soil contamination is deemed to exist. The values below are calculated for a 'Standard Soil' with 10% organic matter and 25% clay.

Subproject activities near sensitive receptors (if any) will comply with WHO noise guidelines.

5. Hazardous Wastes

77. Mongolia's hazardous waste classification list was approved in 2015 by government Resolution No. 263.[15] Wastes from electrical equipment containing PCBs, HCFCs, HFCs, asbestos and other hazardous components are classified as hazardous waste.

Table 10: Mongolian noise standard (MNS 4585: 2017) and WHO Guidelines.

Parameter	MNS Standard dB(A)		WHO Guideline dB(A)	
	Daytime 07:00 – 23:00	Night 23:00 – 07:00	Daytime 07:00 – 22:00	Night 22:00 – 07:00
Maximum Environmental Noise Exposure for the Public	60	45	WHO Class I - Residential, institutional, educational: 55 WHO Class II - industrial, commercial: 70	WHO Class I - Residential, institutional, educational: 45 WHO Class II - Industrial, Commercial: 70

Source: MNS 4585: 2007 and WHO Noise Quality Guidelines (1999) in IFC EHS Guidelines (2007).

6. Occupational Health and Safety Standards

78. Article 16 of the National Constitution of Mongolia states that every employee has the right to 'suitable conditions of work'. The government adopted a National Program for Occupational Safety and Health Improvement in 2001 and later national standards were also adopted such as the National Standard on Occupational Health and Safety MNS 5002:2000 which sets out policies, rules and regulations on occupational safety and health, and the common requirements for workplace safety. A summary of Mongolian standards related to occupational safety and hygiene is presented in **Table 11**.

Table 11: Mongolian standards related to occupational safety and hygiene.

#	Standard	Name of the standard
1	MNS 5002:2000	National Standard on Occupational Health and Safety
2	MNS 5078:2001	Occupational safety. Industrial hygiene. General requirement for ventilation and air conditioning system at industrial enterprise.
3	MNS 5080:2001	Occupational safety and health. Industrial hygiene. Working condition, their classification and factors. Evaluation of working condition.
4	MNS 5105:2001	Occupational safety. Industrial hygiene. Norms and general requirements for hygiene protection zones.
5	MNS 5106:2001	Occupational safety. Industrial hygiene. Occupational physiology. Norms of the indexes for evaluation of load on nerves and psychology. Determination method.
6	MNS 5107:2001	Occupational safety. Industrial hygiene. Occupational physiology. Norms of the indexes for evaluation of the physical loads and method of

[15] Hazardous waste classifications system in Mongolia, Resolution no. 263 dated 29 June 2015 signed by Prime Minister and Minister of MNET.

#	Standard	Name of the standard
		determination.
7	MNS 4990:2015	Occupational safety and health. Occupational hygiene. Workplace environment. Requirement of hygiene http://estandard.gov.mn/standart/reader/3889
8	MNS 6654:2017	Occupational safety and health. Occupational hygiene. General requirement for selection and use respiratory protection devices.
9	MNS 6658:2017	Occupational safety and health. General requirement for protection workers from exposure to mineral dust at workplaces.
10	MNS 6767:2019	Occupational safety and hygiene. General requirement for measurement of light in workplace and its permissible limit.
11	MNS 6768:2019	Occupational safety and hygiene. General requirement for noise exposure measurement, occupational exposure limit and employees hearing protection.
12	MNS 6769:2019	Occupational safety and hygiene. Mechanical vibration. General requirement for measurement of human exposure to hand transmitted vibration and its occupational exposure limit.
13	MNS 6770:2019	Occupational safety and hygiene. Mechanical vibration. Requirement for workers body vibration measurement and occupational exposure limit at workplace.

Source: TA consultant, 2024.

D. Applicable Mongolian Construction Norms and Standards

79. Mongolia construction norms and regulations that govern various aspects of building and infrastructure development are summarized **Table 12**.

Table 12: Applicable Mongolian building construction Norms and Standards.

Construction Type	Mongolian Norms and Standards
General Planning	- BNbD 30.01.04. City and Settlement Planning and Building Construction Norms and Regulation - 30-103- 21 Instructions for Developing Urban Development Documents
External Power Supply	- BNbD 43-101-03 Regulation for Electrical Installations - BNbD 21-02-02 Instructions for Developing Design Drawings for Lightning Protection of Buildings - Ferroconcrete supports of 10/6/kV sheathed overhead power line with UBCTS 2019-177 code (UBCTS Ulaanbaatar Electricity Supply Network).
Water Supply and Sewerage	- BNbD 40-01-14 Sewerage, External Networks and Facilities
External Thermal Supply	- BNbD 40-02-05 External Thermal Supply - BNbD 2.01.03-92 Thermal Engineering of Buildings
External Communication and Alarms	- Regulation on Developing and Getting approval for Design Drawings - MNS 5276:2003 General Requirements for Communication Cable Installation - MNS 6668:2017 Technical Specifications and Installation Requirements for Communication Channeling Facility - MNS 4908:2017 Markers for External Communication Drawing of Telecommunications Network
Building and Facilities Architecture	- BNbD 31-03-03 Public and Civil Buildings - BNbD 21-01-02 Fire Safety of Buildings and Facilities - BNbD 31-04-03 Building for Administration and Utility Premises - BNbD 31-19-10 Storage Building - BNbD 21-02-02 Norm on Fire Safety for Developing Construction Design Drawings
Building Structure	- BNbD 21-01-21 Construction and Planning of Buildings in Earthquake Zones

Construction Type	Mongolian Norms and Standards
	- BNbD 2.01.07-90 Loads and Reactions - BNbD 52-01-10 Concrete and Re-enforced Concrete Structures - BNbD 50-01-16 Construction Code for Developing Design Drawings for Footings and Foundations of Buildings and Facilities - BNbD 52-105-10 Concrete and Re-enforced Concrete Structures without Pre-enforced rebars - B1.038-1.1 Precast reinforced concrete fence
Heating and Ventilation	- BNbD 23-01-09 Climatic and Geophysical Parameters for Construction - BNbD 25-01-20 Building Thermal Performance - BNbD 41-01-11 Heating, Ventilation and Conditioning
Water Supply and Sewerage	- BNbD 40-05-16 Indoor Water Supply and Sewerage Works - MNS3332:2013 Formula marking of Water Supply, Sewage and Gas supply Systems inside the Building - MNS 3239:2014 Design Drawings for Indoor Water Supply and Sewerage System
Powered Equipment, Indoor Lighting	- BNbD 23-02-08 Natural and Artificial Lighting - BNbD 43-101-03 Regulation for Electrical Facilities - BNbD 43-102-07 Planning and Installation of Electrical Devices for Apartment and Public Buildings - BNbD 43-101-03*/12 Regulation for Electrical Facilities – Additional Sections - 2008 Publishing - Ferroconcrete supports of 10/6/kV sheathed overhead power line 2019-177 code (Ulaanbaatar Electricity Supply Network) - BNbD 3.05.06-90 Electrical Engineering Work

Source: Adep LLC, 2024.

E. Applicable ADB Policies, Regulations and Requirements

80. ADB‘s Environmental safeguards requirements, including EIA requirements, are defined in the Safeguard Policy Statement (SPS, 2009). The purpose of the SPS is to ensure that projects are environmentally sound, designed to operate in line with applicable regulatory requirements, and are not likely to cause significant environmental, biological, health, or safety hazards. The SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas: (i) environmental safeguards; (ii) involuntary resettlement safeguards; and (iii) indigenous peoples safeguards. The policies seek to avoid, minimize, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development process. The objectives of ADB’s safeguards are to: (i) avoid adverse impacts of projects on the environment and affected people, where possible; (ii) minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and (iii) help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks. The SPS (2009) is underpinned by the ADB Operations Manual (OM Section F1, 2010) with guidance provided by the ADB *Environmental Safeguards - A Good Practice Sourcebook* (2012).

81. The SPS also promotes the use of international standards, including the World Bank Group’s EHS Guidelines. EHS guidelines relevant to the project include environmental protection, water conservation, hazardous materials, waste management, noise control, sanitation, and community and occupational health and safety. Where EHS standards are more stringent than national standards, efforts are made for ADB-funded projects to target the EHS standards. The standards applied to this project are based on a comparison of national and EHS thresholds. In cases where no EHS standards are available, or the Mongolian standards are the same or higher than the EHS standards, the national standards are applied. Relevant *EHS Guidelines* include

General EHS Guidelines (covering environment; occupational health and safety, and community health and safety), and *EHS Guidelines for Electric Power Transmission and Distribution*. In general, several Mongolian standards are equal, or higher than, the EHS standards.

82. Compared with the Mongolian EIA requirements, the SPS emphasizes additional requirements, including: (i) a project GRM; (ii) definition of the project area of influence; (iii) assessment of indirect, induced and cumulative impacts; (iv) due diligence of associated facilities; (v) protection of physical cultural resources; (vi) climate change mitigation and adaptation; (vii) impacts on livelihoods through environmental media; (viii) biodiversity conservation; and (ix) a project-specific EMP.

83. At an early stage in the project cycle, typically the project identification stage, ADB screens and categorizes proposed projects based on the significance of potential project impacts and risks. A project's environment category is determined by the category of its most environmentally sensitive component, including direct, indirect, induced, and cumulative impacts. Project screening and categorization are undertaken to:

a. reflect the significance of the project's potential environmental impacts;
b. identify the type and level of environmental assessment and institutional resources required for the safeguard measures proportionate to the nature, scale, magnitude and sensitivity of the proposed project's potential impacts; and,
c. determine consultation and disclosure requirements.

84. ADB assigns a proposed project to one of the following categories:

a. **Category A.** Proposed project is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented; impacts may affect an area larger than the sites or facilities subject to physical works. A full-scale environmental impact assessment (EIA) including an EMP, is required.
b. **Category B**. Proposed project's potential environmental impacts are less adverse and fewer in number than those of category A projects; impacts are site-specific, few if any of them are irreversible, and impacts can be readily addressed through mitigation measures. An IEE, including an EMP, is required.
c. **Category C**. Proposed project is likely to have minimal or no adverse environmental impacts. No EIA or IEE is required although environmental implications need to be reviewed.
d. **Category FI**. Proposed project involves the investment of ADB funds to, or through, a financial intermediary.

85. The SPS 2009 requires a number of additional considerations, including: (i) project risk and respective mitigation measures and project assurances; (ii) project-level grievance redress mechanism; (iii) definition of the project area of influence; (iv) physical cultural resources damage prevention analysis; (v) occupational and community health and safety requirements (including emergency preparedness and response); (vi) economic displacement that is not part of land acquisition; (vii) biodiversity conservation and natural resources management requirements; (viii) provision of sufficient justification if local standards are used; (ix) assurance of adequate consultation and participation; and (x) assurance that the EMP includes an implementation schedule and measurable performance indicators.

86. **Energy Policy.** In 2021 ADB adopted a new Energy Policy to support universal access to reliable and affordable energy services, while promoting the low-carbon transition in Asia and the Pacific. The policy is based on five principles:

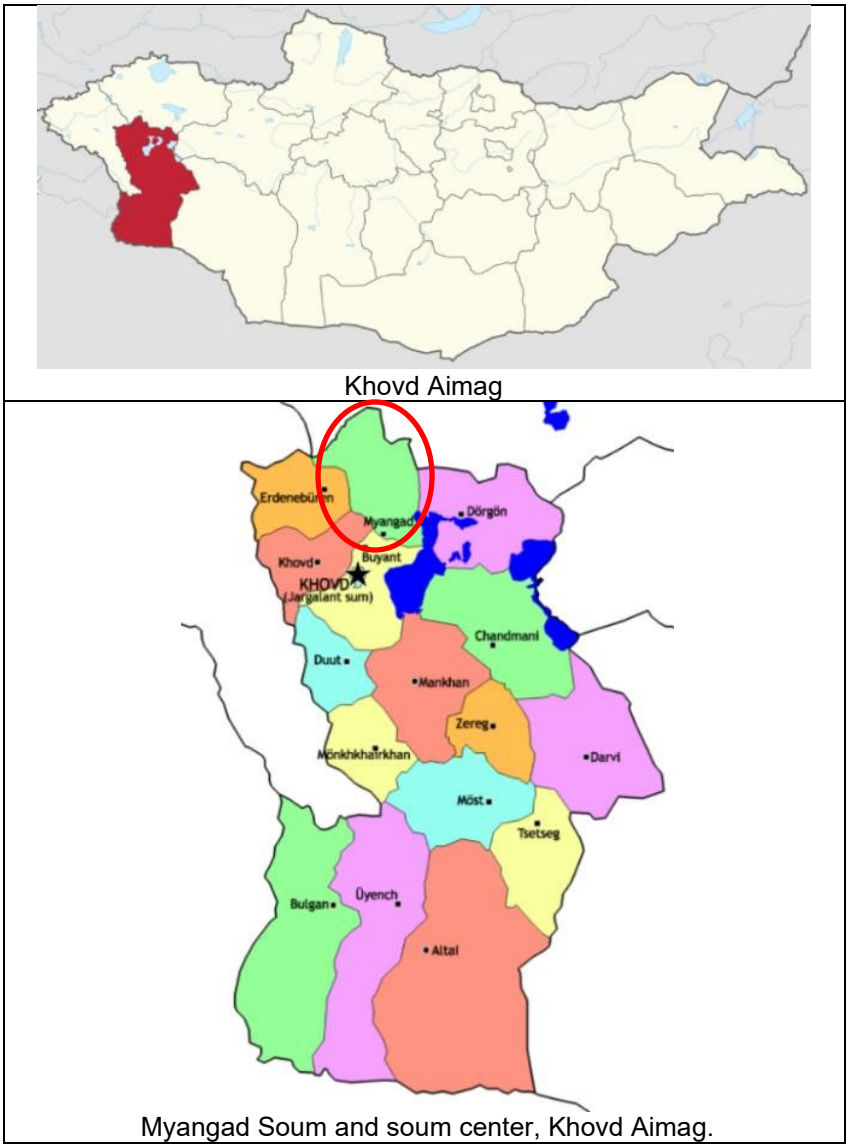
1. *Securing Energy for a Prosperous and Inclusive Asia and the Pacific*. ADB will help its developing member countries (DMCs) secure energy for development by supporting electrification programs; promoting cleaner cooking, heating, and cooling; improving energy efficiency across supply and consumption chains; and promoting social inclusion, gender equality, and partnerships.
2. *Building a Sustainable and Resilient Energy Future*. ADB will help its DMCs increase energy efficiency, deploy more renewable and low-carbon energy, and integrate climate and disaster resilience into energy sector operations. The policy formalizes ADB's current practice of not financing new coal-fired power and heating plants. ADB will support a planned phase-out of coal in the region, and will commit to a just transition that promotes sustainable, inclusive, and resilient livelihoods for all in affected communities. The policy also recognizes DMCs' request for access to affordable, new technologies.
3. S*upporting Institutions, Private Sector Participation, and Good Governance*. ADB will support the institutional development, financial sustainability, and good governance of energy sector institutions and companies, as well as private sector participation. ADB will also help create the policy frameworks needed to manage the energy transition, including helping its DMCs to update and strengthen their nationally determined contributions and long-term strategies for decarbonization under the Paris Agreement.
4. *Promoting Regional Cooperation and Integration*. ADB will promote regional energy cooperation and the integration of energy systems to strengthen energy security and increase cross-border access to cleaner energy sources.
5. *Integrated Cross-Sector Operations to Maximize Development Impact*. ADB will continue to combine finance, knowledge, partnerships, and its country-focused approach to deliver integrated solutions with comprehensive and magnified development impacts (ADB, 2024).

III. Subproject Description

A. Location

87. The proposed 19.8 MW solar PV plant will be developed at Bayankhoshuu Bag in the Myangad Soum center, in the north of Khovd Aimag in western Mongolia (**Figure 3**).

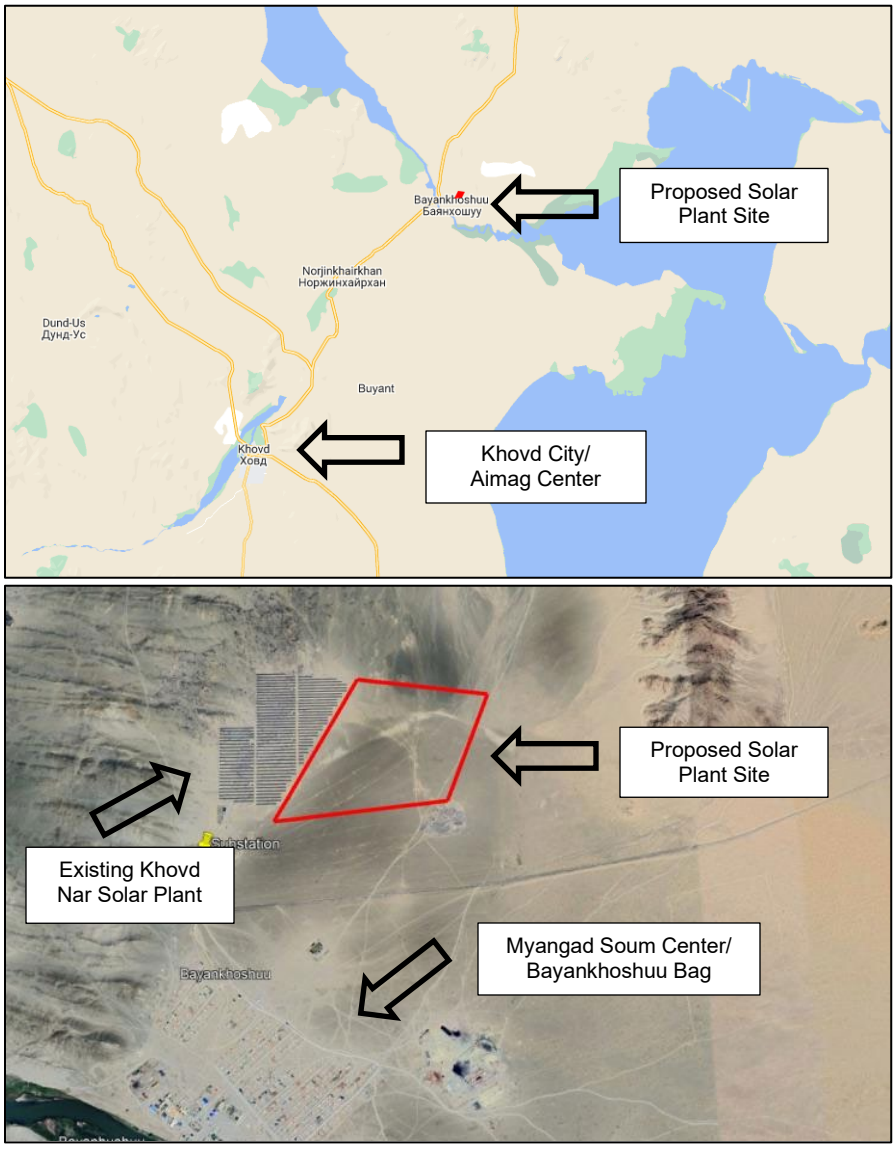
Figure 3: Location of Khovd Aimag and Myangad Soum.



Source: Wikipedia, 2024.

88. The plant will be located on a 55.18 ha empty plot of land on the northern perimeter of the soum center, immediately to the east of the Khovd Nar 10 MW solar plant, constructed recently by the GoM with World Bank support (**Figure 4** and **Table 13**).

Figure 4: Solar PV plant location, Myangad Soum.



Source: FSR 2024, and Google Earth 2024.

Table 13: Myangad Solar PV Plant corner point coordinates.

North latitude			East longitude			Elevation (masl)
Degrees	Minute	Seconds	Degrees	Minute	Seconds	
48	14	52.53	91	55	39.31	1180
48	15	18.16	91	56	0.39	1183
48	15	15.19	91	56	34.03	1181
48	14	55.90	91	56	23.07	1176

Source: Myangad Solar PV Plant BES, 2025.

89. The site is mostly flat with a gentle slope downwards from north to south slope. It is bordered by hills to the north and east, to the west it is immediately adjacent to the Khovd Nar 10 MW solar power plant, and to the south there is a 110 kV power transmission line, the Myangad substation, a small landfill, and the soum center town (total soum population is 3,415).

90. The site is rocky on the uphill portion. Immediately beyond the norther perimeter there is a Khirgisuur[16] and a burial tomb. There is a season flood channel running from the north to the south on the eastern side which poses a potential flood risk. The site has been heavily grazed, but there are no winter camps for livestock. The solar plant layout has been planned to avoid the burial area to the north, and previous landfill areas (the Khovd Nar solar plant is partially located on reclaimed landfill area, but it does not extend into the new solar plant site). Local authorities and land officers have recommended the site. Site photographs are presented in **Figure 5**, and a Myangad Soum no objection letter regarding land use and involuntary resettlement in presented in **Appendix 3**.

Figure 5: Solar PV plant site photos, Myangad Soum, Khovd Aimag.

Site, looking to the south	Site, looking to the west
Site, looking to the north	Site, looking to the east

Source: FSR 2024,

B. Technical Description

91. The following section provides a description of the proposed solar plant based on the FSR. Please note that detailed design will be finalized by the engineering, procurement, and construction (EPC) contractor during implementation. Equipment brands and models presented in this discussion are indicative only, but are what was used in the FSR solar PV system simulation modelling. Panels will meet modern international standards and be recruited from Tier-1 manufacturers. To be regarded as a Tier-1 manufacturer, the company must have experience,

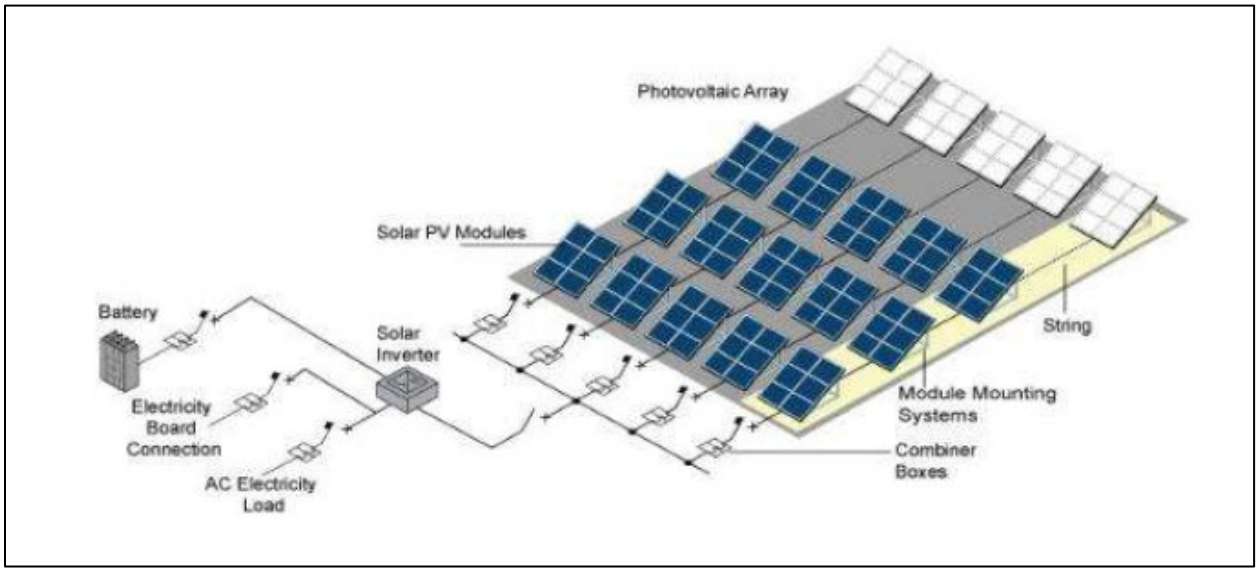
[16] A Khirgisuur is a bronze or iron age burial mound with external stone rings, found in the western part of Mongolia.

use the highest quality materials and automated production lines. This typically results in higher quality, more efficiency and lower chances of malfunction.

1. Solar PV Plants

92. Solar PV generation plants are generally quick to install, easy to expand, and simple to maintain. This makes them an ideal power source for the remote and difficult to access rural sites of Mongolia. A typical PV farm conceptual design layout consists of solar module fields, wiring and connectors, and inverters producing AC power which is then up-linked to the main lines of the grid and/or in some cases to a battery energy storage (BES) system (**Figure 6**).

Figure 6: Typical PV farm components.



Source: UREP PPTA consultant, 2017.

2. Myangad Solar PV Plant

93. The Myangad solar PV plant will be comprised of 33,048 bifacial solar PV ground-mounted modules with a capacity of 695 W, installed in a 46 ha area field. The panels will also have an anti-reflective coating, which is a thin, transparent layers designed to minimize light reflection and maximize absorption, thus boosting the efficiency PV cells. The modules will be attached to galvanized steel and reinforced concrete ground supports (**Figure 7**). Modules will be south facing and have an inclination of 45°, selected to optimize for lowest electricity cost. The modules will be mounted high enough to be clear from snow accumulations in winter. Module mounts will be 1 m apart from each other, in rows 20.4 m apart, with 27 modules per string.

94. The solar modules will be divided into groups of 2 x 27, for a total of 612 groups, connected to six 3500 kW capacity inverters. A total of 5,508 modules will be connected to each of the six inverter through 204 strings and 15 DC combiner boxes. The output voltage of the 3,300 kVA inverters will be 0.63 kV.

95. Inverters will be distributed throughout the solar module field, while a BES container, power converters, and power transformers will be located in the southwestern part of the site. There will be a 110 kV high-voltage switchgear and a 110/10 kV transformer with a 1x25 MVA capacity. With the solar modules, transformers, inverter, BES, and other equipment and

components, the total area of the plant will be 55.18 ha, with a fence length of 3,148 m. The site will be landscaped with native low profile xeric (drought-resistant) plants. A 900 m flood drainage will be included to provide site drainage and flood protection. Flood mitigation requirements will be assessed further during detailed design.

Figure 7: Typical PV panel ground supports.

Source: FSR, 2024.

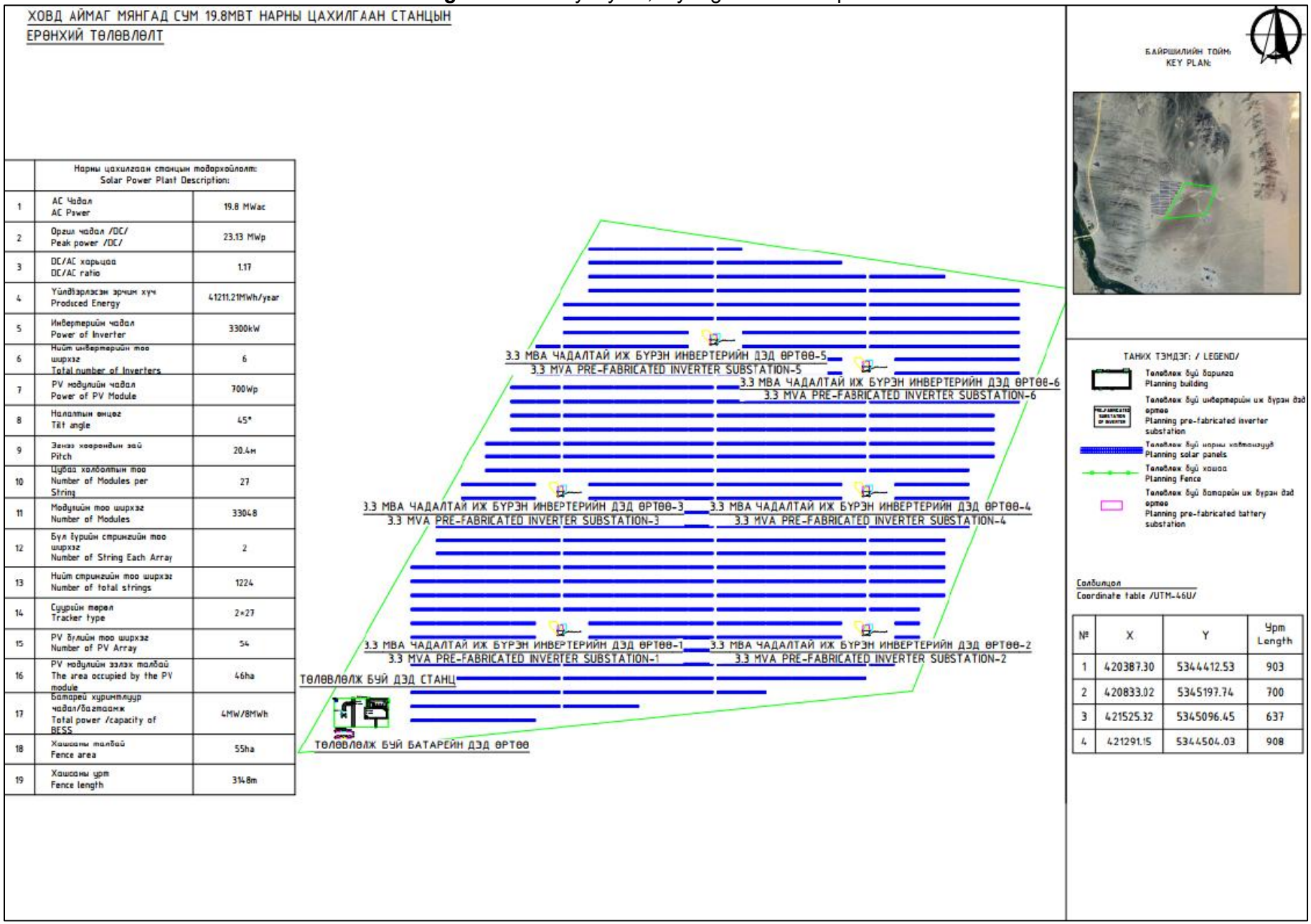
96. The installed capacity of the solar plant on the direct current (DC) side will be 23.13 MW, while the capacity on the alternating current (AC) side will be 19.8 MW, giving a ratio of DC to AC capacity of 1.17. The estimated average annual production of the solar power plant is 39,844 MWh/y[17].

97. **Figure 8** presents the Myangad Solar PV Plant layout, and **Figure 9** presents a single line diagram (SLD) schematic of the plant. **Figure 10** presents the bifacial solar PV panels. General plant design indicative indicators are presented in **Table 14**. Plant solar irradiation energy performance modelling results are presented in **Table 15**.

98. The plant will be equipped with a 4 MW / 8 MWh lithium-ion containerized battery energy storage (BES) system, located in the southwest corner of the site. A solar BES system stores solar energy to help balance the power grid and reduce electricity costs. The Myangad solar system BES will consist of four Luna 2000 lithium iron phosphate ($LiFePO_4$) closed units in parallel, with a total capacity of 7,758 kWh. The units include cooling and fire suppression systems (**Table 16** and **Figure 11**).

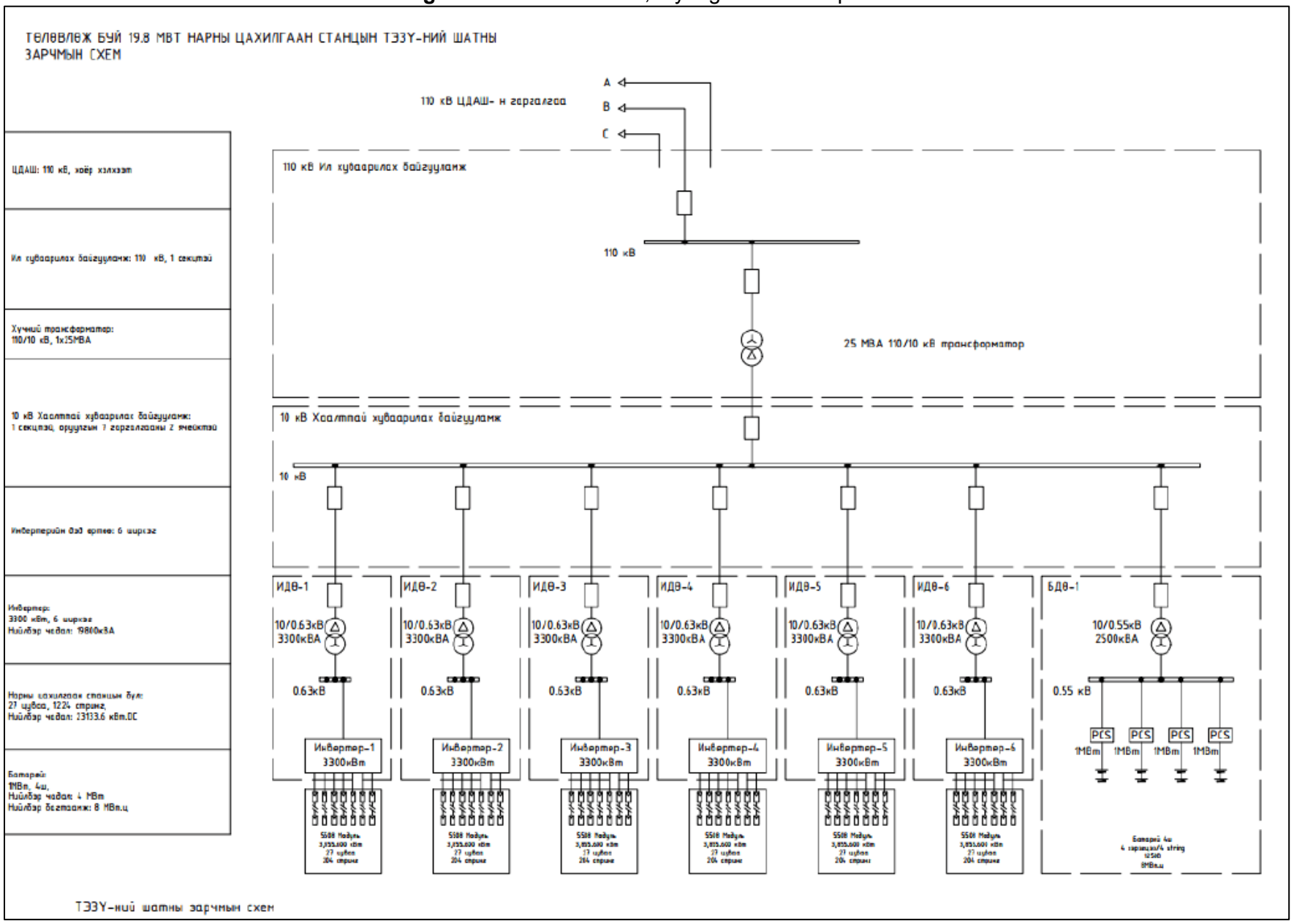
[17] Based on PVsyst - Simulation Report in FSR.

Figure 8: Facility layout, Myangad solar PV plant.



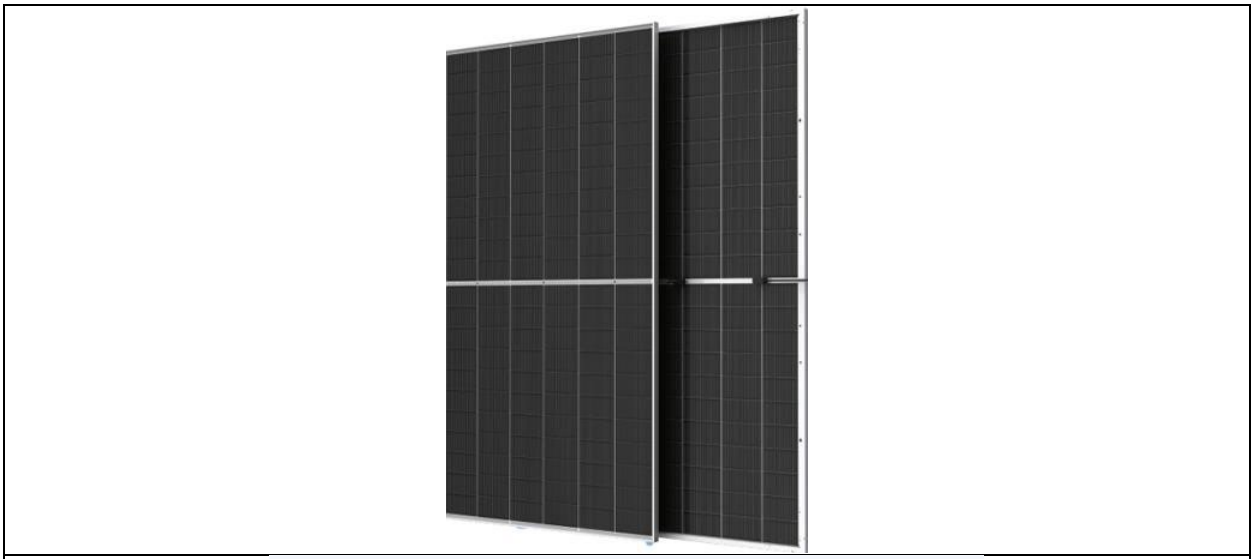
Source: FSR, 2024.

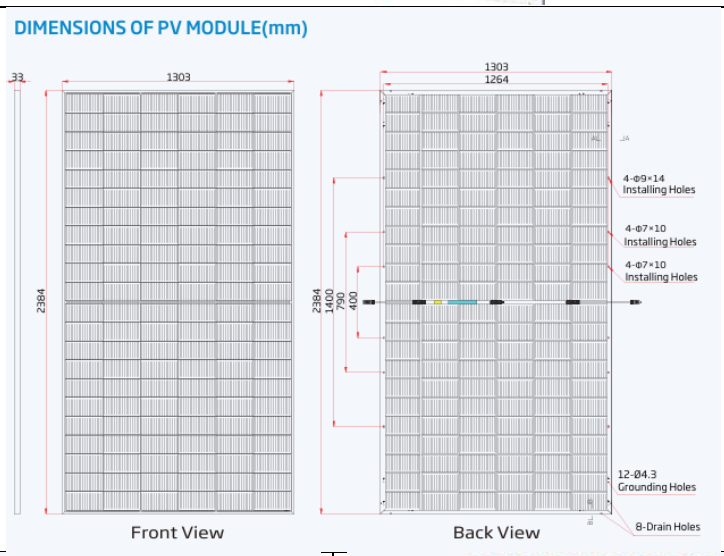
Figure 9: SLD schematic, Myangad solar PV plant.

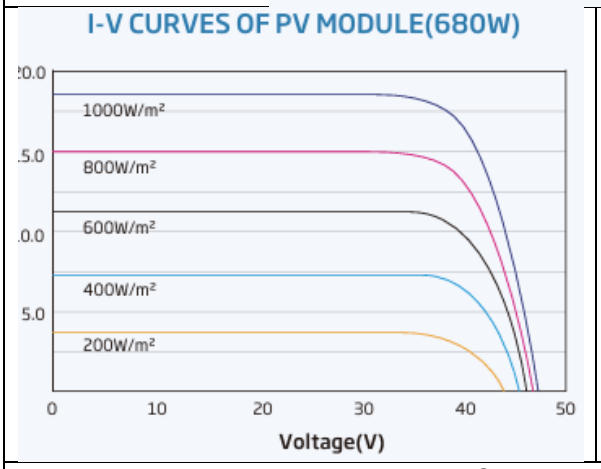


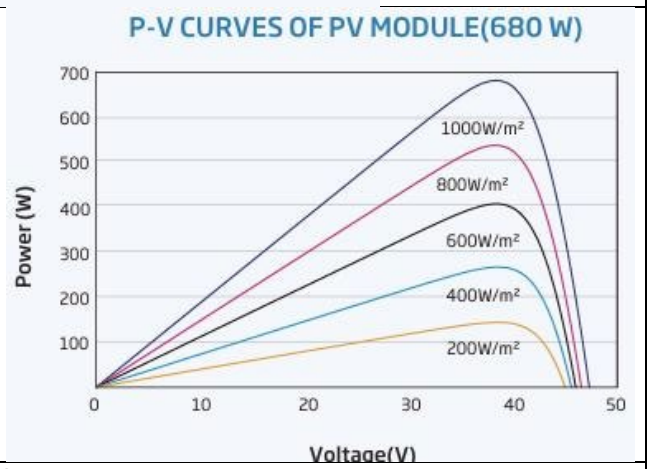
Source: FSR, 2024.

Figure 10: Vertex N Bifacial solar modules (model TSM-NEG21C.20).









Current and power curves

Source:
https://static.trinasolar.com/sites/default/files/Datasheet_Vertex_NEG21C.20_EN_2023_A_web.pdf

Table 14: Myangad solar PV plant indicative parameters.

Plant Boundary Point Locations	48°14'52.53"N, 91°55'39.31"E 48°15'18.16"N, 91°56'0.39"E 48°15'15.19"N, 91°56'34.03"E 48°14'55.90"N, 91°56'23.07"E
Area	Fenced area: 55.18 ha PV Module area: 46 ha
Solar Modules	Type: Vertex N Bifacial solar module, TSM-NEG21C.20 Number modules: 33,048 Capacity: 695 W maximum output Size: 1,303 x 2,384 x 33 mm Direction**:** Azimuth -0°, Inclination 45°
Module Mounts	Type: Galvanized steel and concrete ground mounted support structures Number: 528
Inverters	Number of inverters: six Number of solar power generator modules per inverter: 5,508 Specifications of the internal use transformer: 10/0.63 kV, 3300 kVA Bus voltage of the inverter output: 0.63 kV Power specifications of the inverter: 3,300 kVA Number of DC combiner boxes: 15 Number of strings: 204
BES Capacity	4 MW / 8 MWh
Annual Production over lifetime	39,844 MWh/y (based on PVsyst - Simulation Report in FSR)

Source: FSR, 2024.

Table 15: Myangad solar PV solar irradiation energy performance modelling results.

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray MWh	E_Grid MWh	PR ratio	PR ratio
January	54.3	38.90	-22.35	94.8	92.2	2431	2375	1.083	1.083
February	83.4	46.89	-18.15	136.2	134.4	3417	3110	0.987	0.987
March	133.5	69.88	-3.10	179.2	177.3	4278	3778	0.911	0.911
April	175.8	76.36	7.67	198.7	196.2	4615	4083	0.888	0.888
May	199.9	88.66	14.34	191.2	188.4	4494	4136	0.935	0.935
June	196.1	78.43	20.47	178.2	175.8	4184	3940	0.956	0.956
July	193.5	71.94	22.62	181.3	179.0	4177	3921	0.935	0.935
August	171.0	62.27	20.04	182.8	180.6	4141	3818	0.903	0.903
September	140.0	45.06	13.15	185.7	183.8	4156	3750	0.873	0.873
October	98.1	34.54	3.32	164.4	162.7	3768	3338	0.878	0.878
November	57.3	27.22	-8.11	116.0	113.4	2769	2588	0.964	0.964
December	45.1	25.91	-18.24	98.1	94.9	2422	2373	1.045	1.045
Year	1548.1	666.05	2.75	1906.7	1878.6	44852	41211	0.934	0.934

Legends

GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane	PR	Performance Ratio
GlobEff	Effective Global, corr. for IAM and shadings		

Source: Myangad Solar PV Plant PVsyst - Simulation report, Grid-Connected System. In FSR, 2024.

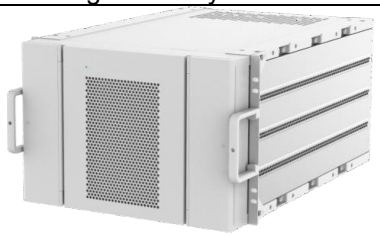
Table 16: Myangad solar PV BES Huawei Luna 2000 - 2.0 MWh - 2H0 unit specifications.

Parameter	Specification
Battery Container	
DC Rated Voltage	1,200 V
DC Max. Voltage	1,500 V
Nominal Energy Capacity	2,064 kWh
Rated Power (0.5C)	344 kW * 3
Rated Power (1C)	344 kW * 6
Container Configuration (W x H x D)	6,058 x 2,896 x 2,438 mm
Container Weight	≤ 30 t
Operation Temperature Range	-30 °C ~ 55 °C
Storage Temperature Range	-40 °C ~ 60 °C
Operation Humidity Range	0 ~ 100% (Without Condensation)
Max. Operating Altitude	4,000 m
Cooling Method	Smart Air Cooling
Fire Extinguishing	FM-200 / Novec 1230
Communication Interface and Protocol	Ethernet / SFP, Modbus TCP
Protection Degree	IP55
Battery Packs	
Cell Chemistry	LFP
Pack Configuration	16S1P
Rated Voltage	51.2 V
Nominal Capacity	320 Ah / 16.38 kWh
Supported Charge and Discharge Rate	≤ 1 C
Weight	≤ 140 kg
Dimensions (W x H x D)	442 x 307 x 660 mm

Source: FSR 2024; Huawei 2025.

Figure 11: Huawei Luna2000 - 2.0 MWh - 2H0 containerized BES.

Single BES System Unit



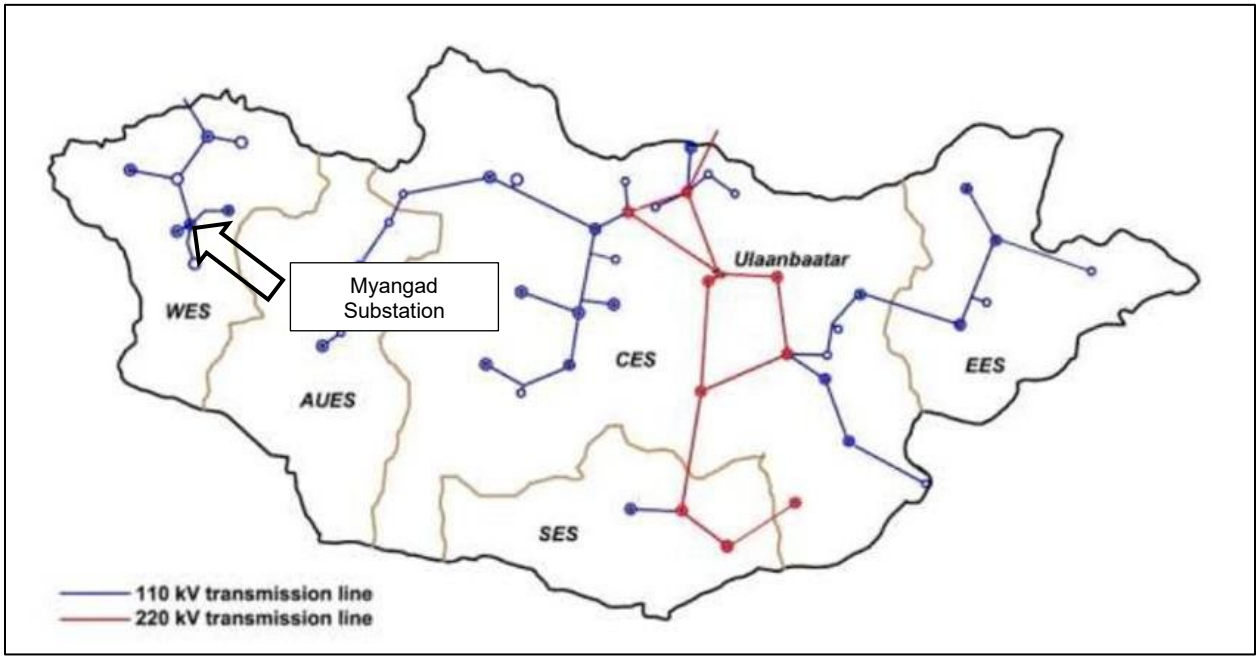
Individual Battery Pack

Source: FSR 2024; Huawei 2025.

3. Grid Connection

99. Electricity generated by the new 19.8 MW solar power plant will dispatched to the WES via the Myangad substation, improving system reliability and efficiency, and reducing the need for electricity imports from Russia. The Myangad substation is one of seven substations in the WES (**Figure 12** and **Table 17**).

Figure 12: Mongolian energy distribution systems, showing location of Myangad substation in the Western Energy System.



WES = Western Energy System, AUES = Altai-Uliastai Energy System, CES = Central Energy System, EES = Eastern Energy System, and SES = Southern Energy System.
Source: Energy Regulatory Commission of Mongolia 2023.

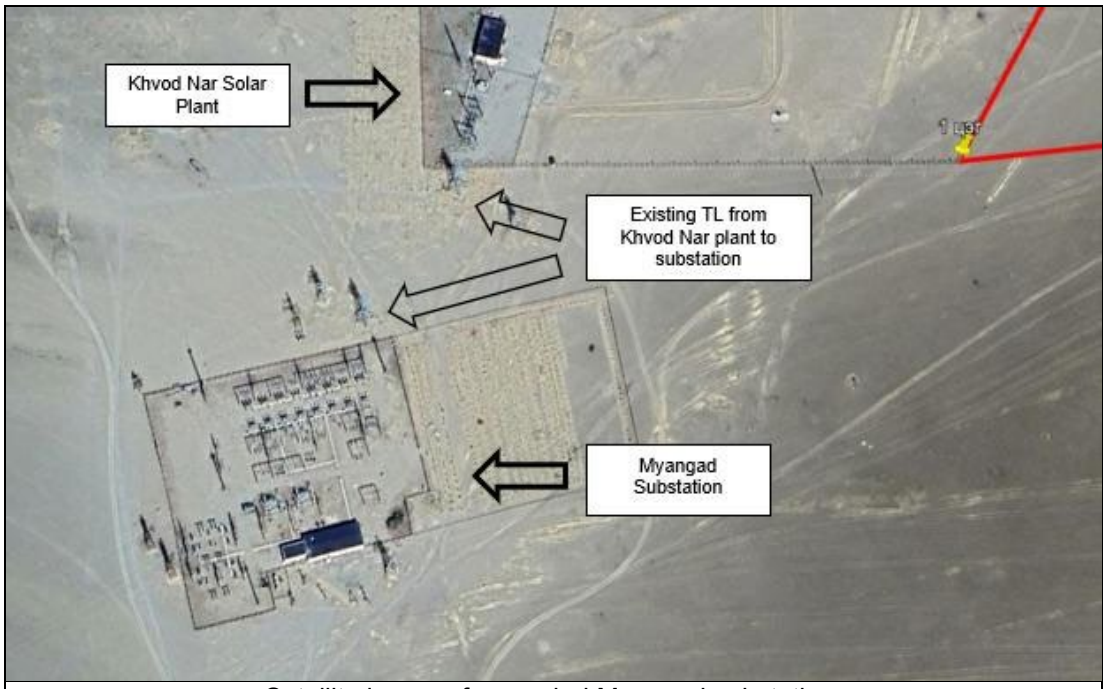
Table 17: Westen Energy System substations.

110/35/10 kV Ulaangom substation
110/35/10 kV Umnugovi substation
110/35/10 kV Malchin substation
110/35/6 kV Myangad substation
110/35/10 kV Bayan-Ulgiis Substation
110/35/10 kV Mankhan substation
110 kV of Durgun Hydropower Plant substation

Source: JICA, 2022.

100. The Myangad 110/35/6 kV substation was initially equipped with a 16 megavolt-amperes (MVA) transformer, but as part of the World Bank funded Khovd Nar 10 MW solar plant project, the substation underwent a $1.7 million refurbishment and upgrade to two 25 MVA transformers. The contract for the upgrade was awarded in March 2021, works were completed in March 2021, and the substation was commissioned in June 2022. It is currently fed by a single-circuit 110 kV TL from the Umnugovi substation, a single-circuit 110 kV TL from the Khovd Nar solar power plant, and a single-circuit 110 kV TL from the Durgun hydroelectric power plant. It has a single 110 kV output line towards Mankhan (**Figure 13**).

Figure 13: Upgraded Myangad 110/35/6 kV substation.



Satellite image of upgraded Myangad substation.

Wide angle view of upgraded Myangad substation looking north. Note Khovd Nar solar plant on the right.

Myangad substation looking north.

Source: Google Earth 2025; MOE, 2023.

101. The new 19.8 MW solar PV plant will connect to the Myangad substation via a short (330 m) double-circuit 110 kV TL. The line is expected to only require two lattice steel towers.

102. The Myangad substation has space available to expand its capacity to receive electricity from the new solar plant. While it is tentatively understood that a 25 MVA transformer will be installed, required upgrades will be defined during the subproject detailed design phase in cooperation with the WES.

C. Workplan and Implementation Period

103. The Mayngad Solar PV Plant will be implemented following a detailed design, procurement, installation, and commissioning approach. The construction workplan is presented in **Table 18**, and was developed based on technical requirements, experience constructing previous plants, and the available workforce.

Table 18: Myangad solar PV plant construction phase workplan.

No.	Work plan	Works Days Required
1	Recruit design and construction companies	10
2	Obtain necessary permits	150
3	Develop detailed design according to applicable standards and regulations, receive regulatory approvals	130
4	Procure equipment and materials	130
5	Construct solar PV plant and install equipment	120
6	Construct transmission line	50
7	Testing, commissioning, and operation	30
8	State commissioning and hand-over to owner	50
	Total	**360**

Source: FSR, 2024.
Note: does not include Myangad substation upgrading.

104. The overall UREP project began implementation in 2019 and will be completed in February 2027. The Myangad solar subproject is expected to take approximately 360 working days. It will start in 2025 and be completed by the third quarter of 2026.

D. Implementation Arrangements

105. The MOE is the UREP EA. A project steering committee, composed of the MOE and the Ministry of Finance has been established to provide overall guidance on project management and implementation. The Western Energy System (WES)[18] is the IA for the Phase II subprojects in western Mongolia, including this subproject, and the NREC is the IA for GSHP subprojects. A project management unit (PMU) under MOE is responsible for managing, coordinating, and supervising the implementation of all subcomponents. Once constructed the solar plant will be owned and operated by the WES.

[18] The Western Energy System (WES) serves consumers in Uvs, Bayan-Ulgii and Khovd aimags, and is responsible for power transmission and import.

E. Project and Subproject Cost

106. The UREP project has an estimated budget of $66.22 million (**Table 19**). The budget for the Myangad 19.8 MW Solar PV Plant subproject is $20 million, of which $7.37 million will be financed by a grant from the ADB, and the remaining amount will be financed by a loan from the ADB.

Table 19: Estimated UREP project budget ($ millions). Shading denotes the Myangad Solar Power subproject.

Item		Amount[a]
A.	**Base Cost**[b]	
	Output 1: Distributed renewable energy system developed	
	a. Altai solar photovoltaic	11.05
	b. Altai *soum* (county) renewable energy hybrid system and battery storage	1.05
	c. Uliastai solar PV and battery storage	9.05
	d. Myangad solar PV and battery storage	20.00
	e. Murun solar photovoltaic	10.24
	Output 2: GSHP systems developed	1.14
	Output 3: Institutional framework strengthened and organizational capacity enhanced	1.76
	Subtotal (A)	**56.73**
B.	**Contingencies**[c]	**4.37**
C.	**Financial Charges during Implementation**[d]	**5.12**
	Total (A + B + C)	**66.22**

[a] Includes taxes and duties of $5.62 million. Such amount does not represent an excessive share of the project cost.
[b] In April 2018 prices.
[c] Physical contingencies computed at 5.0% of base cost. Price contingencies computed at an average of 3.9% on foreign exchange costs and 20.3% on local currency costs; includes provision for potential exchange rate fluctuation assuming a purchasing power parity exchange rate.
[d] Includes interest and commitment charges. Interest during construction for the loan from ordinary capital resources has been computed at the 5-year USD fixed swap rate plus an effective contractual spread of 0.5% and maturity premium of 0.1%. Commitment charges for this loan are 0.15% per year, to be charged on the undisbursed loan amount.

Source: Asian Development Bank estimates.

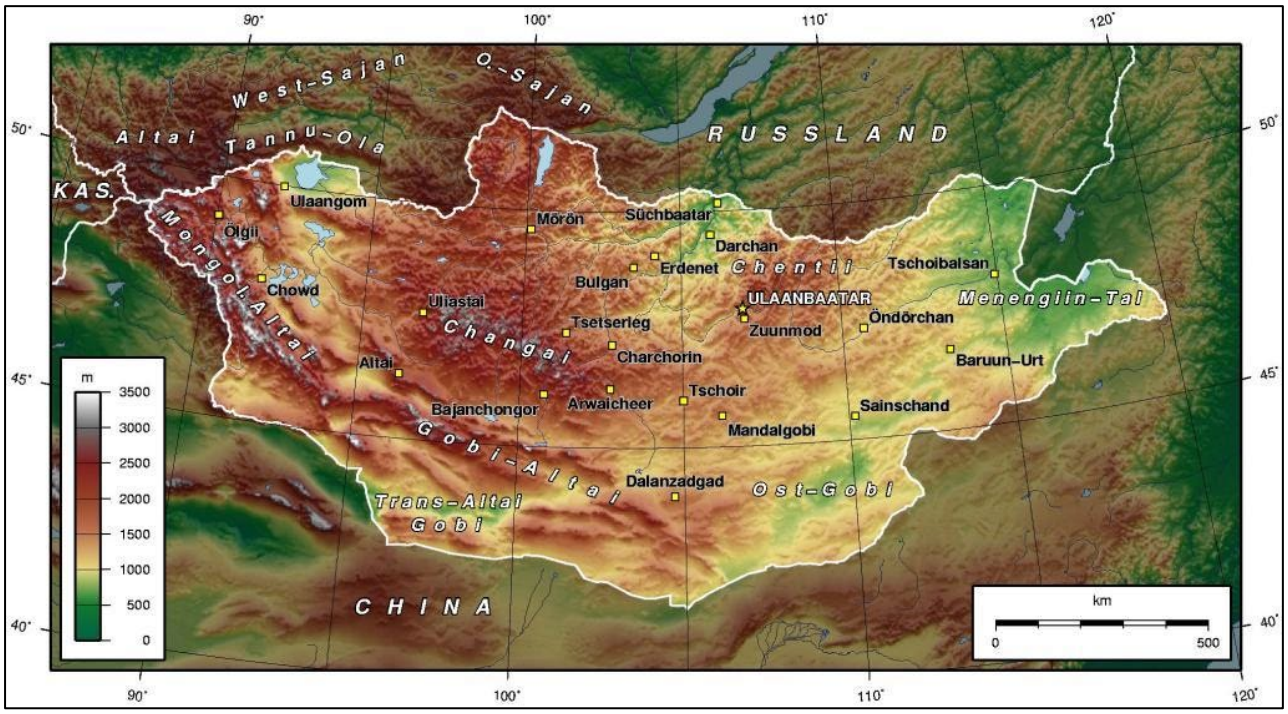
IV. Description of the Environment

A. Mongolia

107. **Location**. Mongolia is a landlocked country in east-central Asia bordered by Russia to the north (3,543 km border length) and China to the south, east and west (4,709 km border length). It has an area of 1,564,116 km^2, and with a population of 3.4 million (2024, UN data), Mongolia is one of the most sparsely populated countries in the world.

108. **Topography.** Mongolia's terrain is one of mountains and rolling plateaus, with a high degree of relief. It can be divided into the Mongolia Plateau, the highlands, and the Gobi Desert. Much of the southern portion of the country is taken up by the Gobi Desert, while the northern and western portions are largely mountainous. The highest point is the Khuiten peak (4,374 masl) of Mount Tavan Bogd in the west of the Altai range and the lowest point is Khukh Nuur (532 masl) in the northeast in Dornod Aimag. It has an average elevation of 1,580 masl, and 81.2% of its territory is above 1,000 masl and only 18.8% is below 1,000 masl. Overall, the land slopes from the high Altai Mountains and valleys of the west and the north to plains and depressions in the east and the south (**Figure 14**).

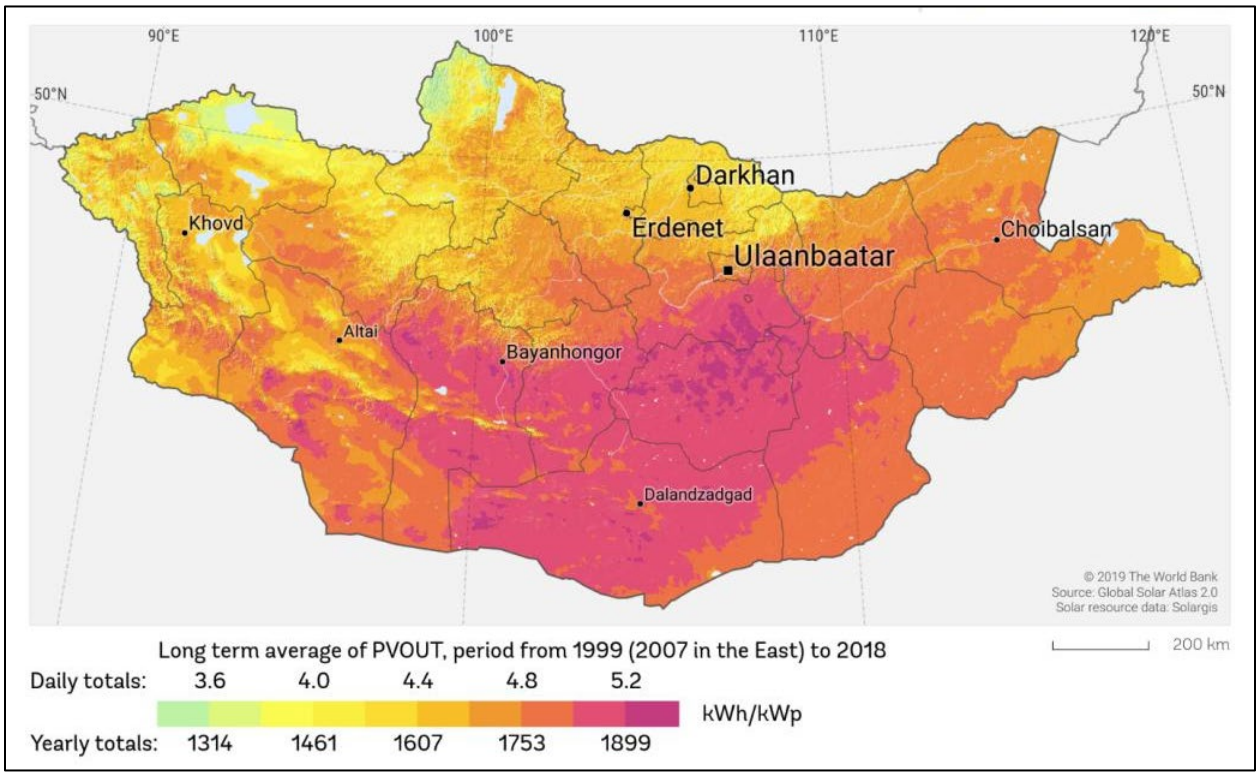
Figure 14: Topography of Mongolia.



Source: http://www.mongols.eu/maps-of-mongolia/thematic-maps/.

109. **Climate.** Mongolia has a northern continental climate characterized by long, cold winters, short summers, and an average of 257 cloudless sunny days per year. Mongolia receives from 2,600 to 3,330 hours of sunshine annually, making it one of the sunniest countries in the world and giving an average potential solar energy production of 66 MW/km^2.

Figure 15: Mongolia photovoltaic power potential map, in kWh/kWp.



Note: The photovoltaic (PV) potential represents the expected lifetime average electricity production (in kWh) produced per kilowatt of installed photovoltaic DC capacity rated at Standard Test Conditions (STC) for grid-connected PV systems without batteries.
Source: Prepared by Solargis for World Bank. Downloaded 2025 from https://globalsolaratlas.info/

110. Precipitation is highest in the north, averaging 200 to 350 mm annually, and lowest in the south, averaging 100 to 200 mm annually. More than 60% of precipitation falls in the summertime. With wintertime temperatures regularly below -30 °C, Mongolia is among the coldest countries in the world.

111. **Ecology.** Mongolia occupies an ecological transition zone in Central Asia where the Siberian taiga forest, Central Asian steppe, Altai Mountains and Gobi Desert meet. Mongolia's taiga, steppe and desert ecosystems have been less affected by human activity than is generally the case in neighboring countries.

112. A total of 5,682 plant species have been recorded in Mongolia, including 2,950 vascular plant species, 445 moss species, 999 lichen species and 1,288 algae species. More than 100 species of plants are currently used for medicinal purposes and more than 200 species for pharmaceutical purposes. Forest occupies 12.1% of the total land area, comprising 140 species of trees and shrubs, with larch being the dominant species. Over 13,000 species of insects have been recorded.

113. There are 472 bird species that have been recorded in Mongolia, of which 391 are migratory. This high percentage of migratory bird species is due to the four major global migratory routes recognized in Mongolia: the East Asia-Australasia flyway, Central Asia flyway, West Pacific flyway and the Africa-Eurasia flyway.

114. Mongolia is host to 138 species of mammals, although this number is likely incomplete due to few studies having been conducted. One study did determine that 128 species were native and 4 were non-native and naturally acclimatized. The native wild horse (Przewalskii horse) was last sighted in the mid-1960s and re-introduced in the early 1990s. Due to Mongolia's harsh continental climate, it has a relatively low herpetofauna diversity. There are 6 species of amphibians and 21 species of reptiles. Being landlocked, the country is dependent on its lakes and rivers for water, as are its 76 fish species.[19]

115. In Mongolia there are 120 state protected areas established with an area of 32.8 million ha, equal to 21% of the country's total territory (MET, 2023). These include Strictly Protected Areas (SPA), National Parks (NP), Nature Reserves (NR), and Natural Monuments (NM).

116. **Socioeconomic Profile**. Mongolia has a population of 3.409 million, comprised of 908,000 households (HHs). **Table 20** presents basic socio-economic data for the country.

117. Since 1990 Mongolia has successfully transitioned from a centrally-planned economy into one of the world's fastest growing market-oriented economies. Mongolia has significant mineral resource wealth estimated at US$ 1-3 trillion, with coal, copper, and gold being the principal reserves. Mining is the most significant sector of the economy, accounting for 20% of total output, and related commodities constitute 82% of total exports. China is Mongolia's main export destination. Due to a lack of diversification in export products and a heavy reliance on foreign capital inflows to meet its investment needs, Mongolia is susceptible to volatile mineral market cycles.

118. Thirty-three percent of Mongolia's population is under 14 years of age and 75% is under 35. Over 67% of the total population live in urban areas, while the rest live a seminomadic lifestyle. Nearly 90% of the population is Mongol, among whom the Khalky-Mongols are the largest subgroup (about 75% of the total). The next largest group is the Kazakhs (5.3%) who live predominantly in the far west. There are also other smaller ethnic groups including Tuvins, Uzbeks Uighurs, Russians, Chinese and others.

Table 20: Mongolian socio-economic data.

No.	Information	Unit	Total	Urban	Rural	Male	Female
1	Population	Person, thousand	3409.9	2316.5	1041.0	1674.0	1735.9
2	Number of households	Household, thousand	908.7	67.3%	32.7 %	641.4	25594
3	Age distribution	Person, thousand					
	- Under 15	Person, thousand	992.3			400.2	592.1
	- 15 – 59	Person, thousand	2037.6			999.7	1037.9
	- 60 and over	Person, thousand	249.9			101.5	148.4
4	Unemployment rate	%	7.0				
5	Employment by sector		1162.9			611.8	551.1
	- Agriculture, forestry, fishing and hunting	Person, thousand	276.5			154.2	122.3
	- Mining and quarrying	Person, thousand	51.5			42.5	9.0

[19] Mongolia Biodiversity Profile, Convention on Biological Diversity, 2022.

No.	Information	Unit	Total	Urban	Rural	Male	Female
	- Processing industries	Person, thousand	89.7			45.1	44.6
	- Construction	Person, thousand	77.3			66.0	11.3
	- Wholesale and retail trade	Person, thousand	166.6			84	82.6
	- Public Administration	Person, thousand	83.4			44.7	38.7
	- Education services	Person, thousand	110.7			29.7	81.0
	- Others	Person, thousand	307.2			145.6	161.6
6	National poverty line	MNT/person/month	28.4		23.8		
7	Population living below the national poverty line	Household	27.8%				

Source: TA social consultants, and Mongolian Statistical Yearbook.

119. Mongolia's political system is a parliamentary republic. Administratively Mongolia is divided into 21 aimags or provinces, and 331 soums or districts. Soums are further subdivided into bags, the lowest level of administrative subdivision. While soums always have a permanent settlement as administrative centers, many bags don't. The capital Ulaanbaatar is the largest city, and home to 45% of the population. It is administered as an independent municipality.

B. Myangad Soum, Khovd Aimag

120. Unless stated otherwise, information in the following section is based on the Baseline Environmental Studies (BESs) prepared for the Khovd Nar 10 MW Solar Power Plant and for the subproject 19.8 MW Solar Power Plant.

1. Physical Resources

a. Geography and Topography

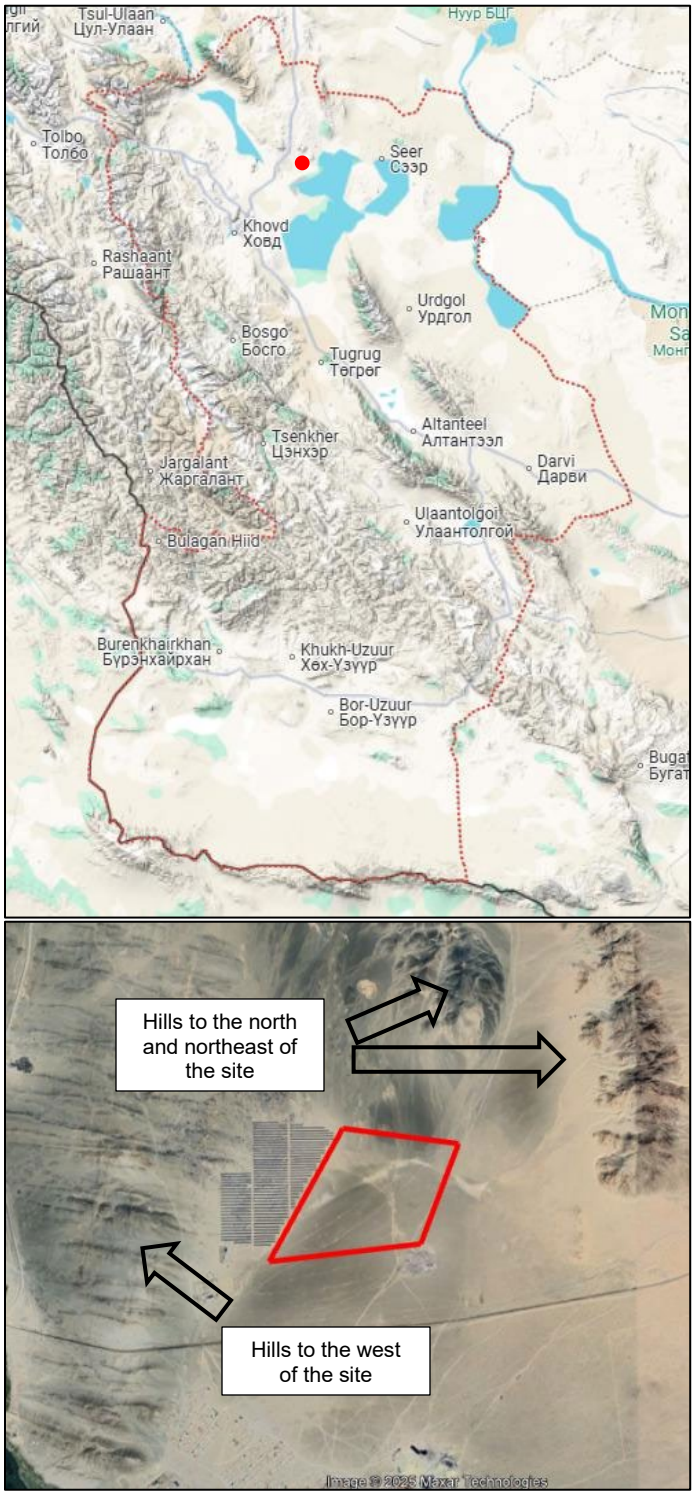
117. Khovd Aimag is located in the Altai mountain range, and includes large mountains such as Munkhkhairkhan, Khokhserkh, Baatar Khairkhan, and Myangan Ugalzat. The main Altai range is about 100 kms to the west of the subproject site. About 20% of the aimag's area is steppe, including the subproject site.

118. Khovd City is the aimag capital, and is officially known as Jargalant Soum. Myangad Soum is situated in the northern portion of the aimag, while the Myangad Soum center, located in Bayankhoshuu Bag, is situated in the southeastern portion of the soum. The Soum center is situated in the northern western portion of the Khar-Us Lake depression and on the eastern bank of the Khovd River (**Figure 16** and **Figure 17**).

119. The 55.18 ha subproject site is located 1.2 km north of Myangad Soum Center, 2.2 km east of the Khovd River, and immediately to the east of the World Bank funded Khovd Nar 10 MW Solar Power Plant. The site is on a plateau and slopes down gently from north to south. The site is generally flat with elevations ranging from 1,189 to 1,176 masl and an average slope of 1.9%. There are small hills to the north of the site with a maximum elevation of 1,262 masl, and the site is steepest on the northern side. There is also a low range of hills running parallel to Khovd River between the site and the river which provide protection from river flooding.

120. A waste disposal site is located 200 m to the east of the site, but it will be decommissioned by the Myangad Soum government in 2024 or 2025 and replaced by a new Category 3 Controlled Landfill three km to the northwest of the subproject site (about 6 km by road) (**Figure 17**).

Figure 16: Khovd Aimag topography in relation to subproject site, and local site topography

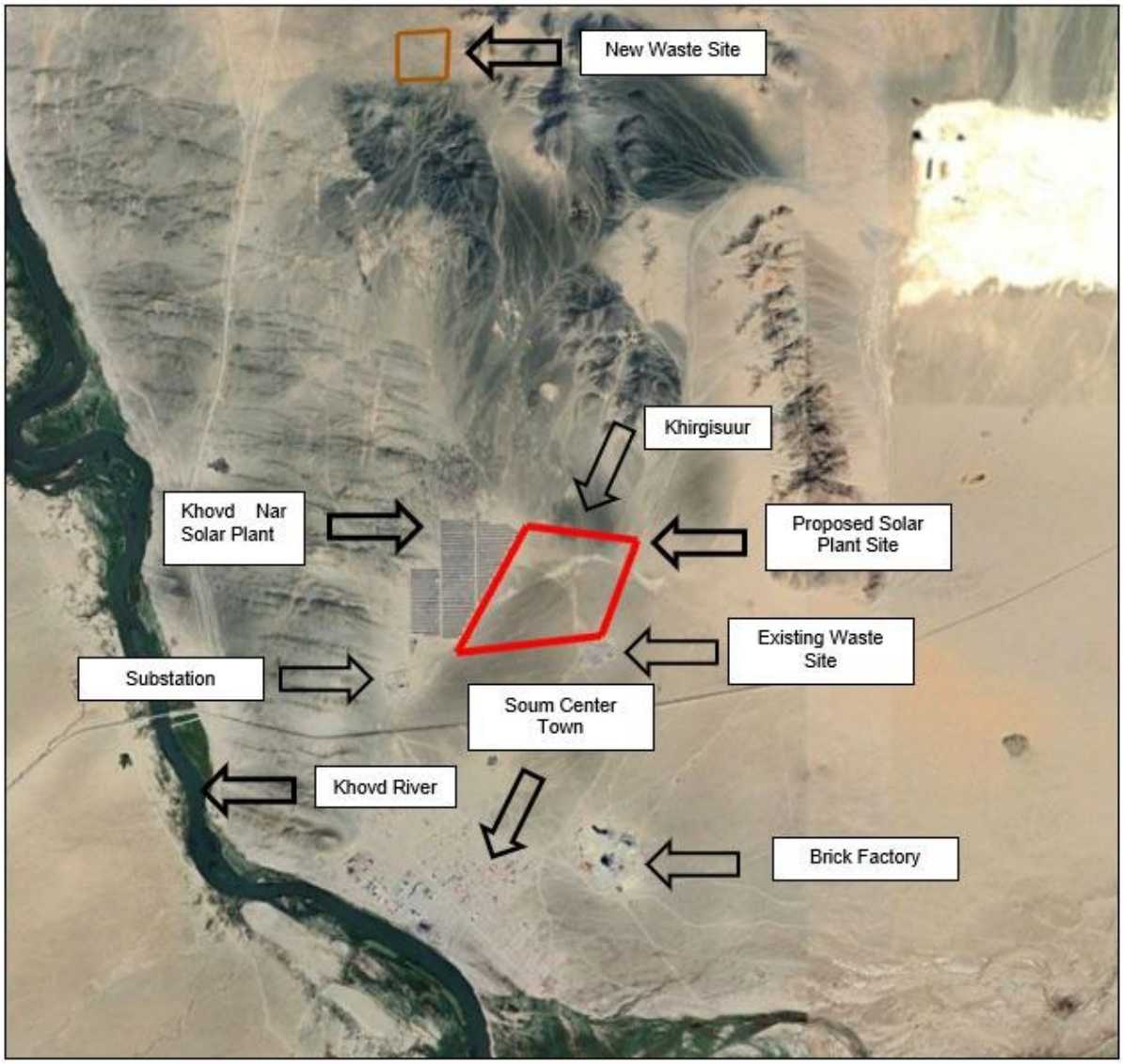


Source: Google Maps, 2025; Google Earth 2025.

121. Mayngad Road and a 110 kV transmission line are located 500 m to the south. The Myangad 110/35/10 kV substation is located 350 m to the southwest of the site.

122. Immediately beyond the northern perimeter there is a Khirgisuur[20] and a burial tomb. There is a seasonal flood channel running from the north to the south on the eastern side. The solar plant layout has been planned to avoid the burial area to the north, and previous landfill areas; the Khovd Nar solar plant is partially located on reclaimed landfill area, but it does not extend into the new solar plant site area.

Figure 17: Area around proposed 19.8 MW Myangad solar power plant, Myangad Soum, Khovd.



Source: FSR 2025; Google Earth 2025.

b. Land Use

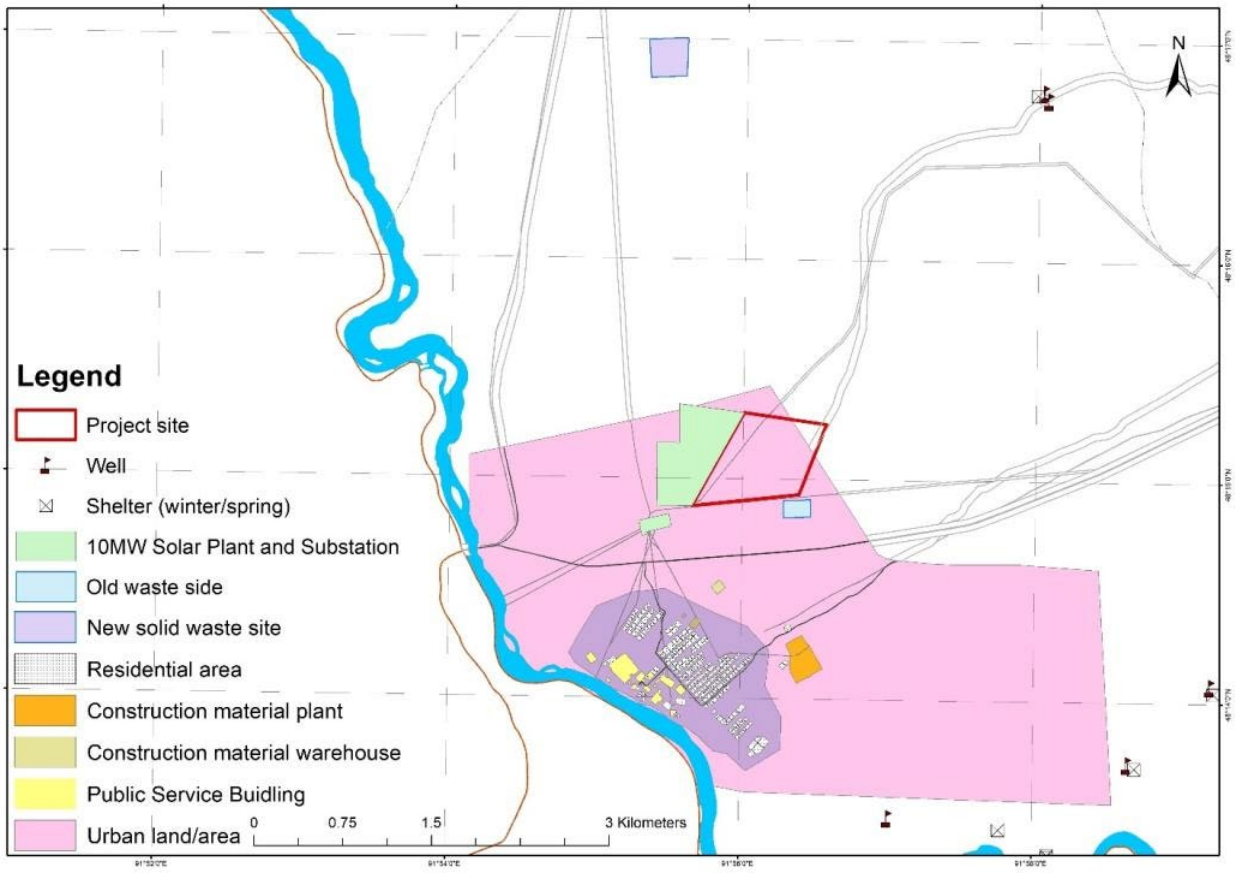
123. The land at the site is unoccupied. It is immediately to the east of the World Bank funded 10 MW Myangad Solar Power Plant, which has been in operation since June 2023. As noted

[20] A Khirgisuur is a bronze or iron age burial mound with external stone rings, found in the western part of Mongolia.

above, the solar plant layout has been planned to avoid the burial area to the north, and previous landfill areas. There are no residences or other structures in the subproject site. Local authorities and land officers have recommended the site.

124. The site has been heavily grazed by cattle, sheep and horses, but there are no winter camps for livestock. The site is crossed extensively by a series of informal dirt road tracks, typical to many peri-urban areas of Mongolia (**Figure 19**).

Figure 18: Landuse around proposed 19.8 MW Myangad solar power plant, Myangad Soum, Khovd Aimag.



Source: Myangad Solar PV Plant BES, 2025.

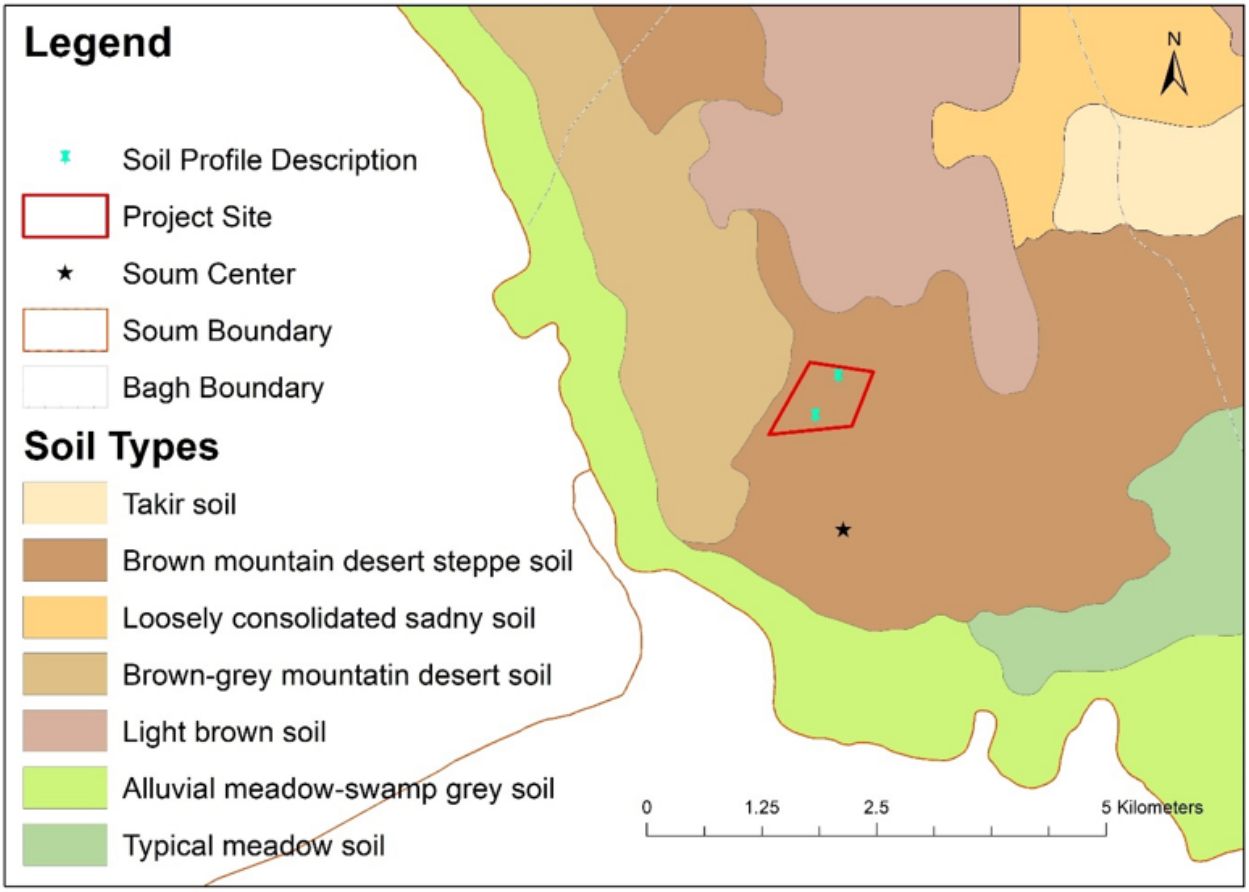
c. Soils

125. A site soil survey was undertaken, with two soil profiles and soil mechanical and chemical analyses. Based on local soil maps (**Figure 20**) and the soil survey, the site is uniformly covered with low fertile sandy brown mountain desert steppe soils. **Figure 21** and **Figure 22** present the soil survey locations, and **Table 21** presents the soil profile morphology records.

Figure 19: Subproject area informal dirt road tracks, encompassing approximately 14.5 ha.

Source: FSR 2025; Google Earth 2025.

Figure 20: Subproject area soil map.

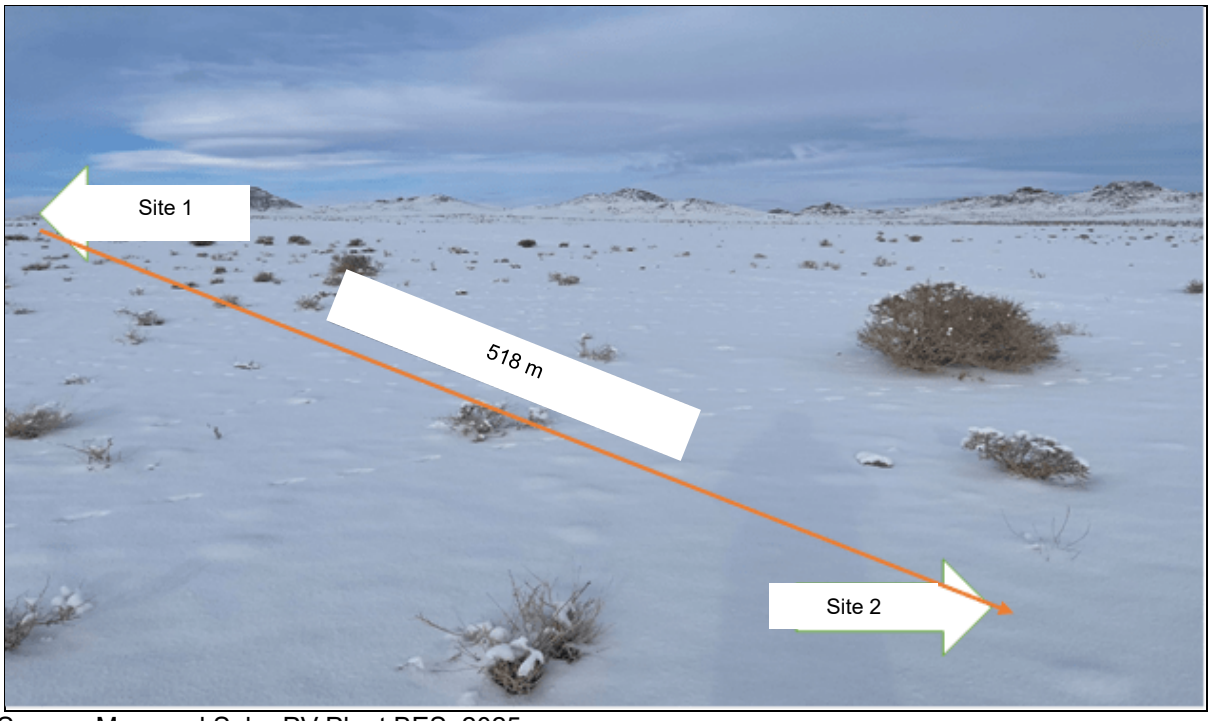


Source: Myangad Solar PV Plant BES, 2025.

Figure 21: Soil survey site locations.

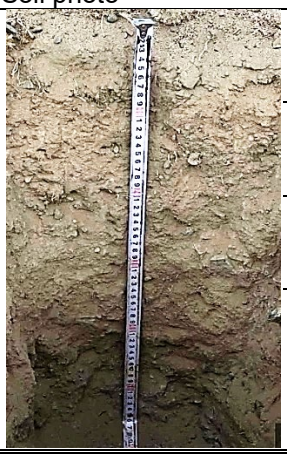
Source: Myangad Solar Power Plant BES, 2025; Google Earth 2025.

Figure 22: Photograph of soil survey sites.



Source: Myangad Solar PV Plant BES, 2025.

Table 21: Soil profile morphology records.

Soil site number		**Site 1**
Location		Myangad soum, Khovd aimag
Coordinates		48°15'13.025"N
		91°56'15.670"E
Date		2025.01.12
Earth's surface		Inside the project site courtyard
Soil name		Mountain desert steppe brown soil
Soil photo	Depth cm	Morphological writing
	0-16	Light brown, granular-granular structure, small crushed stones 30-40%, sandy, dry, dense, among plant roots, eroded by hydrochloric acid, carbonated, clear with a transitional color.
	20-30	Light gray, granular-granular texture, small crushed stones 40-50%, sandy, dry, dense, few plant roots, strongly acidified by hydrochloric acid, clear and variable in color transitions.
	30-45	Light gray, granular-granular texture, small crushed stones 40-50%, sandy, dry, dense, few plant roots, strongly acidified by hydrochloric acid, clear and variable in color transitions.
	50-60	Yellowish-gray, structureless, with large and small crushed pebbles and sand deposits, dry, compact, very rare in the upper part of the plant root layer and absent below a depth of 60 cm, corroded by hydrochloric acid
Soil site number		**Site 2**
Location		Myangad soum, Khovd aimag
Coordinates		48°14'58.956"N
		91°56'3.880"E
Date		2025.01.12
Earth's surface		Inside the project site courtyard
Soil name		Mountain desert steppe brown soil
Soil photo	Depth cm	Morphological writing
	0-16	Light brown, granular-granular texture, 30-40% small crushed stones, sandy, dry, dense, among plant roots, eroded by hydrochloric acid, carbonated, clear with a transitional color.
	16-33	Light gray, granular-granular structure, small crushed stones 40-50%, sandy, dry, dense, few plant roots, strongly eroded by hydrochloric acid, clear and variable color transitions.
	33-60	Yellowish-gray, structureless, large and small pebbles and sand sediments are present, dry, compact, very rare in the upper part of the plant root layer and absent below a depth of 60 cm, and are exposed to hydrochloric acid. The sediments of deluvial-proluvular origin are composed of large and small pebbles and sand. In other words, they are similar to section 1.

Source: Myangad Solar PV Plant BES, 2025.

126. **Chemical Properties.** The soil chemical analysis results indicate that the humus content of the brown mountain desert steppe soils is low, averaging 0.56% between the two sites at a soil depth of 0-16 cm, which is typical of the Mongolian mountain desert steppe regions. Soil pH ranges from 8.6 to 9.1 at a depth of 0-16 cm, which represents a medium alkaline environment. Carbonates in the upper layer is 0.6%. The total exchangeable base content was 16-20 meq/100g in the upper layer, while it increased to 15-22 mg-eq/100g in the lower layers. The nutrient content of mobile phosphorus is 1.1-2.1 meq/100g, and the potassium content is 19-20 meq/100g, which

is low (**Table 22**).

Table 22: Subproject soil chemical properties.

Site	Depth, cm	pH	EC 2,5 ds/m	Humus, %	$CaCO_3$ %	CO_2	Exchange base, meq/100 g			Nutrient elements mg/100 g	
							Ca+Mg	Ca	Mg	P_2O_5, meq	K_2O meq
Cut-1	0-16	8.63	0.151	0.23	0.07	0.32	16.2	10.8	5.4	1.1	19
	20-30	8.91	0.279	0.18	0.13	0.99	15.1	8.5	6.6	0.9	13
	30-45	8.83	0.323	0.11	0.16	0.49	17.7	9.1	8.6	0.7	5
	50-60	8.81	0.275	0.09	0.13	0.66	15.2	9.4	5.8	0.6	5
Cut-2	0-16	9.14	0.124	0.89	0.06	1.98	19.8	11.8	8.0	2.1	20
	16-30	9.01	0.137	0.77	0.06	0.32	22.8	15.4	7.4	1.0	16

Source: Myangad Solar Power Plant BES.

127. **Mechanical Properties.** Based on soil mechanical property analysis, the site has medium and fine sandy soils (**Table 23**).

Table 23: Subproject soil mechanical properties.

Site	Depth, cm	Mechanical composition, % Grain size, mm						
		1-0.25	0.25-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001	<0.01
Cut-1	0-16	19.3	58.2	10.1	3.0	5.6	3.9	12.4
	20-30	44.4	35.8	5.4	3.0	6.7	4.7	14.4
	30-45	17.2	68.9	2.9	3.1	7.2	0.8	11.1
	50-60	17.8	65.9	5.9	2.9	6.9	0.6	10.3
Cut-2	0-16	23.4	46.6	11.0	2.9	7.9	8.2	19.1
	16-30	44.7	28.7	7.5	3.9	11.8	3.4	19.1

Source: Myangad Solar PV Plant BES, 2025.

128. **Heavy metal content.** Heavy metal levels in site soils are well below Mongolian standards (**Table 24**).

Table 24: Subproject soil heavy metal levels.

Site	Depth, cm	Heavy metal content mg/kg					
		Ni	Cd	Pb	Zn	Cr	Cu
Cut-1	0-16	10.74	0.0	11.02	51.82	7.14	9.10
	20-30	13.02	0.0	13.48	64.31	13.42	13.12
Tolerable content (MNS 5850 : 2008)		150.0	3.0	100.0	300.0	150.0	100.0
Toxic content (MNS 5850 : 2008)		1000.0	10.0	500.0	600.0	400.0	500.0
Hazardous content (MNS 5850 : 2008)		1800.0	20.0	1200.0	1000.0	1500.0	1000.0

Source: Myangad Solar PV Plant BES, 2025.

129. **Origin**. Site soils are predominantly deluvial-proluvial in origin:

- Deluvial sediment refers to materials such as clay, sand, and gravel that have accumulated on mountain slopes as rain and snow runoff have washed them down. It is mainly distributed in foothills and valley slopes.

- Proluvial sediments are made of rough clastic material, unclassified partly processed materials, and clay materials that have been transported by rivers. This type of sediment often accumulates in the upper reaches of a river basin, forming layers of gravel, sand, and silt.

d. Earthquake Risks

130. Mongolia lies within a seismically active region prone to earthquakes caused by faulting along strike slip faults. According to the Mongolia earthquake risk Modified Mercalli scale map produced by UN OCHA, the site is a Degree VI risk zone (**Figure 23**). The map indicates that the site is in a medium risk zone and not in the higher risk areas of Western Mongolia.

131. The World Bank GFDRR hazard screening tool ThinkHazard[21] also indicates that the site is in a medium earthquake hazard risk zone, meaning that there is a 10% chance of potentially-damaging earthquake shaking in the project area in the next 50 years. Based on this information, the impact of earthquake should be considered in all phases of the project, in particular during design and construction. Project planning decisions, project design, and construction methods should take into account the level of earthquake hazard.

e. Climate

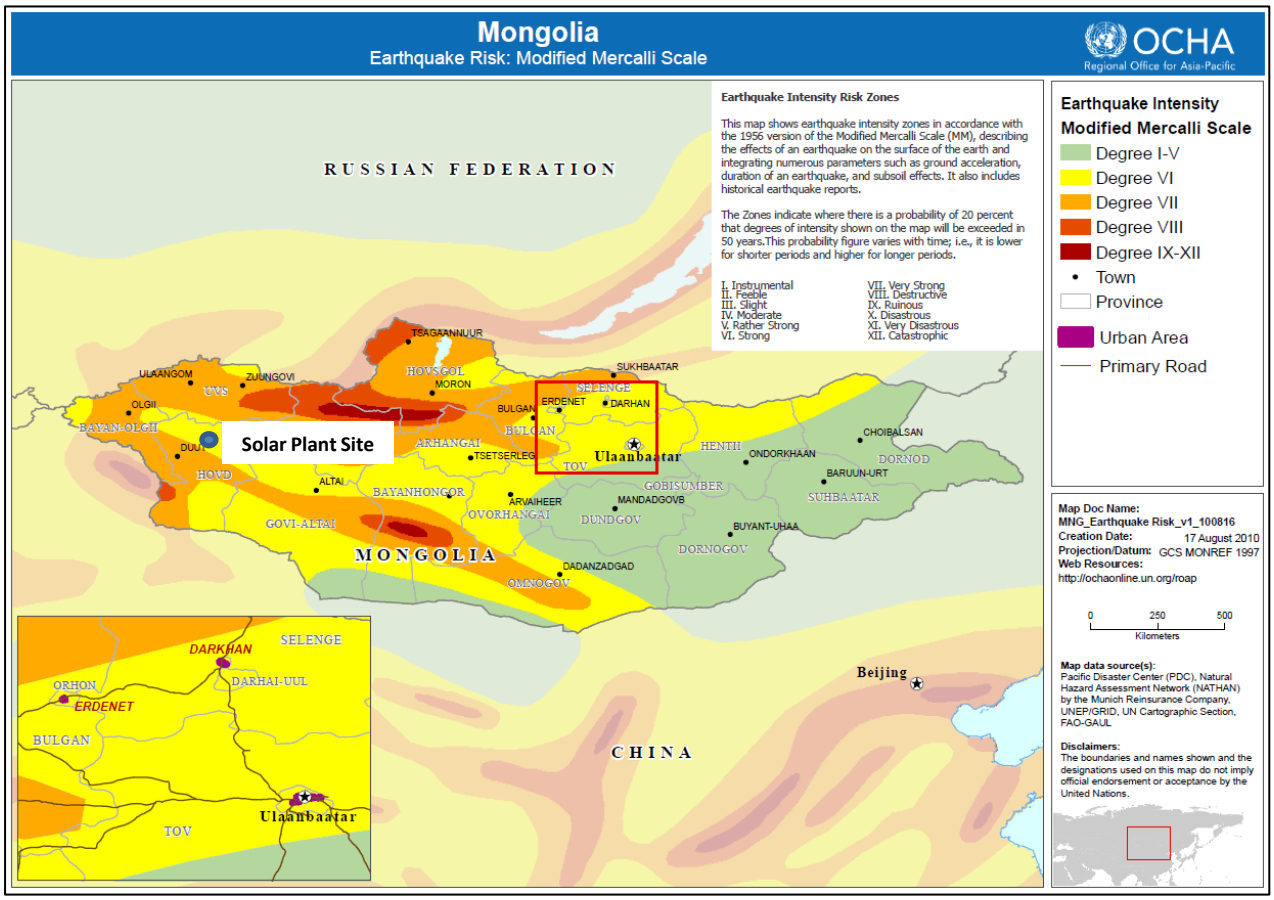
132. Myangad Soum has a dry northern continental climate, characterized by long cold dry winters and short moist summers. Based on data from the Myangad climatological station dating back to 1962, average annual precipitation is only 57.7 mm. Approximately 83% of the average annual precipitation falls in summer months, and 62% in July and August. An average of only 3.9 mm of precipitation falls in the winter season (November to March). The maximum recorded monthly precipitation in the soum was 153.9 mm. Average annual relative humidity is 49%. In spring months relative humidity is 41 to 44% and in the coldest winter months it is 76 to 79%.

133. It rains 40 to 70 days a year and snows 25 to 30 days a year. There is snow cover 120 to 140 days a year. The snow cover has a density of 0.17 to 0.23 g/cm^3, providing a water reserve of 10-17 mm. The average annual temperature is 1.4 °C. The coldest month is January with an average temperature of -23.4 °C and a lowest recorded temperature of -43.3 °C. The hottest month is July with an average temperature of 21.1 °C and a maximum recorded temperature of 37.8 °C.

134. The site receives an average of 2,920 hours of sunlight per year. Average monthly sunshine duration is 145 to 170 hours in winter months, and 300 to 320 hours in spring, summer and autumn months. Average annual Global Horizontal Irradiance (GHI) is 1,532 kWh/m^2 and Diffuse Irradiance is 566.9 kWh/m^2. Monthly and annual average Myangad Soum solar radiation data is presented in **Table 25**.

[21] ThinkHazard provides a general view of the hazards, for a given location, that should be considered in project design and implementation to promote disaster and climate resilience. The tool highlights the likelihood of different natural hazards affecting project areas (very low, low, medium and high), provides guidance on how to reduce the impact of these hazards, and where to find more information. The hazard levels provided are based on published hazard data, provided by a range of private, academic and public organizations.

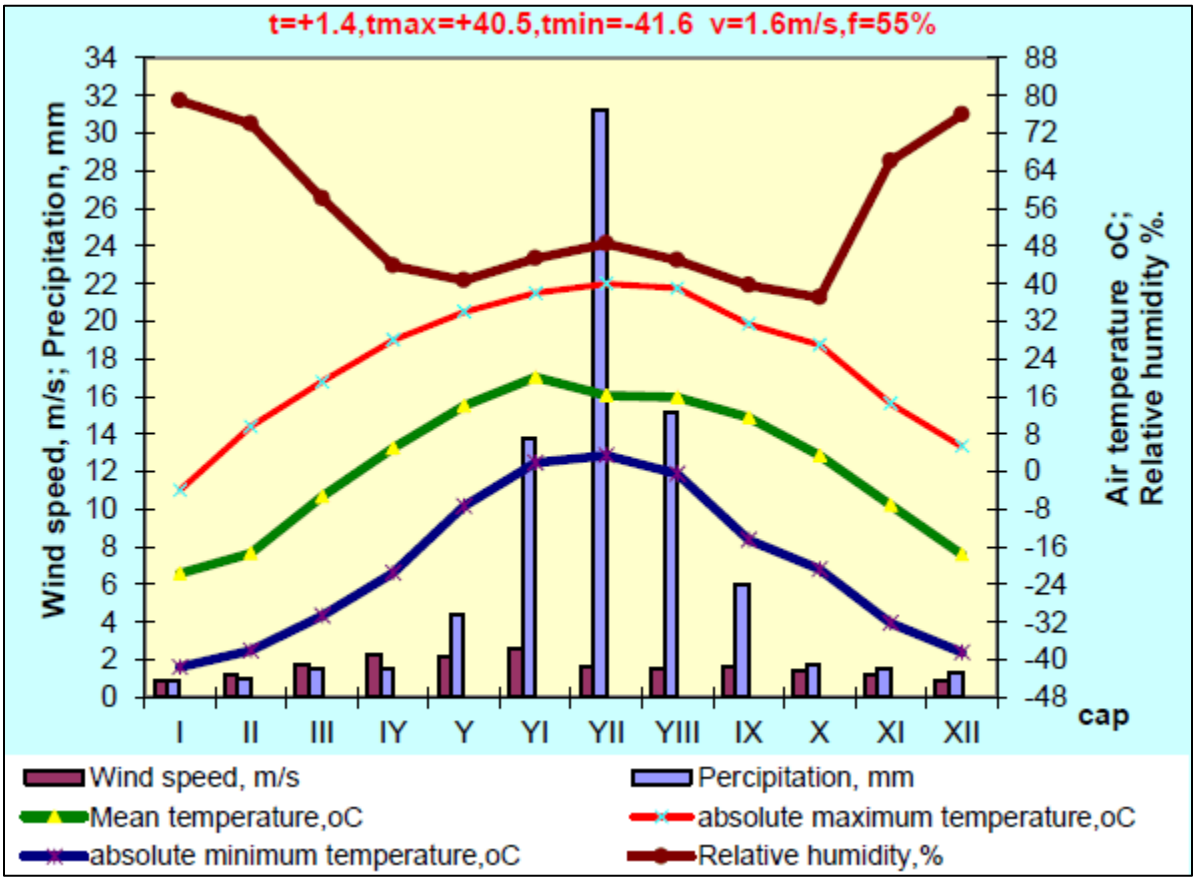
Figure 23: Mongolia earthquake risk Modified Mercalli scale map showing the Myangad Solar PV Plant location.



Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest,especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Source: UN OCHA, 2010.

Figure 24: Myangad climatogram.



Source: Khovd Nar 10 MW Solar Power Plant BES, 2019.

Table 25: Monthly and annual average Myangad Soum solar radiation data.

Coordinates: 48.2518860, 91.9344530 **Time Zone**: UTC +7 **Elevation**: 1178 M													
Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Annual**
GHI (kWh/m^2)	45.6	73.2	131.7	168.9	204.9	205.1	202.9	176.9	138.8	97.3	52.5	34.7	1,532.4
DNI (kWh/m^2)	109.8	137.4	186.8	179.8	192.9	178.1	174.7	170.2	164.2	152.1	108.1	81.6	1,836.0
GTIopta (kWh/m^2)	109.9	142.1	194.4	198.6	206.7	194.2	197.9	193.5	182.9	163.8	112.6	84.5	1,981.1
DIF (kWh/m^2)	15.1	21.6	39.3	61.5	77.5	82.3	83.1	69.2	50.0	33.3	19.3	14.6	566.9
TEMP (^{0}C)	-16.7	-11.4	-2.4	5.9	12.6	19.1	21.0	18.6	12.3	3.4	-6.4	-14.7	3.4
WS (m/sec]	2.1	1.9	2.4	3.4	2.9	2.7	2.4	2.3	2.0	2.1	2.3	2.3	2.4
ALB	0.43	0.45	0.23	0.22	0.21	0.20	0.20	0.19	0.20	0.20	0.23	0.36	0.26
RH (%)	60	55	47	41	38	40	45	46	42	47	58	63	49
PREC (mm)	1.4	2.1	4.7	9	17.1	20.2	24.7	23.5	9.9	4.7	2.8	1.7	121.7

Source: Solargis, in FSR 2025.

Note:

- GHI – Global Horizontal Irradiance
- DNI – Direct Normal Irradiance
- GTIopta – Global Tilted Irradiance at optimal tilt angle
- DIF – Diffuse Irradiance
- TEMP – Air Temperature
- WS – Wind Speed
- ALB – Albedo
- RH – Relative Humidity
- PREC – Precipitation

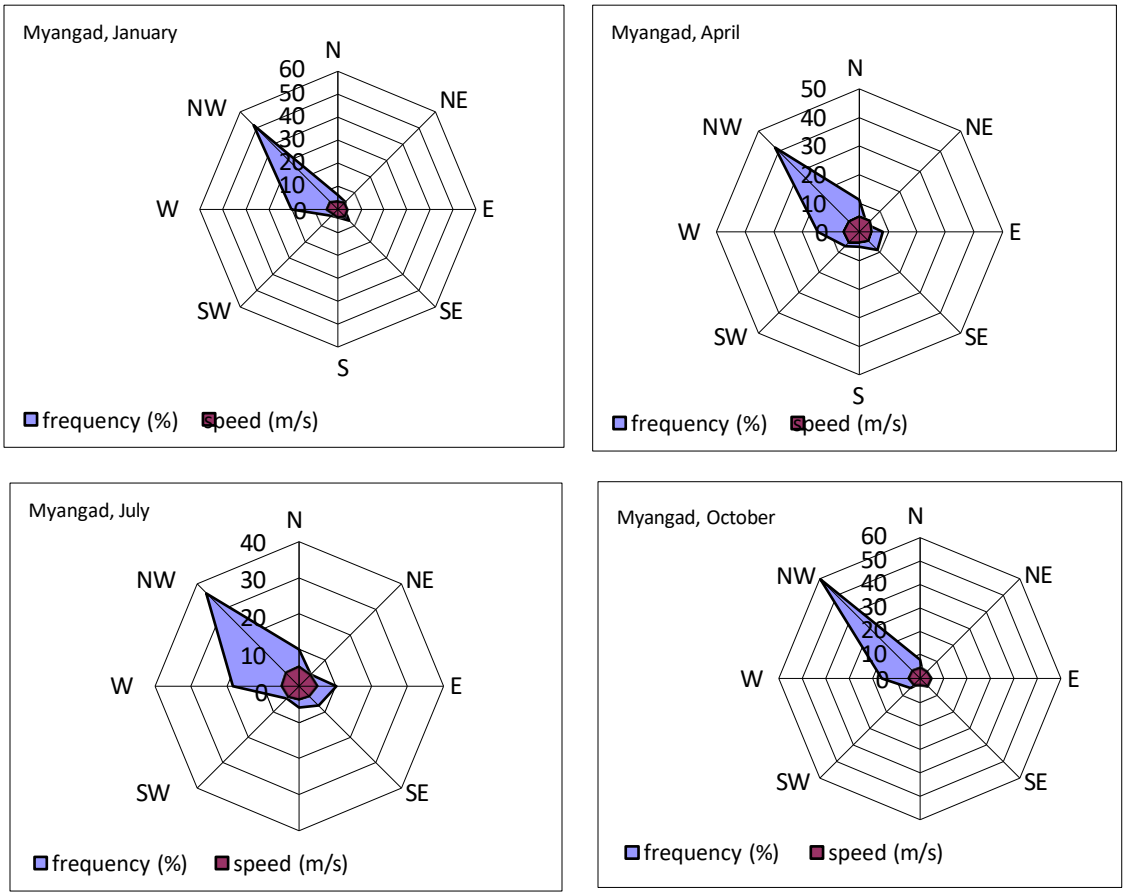
135. The main wind direction is from the northwest, with this direction being dominate from 36 to 60% of the time (**Table 26** and **Figure 25**). Summer winds are more variable. Periods of calm winds are common, ranging from 41 to 71 % of the time. Mean annual wind speed is 1.6 m/s regardless of direction.

Table 26: Wind direction frequency (%) and wind speed (m/s), Myangad Soum.

Month	Parameters	N	NE	E	SE	S	SW	W	NW	Calm
Jan	Frequency, %	6.3	4.4	3.1	6.9	3.5	4.0	20.2	51.7	
	Speed, m/s	3.4	4.1	4.3	4.2	3.3	2.6	4.7	4.4	71
Apr	Frequency, %	11.3	3.7	8.2	8.8	5.2	7.0	14.6	41.7	
	Speed, m/s	5	4.1	4	2.6	4	2.9	3.7	4.8	41
Jul	Frequency, %	10.1	4.5	10.3	7.6	5.9	4.9	18.4	36.4	
	Speed, m/s	3.2	2.8	2.4	2.6	2.5	2.2	2.5	3.3	51
Oct	Frequency, %	8.0	2.1	3.4	2.9	2.0	5.6	16.1	59.8	
	Speed, m/s	4.5	4.1	4.6	4.3	2.7	3.7	4.8	4.7	53

Source: Khovd Nar 10 MW Solar Power Plant BES, 2019.

Figure 25: Myangad Soum wind roses.



Source: Long term data, Myangad Soum meteorological station.

f. Water Resources

136. There are no permanent surface water resources such as lakes or rivers on the subproject site. The closest surface water is the Khovd River, two km to the west. There are also some seasonal streams that drain towards the site.

137. **Khovd River**. The Khovd River originates in the Tavan Bogd Mountain area of the Altai Mountains and flows to Khar Us Lake. It has a length of 596 km and a watershed of 59,139 km^2. From Khar Us Lake the Chonokharaikh River flows into Khar Lake. Khar Lake is connected to Durgun Lake through the Khom Channel, and drains into the Zavkhan River via the Tatakhan-Teel River. The Khar lakes-Khovd River basin is a sub-basin of the Great Lakes' Depression in western Mongolia and belongs to the Central Asian internal basin.

138. The Khovd River is fed by high mountain snows of the Altai Mountains (**Table 27**). The annual mean river discharge is 60.1 m^3/s in its upper reach (at Olgii), 63 m^3/s in the middle reach (at Bayannuur), and 90 m^3/s at its inflow into the Khar-Us Lake at Mayngad. The average annual flow of the Chonokharaikh River between Khar Us and Khar Lake is 33.8 m^3/s.

Table 27: Khovd River annual runoff composition.

River Section	Annual runoff composition, in %		
	Ground water	Snow Melt	Rain
Khovd River at Myangad	40	57	3

Source: Myangad Solar PV Plant BES, 2025.

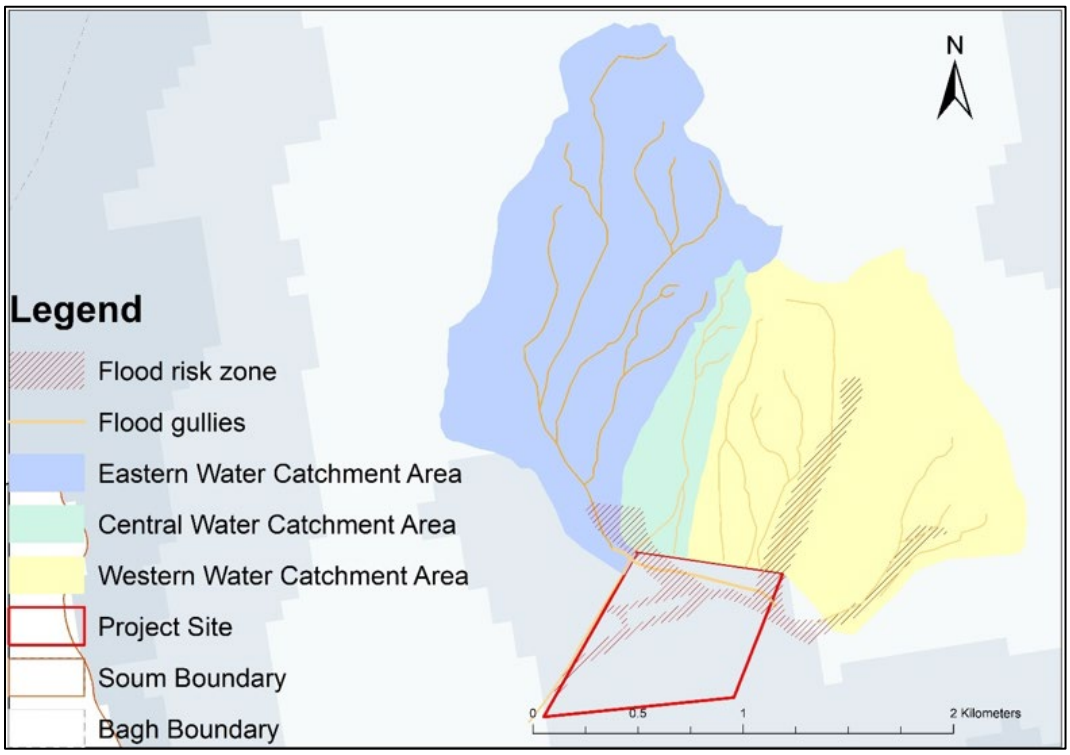
139. The Khovd River terminates at Khar Us Lake. The freshwater lake has a maximum length of 72.2 km, a maximum width of 36.5 km, a surface area of 1,578 km^2, a surface elevation of 1,156.7 masl, an average depth of 2.2 m, a maximum depth of 4.5 m, and a water volume of 3.432 km^3.

140. **Seasonal Streams**. There are three small seasonal streams that drain from the north towards the site, and could carry flood discharges from heavy summer rains. Hydrographic characteristics of the streams are as follows:

- The catchment area of the western channel is 2.61 km^2, channel length is 3.37 km, and channel slope is 54.6°.
- The catchment area of the central channel is 0.42 km^2, channel length is 1.57 km, and channel slope is 50.96°.
- The catchment area of the eastern channel is 0.42 km^2, channel length is 1.57 km, and channel slope is 50.96°.

141. **Figure 26** displays the stream channels, referred to as west, central and east. These channels pose a seasonal flood risk to the subproject area. During detailed design an engineering company appropriately permitted to design water infrastructure in Mongolia will undertake a flood risk assessment and design a flood protection system to protect the solar PV power plant against flood discharges.

Figure 26: Small stream catchment areas draining south.



Source: Myangad Solar PV Plant BES, 2025.

142. **Groundwater**. Groundwater is encountered at shallow depths in the alluvial sediments of the Khovd River area, ranging from a depth of 30 m at the existing Myangad substation 1.5 km from the river, to a depth of 5 m at a hand dug well in Myangad Soum town, closer to the river.

143. There are a total of 312 well in the Myangad Soum. The soum center is served by 6 deep wells and 78 household wells (**Figure 27**). There is no centralized water supply system. **Table 28** presents the results of chemical analysis undertaken on one the soum center drinking water wells. The sample was taken 13 January 2025 and analyzed at an accredited laboratory (Engineer Geodesy LLC) on 14 to 15 January 2025. The chemical analysis indicates that the water that meets the requirements of the Mongolian standards for drinking water.

Figure 27: Hand dug domestic water well in Myangad Soum town.

Source: Ministry of Energy, 2022.

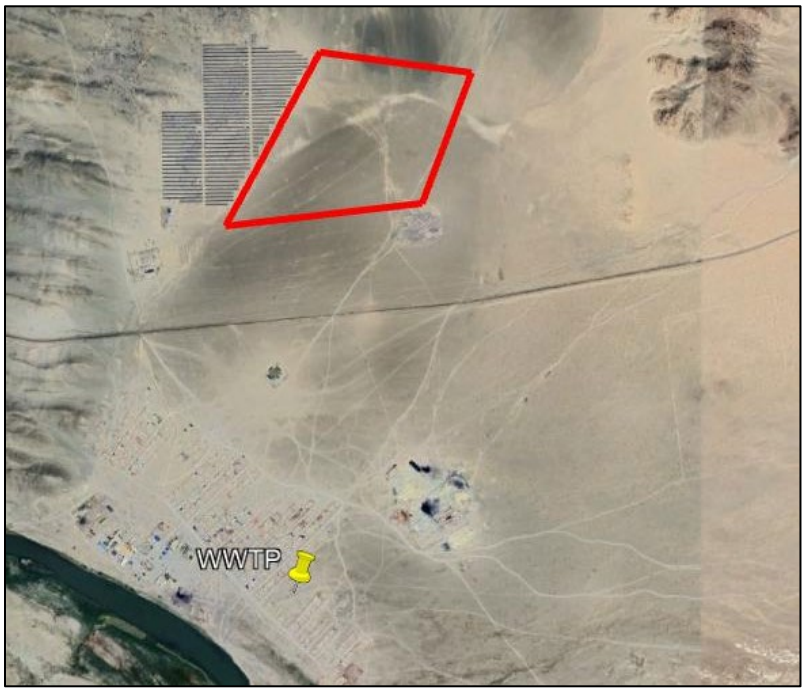
Table 28: Myangad Soum center well water chemical analysis results. Shading denotes any exceedance of the Mongolian standard.

No.	Chemical analysis parameters	Well water, mg/l	MNS 0900: 2018, mg/l
1	Water environment (pH)	8.12	**6.5-8.5**
2	Cl^-	7.09	**350.0**
3	SO_4^-	37.58	**500.0**
4	NO_3^-	3.10	**50.0**
5	NO_2^-	0.20	**1.0**
6	CO_3^-	0.0	**-**
7	HCO_3^-	122.04	**-**
8	$Na^+ + K^+$	27.70	**-**
9	NH_4^+	0.10	**1.5**
10	Ca^{2+}	24.05	**100.0**
11	Mg^{2+}	7.30	**30.0**
12	Fe^{2+}	0.20	**0.3**
13	Total hardness mg-eq/l	1.80	**7.0**
14	Permanganate oxidation potential, mgO/l	0.80	**5-15**
15	Dry residue, mg/l	170.0	**1000**

Source: Myangad Solar Power Plant BES, 2025; *Drinking water. Hygienic requirements, quality and safety assessment* MNS 0900:2018.

144. **Wastewater**. The soum center has a wastewater treatment plant with a capacity of 800 m^3/day (**Figure 28**).

Figure 28: Location of soum center wastewater treatment plant.



Source: Myangad Solar PV Plant BES, 2025.

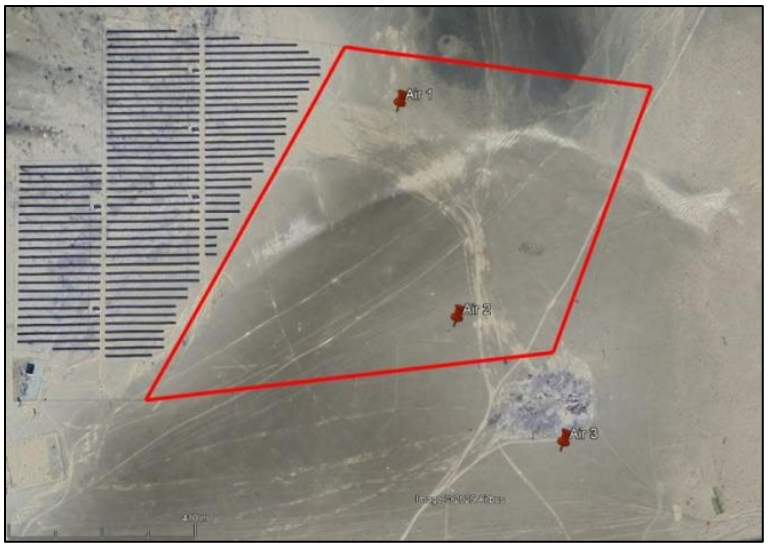
g. Air Quality

145. Air quality was monitored from 11 to 14 January 2025 utilizing a DustTrak TSI 8520 instrument for 20 minutes each at three selected points on the site to determine the baseline air quality conditions in the subproject area. The results show that air quality in terms of particulate matter[22], even during the winter heating period, is good and is in compliance with the relevant Mongolian standards. **Figure 29** shows the monitoring instrumentation, and **Figure 30** shows the monitoring locations. **Table 29** present the monitoring results.

Figure 29: DustTrak TSI 8520 dust measurement device.

Source: Myangad Solar PV Plant BES, 2025.

Figure 30: Air quality baseline monitoring sites, 11 to 14 January 2025.



Source: Myangad Solar PV Plant BES, 2025.

[22] Due to the lack of portable samplers, it was not possible to collect samples and laboratory analyze them in Ulaanbaatar during the preparation of the BES.

Table 29: Total suspended particulate (TSP) matter concentration motoring results, mg/m^3. Shading denotes any exceedance of the Mongolian standard.

Site No.	Monitoring Location		Total dust (TSP mg/m^3)
	Latitude	Longitude	
1	48°15'13.45"N	91°56'6.13"E	0.065
2	48°14'57.80"N	91°56'12.40"E	0.059
3	48°14'48.94"N	91°56'23.82"E	0.079
Standard, MNS 4585: 2016 (20 minute)			**0.500**

Source: Myangad Solar PV Plant BES, 2025.

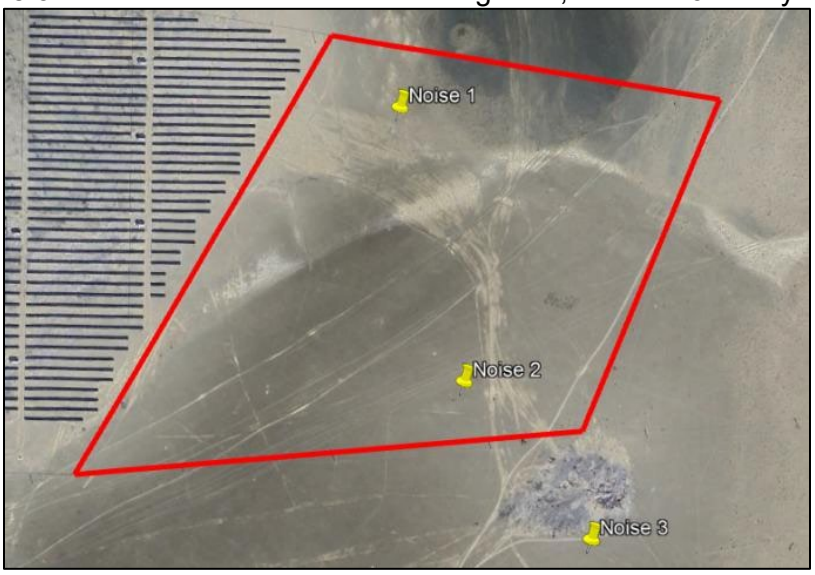
h. Noise

146. Noise level monitoring was undertaken at three sites from 11 to 14 January 2025 utilizing a digital sound level meter. The measurements were taken over 8 hours, with the instrument positioned 1.5 m above the ground. The results show that noise levels within the subproject area are low, ranging from 7.2 to 8.0 dBA, which are far lower than the maximum permissible level in MNS 4585:2016 Air Quality Standard. **Figure 29** shows the monitoring instrumentation. **Figure 30** shows the monitoring locations, and **Table 30** present the monitoring results.

Figure 31: Digital sound level meter.

Source: Myangad Solar PV Plant BES, 2025.

Figure 32: Noise level baseline monitoring sites, 11 to 14 January 2025.



Source: Myangad Solar PV Plant BES, 2025.

Table 30: Noise level monitoring results, mg/m^3. Shading denotes any exceedance of the Mongolian standard.

Site No.	Monitoring Location		Noise level (8-hour average)
	Latitude	Longitude	
1	48°15'13.45"N	91°56'6.13"E	7.5
2	48°14'57.80"N	91°56'12.40"E	8.0
3	48°14'48.94"N	91°56'23.82"E	7.2
Standard, MNS 4585: 2016 (Daytime, 8 hour)			**60**

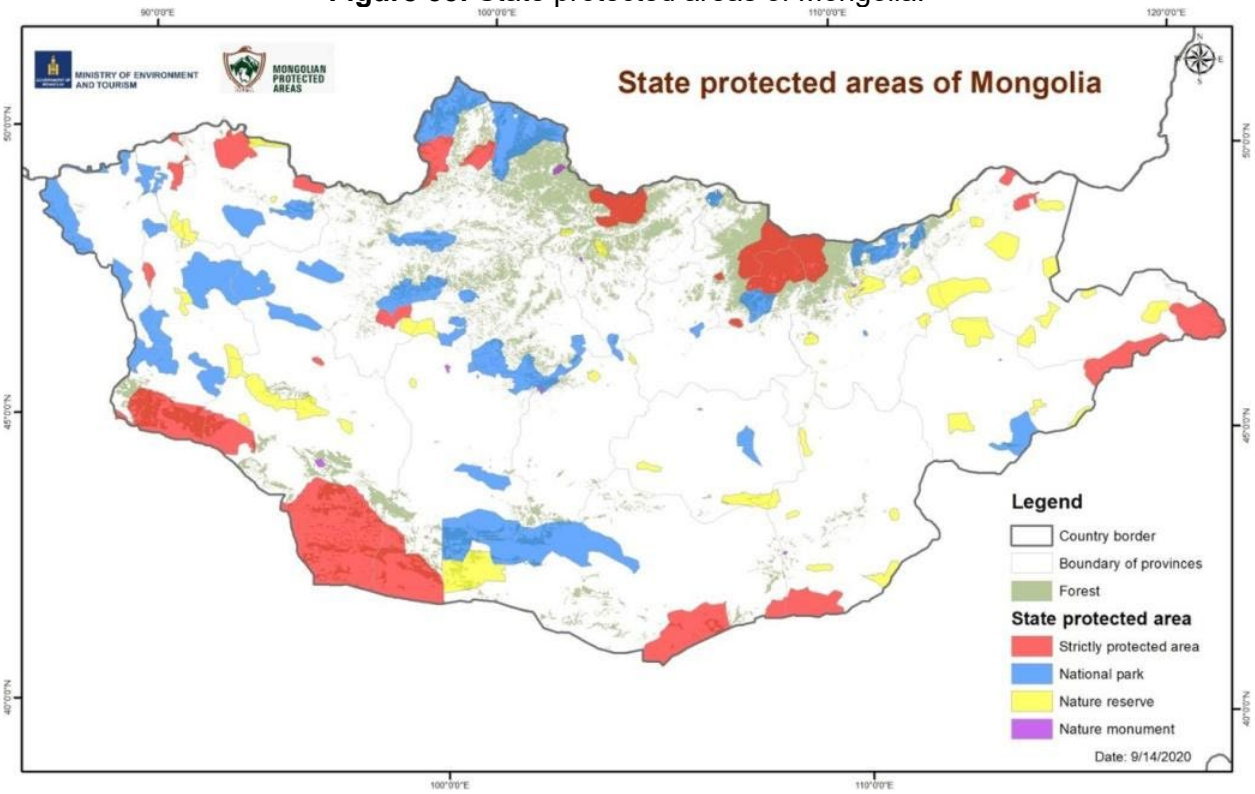
Source: Myangad Solar PV Plant BES, 2025.

2. Ecological Resources

a. Protected Areas

147. In Mongolia there are 120 state protected areas established with an area of 32.8 million ha, equal to 21% of the country's total territory (MET, 2023) (**Figure 33**).

Figure 33: State protected areas of Mongolia.



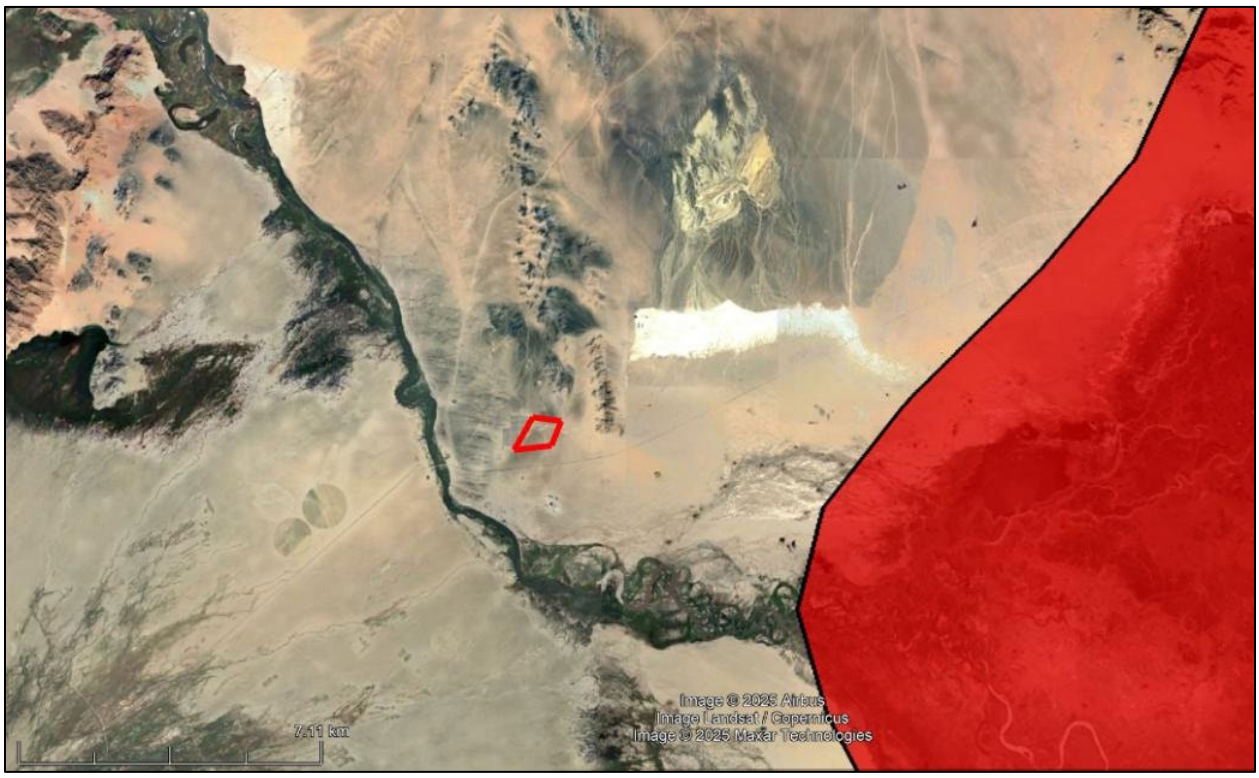
Source: Conservation Standards, 2022.

148. There are no national parks (NPs), protected areas (Pas) or nature reserves (NRs) within or adjacent to the subproject site. There are two NPs in Myangad Soum, Khar Us Nuur NP and Altan Khakhui Uul NP. Khar Us NP overlaps with Birdlife International Import Bird Area (IBA) MN014. The park and IBA boundary are over 7 km to the southeast at nearest, and the Khar Us Lake shoreline is 25 km to the east. Altan Khakhui Uul NP is located approximately 40 km away.

149. **Khar Us NP**. Khar Us NP was established in 1997. It has an area of 8,581 km^2, and

includes the Khar Us Lake, Khar Lake and Durgun Lake in the Khovd River watershed. The park fully encompasses the Khar Us IBA (IBA MN014)[23], Khar Lake IBA (MN016), and Har Us Nuur NP Ramsar site no. 976, all of which were created because of the important bird life in the lakes.[24]

Figure 34: Khar Us NP in relation to the subproject site.



Source: World Database on Protected Areas (WDPA) 2022; Google Earth 2025.

150. **Khar Us Lake IBA MN014[25]:** The IBA covers an area of 2,972.65 km^2 within Khar Us Lake NP. Khar Us Lake is a freshwater lake, fed by the Khovd, Buyant and Tsenkher rivers, and drained by the Chono-kharaikh River. There are over 20 islands in the lake, of which Agbash is the largest. There are extensive reed beds along the southern, western and eastern shores. Surrounding the lake is desert steppe, dry steppe, and semi-desert. At the southeastern edge of the lake is a high mountain, Jargalant Khairkhan, with mountain steppe vegetation. The site is used mainly as pasture for livestock. Problems at the site include burning of reeds, off-road driving and clear-cutting of vegetation, resulting in desertification around the lake. Muskrat (*Ondatra*

[23] An Important Bird and Biodiversity Area (IBA) is an area identified using an internationally agreed set of criteria as being globally important for the conservation of bird populations. IBA was developed and sites are identified by BirdLife International. There are over 13,000 IBAs worldwide.

[24] A Ramsar site is a wetland site designated to be of international importance under the Ramsar Convention, also known as "The Convention on Wetlands", an intergovernmental environmental treaty established in 1971 by UNESCO, which came into force in 1975. It provides for national action and international cooperation regarding the conservation of wetlands, and wise sustainable use of their resources. Ramsar identifies wetlands of international importance, especially those providing waterfowl habitat.

[25] Conservation status in the IBA discussion refers to IUCN Red List status. IUCN and Regional Red List Categories: NA = Not Applicable (taxon deemed ineligible for assessment at a regional level), DD = Data Deficient, LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered, RE = Regional Extinct, EX = Extinct.

zibethicus) was introduced to the lake in the 1980s, and is now having a negative impact on the lake ecosystem. Globally Threatened species include Dalmatian Pelican (*Pelecanus crispus,* VU), White-headed Duck (*Oxyura leucocephala,* EN), Swan Goose (*Anser cygnoid,* EN), Pallas's Fisheagle (*Haliaeetus leucoryphus,* VU), Lesser Kestrel (*Falco naumanni,* VU), White-naped Crane (*Grus vipio,* VU) and Relict Gull (*Larus relictus,* VU) occur at the site. The site also supports species typical of the Eurasian steppe and desert biome.

151. The site regularly supports at least 1% of the flyway populations of Great Crested Grebe (*Podiceps cristatus)*, Dalmatian Pelican (*Pelecanus crispus)*, Great Cormorant (*Phalacrocorax carbo)*, Great White Egret (*Egretta alba)*, Eurasian Spoonbill (*Platalea leucorodia)*, White-headed Duck (*Oxyura leucocephala)*, Whooper Swan (*Cygnus)*, Greylag Goose (*Anser)*, Bar-headed Goose (*A. indicus)*, Ruddy Shelduck (*Tadorna ferruginea)*, Common Shelduck (*T. tadorna)*, Gadwall (*Anas strepera)*, Eurasian Wigeon (*A. penelope)*, Mallard (*A. platyrhynchos)*, Northern Shoveler (*A. clypeata)*, Northern Pintail (*A. acuta)*, Green-winged Teal (*A. crecca)*, Red-crested Pochard (*Netta rufina)*, Common Pochard (*Aythya ferina)*, Tufted Duck (*A. fuligula)*, Common Goldeneye (*Bucephala clangula)*, Common Merganser (*Mergus merganser)*, Common Crane (*Grus)*, Northern Lapwing (*Vanellus)*, Temminck's Stint (*Calidris temminckii)*, Pallas's Gull (*Larus ichthyaetus)* and Caspian Tern (*Sterna caspia)*. Other than birds, several fish species endemic to western Mongolia inhabit the lake, namely Lake Osman (*Oreoleuciscus angusticephalus)*, Potanin's Osman (*O. potanini)*, Small Osman (*O. humilis)* and Mongolian Grayling (*Thymallus revirostris)* (Nyambayar & Tseveenmyadag 2009 and Birdlife International 2022).

152. Based on GIS overlays the subproject is entirely outside and over 7 km to the west of both Khar Us NP and IBA MN014.

153. **Locally Protected Areas**. The Myangad Soum government has designated Sartugtai Park as a local forest, animal, plant, and water reserve until June 9, 2027, in order to maintain natural ecological balance. It includes mountains to the north of the site, and Khar Us Lake wetlands to the east. The reserve is located approximately 1 km from the subproject site at closest (**Figure 35**), and does not affect activities at the site.

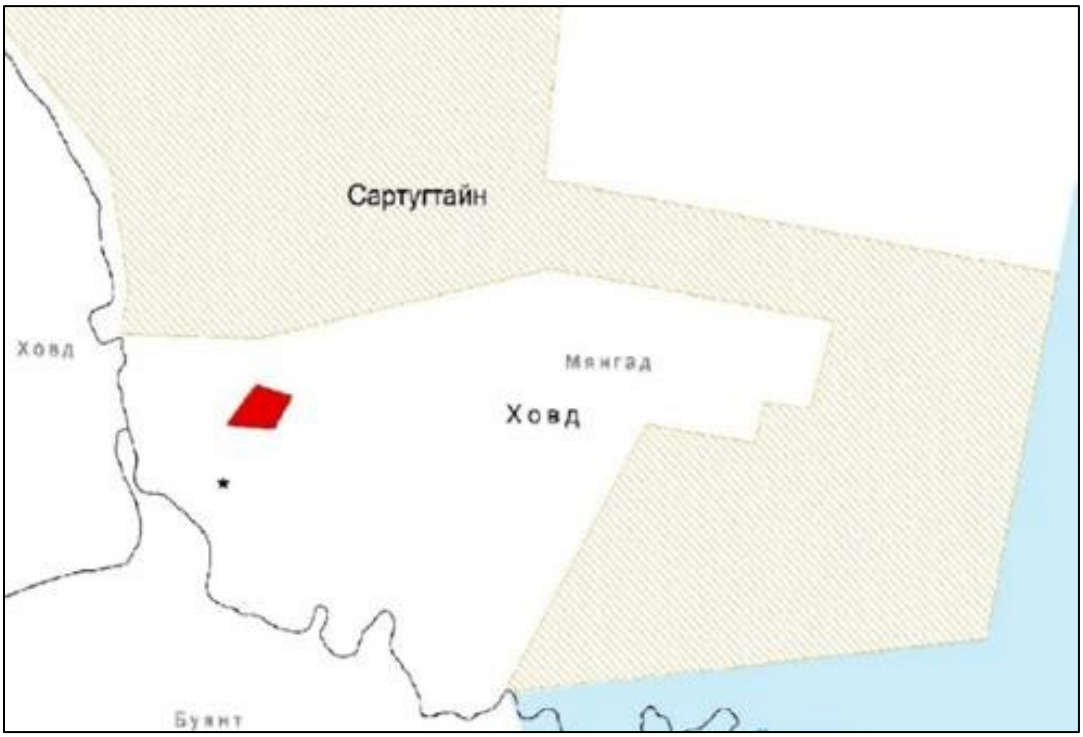
b. Site Flora

154. The subproject site is on the outskirts of Myangad Soum center town, and has been crossed by numerous dirt trails and has been heavily grazed by cattle, sheep and horses. A vegetation survey focusing on species richness, vegetation cover and vegetation height was undertaken on three representative plots on the site. The survey determined that the subproject site is a typical, but heavily degraded and sparse, desert steppe grassland. A total of 30 plant species from 27 genera and 14 families were recorded, including 20 perennial grasses, five species of fungi, four species of annual and perennial plants, and one shrub (**Table 31** and **Figure 36**). Although there are rare and endangered flora that have been recorded in Myangad Soum, all species found at the subproject site are common to the area, and surveys found no areas of critical habitat, and no rare, endangered or protected species under regional (e.g. Mongolian) or IUCN Red Lists.

155. The site is dominated by mixed grasses (*Stipa krylovii, Anabasis brevifolia*, *Agropyron cristatum, Caragana bungei*) and shrubs (*Atraphaxis pungens Jaub*). Vegetation cover is 61% but patchy, and an average of 14 plant species are distributed per m^2. The average plant height is 28-45 cm. Since it is not a wintering area for herders, herders do not settle in the vicinity but there is grazing on the site in the other seasons. It is on the edge of a settlement and adjacent to

an old reclaimed waste dump, the Khar Nor solar plant, and newer disposal site scheduled to be decommissioned. 14.5 ha of the site (26.3%) has no vegetation cover at all dure to informal roads. Overall, the site is dominated by common grasses, has no rare or endangered species, has been negatively affected by nearby human habitation, and is considered significantly ecologically degraded.

Figure 35: Sartugtai local protected reserve in relation to the subproject site.



Source: Myangad Solar PV Plant BES, 2025.

Table 31: List of plants recorded during vegetation survey. All species have low Regional and IUCN conservation status, and no rare or endangered species were recorded.

No	Latin Name	Mongolian Name	Abundance (Drude Scale)	Ground Cover %	Type
	1. Poaceae-Grass				
1	*Agropyron cristatum L.*	Саман Ерхөг	Sp	3	Perennial
2	*Bromus inermis Leyss.*	Соргүй Согоовор	Cop[1]	5	Perennial
3	*Cleistogenes squarrosa Keng.*	Дэрвээн Хазаар өвс	Sp	3	Perennial
4	*Stipa krylovii Roshev.*	Крыловын Хялгана	Cop[1]	6	Perennial
5	*Koeleria macrantha Schult.*	Дааган сүүл	Cop[1]	2	Perennial
6	*Setaria viridis PB*	Ногоон хоног будаа	Sp	2	Annual
	2. Rosaceae-Rose				
7	*Potentilla bifurca L.*	Имт гичгэнэ	Sol	1	Perennial
8	*Potentilla anserina L.*	Галуун Гичгэнэ	Sp	1	Perennial
	3. Cyperaceae- Burdock				
9	*Carex duriuscula CAMey*	Ширэг улалж	Sp	3	Perennial
	4. Amaryllidaceae – Onion				
10	*Allium anisopodium Ldb.*	Шувуун хөл	Sp	2	Perennial
11	*Allium polyrrhizum Turcz.*	Таана	Cop[1]	2	Perennial

No	Latin Name	Mongolian Name	Abundance (Drude Scale)	Ground Cover %	Type
12	*Allium mongolicum Rgl.*	Хөмөл	Sp	2	Perennial
	5. Asteraceae – Compositae				
13	*Heteropappus heteropoppoides Novopokr.*	Согсооторхуу лавай	Sp	1	Perennial
14	*Artemisia frigida Willd.*	Агь шарилж	Sp	1	Fungus
15	*Artemisia scoparia Waldst.*	Ямаан шарилж	Sp	1	Annual
	6. Labiataceae-Lipwort				
16	*Lagochilus ilicifolius Bge.*	Ямаан ангалзуур		0.5	Perennial
	7. Plantaginaceae-Five-branched family				
17	*Plantago depressa Willd.*	Навтгар таван салаа	Sp	1	Perennial
	8. Apiaceae-Umbelliferae				
18	*Bupleurum bicaule Helm.*	Хоёр ишт бэриш	Sol	1	Perennial
	9. Brassicaceae-Cabbage				
19	*Dontostemon integrifolius L.*	Бүхэл навчит багдай	Sol	1	Perennial
	10. Amaranthaceae – Amaranth				
20	*Salsola collina Pall.*	Толгодын бударгана	Sp	1	Annual
21	*Chenopodium aristatum L.*	Сортой лууль	Sp	1	Annual
22	*Kochia prostrata L.*	Дэлхээ тогторгоно	Sol	1	Fungus
23	*Bassia dasyphylla Fisch.*	Үслиг манан хамхаг	Cop[1]	2	Annual
24	*Anabasis brevifolia* CAMey.	Ахар навчит багалуур	Cop[1]	2	Fungus
	11. Polygonaceae-Tarnathan				
25	*Atraphaxis pungens Jaub.*	Өргөст эмгэн шилбэ	Sp	3	Fungus
	12. Convolvulaceae-Convolvulaceae				
26	*Convolvulus ammanii Desr.*	Амманы сэдэргэнэ	Sp	1	Perennial
	13. Fabaceae-Legumes				
27	*Caragana bungei*	Бүнгийн харгана	Cop[1]	2	Shrub
28	*Oxytropis aciphylla Ldb.*	Өргөст ортууз	Sp	3	Fungus
	14. Zygophyllaceae-Memory				
29	*Zygophyllum brachypterum*	Ахар дэвүүрт хотир	Sp	3	Perennial
30	*Tribulus terrestris L.*	Зэлэн зангуу	Sp	3	Perennial

Note: Drude abundance scale: Sol = single plant. Sp = sparse cover. Cop[1] = copious cover, (but less than Cop[2]; Cop[2] = copious cover, higher than Cop[1]; Soc = full (100%) cover.
Source: Myangad Solar PV Plant BES, 2025. Ground cover based on previous survey work undertaken by Khovd University.

Figure 36: Typical plants recorded during the vegetation survey. All species have low Regional and IUCN conservation status, and no rare or endangered species were recorded.

Variegated grass and some fungal communities (winter, summer)

Lagochilus ilicifolius Bge (perennial herb)

Oxytropis aciphylla Ldb. (shrublet)

Heteropappus heteropoppoides Novopokr (flowering plant)

Caragana bungei (Bunge's Caragana, a perennial shrub)

Source: Myangad Solar PV Plant BES, 2025.

c. Site Fauna

157. As noted above, the subproject site is a modified environment affected by presence of the nearby settlement, heavy vehicle traffic across informal dirt tracks, and livestock grazing. There are no large wild mammals utilizing the site, and although rare and endangered wildlife species

have been recorded in Myangad soum, they are not found near the subproject area. Common species in the subproject area that are often found in peri-urban areas include small carnivores such as Red fox (*Vulpes vulpes,* Least Concern (LC) IUCN Red List status), and Corsac fox (*Vulpes corsac*, LC IUCN Red List status); small herbivores such as the Tolai hare (*Lepus tolai*, LC IUCN Red List status), Mongolian gerbil (*Meriones unguiculatus*, IUCN LC status); and low conservation status common mice and moles, as can be seen from the occurrence of tracks, holes, and droppings. Gray wolf (*Canis lupis,* IUCN LC status) can be found in the hills north of the subproject site.

Figure 37: Small carnivores such as foxes, lynxes, and skunks are abundant in the mountains north and east of the subproject area.

Source: Myangad Solar PV Plant BES, 2025.

Figure 38: Small herbivores and rodents common to the subproject area.

Tolai hare *(Lepus tolai)*

Common house mouse *(Mus musculus)*

Eversmann's souslik *(Urocitellus undulatus)*

Mongolian Gerbil *(Meriones unguiculatus)*

Source: Myangad Solar PV Plant BES, 2025.

158. **Site Avifauna**. As noted above, the subproject site is over 7 km west of the outer boundary of Khar Us National Park, which also overlaps with Birdlife International IBA MN014. Khar Us Lake and its surrounding areas contain a diverse range of habitats, which in turn have a high bird species richness. Approximately 280 bird species belonging to 35 families in 17 orders have been recorded in the Khar Us Lake area (Ts. Purevsuren, 2017).

159. Because of its proximity to this important bird habitat, an ornithological survey was undertaken of the site and its surrounding areas on September 1 and 2, 2024, covering wetlands along the Khovd River and dry steppe habitats near the subproject site, using linear transects to record birds. **Figure 39** shows the field survey track and point observation location. Data was also drawn from four hourly observation counts near the subproject site undertaken in the fall of 2021, and spring, summer and fall of 2022 (Ts. Purevsuren, 2022).

Figure 39: Bird survey track and time-based activity and flight direction observation site, 2024 survey undertaken for BES.

Source: Myangad Solar PV Plant BES, 2025.

160. The current and previous survey field surveys have recorded a total of 93 bird species belonging to 30 families in 17 orders in and around the subproject site (**Table 32**).

Table 32: List of birds recorded in past and current surveys at and around the subproject area. Shading denotes a protected status.

#	Common English Name	Scientific Name	Mongolian Name	Previous Surveys				Fall 2024	Regional Red List	IUCN Red List	Status
				Fall 2021	Spring 2022	Summer 2022	Fall 2022				
1	Bar-headed Goose	*Anser indicus*	Хээрийн галуу				1	90	LC	LC	BV
2	Greylag Goose	*Anser anser*	Бор галуу			19	2	76	LC	LC	BV
3	Swan Goose	*Anser cygnoides*	Хошуу галуу		1			57	NT	VU	BV
4	Whooper Swan	*Cygnus cygnus*	Гангар хун	1	2		1	14	LC	LC	BV
5	Ruddy Shelduck	*Tadorna ferruginea*	Хондон ангир					11	LC	LC	BV
6	Eurasian Wigeon	*Mareca penelope*	Зээрд алаг нугас					29	LC	LC	BV
7	Mallard	*Anas platyrhynchos*	Зэрлэг нугас				1	164	LC	LC	BV
8	Eurasian Teal	*Anas crecca*	Ногоохон нугас					2	LC	LC	BV
9	Common Pochard	*Aythya ferina*	Улаан хүзүүт шумбуур					5	LC	VU	BV
10	Common Merganser	*Mergus merganser*	Хумхин бохио			1	5	2	LC	LC	BV
11	Chukar Partridge	*Alectoris chukar*	Эрээн хавирга хахилаг					7	LC	LC	RS
12	Great Crested Grebe	*Podiceps cristatus*	Отгот шунгуур					1	LC	LC	BV
13	Black Stork	*Ciconia nigra*	Хар өрөвтас					2	LC	LC	BV
14	Eurasian Spoonbill	*Platalea leucorodia*	Цагаагчин халбагант	1	1	2	3	10	LC	LC	BV
15	Grey Heron	*Ardea cinerea*	Хөх дэглий					12	LC	LC	BV
16	Great Egret	*Ardea alba*	Цасч дэглий	1	1	3	6	14	LC	LC	BV
17	Great Cormorant	*Phalacrocorax carbo*	Тураг гогой		1	14	11	40	LC	LC	BV
18	Bearded Vulture	*Gypaetus barbatus*	Ооч ёл					2	VU	NT	RS
19	Cinereous Vulture	*Aegypius monachus*	Нөмрөг тас	4	12		3	11	LC	NT	RS
20	Steppe Eagle	*Aquila nipalensis*	Хээрийн бүргэд				1	1	LC	EN	BV
21	Golden Eagle	*Aquila chrysaetos*	Цармын бүргэд					1	LC	LC	RS
22	Northern Goshawk	Accipiter gentilis	Үлэг харцага	1					LC	LC	RS
23	Eurasian Sparrowhawk	*Accipiter nisus*	Морин харцага				2	1	LC	LC	BV
24	Black Kite	*Milvus migrans*	Сохор элээ	13	68	21		45	LC	LC	BV
25	Upland Buzzard	*Buteo hemilasius*	Шилийн сар	1			3		LC	LC	RS
26	Common Buzzard	*Buteo buteo*	Ойн сар				1		LC	LC	BV
27	Long-legged Buzzard	*Buteo rufinus*	Талын сар			3			LC	LC	BV
28	White-tailed Eagle	*Haliaeetus albicilla*	Цагаан сүүлт нөмрөг бүргэд					1	NT	LC	BV
29	Osprey	*Pandion haliaetus*	Загасч явлаг				1		LC	LC	BV
30	Hen Harrier	*Circus cyaneus*	Саарал хулд	1			3		LC	LC	BV
31	Lesser Kestrel	*Falco naumanni*	Зээрд шонхор	1					VU	LC	BV
32	Common Kestrel	*Falco tinnunculus*	Начин шонхор					3	LC	LC	RS
33	Saker Falcon	*Falco cherrug*	Идлэг шонхор					1	VU	EN	RS
34	Demoiselle Crane	*Grus virgo*	Өвөгт тогоруу					27	LC	LC	BV

#	Common English Name	Scientific Name	Mongolian Name	Previous Surveys				Fall 2024	Regional Red List	IUCN Red List	Status
				Fall 2021	Spring 2022	Summer 2022	Fall 2022				
35	Common Crane	*Grus grus*	Хархираа тогоруу					2	NT	LC	BV
36	Northern Lapwing	*Vanellus vanellus*	Умардын хавтгаалж			7	1	29	LC	NT	BV
37	Little Ringed Plover	*Charadrius dubius*	Нарийн хиазат			2		2	LC	LC	BV
38	Kentish Plover	*Charadrius alexandrinus*	Тэнгисийн хиазат					7	LC	LC	BV
39	Temminck's Stint	*Calidris temminckii*	Темминскийн элсэг					2	LC	LC	PM
40	Common Sandpiper	*Actitis hypoleucos*	Эгэл хайргын хөгчүү					3	LC	LC	BV
41	Green Sandpiper	*Tringa ochropus*	Сүүл цагаан хөгчүү				1	2	LC	LC	BV
42	Marsh Sandpiper	*Tringa stagnatilis*	Бүрдний хөгчүү					3	LC	LC	BV
43	Pallas's Gull	*Ichthyaetus ichthyaetus*	Итэглэн цахлай			1			LC	LC	BV
44	Black-headed Gull	*Chroicocephalus ridibundus*	Хүрэн толгойт цахлай			2		2	LC	LC	BV
45	Mongolian Gull	*Larus mongolicus*	Монгол цахлай	1	9	24	14	10	LC	LC	BV
46	Caspian Tern	*Hydroprogne caspia*	Морин хараалай			1			LC	LC	BV
47	Common Tern	*Sterna hirundo*	Эгэл хараалай			52		30	LC	LC	BV
48	White-winged Tern	*Chlidonias leucopterus*	Буурал хараалай					25	LC	LC	BV
49	Hill Pigeon	*Columba rupestris*	Хадны тагтаа				1	15	LC	LC	RS
50	Rock Dove	Columbia livia	Хөхвөр тагтаа				3		LC	LC	RS
51	Pallas's Sandgrouse	*Syrrhaptes paradoxus*	Монгол ногтруу				24		LC	LC	RS
52	Common Cuckoo	*Cuculus canorus*	Эгэл хөхөө				1	2	LC	LC	BV
53	Common Swift	Apus apus	Хурын ураацай	1		18			LC	LC	BV
54	Little Owl	*Athene noctua*	Хотны бүгээхэй					1	LC	LC	RS
55	Common Hoopoe	*Upupa epops*	Бөвөөлжин өвөөлж					1	LC	LC	BV
56	Brown Shrike	*Lanius cristatus*	Ухаа дунхай					3	LC	LC	BV
57	Isabelline Shrike	*Lanius isabellinus*	Тольт дунхай					3	LC	LC	BV
58	Steppe Grey Shrike	*Lanius pallidirostris*	Үнсэн дунхай					1	LC	LC	BV
59	Eurasian Magpie	*Pica pica*	Алаг шаазгай	1		1	10	9	LC	LC	RS
60	Mongolian Ground Jay	*Podoces hendersoni*	Монгол хулан жороо					2	LC	LC	RS
61	Red-billed Chough	*Pyrrhocorax pyrrhocorax*	Улаан хушуут жунгаа					1	LC	LC	RS
62	Rook	*Corvus frugilegus*	Турлиах хэрээ					80	LC	LC	BV
63	Carrion Crow	*Corvus corone*	Хар хэрээ	14	32	13	66	119	LC	LC	RS
64	Northern Raven	*Corvus corax*	Хон хэрээ	7	10	3	5	27	LC	LC	RS
65	Eurasian Skylark	*Alauda arvensis*	Боролзой богширго				3		LC	LC	BV
66	Horned Lark	*Eremophila alpestris*	Эвэрт болжмор	3	4		16	34	LC	LC	RS
67	Asian Short-toed Lark	*Alaudala cheleensis*	Дэрсний жиргэмэл				1	13	LC	LC	RS

#	Common English Name	Scientific Name	Mongolian Name	Previous Surveys				Fall 2024	Regional Red List	IUCN Red List	Status
				Fall 2021	Spring 2022	Summer 2022	Fall 2022				
68	Eurasian Crag Martin	*Ptyonoprogne rupestris*	Харагчин хараацай		11				LC	LC	BV
69	Western House Martin	*Delichon urbicum*	Хүрээний хараацай			1			LC	LC	BV
70	Sand Martin	*Riparia riparia*	Эргийн хараацай	2		29		100	LC	LC	BV
71	Barn Swallow	*Hirundo rustica*	Асрын хараацай	24		19		184	LC	LC	BV
72	Hume's Leaf Warbler	*Phylloscopus humei*	Хүмейн дууч шувуу					19	LC	LC	BV
73	Dusky Warbler	*Phylloscopus fuscatus*	Бүхт дууч шувуу					2	LC	LC	BV
74	Siberian Chiffchaff	*Phylloscopus tristis*	Урианхайн дууч шувуу					9	LC	LC	BV
75	Lesser Whitethroat	*Sylvia curruca*	Тарчигнаа зэржгэнэ					4	LC	LC	BV
76	Common Starling	*Sturnus vulgaris*	Хар тодол		1	1		67	LC	LC	BV
77	Spotted Flycatcher	*Muscicapa striata*	Бөртөт намнаахай					7	LC	LC	BV
78	Bluethroat	*Cyanecula svecica*	Сондорт гургалдай				1	1	LC	LC	BV
79	Black Redstart	*Phoenicurus ochruros*	Мойлон гал сүүлт					6	LC	LC	BV
80	Daurian Redstart	*Phoenicurus auroreus*	Дагуур гал сүүлт					1	LC	LC	BV
81	Siberian Stonechat	*Saxicola maurus*	Эгэл шулганаа					2	LC	LC	BV
82	Isabelline Wheatear	*Oenanthe isabellina*	Бүжимч чогчиго	1				30	LC	LC	BV
83	Desert Wheatear	*Oenanthe deserti*	Цөлийн чогчиго	4	7		3	9	LC	LC	BV
84	Pied Wheatear	*Oenanthe pleschanka*	Мяраан чогчиго					2	LC	LC	BV
85	Eurasian Tree Sparrow	*Passer montanus*	Хээрийн бор шувуу	1		5	1	97	LC	LC	RS
86	Rock Sparrow	*Petronia petronia*	Хадны бор шувуу	3	1		1	39	LC	LC	RS
87	Citrine Wagtail	*Motacilla citreola*	Шар түрүүт цэгцгий					2	LC	LC	BV
88	White Wagtail	*Motacilla alba*	Хөх цэгцгий				1	14	LC	LC	BV
89	Richard's Pipit	*Anthus richardi*	Хээрийн шийхнүүхэй			5	2	1	LC	LC	BV
90	Blyth's Pipit	*Anthus godlewskii*	Годлевскийн шийхнүүхэй					7	LC	LC	BV
91	Olive-backed Pipit	*Anthus hodgsoni*	Бөртөт шийхнүүхэй					1	LC	LC	BV
92	Mongolian Finch	*Bucanetes mongolicus*	Монгол алтан жигүүр	2				21	LC	LC	RS
93	Grey-necked Bunting	*Emberiza buchanani*	Хөхлөрийн хөмрөг					3	LC	LC	BV

IUCN and Regional (Mongolian) Red List Categories: NA = Not Applicable (taxon deemed ineligible for assessment at a regional level), DD = Data Deficient, LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered, RE = Regional Extinct, EX = Extinct.
BV= Migratory, RS = Resident, PM = Transient
Source: Myangad Solar PV Plant BES, 2025.

161. The four previous surveys conducted in 2021 and 2022 recorded 695 individuals from 59 species, with the most numerous species observed being the Carrion crow (*Corvus corone*) (n=125, accounting for 18% of the total number of individual birds observed, LC IUCN status, LC Regional status) and the Black kite (*Milvus migrans*) (n=102, accounting for 48% of the total number of individual birds observed, LC IUCN status, LC Regional status). These birds are urban-dwelling species, and the presence of a settlement and landfill near the project site was the likely reason for the high number of observations. During the surveys Carrion crow and other crows were observed nesting in the willow and hawthorn thickets of the Khovd River, and were actively migrating between nesting habitats and the landfill.

162. In the September 2024 transect survey conducted for the subproject, 1,685 individuals from 78 species were recorded. The most common species observed were the Barn swallow (*Hirundo rustica*) (n=184, accounting for 11% of the total number of individual birds observed, LC IUCN status, LC Regional status), the Mallard duck (*Anas platyrhynchos*) (n=164, accounting for 10% of the total number of individual birds observed, LC IUCN status, LC Regional status), the Carrion Crow (*Corvus corone*) (n=125, accounting for 7% of the total number of individual birds observed, LC IUCN status, LC Regional status), the Eurasian tree sparrow (*Passer montanus)* (n=97, accounting for 6% of the total number of individual birds observed, LC IUCN status, LC Regional status), and the Bar-headed Goose (*Anser indicus*) (n=90, accounting for 5% of the total number of individual birds observed, LC IUCN status, LC Regional status). The transect survey showed a high number of wetland birds, likely due to the transect survey was conducted along the Khovd River. These wetland areas are from two to six km from the site and are at low risk of being negatively impacted by the subproject infrastructure and activities.

163. Of the total number of species recorded, 76% were migratory and 24% were resident, indicating that the Khovd River habitat is used primarily by breeding birds during the spring, summer, and fall seasons. One transient species (Temminck's Stint, *Calidris temminckii*) was recorded.

164. According to the IUCN Red List, the survey found three species classified as near threatened (NT), two classified as vulnerable (VU), and two classified as endangered (EN). According to Regional Red List of Threatened Species, three species are classified as NT and three are classified as vulnerable (VU) (**Table 33**).

165. Of the 10 red listed bird species, the Swan goose (*Anser cygnoides*), Common Pochard (*Aythya ferina*), Common crane (*Grus grus)*, and Northern lapwing (*Vanellus vanellus*) occur in wetland habitats and as noted above are at low risk of being negatively impacted by the subproject infrastructure and activities. The other six species are birds of prey that may enter the subproject area due to the abundance of food at the waste disposal site. In particular, the Saker falcon (*Falco cherrug*) and the Lesser kestrel (*Falco naumanni*) may use infrastructure such as fences and power transmission poles to monitor their prey, feed, and rest. This risk will be reduced when the disposal site is closed in the near future.

166. The EMP includes mitigations to further reduce risk. The solar plant and transmission line will feature bird friendly designs developed based on guidelines produced by the Avian Power Line Interaction Committee (APLIC) and in consultation with the Wildlife Conservation Society (WCS) of Mongolia.

Table 33: Threatened vulnerable and endangered bird species encountered during bird surveys (2021 to 2024).

No.	Mongolian name	Latin name	Red List Status		Status
			Regional	International	
1	Swan Goose	*Anser cygnoides*	NT	VU	BV
2	Common Pochard	*Aythya ferina*	LC	VU	BV
3	Common crane	*Grus grus*	NT	LC	BV
4	Northern Lapwing	*Vanellus vanellus*	LC	NT	BV
5	Bearded Vulture	*Gypaetus barbatus*	VU	NT	RS
6	Cinereous Vulture	*Aegypius monachus*	LC	NT	RS
7	Steppe eagle	*Aquila nipalensis*	LC	EN	BV
8	White-tailed eagle	*Haliaeetus albicilla*	NT	LC	BV
9	Lesser Kestrel	*Falco naumanni*	VU	LC	BV
10	Saker Falcon	*Falco cherrug*	VU	EN	RS

IUCN (2025) and Regional Red List (2025) Categories: NA = Not Applicable (taxon deemed ineligible for assessment at a regional level), DD = Data Deficient, LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered, RE = Regional Extinct, EX = Extinct.
BV= Breeding, RS = Resident
Source: Myangad Solar Power Plant BES.

Figure 40: Threatened vulnerable and endangered bird species encountered during bird surveys (2021 to 2024).

(*Anser cygnoides*) NT regionally, VU internationally

Lesser kestrel (*Falco naumanni*) VU regionally

Steppe Eagle (*Aquila nipalensis*) EN internationally

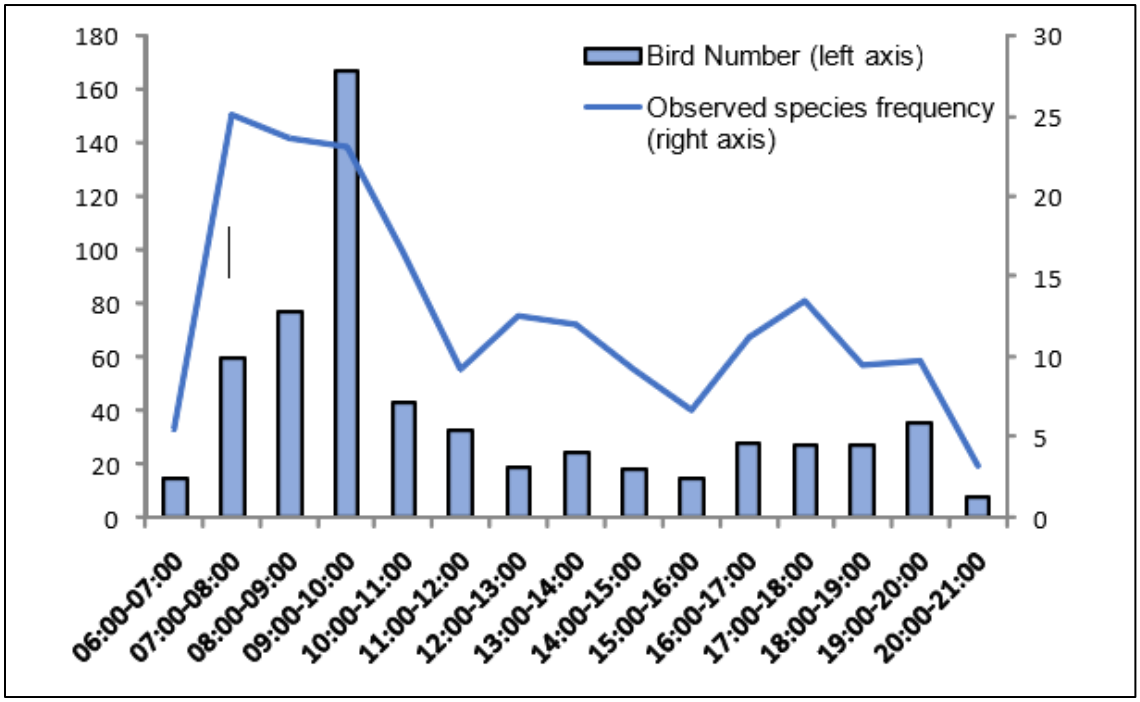
Saker Falcon (*Falco cherrug*) VU regionally, EN internationally

	
Cinereous vulture (*Aegypius monachus*) NT internationally	Bearded Vulture (*Gypaetus barbatus*) VU regionally, NT internationally

IUCN and Regional Red List Categories: NA = Not Applicable (taxon deemed ineligible for assessment at a regional level), DD = Data Deficient, LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered, RE = Regional Extinct, EX = Extinct.
BV= Breeding, RS = Resident
Source: Myangad Solar PV Plant BES, 2025.

167. Bird activity was recorded at the observation site from 6:00 AM to 9:00 PM four times (fall of 2021, and spring, summer, and fall of 2022). Bird activity began at 7 am and peaked at 9 to 10 am. After that activity decreased and remained relatively stable until sunset. All species of birds were active in the morning, undertaking foraging, brood care, and migration.

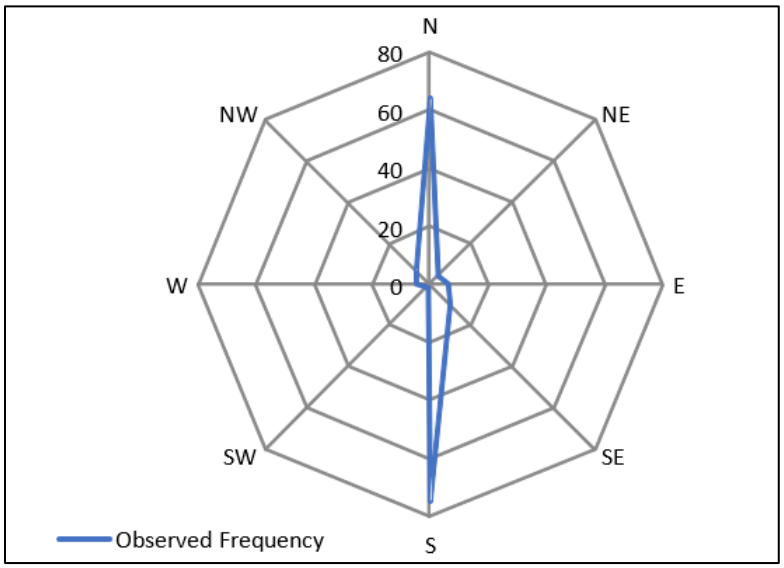
Figure 41: Hourly activity of birds recorded at observation site by total bird number and observed species frequency (2021 to 2022).



Source: Ts. Purevsuren 2022, in Myangad Solar PV Plant BES, 2025.

168. Flight directions were also recorded (**Figure 42**). The main directions recorded were to the south and north, accounting for 81% of all flights. Flights to the south accounted for 44% of flights and flights to the north accounted for 37%. This directionality is likely due to breeding species and resident birds in the vicinity of the study area search for feeding and resting sites along the Khovd River, which has a largely north-south trend in the subproject area.

Figure 42: Average flight directions recorded at observation site (2021 to 2022).



Source: Myangad Solar PV Plant BES, 2025.

3. Socioeconomic Profile

a. Khovd Aimag

169. Khovd Aimag is located in western Mongolia. Khovd City is the capital of the aimag, and is officially known as Jargalant Soum (**Figure 3**). Khovd Aimag has an area of 76,060.38 km^2, and population of 90,333 comprised of 22,500 households. The aimag's GDP was MNT 974.7 billion in 2022. The agriculture sector accounts 36.3% of total GDP, industry and construction account for 22.8 %, and other sectors account for 40.9 %. **Table 34** presents basic socio-economic data for the aimag.

Table 34: Khovd Aimag socio-economic information.

No.	Information	Unit	Khovd Aimag		
			Total	Male	Female
1	Total population	Person	90,333	45,285	45,048
2	Number of households	Household	22,513		
3	Age distribution				
	- Under 15	Person	30,966	15,911	15,055
	- 15 - 59	Person	53,128	26,772	26,356
	- 60 and over	Person	6,239	2,602	3,637
4	Population aged 15+ who are religious	Person	35,357		
	- Buddhists	Person (%)	28,760 (81.3)		
	- Christians	Person (%)	603 (1.7)		
	- Muslims	Person (%)	4,826 (13.6)		
5	Illiteracy rate	%	2.3		

No.	Information	Unit	Khovd Aimag		
			Total	Male	Female
6	Highest education of Population aged 18+				
	- None	Person	4,182		
	- Primary education	Person	11,379		
	- Secondary education	Person	32,232		
	- Tertiary education	Person	2,313		
	- Vocational	Person	3,092		
	- Bachelor	Person	13,355		
	- Master	Person	-		
7	Unemployment rate	%	6.3		
8	Employment by sector				
	- Agriculture, forestry, fishing and hunting	Person	15,344	8,784	6,560
	- Mining and quarrying	Person			
	- Processing industries	Person	1,921	663	1,258
	- Construction	Person	1,551	1,434	117
	- Wholesale and retail trade	Person	4,585	1,424	3,161
	- Public administration	Person	1,925	1,097	828
	- Education services	Person	3,510	1,069	2,441
	- Others	Person	9,165	7,402	1,763
9	Annual income per capita	$/person/yr	4,535		
10	National poverty line	MNT/person/month	238,800		
11	Population living below the national poverty line	Household	91,127		
12	No. districts with access to electricity grid	%	100		
13	Population having access to electricity	%	98.6		
14	% of HHs with access to clean water	%	36.9		
15	% of HHs with access to sanitation	%	53		
16	Types of housing				
	- Gers	Household	17,162		
	- Houses	Household	6,085		
	- Other dwellings	Household	82		
17	Maternal mortality per 100,000 live births	%	1		
18	Under 5 mortality rate	%	15		
19	Number of doctors per 1,000 people	Person	285		
20	Number of nurses per 1,000 people	Person	321		
21	Number of health institutions		90		
	- Clinics, specialized hospitals		1		
	- Province and district general hospitals				
	- Inter-soum hospitals		1		
	- Soum hospitals		21		
	- Private health institutions		24		
	- Pharmacies		31		
22	Road networks				
	- Pavel roads	km	210		
	- Gravel roads	km			
23	HIV prevalence rate	%	<0.1		
24	Reported AIDS-related death in a year	Person	<100		

Sources: Mongolian Statistical Yearbook, https://www2.1212.mn/, https://www.macrotrends.net/countries/MNG/mongolia/gdp-per-capita, http://ldi.nda.gov.mn/?province_id=20&region_id=413

b. Myangad Soum

121. Myangad Soum is located in the north of Khovd Aimag, and has an area of 3,258 km^2 including 3,091 km^2 of pasture (grazing) land. It had a population of 3,731 in 2023. There was a slight decrease in population over the 2021 to 2023 period.

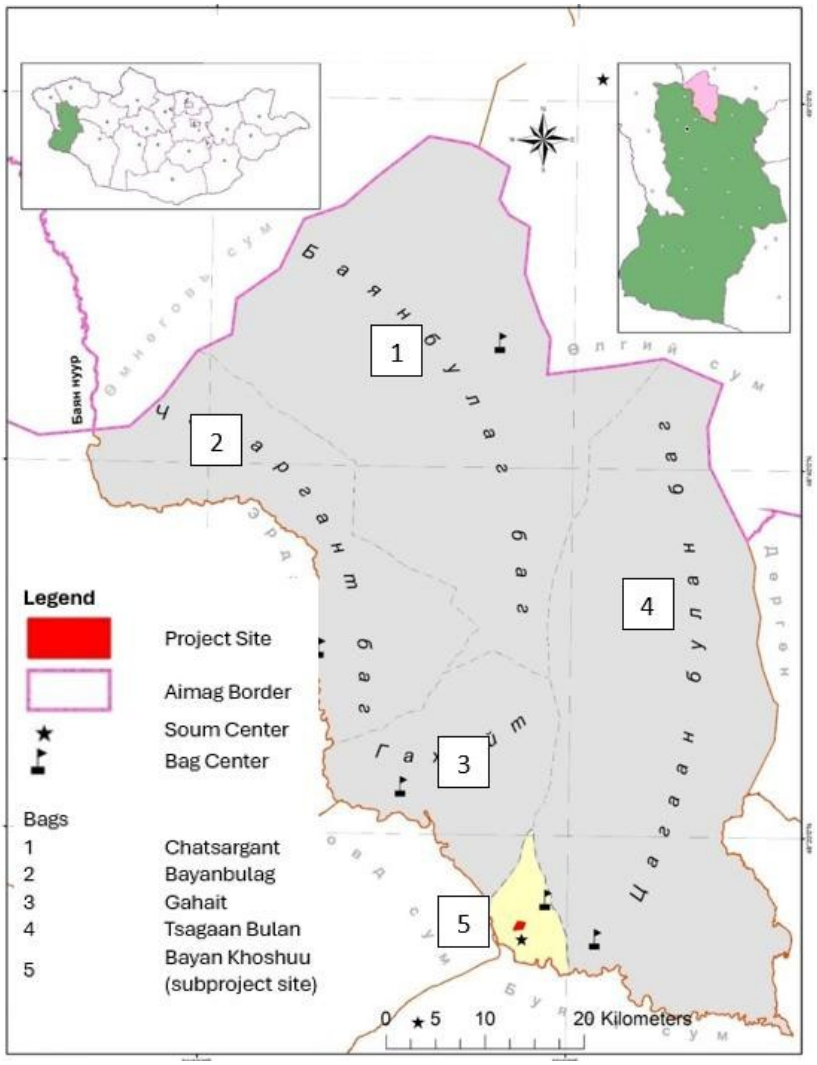
Table 35: Myangad Soum population data.

Gender	2021	2022	2023
Male	1,910	1,889	1,881
Female	1,858	1,863	1,850
Total	3,768	3,752	3,731

Source: https://www2.1212.mn/

170. Administratively Myangad Soum is divided into 5 bags: Chatsargant, Bayanbulag, Gakhait, Tsagaanbulan and Bayankhoshuu (**Figure 43**).

Figure 43: Myangad Soum administrative map.



Source: Myangad Solar PV Plant BES, 2025.

171. Soum facilities include the governors office, a secondary school, kindergarten, cultural center, health center, hydrometeorological service, gas station, branches of the Khan and Savings

Bank, and four brick factories. Minerals in Myangad Soum include gold, silver, copper, limestone, phosphate, coal, yellow clay, gypsum, and rare earth metals.

c. Bayankhoshuu Bag

172. Bayankhoshuu Bag at the soum center where the subproject is located, has also seen a population decrease, from 925 person in 2021 in 232 households to 899 in 2023 in 235 households.

Table 36: Bayankhoshuu Bag population data.

Gender	2021	2022	2023
Male	453	450	435
Female	472	473	464
Total	925	923	899

Source: https://www2.1212.mn/

173. The agricultural sector is very important to the Bayankhoshuu Bag economy, and in 2023 there was a total of 27,953 livestock in the bag, including 1,027 horses, 2,465 cattle, 6 camel, 7,656 sheep, and 16,799 goat. In 2023 Bayankhoshuu Bag had 79 herders, a significant decline from 113 in 2021.

d. Infrastructure to Support Subproject Implementation

174. Existing infrastructure that will support the subproject construction and operation are summarized below:

- **Road connections***:* The subproject area is 40 km from Khovd City by paved road. The road crosses the Khovd River bridge, then it branches off from the paved road and travels 840 m on a dirt road to the subproject area.
- **Heat supply***:* There is one centralized boiler house in the center of the soum, owned by a private company (Toosgon Uul) which provides heat to municipal buildings including the health center, high school, kindergarten, boarding house, cultural center, and banks.
- **Power supply***:* The sum is connected to the western power system. There is a 110/35/10 kW substation built in 2004 in the soum center, which was upgraded in 2021 to connect to the Khovd Nar 10 MW solar plant.
- **Water supply***:* There are 6 deep wells in the soum center, and 78 household wells. There is no centralized water supply system.
- **Sewage***:* The soum center has an integrated wastewater treatment plant with a capacity of 800 m^3 of wastewater per day.
- **Waste disposal***:* An old soum waste disposal site in the area of the Khovd Nar 10 MW solar plant has been decommissioned. There is an existing disposal site southeast of the proposed solar plant (**Figure 44**). Myangad Soum's Land Development Plan (2023-2030) includes the construction of a 10 ha Category 3 Controlled Landfill approximately 3 km north of the soum center. The new facility will be developed and equipped in accordance with MET Resolution 2018 A/445 Guidelines for Establishing, Operating, and Closing a Centralized General Waste Dump Site. The new facility will be operated by a government owned and permitted company. With its construction the existing disposal site will be decommissioned by the soum government, in either 2024 or 2025.

- **Raw building materials***:* There are 12 mineral exploitation and exploration licenses registered in Myangad soum, of which 3 enterprises are engaged in mining and brick production from the Tsagaanshal yellow clay deposits. Yellow clay is mined from 200 ha of land in the soum, and there is a brick factory located on the soum center outskirts.

Figure 44: Existing waste disposal site to the southeast of the subproject site. It is scheduled to be decommissioned and replaced by a new Category 3 Controlled Landfill in 2024 or 2025.

Source: Enkhbold Sumiya, 2025.

4. Physical Cultural Resources

175. Physical Cultural Resources (PCRs) are movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings and may be above or below ground or under water. Their cultural interest may be at the local, provincial, national, or international level

176. There are a number of PCRs in Myangad Soum, including:

- Khirgisuurs, bronze or iron age burial mounds with external stone rings found in the western part of Mongolia. They are typically composed of a central stone mound with a stone burial chamber generally beneath it, a stone enclosure, and external mounds and circles on the periphery.
- Hunnic tombs, dating back to the 2nd century BC. These tombs provide important information about the Hunnic culture and customs. A variety of items, including gold and silver items, weapons, and decorations, have been found in the tombs.
- Rock paintings, 3000 to 5000 years old, depict hunting and animals and provide insight into the life, culture, and religion of ancient peoples.
- Stone weapons and tools shed light on the life, economy, and technological level of

ancient peoples.

- Tribal monuments are important for studying the social and administrative systems of ancient Mongolian tribes.
- Buddhist temples. There are thousands of Buddhist temples in Myangad Soum, which reflect the spread of Buddhism in the region and the religious beliefs of the soum's inhabitants.

177. There are no known PCRs within the subproject site. However, immediately beyond the northern perimeter there is a Khirgisuur and burial tombs. The site layout previously included these PCRs, but was later modified such that they were excluded. There are no other known monuments or archaeological finds on or near the project site.

Table 37: Description of PCRs in subproject vicinity

Type	Description	Coordinates	Size
Khirgisuur	Stone rings in round, central stone burial mound	48°15'18.3" 91°56'11.7"	Diameter of central burial mound is 18 m by 2 m tall. Diameter of external stone ring is 40 m.
Tomb	Round shaped stone burial mound	48°15'17.6" 91°56'11.23"	Diameter is 7 m.

Source: Khovd Nar 10 MW Solar Power Plant BES, 2019.

5. Sensitive Receptors

178. Sensitive receptors include, but are not limited to, hospitals, schools, daycare facilities, elderly housing and convalescent facilities. These are areas where the occupants are more susceptible to the adverse effects of exposure to noise, toxic chemicals, pesticides and other pollutants. Extra care must be taken when dealing with contaminants and pollutants in close proximity to areas recognized as sensitive receptors.

179. There are no human settlements structure, building or homes within or adjacent to the subproject site; the nearest house is over 2 km away. It is not a wintering area for herders, so there are no nomadic winter shelters. There are thus no permanent sensitive receptors in the subproject area of influence.

Figure 45: PCRs adjacent to the subproject northern perimeter.

Tomb and Khirgisuur are located in between the posts of overhead transmission lines.

The surface of the Khirgisuur

Tombs placed in parallel to the south-east of the Khirgisuur

Source: Khovd Nar 10 MW Solar Power Plant BES, 2019.

V. Anticipated Impacts and Mitigation Measures

122. Pre-construction, construction, operation and decommissioning phases are each considered separately. Potential impacts and mitigation measures are discussed below, and mitigation measures are presented in detail in the subproject environmental management plan (EMP, **Appendix I**).

A. Subproject Area of Influence

123. Solar plants represent one of the most efficient ways to generate clean energy: they're relatively inexpensive, easy to construct, and produce no emissions during energy production. Based on the expected modest construction activities to install the solar plant and short connecting line, and typical range of impacts from noise, dust, erosion, soil disturbance and ecological disturbance, the subproject area of influence, i.e., the total area which might be subject to adverse impacts, is defined as a zone:

i) 500 m perpendicular to each side of the perimeter of the solar PV power plant site;
ii) 200 m perpendicular to each side of the Myangad substation site;
iii) 100 m perpendicular to either side of the 300 m 110 kV transmission line connecting to the Myangad substation;
iv) 100 m perpendicular to either side of any access roads;
v) 50 m around borrow pits and spoil disposal sites (locations not yet identified); and,
vi) 100 m around the worker camp (location not yet identified).

124. This zone will be adjusted as required if construction phase monitoring or consultations indicate unexpected impacts outside of the zone.

B. Assessment of Impacts

125. Anticipated positive and negative environmental impacts of the subproject were assessed based on the domestic FSR[26]; a screening utilizing the Integrated Biodiversity Assessment Tool (IBAT) developed by BirdLife International, Conservation International, IUCN and UN Environment's World Conservation Monitoring Centre[27]; a screening utilizing the World Bank GFDRR hazard screening tool ThinkHazard[28]; a screening utilizing the Mongolia earthquake risk Modified Mercalli (MM) scale map produced by the United Nations OCHA; the BES prepared by a team of qualified EIA, botany, soil, hydrology, zoology and sociology experts[29]; a GEIA conducted by the MECC[30]; multiple site visits conducted by TA environmental, biological and

[26] Technical and Economic Feasibility Study Report for the Construction of a Solar Plant, Myangad Soum. Prepared for the Ministry of Energy, by D. Bayasgalan. 2024. Prepared as part of the Ministry of Energy's Renewable Energy Expansion Project.
[27] https://www.ibat-alliance.org/
[28] https://www.gfdrr.org/en
[29] Myangad Solar Power Plant BES, 2025.
[30] See Appendix II. Note – at the time of writing this has not yet been conducted.

resettlement consultants; and, stakeholder and public consultation meetings.[31]

C. Anticipated Pre-construction Phase Impacts and Mitigation Measures

1. Impacts and Mitigation Measures during Pre-Construction

60. Pre-construction phase negative impacts are typically associated with any permanent land acquisition and associated loss of land and/or structures. The solar PV plant is located on government owned unoccupied land that does not have any residents, houses or other structures, farm plots, mining plots, etc. and there will be no land acquisition. Thus, there are no associated impacts or mitigation measures required.

2. Environmental Management Measures during Pre-Construction

126. A number of environmental management measures will be implemented in the pre-construction phase during detailed design, including: IEE and EMP updating (if necessary); an assessment of earthquake risks; incorporation of environmental mitigation measures into contractor's bidding documents, technical specifications, and contracts for civil construction and equipment installation; obtaining permits and approvals; implementation of the GRM; training and capacity building; and public outreach. Pre-construction phase environmental management measures are summarized below and presented in detail in the subproject EMP (**Appendix 1**).

a. Flood Risk

157. Flood risk will be assessed in detail, and if required flood control dykes will be designed to protect the substation (a preliminary design has already been proposed).

b. Earthquake Risk

158. A detailed assessment of earthquake risks will be undertaken, and the result incorporated into the subproject design as appropriate and in accordance with Mongolian construction standards.

c. IEE and EMP Updating

159. The IEE and EMP will be updated, if required, to take into account and assess any significant design changes or new information. The environmental mitigation measures indicated in the updated IEE and EMP will be incorporated into the detailed design. ADB will review and approve any significant revisions to the IEE and EMP.

160. If changes in scope are significant, the BES and DEIA may also need to be updated.

d. Bidding Documents and Contracts

127. Environmental mitigation measures indicated in the (updated) IEE and EMP will be included in the subproject contractor's bidding documents, technical specifications, and contracts.

[31] See Appendix IV.

e. CEMP

128. The subproject contractor will develop a subproject Construction Environmental Management Plan (CEMP) that outlines the manner by which they will comply with the requirements of the IEE and EMP.

f. Permitting and Approvals

161. The PMU, IA and/or contractor will obtain all necessary Mongolian permits according to the *Law on Construction* to undertake project construction, and any other relevant permits or requirements, including those in the GEIA and DEIA.

g. Grievance Redress Mechanism

129. In accordance with the GRM presented in **Chapter X** of the IEE, the PMU has been assigned overall responsibility for the GRM. GRM training will be provided for PMU, IA and GRM access points, and the PMU will issue public notices to inform the public within the subproject area of the GRM. Contact information (phone number, address, email address) for the PMU and local entry points (e.g. contractors, bag and soum Citizens Representative Khurals, and bag and soum government representatives) will be disseminated at construction sites.

h. Training and Capacity Building

130. An institutional strengthening and training program will be delivered by the PMU Environmental and Social Safeguards Specialist (ESSS). The PMU has been running for a number of years now and has good environmental management capacity. To ensure effective implementation of the EMP, the capacity of the IA and contractors will be strengthened. The training will focus on ADB's SPS; the Project's EARF requirements; Mongolia's environmental, health and safety laws, regulations and policies; implementation of the EMP, including chance find procedures for PCRs, spill prevention and management, emergency preparedness, etc.; and the GRM.

i. Consultation and Outreach

131. Information disclosure and consultation activities will be continued with interested stakeholders, particularly on construction schedule and activities and the GRM.

D. Anticipated Construction Phase Impacts and Mitigation Measures

132. Potential negative subproject construction phase environmental impacts are low in magnitude, short to medium term in duration, and very localized in scale. They are associated with land preparation for the solar plant, installation of the RE equipment, and other construction activities. Localized impacts may include soil erosion, construction noise, fugitive dust, wastewater, solid and hazardous waste, and risks to worker and community health and safety, and risks to cultural heritage sites. Potential negative construction phase impacts can be effectively mitigated through the application of appropriate good international construction practices and compliance with national laws and regulations and international guidelines including the *General EHS Guidelines* and the *EHS Guidelines for Electric Power Transmission and Distribution.* Mitigation measures are summarized below and presented in detail in the subproject EMP (**Appendix 1**).

1. Impacts on Physical Resources

a. Erosion, Borrow and Spoil

i. Potential Impacts

180. Construction activities such as land leveling, excavation and filling may lead to localized surface erosion and runoff and the generation of spoil. Soil erosion can be more serious on slopes or near water bodies, and can also occur after the completion of construction if site restoration is inadequate. However, the subproject site is generally flat, and not adjacent to water bodies, critical habitat or sensitive receptors such as residences, schools or hospitals. Overall, impacts will be minor in scale, short-term in duration, and localized.

ii. Mitigation Measures

181. These potential impacts, though minor, will be effectively mitigated through good site maintenance practices including erosion control and managing storm water runoff.

b. Air Pollution

i. Potential Impacts

138. Anticipated sources of air pollution from construction activities include: (i) dust generated from earth excavation, filling, loading, hauling and unloading; (ii) dust generated from disturbed and uncovered construction areas, especially on windy days; (iii) dust generated from construction material storage areas, especially on windy days; (iv) dust generated by the movement of vehicles and heavy machinery on unpaved access and haul roads; (v) dust generated from aggregate preparation and concrete-mixing; and, (vi) equipment emissions (gaseous CO and NO_2 from transport vehicles and heavy diesel machinery and equipment).

139. Excavation and other earthworks are relatively minor at a solar PV plant. Impacts at the subproject site will be localized and short-term in duration, and are unlikely to impact residents. Impacts of vehicle emissions along access routes will not result in any predicted exceedances of air quality standards, and will be small in scale compared to other vehicle emissions.

ii. Mitigation Measures

140. These potential impacts, though minor, can be effectively mitigated through good site and equipment management practices, including covering transportation loads, and managing construction traffic to avoid residential neighborhoods. Due to limited water resources, site spraying will only be utilized when necessary and if sufficient water resources are available.

c. Equipment Procurement

141. It is expected that major equipment will be sourced from outside of Mongolia. Equipment will be required to meet technical specifications including ability to withstand predicted climate changes. Once required technical specifications are met, preference will be given to regional suppliers so as to minimize transport requirements and associated greenhouse gas and other emissions.

d. Wastewater

i. Potential Impacts

142. Inappropriate disposal of domestic wastewater (from construction workers) or construction wastewater (from drainage of excavation and drilling, washing aggregates, washing construction equipment and vehicles, pouring and curing concrete, and oil-containing wastewater from machinery repairs) may cause soil or groundwater resources contamination. Potential impacts will be localized to the construction site.

ii. Mitigation Measures

143. These potential impacts will be mitigated through good wastewater management practices, including provision of sanitation facilities for workers, management of construction wastewater, and off-site maintenance of construction equipment and vehicles.

e. Water Conservation

i. Potential Impacts

144. During the construction phase fresh water will be required. The subproject site is in an arid location with limited water resources.

ii. Mitigation Measures

145. Water usage will be mitigated through good water conservation construction practices. These will be decided during detailed design depending on suitability for Mongolian conditions, but depending on availability of products could include: water conservation management including recycling water; adopting alternate methods of concrete curing; using water reducing admixtures, sometimes referred to as plasticizers, to reduces the amount of water required for concrete; using dry mortar; creating water harvesting and storage ponds; and worker camp (if required) water conservation methods such as auto-shut off valves on water dispensing containers.

f. Noise

i. Potential Impacts

146. During the construction phase noise and vibration will be generated by on site construction activities using heavy equipment such as bulldozers and excavators, and by the transport of construction materials. Due to the absence of adjacent residents, potential noise and vibration impacts are anticipated to be very minor, though workers may be exposed to high noise levels at times.

ii. Mitigation Measures

147. Although minor, potential impacts will be effectively mitigated through good construction noise management measures if required, including limiting working hours, using noise barriers if necessary, using low noise equipment, and equipping machinery with mufflers in accordance with relevant government requirements. In addition, workers will be equipped with appropriate noise PPE (see Occupational Health and Safety, below).

g. Solid Waste

i. Potential Impacts

148. Solid waste generated in the construction phase may include construction and domestic wastes. Construction wastes include a large amount of packaging materials for the solar panels, various building materials such as steel, timbers and rubble, and other types of waste. Domestic wastes include organic and inorganic matter, and an estimated 0.4 kg/day per worker of domestic waste. Inappropriate waste storage and disposal could affect soil, groundwater, and surface water resources, and hence, public health and sanitation.

ii. Mitigation Measures

149. These potential impacts will be effectively mitigated through good waste management practices, including the adoption of the waste hierarchy, providing recycling and waste containers at all construction sites, recycling all materials to the extent possible, and collecting and disposing remaining wastes at the new Mayngad Soum Category 3 waste facility in accordance with national regulations. Waste burning on the subproject site will not be allowed.

h. Hazardous and Polluting Materials

i. Potential Impacts

150. Inappropriate transportation, storage, use, disposal and spills of petroleum products and hazardous materials and wastes can cause soil, surface and groundwater contamination. Mongolia's hazardous waste classification list (2015) makes no reference to solar panels, though wastes from electrical equipment containing PCBs, HCFCs, HFCs, asbestos and other hazardous components are also classified as hazardous waste.

ii. Mitigation Measures

151. These potential impacts will be effectively mitigated through good practice hazardous materials management in accordance with relevant GoM regulations. This will include appropriate hazardous materials transport, storage and disposal.

152. Providers of hazardous materials will be responsible for removing and or recycling them if they become wastes, either in Mongolia in licensed facilities (if they become available), or through transport to a licensed facility in another country in the region. All exports of hazardous wastes must be with the review and approval of the MECC, and all necessary export licenses must be obtained.

2. Impacts on Ecological Resources

a. Flora and Fauna

i. Potential Impacts

153. Surveys indicate that there is no critical habitat, rare or endangered flora or areas of natural forest at or immediately adjacent to the subproject. Therefore, construction activities, including limited vegetation clearance, are not expected to have any impact on these resources.

ii. Mitigation Measures

154. In general, impacts are low and will be effectively managed through good vegetation and wildlife management construction practices, including minimizing the clearing of vegetation to the solar plant footprint as much as possible, prohibiting the use of herbicide for vegetation clearing, restoration of disturbed borrow and spoil pits, landscaping with native drought tolerant species, avoiding construction activities during bird breeding seasons, and prohibiting poaching including illegal hunting, trapping, and wildlife collection and trading by workers.

b. Parks and Protected Areas

i. Potential Impacts

155. The subproject is not located in or near any parks or protected areas, and no mitigation measures are required.

3. Impacts on Socio-Economic Resources

a. Traffic and Roads

i. Potential Impacts

156. Materials, goods and workers will be transported to and from the subproject site via roads. Construction has a potential to cause impacts on traffic and access roads to the subproject site.

- Transport of construction materials and heavy loads can result in congestion and potential safety risks.
- Transportation of heavy equipment and loads may cause damage to roads, including surface damage and subsidence.

157. However, the subproject is relatively small as is anticipated construction traffic, and road traffic in the community is also low; impacts are expected to be low in magnitude, scale and duration.

ii. Mitigation Measures

158. These modest impacts can be effectively mitigated through good traffic and road management practices, including planning transportation routes and delivery schedules in consultation with relevant road management authorities.

159. Any damage caused by construction traffic will be repaired by the subproject contractor at their own cost.

b. Workers Occupational Health and Safety

i. Potential Impacts

160. Subproject construction may cause physical hazards to workers from electrical shocks, noise and vibration, dust, handling heavy materials and equipment, traffic, falls and falling objects, work on slippery surfaces, fire hazards, chemical hazards such as toxic fumes and vapors, disease including COVID-19, and others. These health and safety hazards pose a significant risk that will be present throughout the construction period.

ii. Mitigation Measures

161. To minimize health and safety risks the subproject contractors will implement good practice Occupational Health and Safety (OHS) measures including the use of Personal Protective Equipment (PPE) and Emergency Response Procedures (ERP), developed in compliance with relevant GoM regulations.

162. Contractors will develop a health and safety plan to address the outbreak of potential communicable diseases during construction, which will include implementation of COVID-19/other communicable diseases prevention measures, including disinfection/cleaning of office buildings, construction sites and labor camps, on-site temperature checks, social distancing measures, mandatory use of personal protective equipment such as facemasks, provision of handwashing stations and hand sanitizers etc., and procedures to be adopted in the event any worker is infected with COVID-19 or other communicable diseases.

163. If a worker camp is required it will be sites in cooperation with local authorities, and will be equipped in accordance with the IFC and EBRD guidance note on workers' accommodation,[32] including adequate and separate sanitation facilities for men and women.

c. Community Health and Safety

i. Potential Impacts

164. Subproject construction has the potential to cause community disturbance such as traffic congestion or delays, and public safety risks from construction activities, heavy vehicles and machinery traffic, fires, spills of materials, and risk associated with unauthorized entry into work areas. In addition, work camps and an influx of migrant workers may cause social conflict or even lead to the spread of disease. These potential impacts are low to moderate in significance, and medium term in duration during the project construction period.

ii. Mitigation Measures

165. To mitigate these potential impacts, in addition to traffic safety measure noted above, subproject contractors will implement good community health and safety practices, including outreach to local communities to disseminate knowledge about safety at or near the construction sites, installation of site safety fencing and warning signs (in Mongolian language), and on site supervision personal (including night guards) as determined by the risk, to prevent unauthorized access to construction areas.

166. To address the risks of communicable diseases, contractors will develop a health and safety plan which will include implementation of COVID-19 and other communicable diseases prevention measures.

167. With respect to the recruitment of workers, workers will be locally recruited to the extent practical, and will receive health examinations and education on sexually transmitted diseases.

[32] https://www.ifc.org/content/dam/ifc/doc/mgrt/workers-accomodation.pdf

d. Physical Culture Resources

i. Potential Impacts

168. Based on field surveys there are no known PCRs within the subproject site. However, immediately beyond the norther perimeter there is a Khirgisuur and a burial tomb which are within the subproject area of influence and could be negatively affected by construction activities. In addition, construction activities have the potential to disturb as yet unknown PCRs within the subproject area of influence.

ii. Mitigation Measures

169. The Khirgisuur and burial tomb will be assessed by a qualified archaeologist, and PCR protection plan will be developed and implemented, including fencing the Khirgisuur and burial tomb and identifying them as strict no-entry zones for all workers. The archaeologist may define other protection measures as needed.

170. In addition, a construction phase chance find procedure will be established and activated if any chance finds of PCRs are encountered. ASHLEY

E. Anticipated Operation Phase Impacts and Mitigation Measures

171. Operation of the subproject will not produce any air or water pollution. There are some moderate potential negative impacts during the operation phase, including the risk of glare from the solar panels, risks to worker health and safety, and risks to community health and safety. Potential operation phase impacts can be effectively mitigated through good design, the application of appropriate good operational management practices, compliance with relevant GoM standards, and compliance with international good practices including the *General EHS Guidelines* and the *EHS Guidelines for Electric Power Transmission and Distribution*. Mitigation measures are summarized below and presented in detail in the subproject EMP (**Appendix 1**).

1. Water Use

a. Potential Impacts

172. Solar PV farms often use water to clean panels to maintain high panel efficiency. A typical assumption is 1-3% loss over a year due to dust collection, less with steep panel tilting, and more when sandstorms and heavy dust are frequent. Water resources at the subproject are limited, and excessive cleaning could deplete water sources.

173. The cost of cleaning must be balanced against potential power losses. Unlike concentrated solar power (CSP) plants where a highly polished surface is critical for performance, PV cleaning is more about removing caking around the lower edges of the panels. In northern areas operators typically rely on self-cleaning by rains and snow sliding off the surface. In Mongolia winter snows and summer rains can be expected to be relatively effective in cleaning panels.

b. Mitigation Measures

174. The subproject solar plant will utilize snow and summer rains to undertake panel self-cleaning. If cleaning is required, it is estimated that it will require 5 l/m^2, at most two times per

year (April and August). Water will be sourced from the Khovd River, and stored on site in tanks, avoiding impacts on local groundwater levels. Well water will be avoided as calcified water can do more harm than good.

2. Wastewater

175. Operation of the Myangad Solar PV Plant will not generate wastewater. Solar panels will be cleaned by natural snow and summer rains, and the limited number of operational staff (2 to 3 technicians) will use the sanitation facilities at the adjacent Khovd Nar Solar Power Plant.

3. Site Soils and Flora

176. The site soils are eroded from vehicle traffic and grazing, and the site is dominated by common grasses, has no rare or endangered species, has been negatively affected by nearby human habitation, and is considered significantly ecologically degraded. The site will be landscaped with native low profile xeric (drought-resistant) plants, which will be an improvement. Overall the placement of the panels and other equipment is not expected to have any significant negative impact on flora or soils.

4. Batteries, Panels and Solid Waste

a. Potential Impacts

177. Wastes generated from operation of the subproject could include solar panels and batteries, and other electrical components. Toxic chemicals and hazardous wastes can have negative impacts on human health and the environment if not appropriately managed. Small amounts of domestic solid waste will also be generated at the subproject site.

b. Mitigation Measures

178. PV panels in general are expected to last for approximately 20 years before replacement is required, though during operation some may fail earlier than that or be faulty. Batteries may also fail and need to be replaced. There are currently no known licensed and international standard battery or solar panel recycling facilities or hazardous waste disposal sites in Mongolia. It will be a contractual requirement of the panel and battery supplier(s) that faulty or used PV panels and batteries will be collected, transported and recycled.

179. The panel and battery supplier(s) will be responsible performing periodic checks on the PV panels and batteries and repairing or replacing and recycling used or defective panels and batteries, either i) in Mongolia if an appropriate and licensed facility become available during the subproject operation period, or ii) in a licensed and appropriate facility in a neighboring country in the region, for the guarantee period of the panels and batteries. If the guarantee period has passed or the supplier is no longer solvent, the IA will assume the responsibility. If export is required due to the lack of domestic facilities, it will be done in compliance with: i) the relevant requirements of Mongolia, including obtaining appropriate approvals and export permits from the MECC; the requirements of the receiving country; and the Basel Convention.

180. The Basel Convention regulates the export of hazardous wastes, and lays out clear technical guidelines for handling waste batteries. Batteries require special handling and recycling processes to recover valuable materials and safely manage harmful components. The Convention requires that exporting countries receive informed consent from importing countries before

shipping hazardous waste batteries. Prior ADB endorsement of any planned panel and/or battery export for recycling will also be required.

181. Domestic wastes produced at the subproject site will be collected and disposed at the new Myangad Soum Category 3 waste disposal site following national regulations.

5. Solar Panel Glare

a. Potential Impacts

182. Solar glare describes the reflection of the sun´s rays from solar surfaces which might impede the sight of airline pilots or adjacent residents. Solar surfaces can be panels of PV arrays and solar mirrors for CSPs, though the risk of dangerous glare to aircraft is higher with CSPs. PV panels have solar cells with antireflective coatings and are designed for minimum reflection in order to obtain maximum irradiation.

183. There are no airports in the soum center, so there is no risk to airports or aircraft.

184. The risk of solar glare to residents in the Myangad soum center was assessed in the FSR. Bifacial solar panels generally produce less glare than traditional monofacial panels, as their design allows for more light absorption due to their double-sided functionality. The panels will also have an anti-reflective coating, which is a thin, transparent layers designed to minimize light reflection and maximize absorption, thus boosting the efficiency PV cells. In addition, the azimuth of the panels will be 180° (e.g. south facing), and the majority of glint and glare impact assessment investigating the effects of south facing panels have found that reflections are most likely to occur to the east and west of the solar site, where as the soum center town is to the south of the subproject site.

185. Overall, based on the type of panel, their 45° inclination and 180° azimuth, the relatively higher elevation of the site compared to the town, and surrounding topography, the FSR assessment concluded that glare will not affect residents in the soum center, and no additional mitigations are required. It should be noted that no complaints or concerns regarding solar glare from the currently operating 10 MW Khovd Nar Solar Plant have been raised during meeting with Myangad Soum authorities and questionnaires with soum center residents, including the recently conducted public consultations for this subproject (see **Chapter VIII**), which supports this conclusion.

6. Flooding

a. Potential Impacts

182. The Myangad Solar PV site is 2 km from the nearest portion of the Khovd River, and is protected by a range of low hills running between the plant and the river (**Figure 16**). Thus flooding from the Khovd River does not pose a risk to the subproject. However, there are three small seasonal streams that drain from the north towards the site, and could carry flood discharges from heavy summer rains. **Figure 26** displays the stream channels, referred to as east, central and west.

b. Mitigation Measures

186. During detailed design an engineering company appropriately permitted to design water

infrastructure in Mongolia will undertake a flood risk assessment and design a flood protection system to protect the solar PV power plant against flood discharges.

7. Noise and Vibration

187. Operation of the solar plant will not generate noise and is not expected to result in any noise impacts.

8. Aesthetic Impacts

188. There is a potential for the solar plant to impact visual aesthetics negatively. However as it has a low visual profile and is located outside of the inhabited areas, it is not expected to be a significant impact. It should also be noted that during the public consultations for the Khovd Nar solar plant visual aesthetics were not raised as a potential issue by participants.

9. Bird Electrocutions on Transmission Lines and Equipment

a. Potential Impacts

189. Raptors are opportunistic and in open Mongolian grasslands habitats where few natural perches exist, raptors are attracted to power poles, which provide roosting and nesting sites as well as hunting perches. However, utility structures can also pose a threat to raptors and other birds through electrocutions or collisions. Electrocution can occur when a bird completes an electric circuit by simultaneously touching two energized parts or an energized part and a grounded part of the electrical equipment. Collisions often occur with the overhead static wire, which may be less visible than the other wires due to its smaller diameter.

b. Mitigation Measures

190. The subproject is only building a short TL, less than 300 m. Such lines are common near the site, throughout Mongolia, and the throughout world.

191. The solar plant and TL will feature bird friendly designs developed based on guidelines produced by the Avian Power Line Interaction Committee (APLIC) and in consultation with the Wildlife Conservation Society (WCS) of Mongolia. Bird friendly design could include use of antireflective coatings on solar panels to reduce their visibility to birds, ensuring a safe distance between energized wires or between energized and grounded parts; designing crossarms, insulators and other parts of powerlines such that that birds find no opportunity to perch near energized power lines that might be hazardous; and, the use of marker balls, bird diverters, or other devices to increase line visibility.

10. Occupational Health and Safety

a. Potential Impacts

192. Workers may work at height or come in contact with high-voltage power lines/equipment during operation, maintenance and repair. Other hazards include lightening, fires, accidents, and communicable diseases.

b. Mitigation Measures

193. These risks can be mitigated through the implementation of good operational OHS practices, as per the general *EHS Guidelines* and the *EHS Guidelines for Electric Power Transmission and Distribution* (2007).

194. To address the risks of communicable diseases the operator will develop a health and safety plan to address the outbreak of COVID-19 and other potential communicable diseases during operation, which will include implementation of COVID-19/other communicable disease prevention measures, including disinfection/cleaning of office buildings, construction sites and labor camps, on-site temperature checks, social distancing measures, mandatory use of personal protective equipment such as facemasks, provision of handwashing stations and hand sanitizers etc., and procedures to be adopted in the event any worker is infected with COVID-19 or other communicable diseases.

11. Community Health and Safety

a. Potential Impacts

195. Operational community health and safety impacts are low, and include exposure to electrical shocks if entering the solar plant. The increase in local traffic caused by subproject operation and maintenance will be insignificant, and there will be no air or effluent emissions.

b. Mitigation Measures

196. The solar plants will be fenced and public access prohibited.

12. Climate Change

a. Potential Impacts

197. A Climate Risk Vulnerability Assessment (CRVA) was undertaken for the UREP Project. The assessment was conducted by analyzing baseline climate data, historical climate trends, and projected climate trends for each of the subproject areas; assessing the projected climate change risks for each subproject; and, based on these analyses, recommending adaptation measures.

198. The primary source of climatological data was the Mongolian National Agency for Meteorology and Environment Monitoring (NAMEM). Data obtained for each subproject area for the period 1960-2015 included monthly (average, maximum, and minimum) and annual air temperatures in Celsius (^{o}C), precipitation in mm, and wind velocity in m/s. Linear regression were used to analyze long term observed climate data to determine climate trends.

199. To assess the potential climate trends over the Project areas the results of the most recent climate modelling projections presented in the Mongolian Third National Communication (NC3) were used. NC3 utilizes the results of a regional climate model (RegCM4) nested within two general circulation models (GCMs), ECHAM5 and HadGEM2, to predict future changes in temperature and precipitation in Mongolia. The two models were selected because they more accurately simulate current climate conditions than other available GCMs. Outputs from the two GCMs were downscaled by regional climate model RegCM4 using the AR5 Scenario Database to predict future changes in temperature and precipitation.

b. Findings and Mitigation Measures

191. Given the location in a land locked arid region, the Project is not threatened by some of the most serious effects of climate change such as sea level rise and coastal flooding. The observed and projected climate changes that do affect it do not appear to pose a serious or viability threatening risk to any of the three main types of RE technologies to be adopted (solar PV power, wind turbine power and GSHP heating). However, increased temperatures may lead to reduced PV efficiency, and extreme weather events such as high winds may pose a risk to both PV and turbine structures and associated infrastructure, and may also increase dust related issues and the need for increased maintenance. Flash flooding also poses a risk. The impact of these risks is generally low, and suitable adaptations have already been incorporated into the Project design.

192. For solar subprojects, these include:

- design parameter for all solar array supports be increased to a range of -45 to +40 °C;
- heat resistant materials and products to be used where available;
- solar arrays designed to withstand future projected extreme wind speed events;
- solar arrays monitored for dust accumulation, and cleaned on a regular (if required) or as necessary basis; and
- flood dykes and site drainage to be installed to protect sites from flash flooding if required.

F. Cumulative, Induced and Indirect Impacts

133. Cumulative impacts are the combination of multiple impacts from existing projects, the proposed subproject, and anticipated future projects that may result in significant adverse and/or beneficial impacts that cannot be expected in the case of a stand-alone project.

Table 38: Assessment of potential cumulative impacts.

Phase	Issue	Cumulative Impacts
Construction	Dust Noise Traffic Wastes	**Negative Cumulative Impacts** There is one existing solar PV plant and the new plant is being built immediately adjacent to it. As no significant problems were encountered with the construction and operation of the existing plant, no problems are anticipated with what is essentially an expansion of the existing plant, as long as the mitigation measures in the EMP are implemented. **Mitigations** None required other than EMP implementation.
	Influx of Workers	**Negative Cumulative Impacts** There is one existing solar PV plant and the new plant is being built immediately adjacent to it. As no significant problems were encountered with the construction and operation of the existing plant, no problems are anticipated with what is essentially an expansion of the existing plant, as long as the mitigation measures in the EMP are implemented. **Mitigations** None required other than EMP implementation.

Phase	Issue	Cumulative Impacts
	Solid and Hazardous Waste Management	**Negative Cumulative Impacts** There is one existing solar PV plant and the new plant is being built immediately adjacent to it. As no significant problems were encountered with the construction and operation of the existing plant, no problems are anticipated with what is essentially an expansion of the existing plant, as long as the mitigation measures in the EMP are implemented. **Mitigations** None required other than EMP implementation.
	Socio-economics	**Negative Cumulative Impacts** There is one existing solar PV plant and the new plant is being built immediately adjacent to it. As no significant problems were encountered with the construction and operation of the existing plant, no problems are anticipated with what is essentially an expansion of the existing plant, as long as the mitigation measures in the EMP are implemented. **Mitigations** None required other than EMP implementation.
Operation	Socio-economics	The operation of the solar PV power plant will provide a clean source of renewable energy, and will be a demonstration renewable energy project in a rural area with limited power demand and consumption.

134. Induced impacts are adverse and/or beneficial impacts on areas and communities from unintended but predictable developments caused by a project, which may occur later or at a different location.

135. Operation of the subproject is expected to result in positive induced impacts, including expansion of renewable energy in remote areas of Mongolia, and improved economy in western Mongolia through stable energy supply and lowered energy costs.

136. Indirect impacts are adverse and/or beneficial environmental impacts that cannot be immediately traced to a project activity but can be causally linked. For example, during construction, hunting of mammals may cause indirect impacts on biodiversity. These impacts have been included in the construction and operation phase impact assessment in this IEE.

G. Due Diligence Review of Associated and Existing Facilities

137. ADB's SPS requires due diligence be undertaken for two types of facilities: (i) associated facilities – those which are not funded by the project but whose viability and existence depend exclusively on the project and whose operation and services are essential for the successful operation of the project; and (ii) existing facilities – those which are already established and will be necessary for the project operations, but whose operation does not depend on the project and therefore do not meet the SPS definition of associated facility. These facilities are not part of the project scope and will not be subject to any ADB-funded construction, operation, upgrade, rehabilitation, or other activities.

138. Under these definitions there are no subproject associated or existing facilities. While the Myangad substation may appear to be an existing facility, it is being upgraded as part of the subproject, and therefore does not fit the definition.

139. Nonetheless, the environmental assessment process for the upgrading already undertaken at the Myangad substation was reviewed. The Khovd Nar solar power plant and the Myangad substation upgrade works were undertaken through the World Bank Second Energy Sector Project (P152343). The Second Energy Sector Project was structured with investments fully identified prior to loan approval and investments that were to be identified subsequent to loan approval. An Environmental and Social Management Framework (ESMF) guided the Project Management Unit (PMU) under the MOE and the implementing units, including the WES, to perform safeguard due diligence in accordance with World Bank environmental and social safeguard policies. The ESMF provided guidance on safeguard obligations for all Project investments identified subsequent to loan approval, including the Khovd Nar 10 MW solar plant project and Myangad substation upgrade. A Detailed Environmental and Social Impact Assessment report was prepared for the plant and substation upgrade, in compliance with World Bank and Mongolian requirements.[33] There are no known environmental or social issues reported on the substation operation, and it is understood to be functioning in compliance with relevant Mongolian regulations.

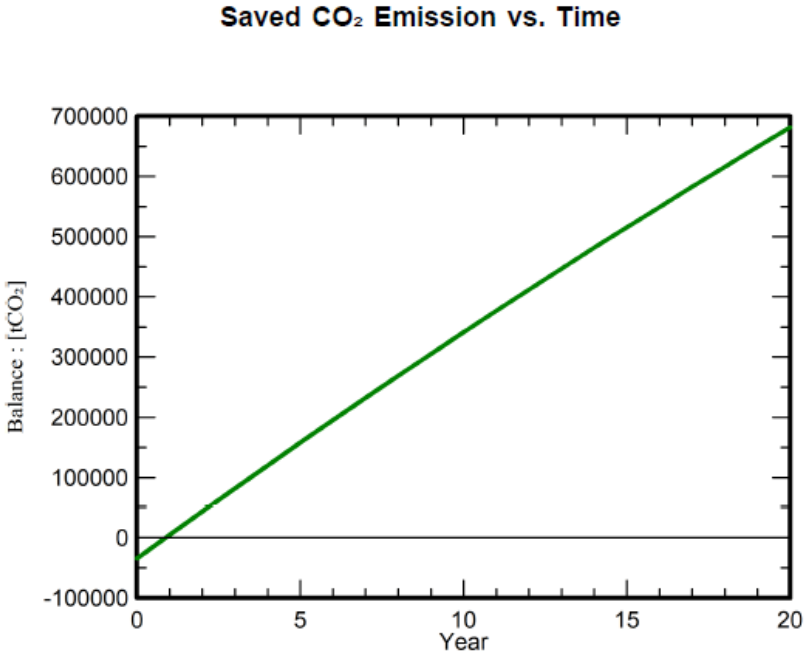
H. Benefits

140. Mongolia's energy system is currently heavily reliant on coal-fired power generation. Operation of the 19.8 MW Myangad Solar PV Plant is expected to have positive indirect impacts on human health. Coal-fired boilers emit sulfates, nitrogen oxides, and particulates (at levels that vary with fuel quality and the pollution control technology used, among other parameters), all of which are associated with significant impacts on the human respiratory and cardiovascular systems. Subproject operation will allow for the production of an average of 39,844 MWh/y[34] of clean non-polluting renewable energy.

141. The power plant will generate an estimated 796,890 MWh of electricity over the life span of the project, reducing green house gas emissions compared to grid supplied energy by an estimated 615,200 tons of CO_{2e}.[35]

[33] Detailed Environmental and Social Impact Assessment Report for the 10 MW Solar Power Plant Project. Prepared by SATU LLC, Ulaanbaatar, 2019.
[34] Based on PVsyst - Simulation Report in FSR.
[35] Source: FSR, 2024. Based on an IPCC grid emission factor of 0.772 tCO_2/MWh.

Figure 46: Saved CO_2 emissions over time.



Source: PVsyst - Simulation Report, Grid-Connected System, Hovd, Myangad, in FSR 2025.

I. Project Decommissioning

1. Potential Impacts

193. The subproject lifespan is expected to be 20+ years, at which point it is expected that it will be decommissioned. Typical activities during the decommissioning and site reclamation phase include facility removal, breaking up of concrete pads and foundations, removal of access roads that are not maintained for other uses, re-contouring the surface (if required), and revegetation. Associated impacts include erosion, noise, dust and vehicle exhaust, and the need to properly manage large amounts of debris, solar panels, wire and cabling, electronics, etc.

2. Mitigations – Decommissioning Plan

194. It is not possible to develop detailed decommissioning plans for events 20+ years in the future. However, at a minimum of 6 months prior to closure a decommissioning and site reclamation plan will be developed for the subproject that addresses effectively potential impacts, and is in accordance with good international practices and relevant government regulations and standards in force at that time. This will include but not be limited to appropriate recycling or disposal of debris at domestic waste disposal site following national regulations; and appropriate recycling or disposal of panels, batteries, transformers and other electrical equipment, either in Mongolia in an appropriate facility or in the region, in compliance with relevant national and internation laws and conventions.

VII. Alternative Analysis

195. An analysis of subproject alternatives was undertaken during the feasibility stage to determine the most financially and technically feasible way of achieving the subproject objectives while minimizing environmental and social impacts and maximizing environmental and social benefits.

A. Renewable Power Type Options - Wind vs Solar

196. It was originally proposed that Phase II of UREP would include a 15 MW wind power subproject in Taishir Soum, Gobi-Altai Aimag (**Figure 47**). However a wind power subproject was ultimately rejected due to the presence of PCRs, poor wind resources at the site, and poor economic viability, as described below.

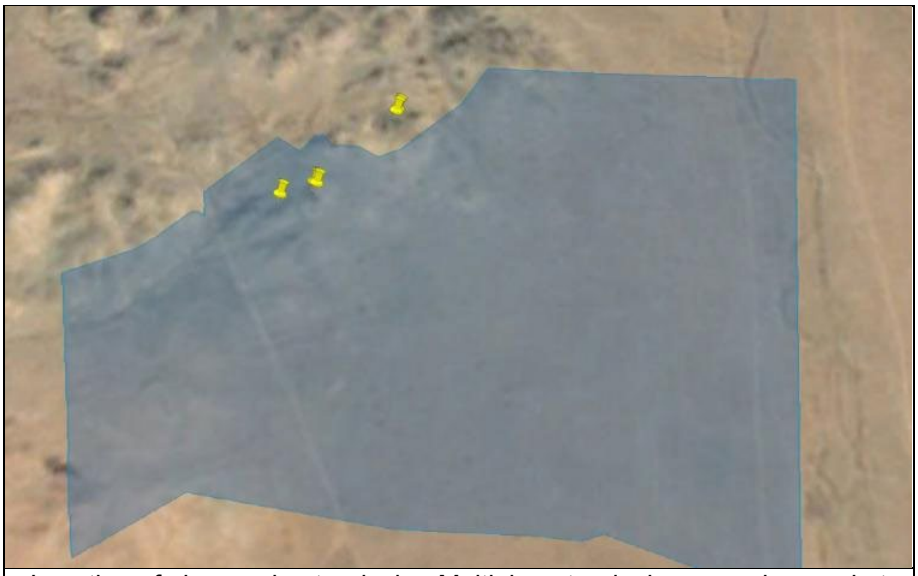
Figure 47: Western Mongolia map with arrow showing the general location of wind farm (top) and area proposed for wind farm development, Taishir Soum (bottom).

Source: ADB 2023; Google Earth 2023.

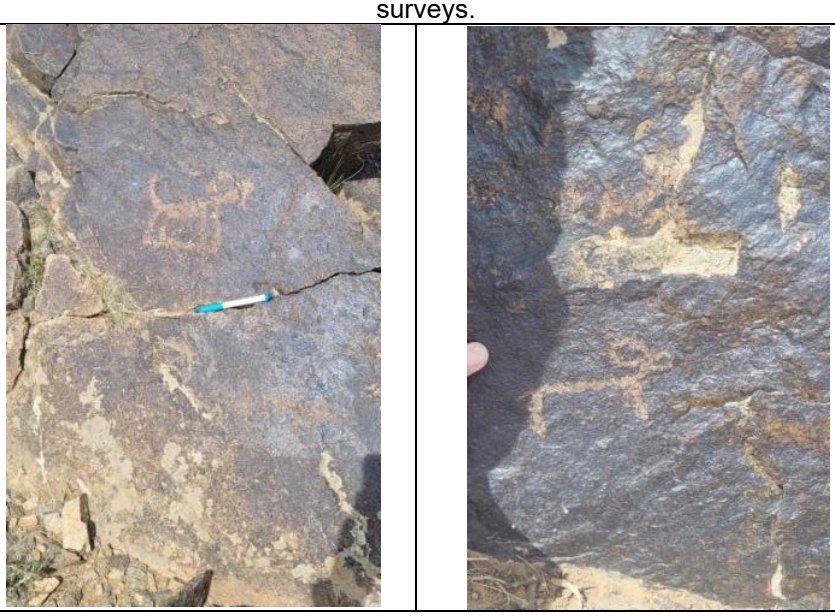
1. PCRs at proposed Taishir wind farm site

197. Gobi Altai Aimags has a rich cultural history. During due diligence sites visits up 50 petroglyphs (rock paintings) were discovered on the northern perimeter of the proposed wind farm site. In addition a Khirgisuur was also observed. In May 2023 an ADB mission consulted with the Govi Altai Aimag environment division who informed the mission that there are no officially cultural heritage records in the proposed site. However, the Taishir Soum Government was aware of the petroglyphs, and engaged archaeologists from the National University of Mongolia (NUM) to conduct an archaeological investigation. The findings are not yet formally available, but it as been estimated that the petroglyphs may be 5,000 to 6,000 years old (stone age).

Figure 48: Petroglyphs at the Taishir Wind Farm site.



Location of observed petroglyphs. Multiple petroglyphs were observed at each site. There may be additional petroglyphs found during additional surveys.



Photographs of petroglyphs

Source: ADB TA consultant, 2023.

198. The petroglyphs and Khirgisuur qualify as Physical Cultural Resources (PCRs) under the ADB SPS (2009).

2. Wind resources at proposed Taishir wind farm site

199. Wind measurements taken by four wind measuring devices (met-masts and a SODAR), over a period of 8 – 9 months, show low average long-term wind speeds of around 5.4 meters/second (m/s). Low wind speed turbines would be required for operation at the measured average wind speed of 5.4 m/s, and at such low wind speeds the average power output from the wind farm would only average ~2.6 MW, i.e. ~17% of the wind farm installed capacity.

3. Economic viability at proposed Taishir wind farm site

200. An economic cost-benefit analysis based on a wind farm power capacity of 13.6 MW, and capacity factor of 23% (P90), determined that the Economic Internal Rate of Return (EIRR) was 14.6%, exceeding the 9% social discount rate specified in the ADB Project Administration Manual (PAM) as the economic hurdle. However, the economic comparison of a 15 MW wind and 15 MW solar PV farm shows that the solar PV farm is more economical, the estimated EIRR for a solar PV farm was 15.5%. The comparison of a wind farm with a solar PV farm constructed at Taishir is a fair comparison because annual dispatch simulations of wind and solar PV, based on average daily production profiles for each month, show that the difference in net export / import to the CES grid is not significant. Seen from the grid perspective, there is little difference whether wind or solar PV capacity is constructed at Taishir. However, given the regular cycle of solar PV power output, there is potential to coordinate the operation of the Taishir HPP to optimize the dispatch. While this could be done with a wind farm, the more variable nature of wind power production makes this difficult to achieve in practice.

4. Decision

201. For the reasons noted above as well as other technical aspects, the Taishir 15 MW wind subproject FSR recommend the subproject not proceed. Instead, a new 15 MW solar subproject in western Mongolia was recommended by the PMU, either in Umnugovi Soum, Uvs Aimag, or Myangad Soum, Khovd Aimag.

B. Solar Plant Site Options

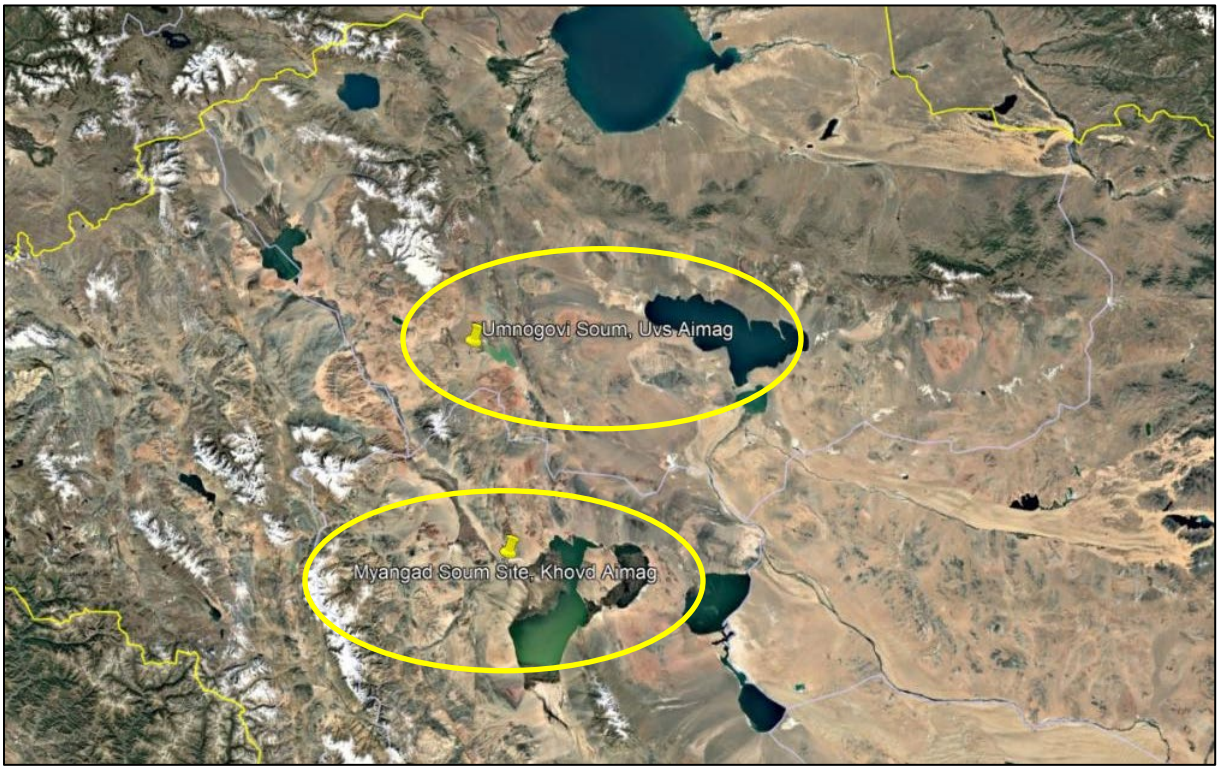
202. A new FSR[36] for the development of a solar plant replace the canceled Taishir Wind subproject was developed. Two sites were considered:

- A 65 ha site in Umnugovi Soum, Uvs Aimag, 3 km south of the soum center, and 500 m west of the Umnugovi 110/35/10 kV substation (**Figure 49** and **Figure 50**); and,

- A 55.18 ha site in Myangad Soum, Khovd Aimag, located immediately to the east of the existing World Bank funded 10 MW Khovd Nar Solar Plant (**Figure 49** and **Figure 51**).

[36] Technical and Economic Feasibility Study Report for the Construction of a Solar Plant, Myangad Soum. Prepared for the Ministry of Energy, by D. Bayasgalan. 2024. Prepared as part of the Ministry of Energy's Renewable Energy Expansion Project.

Figure 49: Location of the two options considered for the solar power plant in western Mongolia.

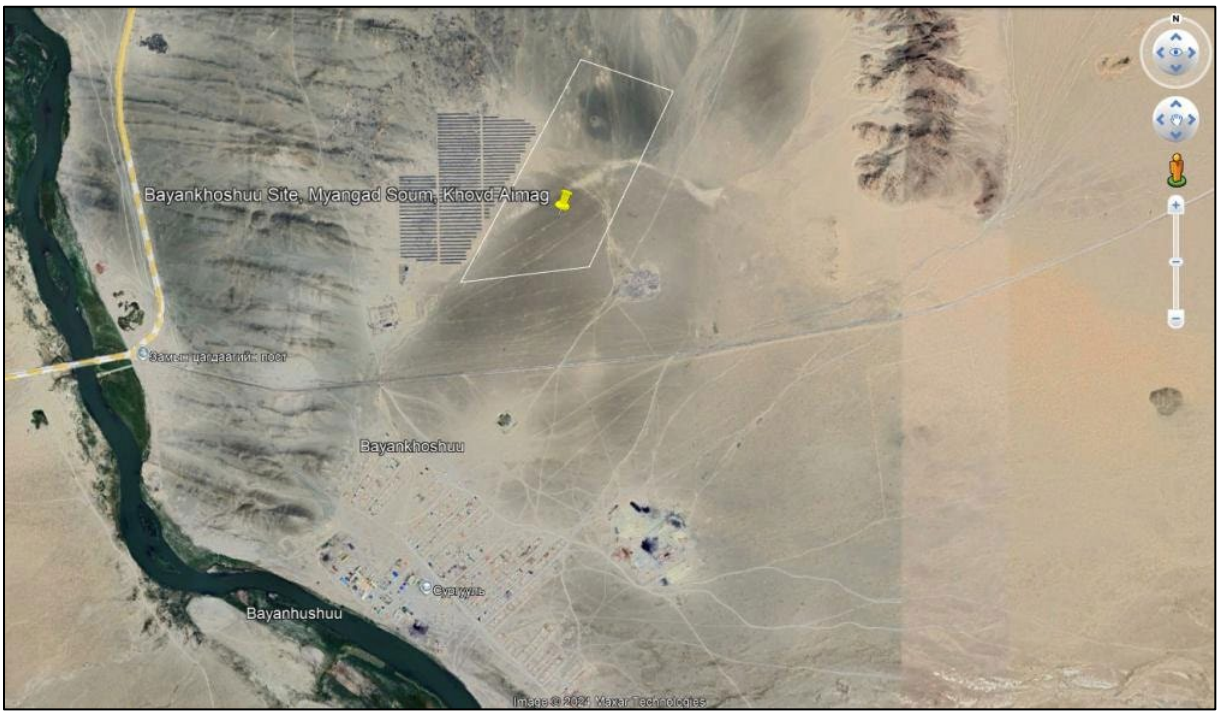


Source: FSR 2024; Google Earth 2024.

Figure 50: The Umnugovi Soum, Uvs Aimag site option.

Source: FSR 2024; Google Earth 2024.

Figure 51: The Myangad Soum, Khovd Aimag site option.



Source: FSR 2024; Google Earth 2024.

203. The FSR recommended the Myangad Soum option for the following reasons:

- The Myangad Soum option has better energy production (calculated using PVsyst 7.2 software), income generation and green house gas (GHG) reduction:
  - In Myangad soum, the plant will generate from 736.49 to 796.89 million kWh of electricity during the project period, generate sales revenue of 399.5 to 432.7 billion tugriks, and reduce greenhouse gas emissions by 586.5 to 615.2 thousand tons CO_{2e}.
  - In Umnugovi soum, the plant would generate 631.7 to 688.5 million kWh of electricity during the project period, generate sales revenue of 314.83 to 372.87 billion tugriks, and reduce greenhouse gas emissions by 487.67 to 531.59 thousand tons CO_{2e}.

- The Myangad Soum option has a better internal rate of return (IRR):
  - The IRR for the Myangad Soum option was estimated to be from 12.1% to 13.27% with a net present value (NPV) of 47,408.2 to 59,451.3 million tugriks, and a project payback period of 8 to 9 years.
  - The IRR for the Umnugovi Soum option was estimated to be from 9.48% to 10.45%, with a NPV of 25,308.5 to 34,246.3 million tugriks, and a project payback period of 10 to 11 years.

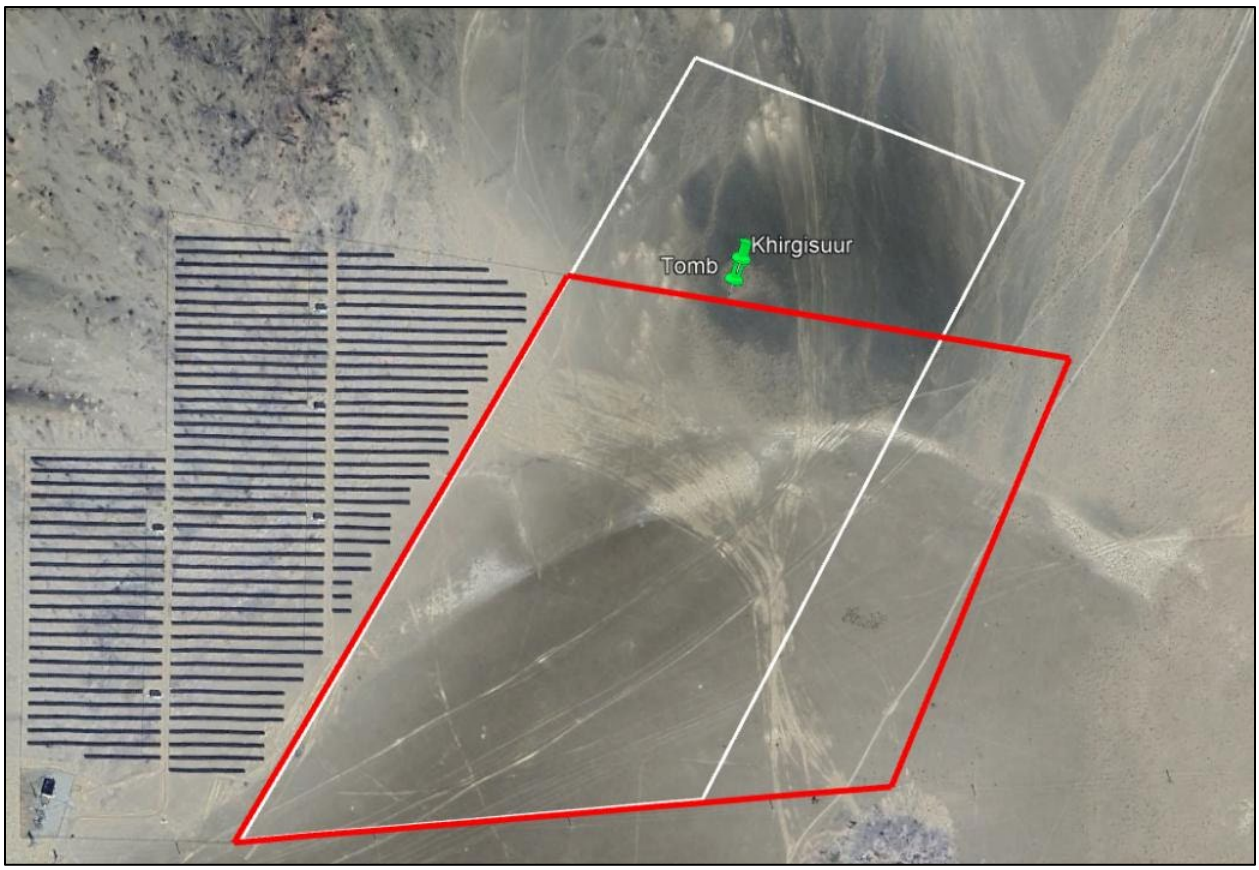
- The levelized cost of ownership (LCOE) for the project implementation period was lowest in Myangad Soum at 195.29 tug/kWh as compared to 220.09 tug/kWh in Umnugovi Soum.

204. Based on the above, the FSR concluded that the most efficient option is to build and operate a solar power plant in Myangad Soum of Khovd Aimag, which has the lowest investment amount, the highest project return, and the lowest levelized tariff. Based on this conclusion, the MOE selected the Myangad Soum site option.

C. Myangad Soum Site Layout Options

205. The Myangad Soum original site layout is shown in white in **Figure 52**. It was subsequently modified to avoid a Khirgisuur and a burial tomb. The PCRs are now entirely outside of the plant area.

Figure 52: The Myangad Soum site layout options. The original site layout is shown in white, while the revised layout is shown in red, and avoids a Khirgisuur and a burial tomb.



Source: FSR 2024; Google Earth 2025.

D. Solar Panel Technology Options

206. Solar PV panels generate power because substances like silicon generate an electrical current when they absorb sunlight, in a process known as the photovoltaic effect. The solar plant will be comprised of 33,048 bifacial type solar panels. Bifacial solar panels are an innovative solar technology. The International Technology Roadmap for Photovoltaic (ITRPV) predicts rising demand for crystalline silicon (c-Si) bifacial solar cells and modules in the global photovoltaic market throughout the coming decade, and by 2028 they are expected to account for over 35% of the market share. This upward trajectory signifies the increasing recognition and adoption of bifacial PV technology as a key player in the global renewable energy sector.

207. Bifacial solar panels can produce substantially more power than standard panels produce. They feature a distinct solar cell structure that differs from traditional solar modules, incorporating a dual-sided design that can capture sunlight from both the front and rear sides, harnessing reflected light from the surface beneath the panel. This particular property optimizes energy production, making the most of the available sunlight throughout the day. In addition, the use of transparent back sheets or glass allows for better light penetration and improved durability compared to traditional solar panels.

208. Although bifacial modules were developed over 50 years ago, with their origins being in the Soviet Space Program, it really wasn't until passivated emitter rear cell (PERC) technology was developed that they became known for their higher efficiency ratings and real-world use case potential. PERC panels are a specialized type of silicon-based solar cells that feature an added layer on the rear side. This supplementary reflective layer has the ability to redirect unabsorbed light, sending it back through the n-type and p-type junctions to produce extra energy.

209. The breakthrough in PERC panel technology, with its added reflective layer, has paved the way for the growing popularity of bifacial solar panels. By adopting the idea of redirecting unused light, bifacial panels enhance energy production by capturing sunlight on both the front and rear sides.

210. **Disadvantages.** It took nearly 40 years for bifacial panels to develop from their first iteration into becoming a true market-ready solution. They rose to prominence in the 2010s, despite being demonstrated as early as the 1970s in the USSR. As a relatively recent innovation that features a more involved production process compared to traditional PV panels, bifacial solar technology typically comes with higher price tags. However, when factoring in the increased energy savings, it's possible that bifacial panels' efficiency can quickly offset the initial costs of installation.

211. Another potential drawback is that the design of bifacial solar panels restricts their suitability for certain locations, as the double-sided cells are less compatible with standard rooftop installations. To achieve maximum energy output, these panels usually require open spaces with ample sunlight.

212. **Advantages.** Critical benefits of bifacial solar panels include:

- Capacity to produce electricity from reflected light that travels through the panels. According to satellite data, the Myangad solar power plant is expected to produce 10 to 12% more electricity over the entire operating period when using bifacial solar modules than if using single-sided solar panels.

- Many bifacial panels come with a performance warranty that extends up to 30 years, surpassing the standard 25-year warranty of traditional solar panels.

- The glass in bifacial panels helps protect against hazards related to UV exposure and moisture infiltration.

- The high-strength glass in bifacial panels ensures the modules remain safe from chemical corrosion.

- Bifacial solar panels typically do not have aluminum frames, eliminating the need for grounding (which can save both materials and time during the installation process).

342. Based on assessment of site conditions and the advantages and disadvantages of the technology, bifacial solar panels were selected for the Myangad Solar PV Plant.

E. No Project Alternative

213. The “no project” alternative addresses the likely consequences of not undertaking the proposed action. The subproject is expected to result in significant environmental and social benefits as described in Chapter V. Based on the important of the anticipated benefits, the “no project” alternative was rejected.

F. Overall Alternative Analysis

214. Based on the analysis of alternatives, the subproject has selected the most appropriate location, layout and technologies.

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VIII. Information Disclosure and Public Consultation

A. Mongolian and ADB Requirements for Public Consultation

1. Mongolian Requirements

142. Mongolian environmental assessment requirements are described in **Chapter II** of this report. With respect to DEIA public consultation, the *Law on Environmental Impact Assessment* (2012) requires that:

- Development plans and programs assessed as part of the DEIA process will be publicly disclosed on the website of the State Administrative Central Organization in charge of nature and environment.
- There will be a 30 working day period for submittal of verbal or written public input, and the DEIA consultant should organize community consultations that include local government and local residents within the area of influence.
- The DEIA should include meeting minutes, comments by local government, and community consultation that have been conducted with local communities in the area of influence.[37]

2. ADB Requirements

143. ADB's SPS 2009 has specific requirements for information disclosure and public consultation.

144. Information disclosure involves delivering information about a proposed project to the general public and to affected communities and other stakeholders, beginning early in the project cycle and continuing throughout the life of the project. The SPS 2009 requires that borrowers take a proactive disclosure approach and provide relevant information from environmental assessment documentation directly to affected peoples and stakeholders. Information disclosure is intended to facilitate constructive engagement with affected communities and stakeholders over the life of the project. In order to make key documents widely available to the general public, ADB requires that the borrower/client submit the following documents for disclosure on ADB's website for Category A projects:

- draft EIA - at least 120 days prior to ADB Board consideration;
- final EIA upon receipt;
- supplementary reports, if required during project implementation;
- corrective action plan/s (for major noncompliance, if any) prepared during project implementation; and,
- environmental monitoring reports.

145. The SPS 2009 also requires that the borrower carry out meaningful consultation with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation in project decision making. Meaningful consultation:

- Begins early and is carried out on an ongoing basis throughout the project cycle.

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[37] *Law on Environmental Impact Assessment* (2012), Articles 8 and 18.

- Provides timely disclosure of relevant information. Affected people and stakeholders should have access to relevant project information prior to any decision-making that will affect them. Relevant information includes key aspects of the assessment such as project activities and locations, identified impacts, mitigation measures, compensatory methods and amounts, and consultation and grievance mechanisms. Information should be provided in a form and language that are understandable and readily accessible to affected people.
- Is free of intimidation or coercion. Consultation occurs freely and voluntarily, without any external manipulation, interference, or threat of retribution, and is conducted in an atmosphere of transparency.
- Is gender-inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups. Consultation should be inclusive of various segments of the affected community, including both women and men, and accessible to the disadvantaged and vulnerable groups within the community.
- Requires the incorporation of relevant views of affected people and other stakeholders into project design and decision-making, including the development of mitigation and compensation measures. It also involves communicating to affected people and other stakeholders the measures taken to address their concerns. It facilitates the sharing of development benefits and opportunities.

B. Consultations with Government

146. During the development of the subproject ADB and UREP PMU undertook a number of meetings with Khovd aimag and Myangad soum government officials.

1. Myangad Soum Government, 14 November, 2024

147. The PMU Hybrid Power Engineer and the solar subproject FSR consultants conducted a site visit and met with the following local soum government officials:

- Mr. Iderzaya B, Chairman of the Citizen`s Representatives Khural
- Ms. Tsetsegmaa Ts, Specialist of the Provincial Land Relations, Construction, and Urban Development Department of Khovd province, Land Officer of Myangad Soum
- Ms. Khishigtogtokh, Soum Environmental State Inspector,
- Mr. Munkh-Erdene, FS Consultant`s representative, RE Engineer
- MR. Erdenebaatar A, PMU Hybrid system engineer

148. In summary:

- The FSR conducted for a new solar power plant in either Umnugovi soum of Uvs Aimag or Myangad Soum of Khovd Aimag was presented to the local soum government for comparison.
- The site for the solar plant in Myangad soum was selected together with the Soum Environmental State Inspector, the Land Officer of Myangad Soum, the PMU engineer and the Ministry of Energy, and was presented to the Chairman of the Citizen`s Representatives Khural.
- Mr. Iderzaya, Chairman of the Citizen`s Representatives Khural issued a letter stating that there will be no land acquisition or relocation impacts related to the construction of the plant at that site in Myangad Soum, and there is no objection to the construction of the new solar plant (see **Appendix 3).**

Figure 53: Meeting between PMU and the Myangad Soum officials, 14 November 2024.

Source: ADB, 2024.

2. ADB/PMU UREP Review Mission, 2-13 Dec, 2024

149. As part of an overall UREP review mission, ADB and the PMU assessed the two potential sites and met with:

Khovd Aimag Government Office
- Urtnasan E, Deputy Governor
- Gombosuren B, Head of the Development Policy, Planning and Investment Division of the Governor's Office
- Erdenebat D, Specialist in charge of the infrastructure, Development Policy, Planning and Investment Division
- Tsatsraltsetseg N, Energy State Inspector, Legal Division
- Oyunchimeg G, Director of 1st Kindergarten

Western Region Energy System SOE
- Tooroikhuu Ts, Chief Engineer
- Lkhamsuren Ys, General Accountant, Finance Unit
- Batkhuu I, Senior Economist, Finance Unit
- Otgonbileg D, Economist, Finance Unit

150. The mission visited the two potential sites for the new solar subprojects: (i) Umnugovi Soum in Uvs Aimag, and (ii) Myangad Soum in Khovd Aimag. The mission observed that site in Umnugovi Soum is within an international bird area near a lake. Given this, an environmental study may be required which could prolong project implementation. The mission noted that connection to the substation will need significant upgrades. The area nearby was foggy, very remote with unpaved roads which may impact operation and maintenance. These concerns were communicated with the FSR and DEIA consultants.

151. The site in Myangad Soum in Khovd Aimag is next to a World Bank-financed solar project that is operational, which reduces uncertainty. It was noted that grid connection will be less costly, with space available for expanded capacity at the Myangad substation. Reaching the site was easy with good infrastructure and road access. The MOE noted that the Myangad substation has already been upgraded as part of the World Bank-financed project and has sufficient capacity to receive energy from the new ADB-funded subproject.

3. Myangad Soum Government Office, 12 January 2025

152. BES consultants met with Myangad Soum officials during the preparation of the BES:

Myangad Soum Government
- B. Batkhishig, Soum Governor
- D. Nyambayar, Soum Deputy Governor
- Ch. Ulaankhü, Head of the Administrative Office
- Mr. Iderzaya, Chairman of the Citizens' Representatives Khural
- N. Choyon-Iyshee, Environmental Officer (**Figure 54**)

153. The following summarizes suggestions from the soum government and the BES team responses:

Comment: If the solar power station is built, the local workforce should be prioritized for employment.
Response: This can gradually be implemented by training the local residents.

Comment: The local electricity supply is not sufficient if there is a power outage from the Russian side even with the existing solar power station in operation.
Response: The "Khovd Nar" solar power station does not have an energy storage system, so it cannot store surplus production. However, our project will have an energy storage system, which will create a more favorable condition to address this issue.

Comment: Is it possible that the solar power station can directly supply the soum with electricity and can such a request be made?
Response: The new solar power station will support the western regional energy grid. Although we cannot guarantee the direct provision of energy to the soum, we are confident that the soum's current energy situation will improve.

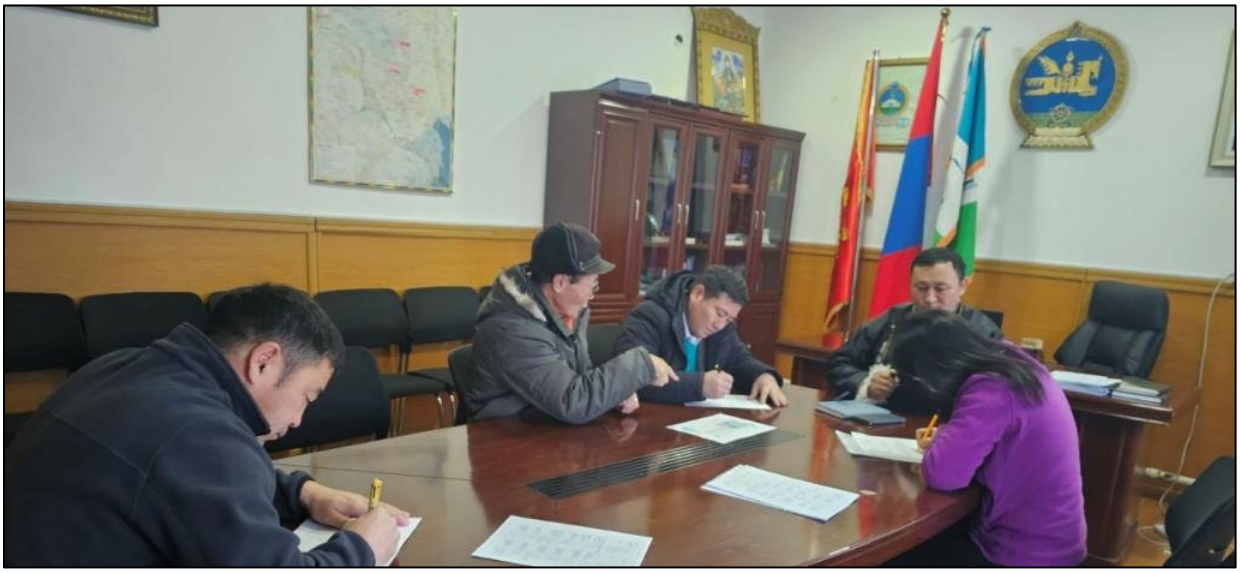
C. Information Disclosure and Public Consultations

1. Social Survey during BES Preparation

154. A social survey of 36 residents was undertaken during the preparation of the BES to better understand potential social impacts of the subproject. Of the residents surveyed:

- All had lived in the area a minimum of five years, and 81% had lived there for over 20 years.
- 50% of the participant’s households had at least three members, and the majority were aged 36 and above.

Figure 54: Meeting with the Governor of Myangad Soum, B. Batkhishig, on 12 January 2025 during the preparation of the BES.



Source: Myangad Solar PV Plant BES, 2025.

155. The following summarizes comments from the soum residents received during the social survey and provides the BES team responses:

Comment: Measures should be taken to distribute the generated electricity properly during peak load times, and energy storage systems should be installed.
Response: The Khovd Nar solar power station, which was previously put into operation, does not have an energy storage system, so it cannot store surplus production. However, our project will have an energy storage system, which will create a more favorable condition to address this issue.

Comment: A special policy should be established at the soum level to offer discounts on electricity bills and nighttime usage for electricity provided from renewable energy sources.
Response: The request for discounts on electricity is complicated due to regulatory constraints. The energy pricing policy is regulated by the Energy Regulatory Commission, so the project implementer cannot independently offer discounts.

Comment: The energy supply in the soum should be stable, without power shortages or delays. Hospitals, social services, and households are the most vulnerable to power shortages, highlighting the need for a stable and reliable energy infrastructure to support these essential services.
Response: The project's planned energy storage system is a positive response to the concern regarding energy shortages, and while the solar power station may not directly supply the soum, it is expected to improve the overall energy situation in the region.

Comment: The project should contribute to the establishment of green spaces.
Response: Planting large trees around energy sources and storage systems presents a lightning risk, but trees can be planted on designated areas provided by the soum.

Comment: Attention must be given to the concerns raised by citizens regarding the potential impact of higher authorities' decisions on local benefits. As the Myangad soum has contributed land for the project, it is essential that local residents are prioritized in receiving the project's benefits. This ensures that the community's support and contribution are acknowledged and that the project aligns with the interests of those directly affected by it.
Response: The project's planned energy storage system is a positive response to the concern regarding energy shortages, and while the solar power station may not directly supply the sum, it is expected to improve the overall energy situation in the region.

Comment: There is a concern that, despite the implementation of similar projects, the current solar project is not making a significant contribution to the energy supply. It is important for the project to clearly address how it will improve the energy supply to our soum and ensure that it provides tangible benefits to the community. This aspect should be thoroughly considered and outlined in the project plans.
Response: The new solar power station will support the western regional energy grid, and although we cannot guarantee the direct provision of energy to the soum, we are confident that the soum's current energy situation will improve.

Comment: The workforce for the station should be sourced from the local area, with up to 30% of the station’s employees being soum residents.
Response: The contractor can implement the suggestion of employing local residents gradually by providing training, which aligns with the community's expectations for economic benefits.

156. Overall, the BES consultants concluded that the feedback from Myangad Sum residents and local authorities reflected a community that is engaged and invested in the success of the solar power plant project. While there are concerns regarding energy reliability, local employment, and environmental impacts, the project has made positive strides in addressing these issues. The feasibility of implementing key suggestions, such as local workforce involvement and energy storage, is promising.

2. Information Disclosure and Public Consultations during IEE Preparation

157. A Myangad Soum All Citizens Public Consultation Meeting was held from 11:00 AM to 12:45 PM on 20 March 2025, at the Bayankhoshuu Bag Cultural Center's conference hall. The meeting was organized by the UREP PMU environment, resettlement, and social specialist, PIU specialists and engineers, and national environmental consultants, in cooperation with the Myangad Soum Government. The meeting was publicized in advance via soum communication channels including announcements at the Soum Government Building and Bayankhoshuu Bag Cultural Center, postings in soum social media groups, and phone messages. Local NGOs including the soum Water Users Association and WWF (Khovd) were invited, as was the local field office of the ADAPT project (formerly titled Improving Adaptive Capacity and Risk Management of Rural Communities in Mongolia), funded by the Green Climate Fund and implemented in close partnership with the Government of Mongolia.

158. Information was provided in the meeting on (i) the Myangad Solar Power plant, both in the form of a written handout (**Appendix 4.A**) and in a presnetaion; (ii) the findings of the IEE and BES, and draft DEIA; (iii) the project’s GRM, and (iv) the ADB SPS.

159. The meeting was attended by 59 participants, representing 52.6% of all households in Bayankhoshuu Bagh (**Figure 55**). A representative from the soum Water Users Association also attended, though WWF and ADPAT did not. The meeting minutes are presented in **Appendix IV.C**.

Figure 55: Public consultation meeting photographs, March 20, 2025, at Bayankhoshuu Bagh, Myangad Soum.

Source: BES consultants, 2025.

160. After the information presentations, there was a question and answer period:

Question: Will workers be hired from the local area during construction? Will a full-time worker be hired during operation?
Response: During the construction process, the company can hire local helpers. With the commissioning of the solar station, new jobs will be created. Full-time engineers and technicians with expertise in electrical engineering, particularly renewable energy, will be required. It would be an advantage to employ such professionals from Myangad Soum.

Question: Will the residents of the soum receive energy discounts?
Response: Electricity tariffs are not decided by our project or the Ministry of Energy. The Energy Regulatory Commission sets the tariffs. Thus the project implementer cannot independently offer discounts..

Question: The existing solar plant has not eliminated power outrages. Will the residents of the soum experience power outages?
Response: The Khovd Nar solar power station, which was previously put into operation, does not have an energy storage system, so it cannot store surplus production. However, our project energy storage system is a positive response to the concern regarding energy shortages, and it is expected to improve the overall energy situation in the region.

Question: What negative impacts will the project have on the environment? Will there be glare or overheating issues from the solar panels?
Response: The solar power plant project is an environmentally friendly green technology that does not use air polluting gases or harmful chemicals and is silent and non-polluting. The sun is placed on the screen so that glare does not occur. Many solar power plant projects have been implemented in our country since 2017, and there have been no problem at these stations.

Comment: I am happy that the capacity of the solar power plant is increasing in the district. The project will support the working and living conditions of the residents of the soum, and opportunities for employment are increasing.

161. No questions or comments on land aquation or resettlement were raised. The meeting minutes are presented in **Appendix V.D**.

162. At the end of the meeting a Citizens Khural Resolution to support the subproject was proposed. The citizen's support was unanimous – 100% of participants voted in support of the solar plant (**Appendix 4.E**).

163. A questionnaire was distributed during the meeting (**Appendix IV-E)**. The questionnaire was completed and returned by 36 participants, of whom 19 were male and 17 female. Respondent ages ranged from 22 to 72, and the average age was 46. 84% had lived in the soum nine years or longer.

164. A compilation of questionnaire responses is presented in **Appendix IV.F**, and is summarized below:

- With respect to environmental pollution issues in the area, the most significant problem is solid waste identified by 88% of respondents, followed by soil contamination at 28%,

surface water pollution at 25%, ambient air quality at 19%, and indoor air quality and noise, both identified by 9% of respondents.

- 69% of respondents support or partially support the development of renewable energy in Western Mongolia, 16% were uncertain, and 16% did not support it.

- 59% of respondents believe or partially believe the project can be constructed without negative environmental impacts, 19% were uncertain, 19% disagreed, and 3% did not answer.

- 69% of respondents believe or partially believe the project can be constructed without negative social or economic impacts, 22% were uncertain, and 19% disagreed.

- 41% of respondents believe or partially believe the project will have a positive environmental impact, 31% were uncertain, and 28% disagreed.

- 71% of respondent believe or partially believe the project will have a positive social or economic impact, 9% were uncertain, 9% disagreed, and 9% did not answer.

- 69% of respondents felt they got enough information about the project from the project public discussion, 6% were uncertain, 19% disagreed, and 6% did not answer.

- 69% of respondents felt they got enough information about the GRM from the project public discussion, 3% were uncertain, 22% disagreed, and 6% did not answer.

165. Additional comments were provided, most of which had been raised in the meeting (and are presented in the previous discussion, above) or did not relate to the project, such as the need to renovate the school dormitory and playground.

166. Overall, the public consultation meeting, Citizens Khural Resolution and questionnaire indicate strong local support for the subproject. Some concerns such as energy storage have already been addressed by the subproject design, and the construction contractor will be encouraged to engage the local workforce as much as possible.

D. Future Disclosure and Consultation Activities

167. Stakeholder engagement will continue during pre-construction, construction and operation in accordance with relevant government and ADB policies and procedures.

- This IEE report will be disclosed on the ADB website, as will any updates.
- A translated summary of the IEE report will be provided by the PMU to local soum authorities to be distributed to interested parties.
- Environmental monitoring reports prepared by the PMU will be disclosed on ADB's website semi-annually during construction and annually during operation.
- The PMU and contractor will continue to conduct regular community liaison activities during the construction and operation phases, including providing community information construction updates, implementation of the grievance redress mechanism (**GRM**, see **Chapter VII**), and implementation of safety measures during both construction and operation. Ongoing consultation will ensure that public concerns are understood and dealt with in a timely manner.

IX. Grievance Redress Mechanism

A. Introduction

168. A project grievance is defined as an actual or perceived project related problem that gives ground for complaint by an affected person (AP). As a general policy, the EA will work proactively toward preventing grievances through the implementation of impact mitigation measures and community liaison activities that anticipate and address potential issues before they become grievances. In addition, as the Project has strong public support and will not involve any involuntary land or property acquisition or resettlement, significant grievance is unlikely. Nonetheless, during construction and operation it is possible that unanticipated impacts may occur if the mitigation measures are not properly implemented, or unforeseen issues arise. In order to address complaints if or when they arise, a Project GRM will be developed in accordance with ADB requirements and Government practices. A GRM is a systematic process for receiving, recording, evaluating and addressing an AP's project-related grievances transparently and in a reasonable period of time.

B. ADB's GRM Requirements

169. The ADB SPS 2009 requires the EA and IA to establish a GRM to receive and facilitate resolution of AP's concerns and complaints about the Project's environmental performance during the construction and operation phases. The GRM should i) be scaled to the risks and adverse impacts of the project; ii) address affected people's concerns and complaints promptly using an understandable and transparent process; iii) be readily accessible to all sections of the community at no cost and without retribution; and iv) not impede access to the Mongolian judicial or administrative remedies and ADB's Compliance Review Panel.

C. Current GRM Practice in Mongolia

170. Residents' complaints or concerns in Mongolia are generally taken directly to contactors or to bag or soum Citizens Representative Khurals and/or bag or soum government representatives. This approach focusses on taking complaints to lower administrative levels so mitigation actions can be taken quickly without delay, and elevating to higher levels if required.

D. UREP GRM

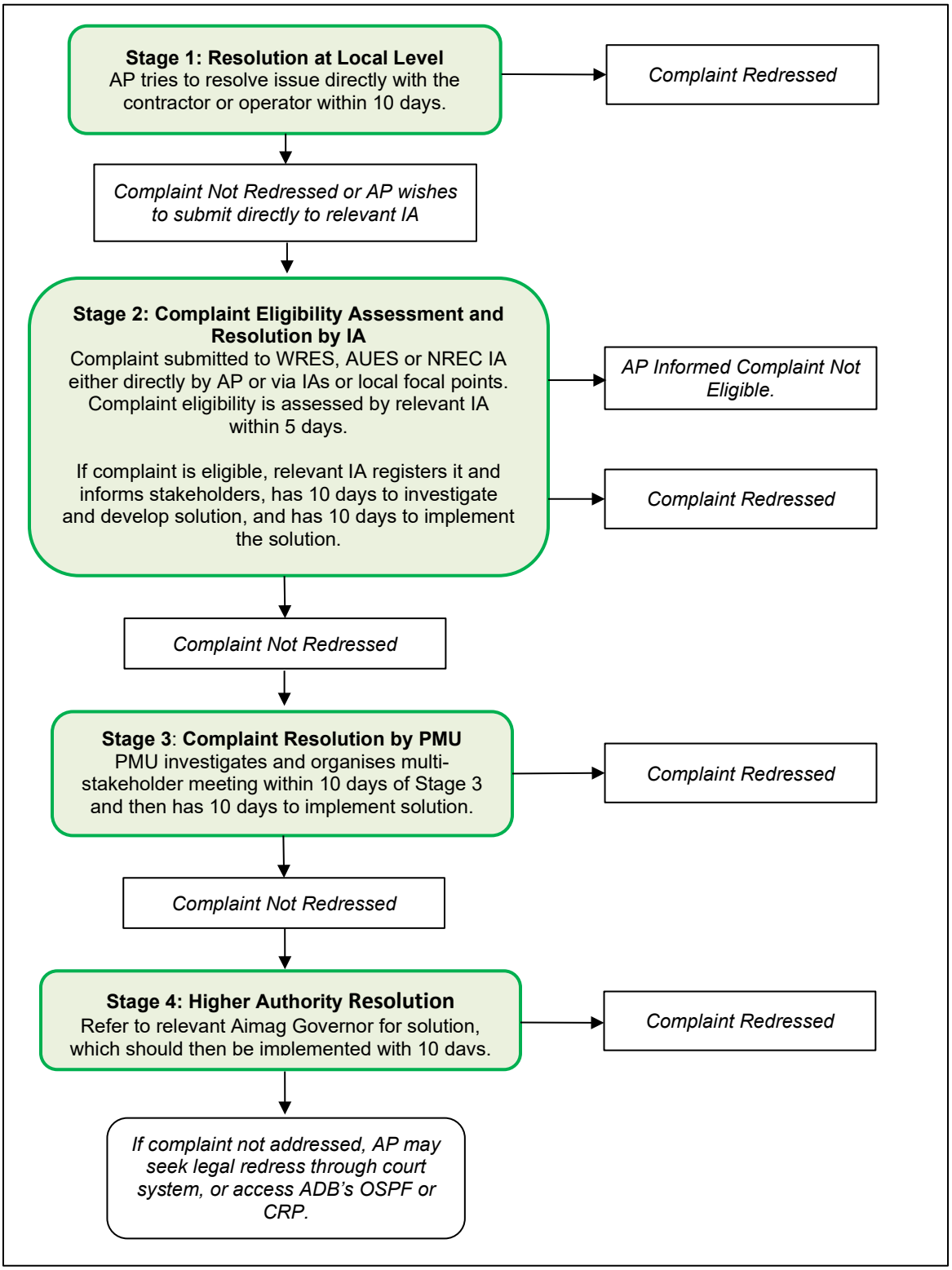
1. Objective

171. The objective of the GRM is to prevent or address community concerns, reduce environmental and social risks, and assist the Project to maximize environmental and social benefits. In addition to serving as a platform to resolve grievances, the GRM has been designed to: i) provide open channels for effective communication, including the identification of new environmental issues of concern arising from the project; ii) demonstrate concerns about community members and their social and environmental well-being; and iii) prevent and mitigate any adverse environmental and social impacts on communities caused by project implementation and operations. The GRM will be accessible to all members of the community.

2. GRM Stages and Timeframe

172. The five GRM stages and associated timeframes for the grievance redress process are presented below and illustrated in **Figure 56**.

Figure 56: UREP GRM.



Stage 1: Resolution at Local Level. If a concern arises, the AP may try to resolve the issue of concern directly with the relevant subproject contractor (during construction) or operator (during operation). If the concern is resolved successfully, no further action is required. Nonetheless, the contractor (during construction) and/or the operator (during operation) shall record any complaint and actions taken to resolve the issues and report the results to the relevant IA. If no solution is found within 10 working days, the complainant is not satisfied with the suggested solution under Stage 1, or the AP does not wish to resolve the concern directly with the contractor or operator, proceed to Stage 2.

Stage 2: Complaint Eligibility Assessment and IA Resolution. The AP will submit the grievance to the relevant subproject IA (e.g. WES, AUES or NREC IAs) directly or via local entry points, either verbally or in writing. Local entry points will include bag or soum Citizens Representative Hurals, and/or bag or soum government representatives. The IA will make a written record of each complaint and assess its eligibility. If the complaint is deemed ineligible, e.g. related to an issue outside the scope of the Project, the IA will provide the AP a clear written explanation of the decision within 5 working days.

If the complaint is deemed eligible the relevant IA will register the complaint and inform the relevant entry point, contractor or operator, the PMU and the ADB. The IA will take steps to investigate, communicate with all relevant stakeholders and identify a resolution within 10 working days of receipt of the complaint. This may involve instructing the contractor or operator to take corrective actions. Within 10 working days of the redress solution being agreed upon, the contractor or operator should implement the redress solution and convey the outcome to the PMU and the AP.

Stage 3: PMU Complaint Resolution. If no solution can be identified by the IA or if the AP is not satisfied with the suggested solution under Stage 2, within two weeks of the end of Stage 2 the PMU will organize a multi-stakeholder meeting including relevant local government authorities. The meeting should result in a solution acceptable to all, and identify responsibilities and an action plan. The contractor or operator will implement the agreed redress solution and convey the outcome to the relevant IA, AP and other stakeholders within 10 working days.

Stage 4: Higher Authority Resolution. If the multi-stakeholder meeting cannot resolve the problem, and the AP is unsatisfied, the PMU will set up a meeting with the relevant Aimag Governor's office to identify a solution, which should be then implemented within 7 days.

Stage 5: If the complainants are not satisfied with the suggested solution under Stage 4, the AP can access ADB's OSPF or CRP, or seek local legal address.

173. The IAs will be the key contact point for locals who may require information about the Project or who would like to submit a grievance. The IAs will issue public notices to inform the public within the subproject areas of the GRM and contact information (phone number, fax, address, email address) for the PMU and local entry points (e.g. the IAs, local bag, soum or district officials, and the contractors).

3. Reporting

174. Each IA will record the complaint, investigation, and subsequent actions and results, and report this information to the PMU. The PMU will include this information in the environmental monitoring reports to the ADB.

175. The tracking and documenting of grievance resolution will include: i) tracking forms and procedures for gathering information from project personnel and complainant(s); ii) periodic reviews of complaints so as to recognize grievance patterns, identify any systemic causes of grievances, and periodically evaluate the overall functioning of the mechanism; iii) processes for informing stakeholders about the status of a case; and iv) procedures to retrieve data for reporting purposes, including the periodic reports to the EA and ADB.

X. Conclusions and Recommendations

176. This is the initial environmental examination (IEE) report for the Myangad 19.8 MW Solar PV Plant Subproject (the subproject) in Khovd Aimag. The subproject is being developed under Phase II of UREP (the Project).

177. Subproject operation will allow for the production of up to 39,844 MWh/y of non-polluting renewable energy.

178. Based on the analysis conducted in this assessment it is concluded that overall the subproject will result in significant positive environmental and socioeconomic benefits, and will not result in significant adverse environmental impacts that are irreversible, diverse, or unprecedented. Any adverse environmental impacts associated with the subproject can be prevented, reduced, or minimized through the appropriate application of mitigation measures. The designation of the subproject as Category B is confirmed. It is therefore recommended that:

(i) this IEE is considered sufficient to meet ADB's environmental safeguard requirements for the subproject, and no additional studies are required; and
(ii) the subproject be supported by ADB, subject to the implementation of the commitments contained in the EMP and allocation of appropriate technical, financial and human resources by the EA and IA to ensure these commitments are effectively and expediently implemented.

Appendix I: Myangad 19.8 MW Solar Subproject Environmental Management Plan (EMP)

A. Introduction

1. This is the environmental management plan (EMP) for the proposed Myangad 19.8 MW Solar Photovoltaic (PV) Power Subproject (the subproject), in Myangad Soum, Khovd Aimag, in western Mongolia. The subproject is being developed as part of Upscaling Renewable Energy Sector Project (UREP, the Project). UREP will i) increase renewable energy capacity for electricity and heating supply in remote grid system in western Mongolia; and ii) enhance the capacity of local public utilities in investment planning, project management, and grid control while decarbonizing energy sector in Mongolia. .

B. Objectives

2. The objectives of the EMP are to ensure i) implementation of identified mitigation and management measures to avoid, reduce, mitigate, and compensate for anticipated adverse environment impacts; ii) implementation of monitoring and reporting; and iii) the subproject compliance with the Mongolia's relevant environmental laws, standards and regulations, and ADB's SPS 2009. Organizational responsibilities and budgets are clearly presented for execution, monitoring and reporting for pre-construction, construction, operation and decommissioning phases.

C. Implementation Arrangements

6. The Ministry of Energy (MoE) will be the Executing Agency (EA). The Western Energy System (WES) State Owned Joint Stock Company will be the IA.

7. The construction contractor will be responsible for implementing the EMP mitigation measures. The contractor will be required to respond to the environmental specifications in the bidding documents in their proposals. The contractor will also be required to develop a Construction Environmental Management Plan (CEMP) which outlines the way in which they will comply with the EMP, and will assign a person responsible for environment, health and safety. After subproject completion, environmental management responsibilities will be handed over to the operation and maintenance units of the IA.

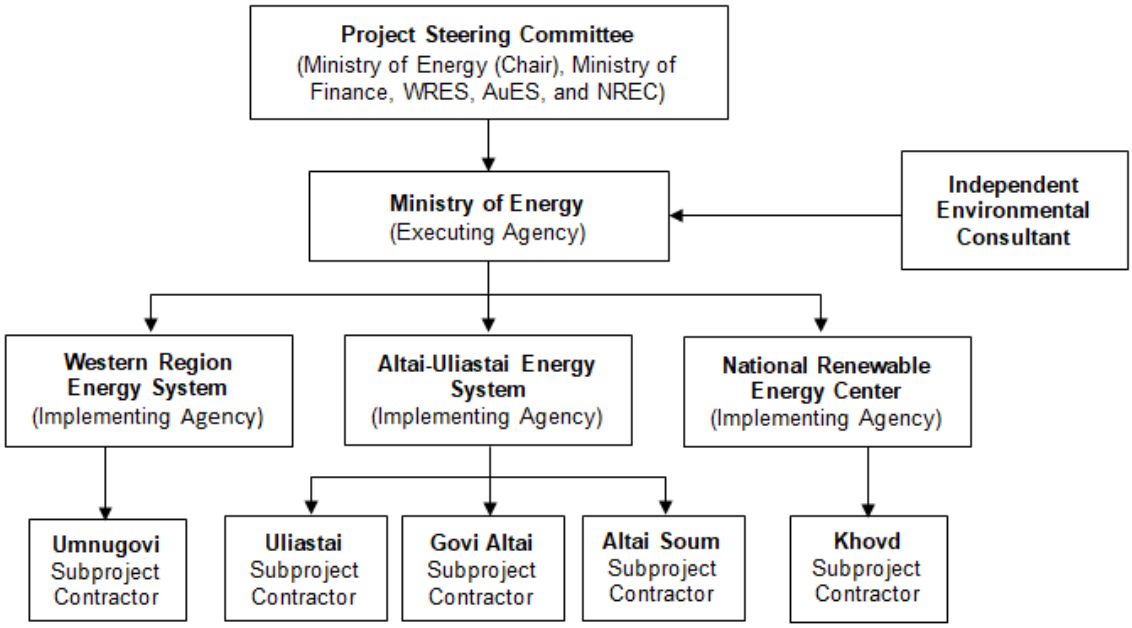
8. The implementation arrangements for UREP are illustrated in **Figure 1**.

D. Responsibilities for EMP Implementation

1. Steering Committee

9. Chaired by the MoE and including the Ministry of Finance (MoF), the WES, AUES, and the National Renewable Energy Center (NREC), the Steering Committee provides overall guidance to the Project implementation.

Figure 1: UREP Project Implementation Arrangements.



2. Ministry of Energy (MoE) and PMU

10. The MoE is the EA for the Project and the primary point of contact with ADB. It has appointed an Environmental and Social Safeguards Specialist (ESSS) to its Project Management Unit (PMU), and is responsible for overall project planning and management, coordination, and monitoring and supervision. In relation to environment safeguards, the PMU:

- Has overall responsibility for ensuring the implementation of the EMP.
- Ensures allocation of sufficient budget for EMP implementation and monitoring.
- Ensures compliance with loan assurances, including all the requirements specified in the EMP.
- Ensures that the necessary environmental clearances and permits are secured for the project.
- Provides coordination and supervision support to the subproject IAs.
- Coordinates resolution of complaints under the GRM.
- Liaises with ADB on the implementation of the EMP and corrective actions.
- Reviews the environmental monitoring reports submitted by the subproject IAs.
- Submits environmental monitoring reports to ADB for disclosure.
- Incorporates the results of the environmental monitoring reports into progress reports submitted to ADB.

3. Subproject Implementing Agency (IA)

11. The WES IA will appoint environmental and social safeguards focal points. The IA will have direct day-to-day responsibility for ensuring the implementation of the EMP, including:

- Revise the IEE and EMP as required during detailed design.
- Ensure that national EIA and revised IEE/EMP requirements are included in the bidding documents and civil works contracts.
- Obtain all necessary environmental clearances and permits for the project.
- Coordinating delivery of the training program described in this EMP.
- Require the contractors to develop CEMPs (one for each subproject) in compliance with the EMP, and review and approve CEMPs.
- Ensure the contractors implement the CEMPs properly and in compliance with the requirements of the EMP.
- Ensure that the contractors comply with the relevant environmental management and protection requirements and regulations of Mongolia and the ADB, and with any Project environmental or social loan covenants and assurances.
- Identify any environmental issues during implementation and propose necessary corrective actions.
- Undertake ongoing outreach and communications with project stakeholders and affected persons (APs).
- Ensure implementation of the GRM such that complaints from affected persons are efficiently and effectively resolved.
- Ensure implementation of the environmental monitoring presented in the EMP environmental monitoring plan.
- Review and consolidate quarterly environmental monitoring reports submitted by the contractors.
- Prepare and submit consolidated semi-annual/annual environmental monitoring reports to PMU for onward submission to ADB.

4. Subproject Contractor

12. The subproject contractor will be responsible for construction of the solar PV power plant, including implementing the EMP mitigation measures. The contractors will also submit quarterly environmental reports to the IA on EMP implementation, and will be required to report any spills, accidents, fires and grievances received and take appropriate action.

5. Independent Environmental Consultant (IEC)

13. A qualified independent environmental consultant was previously recruited to support the EA and IAs in environmental monitoring, reporting, GRM implementation, and delivery of the training program. PMU has been operating for multiple years now, and has developed sufficient capacity to undertake these tasks.

6. Ministry of Environment and Climate Change (MECC)

14. The MECC may undertake inspections and monitoring at their discretion.

7. ADB

15. ADB will conduct environment safeguard due diligence during Project review missions. ADB will review the semi-annual/annual environmental monitoring reports submitted by the PMU and will disclose the reports on its website. If the PMU fails to meet safeguards requirements described in the EMP, ADB will seek corrective measures and advise the EA on items in need of follow-up actions.

E. Potential Impacts and Mitigation Measures

16. The potential impacts of the subproject during construction and operation have been identified and appropriate mitigation measures developed (see **Chapter V** of the IEE). Detailed mitigation measures are presented in **Table 1.**

17. Many of the mitigations apply to subproject works as a whole, be it construction of the plant or TL, such as erosion control, community safety or worker safety around high voltage. Some are specific however, such as working at height on the TL. This has been specified where relevant in the EMP.

16. The mitigation measures will be incorporated into subproject detailed design, bidding documents, construction contracts and operational management manuals. The effectiveness of these measures will be evaluated based on environmental inspections and monitoring to determine whether they should be continued, improved or adjusted.

F. Environment Monitoring Plan

17. An environment monitoring plan (EMoP) to monitor the environmental impacts of the subproject and assess the effectiveness of mitigation measures is presented in **Table 2.** The EMoP is focused on compliance inspections undertaken by the IA supported by the ESSS. The results will be used to assess: (i) the extent and severity of actual environmental impacts against the predicted impacts and baseline data collected before the subproject implementation; (ii) performance or effectiveness of environmental mitigation measures or compliance with pertinent environmental rules and regulations; (iii) trends in impacts; (iv) overall effectiveness of EMP implementation; and (v) the need for additional mitigation measures and corrective actions if non-compliance is observed.

Table 1: Myangad 19.8 MW Solar Plant subproject EMP.

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
A. <u>Preconstruction Phase</u>					
Detail Design Stage	Environmental Management Readiness	− Flood risk to the solar PV plant will be assessed in detail, and if required flood control dykes will be designed to protect the plant and TL. − A detailed assessment of earthquake risks will be undertaken during the detailed design phase, and the result incorporated into the tower and plant design as appropriate and in accordance with Mongolian construction standards. − This EMP will be updated as required and incorporated into the detailed design. ADB will review and approve any significant revisions to the IEE and EMP. − If changes in scope are significant, the BES and DEIA may also need to be updated. − The updated EMP requirements will be incorporated into the subproject contractor's bidding documents, technical specifications, and contracts. − The subproject contractor will develop a subproject CEMP that outline the manner by which they will comply with the requirements of the IEE and EMP. − The PMU, IA and/or contractor will obtain all necessary Mongolian permits according to the *Law on Construction* to undertake project construction, and any other relevant permits or requirements, including those in the GEIA and DEIA. − In accordance with the GRM presented in Chapter X of the IEE, the PMU has been assigned overall responsibility for the GRM. GRM training will be provided for PMU, IA and GRM access points, and the PMU will issue public notices to inform the public within the subproject area of the GRM. Contact information (phone number, address, email address)	EA PMU and subproject IA	EA and ADB	Included in EA and subproject IA operations budget

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
		for the PMU and local entry points (e.g. contractors, bag and soum Citizens Representative Khurals, and bag and soum government representatives) will be disseminated at construction sites. − The institutional strengthening and training program will be delivered by the PMU Environmental and Social Safeguards Specialist (ESSS). − Information disclosure and consultation activities will be continued with interested stakeholders, particularly on construction schedule and activities and the GRM.			
B. Construction Phase					
Topography and Soils	Erosion, borrow and spoil	Good soil maintenance practices (where applicable for solar plant, access roads and tower foundations): − Minimize the area of soil clearance. − Maintain slope stability at cut faces by implementing erosion protection measures. − Use temporary berms or other appropriate temporary drainage provisions to prevent stormwater runoff from entering adjacent water bodies. − Ensure that borrow areas are located away from residential areas, water bodies, dry river beds and valuable pasture/grazing land. − Dispose of spoil (if any) at spoil disposal sites identified in consultation with soum authorities. − After use, grade borrow and spoil areas to ensure drainage and visual uniformity.	Subproject Contractor	PMU supported by ESSS	Included in the construction contract
Ambient Air	Fugitive dust generated by construction activities, gaseous air pollution (SO_2, CO, NOx) from construction	Good site maintenance practices implemented: − Stockpiles will be managed to reduce problematic fugitive dust emissions, including covering if necessary. Water spraying is to be used only if other techniques are unsuccessful. − The locations of the stockpiles will be downwind of sensitive receptors (if applicable).	Subproject Contractor	PMU supported by ESSS	Included in the construction contract

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
	machinery	− Construction site management: Water will be sprayed on construction sites and material handling routes if monitoring indicates fugitive dust is impacting residents. − Transport of materials: Trucks carrying earth, sand or stone will be covered with tarpaulins or other suitable cover. Construction vehicles and machinery will be maintained to a high standard to minimize emissions. − Manufacturing plants: Site any plants for the production of concrete at least 500 m downwind from the nearest dwelling.			
	Equipment Procurement	It is expected that major equipment will be sourced from outside of Mongolia. Equipment will be required to meet technical specifications including ability to withstand predicted climate changes. Once required technical specifications are met, preference will be given to regional suppliers so as to minimize transport requirements and associated greenhouse gas and other emissions.	Subproject Contractor	PMU supported by ESSS	Included in the construction contract
Surface and Ground Water	Contamination from construction and domestic wastewater	Good wastewater practices implemented: − Temporary drainage provision will be provided during construction to ensure that any storm water running off construction areas will be controlled. − Construction site will be equipped with adequate potable water and temporary sanitation facilities.	Subproject Contractor	PMU supported by ESSS	Included in the construction contract
Fresh Water Use	Water Conservation	Water usage will be mitigated through good water conservation construction practices. These will be decided during detailed design depending on suitability for Mongolian conditions, but depending on availability of products could include: − Water Conservation Management Proper water conservation management will save water during construction. The saved water from	Subproject Contractor	PMU supported by ESSS	Included in the construction contract

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
		harvesting or recycled water can be used for works other than mixing in cement, like cleaning working site, cleaning equipment, etc. While cleaning site and equipment a continuous water flow through pipes must be avoided and application in small packets like buckets should be used. − Adopt Alternate Methods of Curing Drip curing gives the optimum level of compressive strength along with using water resource most efficiently. In drip curing, water is applied directly at the required spot or location, minimizing conveyance losses. Moreover, to increase the efficiency of curing the concrete surface can be covered by moist canvas. − Use Water Reducing Admixtures Water Reducing Admixtures, sometimes referred to as plasticizers, are designed to free trapped water that is present in concrete mixtures and are used in a variety of applications to ensure or improve workability. Use of these admixtures reduces the amount of water required, while maintaining an optimum level of workability and consistency i.e., provide certain workability at less water cement ratio, which further results in better strength and durability. It also decreases the concrete porosity and reduces permeability, thus, further reducing loss of water. Water reducing admixtures actually neutralizes surface charges and allows for better dispersion resulting in reduced flocculation of cement particles and formation of greater slump − Use Dry Mortar In general, the maximum amount of water is used during preparation of mortar and during curing. Use			

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
		of dry mortar efficiently reduces the water requirement as there is no need of wet mortar. Moreover, use of dry mortar completely eliminates the curing need. − Create Water Harvesting and Storage Ponds Collected and stored rainwater or used grey water can be used for dust control and other purposes. − Worker Camp Conservation If a worker camp is required, water conservation methods will be applied in the camps to avoid wastage, such as auto-shut off valves on water dispensing containers.			
Noise	Impacts on workers	− Good construction noise management measures if required, including limiting working hours, using noise barriers if necessary, using low noise equipment, and equipping machinery with mufflers in accordance with relevant government requirements. − Workers to be equipped with appropriate noise PPE (see Occupational Health and Safety, below)	Subproject Contractor	PMU supported by ESSS	Included in the construction contract
Waste	Waste management and resource use	Good waste management practices and the adoption of the waste hierarchy: − The preference is for prevention of waste at source. Procurement options will play a role in waste prevention as the procurement of materials which have less packaging for example, would be preferable. Excavated soil will be used for backfilling to the maximum extent. Waste minimization is the second preferred option. This means the effective management of materials on site through good house-keeping and work planning, in order to generate less waste. Reuse or recycling options should be considered prior to disposal, separate containers for recyclables should be used if there is a	Subproject Contractor	PMU supported by ESSS	Included in the construction contract

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
		market for the materials. Disposal of waste which cannot be reused or recycled shall take place at sites authorized by authorities. − Storage and containment: Provide appropriate waste storage containers for worker's construction wastes, regularly haul to an approved disposal facility. − Wastes that cannot be reused or recycled will be collected and disposed at the new Mayngad Soum Category 3 waste facility in accordance with national regulations. − Burning of waste on site is strictly prohibited at all times.			
	Hazardous and polluting materials	Good waste management practices implemented: – Storage facilities for fuels, oil, chemicals and other hazardous materials will be within secured areas on impermeable surfaces provided with dikes, and at least 300 m from drainage structures, important water bodies and other sensitive receptors. – Storage facilities for hazardous materials will be placed on impermeable surfaces with a storage capacity of at least 110% of the capacity of the hazardous materials stored. – Signs will be placed at chemicals and hazardous materials storage sites to provide information on type and name of chemicals and hazardous materials. – Spill response procedures will be developed (including provision of absorbents at hazardous materials storage facilities), and all spills will be cleaned immediately. – Providers of hazardous materials will be responsible for removing and or recycling them if they become wastes, either in Mongolia in licensed facilities, or through transport to a licensed facility in another country in the region. All exports of hazardous wastes must be with the review and approval of the MECC,	Subproject Contractor and Suppliers	PMU supported by ESSS	Included in the construction contract

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
		and all necessary export licenses must be obtained. – Vehicles and equipment will be properly maintained and refueled either off-site in local garages or other similar facilities. Washing or repair of machinery in or near surface waters is prohibited.			
Ecological Resources	Impacts on Flora	Good vegetation management construction practices: − The clearing of vegetation will be minimized to the solar plant footprint as much as possible. − The use of herbicide for vegetation clearing is strictly prohibited. − Burning of cleared vegetation is strictly prohibited. − Disturbed surfaces including borrow pits, spoil pits, temporary borrow and spoil storage areas will be restored to pre-construction conditions as soon as possible after the completion of works through grading and surface preparation. − Disturbed areas will be allowed to revegetate naturally, unless additional measures are found to be necessary. If replanting is required, only native drought tolerant species typical to the area will be utilized. Restoration shall be in compliance with General *Guidelines on Reclamation and Vegetation of Damaged Land During Construction Activities*, Appendices 2,3,4 of Joint Decree by Ministry of Environment and Tourism and Ministry of Agriculture and Industry (2000). − Solar plant farm will be landscaped with native drought tolerant species typical to the area. − Firewood collection is strictly prohibited.	Subproject Contractor	PMU supported by ESSS	Included in the construction contract
	Fauna	Good wildlife management construction practices will be applied − As noted above, the clearing of vegetation will be minimized as much as possible. − Construction activities should be scheduled to avoid	Subproject Contractor	PMU supported by ESSS	Included in the construction contract

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
		bird breeding seasons. − Poaching including illegal hunting, trapping, wildlife collection and trading by workers should be strictly prohibited. − Project staff and work crews will not be allowed to have or use firearms and animal traps. − Clauses to prevent poaching and illegal wildlife trading should be clearly included in contract documents and be accompanied by strict penal provision in case of violation such as significant financial penalty to the contractor and direct deduction from contract payments. Anti-poaching measures should be in place before start of civil works and should include penalties for transgressions of these clauses.			
Socio-economic Resources	Traffic Impacts	Good traffic and road management practices: – Transportation routes and delivery schedules planned in consultation with relevant road management authorities. – Any damage caused by construction traffic will be repaired by the subproject contractor. – Vehicles transporting construction materials or wastes will be required to slow down when passing through or nearby sensitive locations.	Subproject Contractor	PMU supported by ESSS	Included in the construction contract
	Worker Occupational Health and Safety (OHS)	Good construction OHS practices implemented as per the EHS Guidelines and the EHS Guidelines for Electric Power Transmission and Distribution: – All relevant GoM safety regulations will be strictly enforced. – All workers will be equipped with appropriate personal protective equipment (PPE), such as hard hats, insulating and/or fire resistant clothes, appropriate grounding, hot line and uninsulated tools, safety gloves, safety goggles, fall protection system including safety belts and other climbing gear (for	Subproject Contractor	PMU supported by ESSS	Included in the construction contract

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
		work at heights), ear protection, etc. PPE will be maintained and replaced as necessary. – All work at height, particularly for TL construction, will be prohibited during non-daylight hours, during periods of fog, and during periods of strong wind. – Construction sites will be equipped with adequate potable water and temporary sanitation facilities. – Training will be provided to workers in all aspects of OHS, including prevention of communicable diseases (including HIV/AIDS) prior to the start of construction and on a regular basis (e.g. monthly briefings). Emergency Response Procedures (ERP): – Emergency response procedures will be developed, including communication protocols for interaction with local and regional emergency response providers, protocols for shutting down power, firefighting response procedures, provision of appropriate firefighting equipment, training for workers on fire response, and record keeping. – Medical emergency response procedures will be developed covering both workers and community members (when affected by project related activities), including communication protocols for interaction with local and regional emergency response providers, first aid equipment on site, contact information for the nearest ambulance and medical facilities, training for workers on initial on-site emerge response, protocols for informing and transferring injured workers to local or provincial health centers, and record keeping. At least one trained first-aid worker will be available at the construction site. – Training will be provided to workers in all aspects of the ERP.			

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
		Worker camp, if required: – The worker camp will be sited in cooperation with local authorities, at least 200 m from surface waters. – Camp will be equipped in accordance with the IFC and EBRD guidance note on workers' accommodation[38], including: - Appropriate site drainage. - Adequate housing. - Canteen, cooking and laundry facilities. - Adequate potable water supply. - Adequate solid waste management, including solid waste bins that are emptied on a regular basis, with wastes directed to an approved solid waste disposal facility. - Adequate sanitation facilities, either pit latrines or portable toilets, including separate facilities for men and women. Pit latrines will be decommissioned upon completion of construction, and pit latrines and portable toilets will be pumped out by a qualified service provider on an as needed basis. - Wastewater from canteens will be discharged to a settling pit located away from surface water sources, and the settling pit will be restored to preconstruction conditions when construction is complete. – Weapons will not be allowed. Site conditions at accommodation camps will be fully restored to preexisting condition upon completion of construction.			
	Communicable diseases	– To address the risks of communicable diseases, contractors will develop a health and safety plan	Subproject Contractor	PMU supported by ESSS	Included in the construction

[38] https://www.ifc.org/content/dam/ifc/doc/mgrt/workers-accomodation.pdf

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
		which will include implementation of COVID-19 and other communicable diseases prevention measures, including disinfection/cleaning of office buildings, construction sites and labor camps, on-site temperature checks, social distancing measures, mandatory use of personal protective equipment such as facemasks, provision of handwashing stations and hand sanitizers etc., and procedures to be adopted in the event any worker is infected with COVID-19 or other communicable diseases.			contract
	Community health and safety risks	Good community health and safety practices, including: − Outreach to local communities to disseminate knowledge about safety at or near the construction sites, installation of site safety fencing and warning signs (in Mongolian language). − On site supervision personnel (including night guards), as determined by the risk, to prevent unauthorized access to construction areas. − Signs will be placed at construction site in clear view of the public and made secure to avoid public access. − Workers will be locally recruited to the extent practical, and will receive health examinations and education on sexually transmitted diseases.	Subproject Contractor	PMU supported by ESSS	Included in the construction contract
	PCRs	The Khirgisuur and burial tomb will be assessed by a qualified archaeologist, and a PCR protection plan will be developed and implemented, including fencing the Khirgisuur and burial tomb and identifying them as strict no-entry zones for all workers. The archaeologist may define other protection measures as needed.	Archaeologist recruited by Subproject Contractor	PMU, local Cultural Heritage Bureau	Included in the construction contract
		If any chance finds of PCRs are encountered: − construction activities will be immediately suspended; − destroying, damaging, defacing, or concealing PCRs will be strictly prohibited in accordance with Mongolian regulations;	Subproject Contractor	PMU, local Cultural Heritage Bureau	Included in the construction contract

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
		− the local Cultural Heritage Bureau will be promptly informed and consulted; and, − construction activities will resume only after thorough investigation and with the permission of the local Cultural Heritage Bureau.			
C. Operation Phase					
Water	Water Use	− The solar PV plant will utilize snow and summer rains to undertake panel self-cleaning. − If cleaning is required, it is estimated that it will require 5 l/m^2, at most two times per year (April and August). Water will be sourced from the Khovd River, and stored on site in tanks, avoiding impacts on local groundwater levels. Well water will be avoided as calcified water can do more harm than good.	Subproject Operator	Not Applicable	Not Applicable
Wastewater	Wastewater Disposal	The operation of the Solar PV plant will not generate wastewater. − Solar panels will be cleaned by natural snow and summer rains (see above). − Staff will use the sanitation facilities at the adjacent Khovd Nar Solar Power Plant.	Subproject Operator	PMU supported by ESSS	Subproject operating budget
Waste	Solid and Hazardous Wastes	− Solar PV plant domestic wastes will be collected and disposed at the new Myangad Soum Category 3 waste disposal site following national regulations. − The panel and battery supplier(s) will be responsible performing periodic checks on the PV panels and batteries and repairing or replacing and recycling used or defective panels and batteries, either i) in Mongolia if an appropriate and licensed facility become available during the subproject operation period, or ii) in a licensed and appropriate facility in a neighboring country in the region, for the guarantee period of the panels and batteries. If the guarantee period has passed or the supplier is no longer	Panel or battery supplier(s) during guarantee period. Subproject Operator if outside of guarantee period or supplier(s) is insolvent.	PMU supported by ESSS	Panel or battery supplier(s) budget Subproject operating budget

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
		solvent, the IA will assume the responsibility. If export is required due to the lack of domestic facilities, it will be done in compliance with: i) the relevant requirements of Mongolia, including obtaining appropriate approvals and export permits from the MECC; the requirements of the receiving country; and the Basel Convention. − The Basel Convention regulates the export of hazardous wastes, and lays out clear technical guidelines for handling waste batteries. Batteries require special handling and recycling processes to recover valuable materials and safely manage harmful components. The Convention requires that exporting countries receive informed consent from importing countries before shipping hazardous waste batteries. Prior ADB endorsement of any planned panel and/or battery export for recycling will also be required.			
Flooding	Flood Damage	− During detailed design an engineering company appropriately permitted to design water infrastructure in Mongolia will undertake a flood risk assessment and design a flood protection system to protect the solar PV power plant against flood discharges.).	Appropriately permitted Design Contractor	PMU supported by ESSS	Subproject detailed design budget
Fauna	Bird electrocutions and collisions on power lines and solar plant infrastructure	− The solar PV plant and TL will feature bird friendly designs developed based on guidelines produced by the Avian Power Line Interaction Committee (APLIC) and in consultation with the Wildlife Conservation Society (WCS) of Mongolia. Bird friendly design could include use of antireflective coatings on solar panels to reduce their visibility to birds, ensuring a safe distance between energized wires or between energized and grounded parts; designing crossarms, insulators and other parts of powerlines such that that birds find no opportunity to perch near energized power lines that might be hazardous; and, the use of	Design Contractor in consultation with PMU safeguards staff, relevant specialists and ADB	PMU supported by ESSS	Included in the construction contract

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
		marker balls, bird diverters, or other devices to increase line visibility.			
Occupational Health and Safety	Worker safety	Good operation OHS practices implemented as per the general *EHS Guidelines* and the *EHS Guidelines for Electric Power Transmission and Distribution*: − Workers will wear PPE, such as safety shoes or boots with non-slip soles, goggles, etc., to protect workers from potential safety hazards. − Check electrical equipment for safety before use; verify that all electric cables are properly insulated; take faulty or suspect electrical equipment to a qualified electricity technician for testing and repair. − All workers will undergo periodic examinations by occupational physician to reveal early symptoms of possible chronic effects or allergies; and − Health and safety will be incorporated into the regular staff training programs, including prevention of communicable diseases.	Subproject Operator	PMU supported by ESSS	Subproject operating budget
	Communicable Diseases	− To address the risks of communicable diseases, the operator will develop a health and safety plan to address the outbreak of COVID-19 and other potential communicable diseases during operation, which will include implementation of COVID-19/other communicable diseases prevention measures, including disinfection/cleaning of office buildings, construction sites and labor camps, on-site temperature checks, social distancing measures, mandatory use of personal protective equipment such as facemasks, provision of handwashing stations and hand sanitizers etc., and procedures to be adopted in the event any worker is infected with COVID-19 or other communicable diseases.	Subproject Operator	PMU supported by ESSS	Subproject operating budget
	Community Health and Safety	− Solar plant to be fenced and equipped with warning signs in Mongolian.	Subproject Operator	PMU supported by ESSS	Subproject construction

Item	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented By	Supervised By	
					budget
Climate Risk	Adaptation to observed and Projected Climate Change	− Design parameter for all solar array supports be increased to a range of -45 to +40 °C; − Heat resistant materials and products to be used where available; − Solar arrays designed to withstand future projected extreme wind speed events; − Solar arrays monitored for dust accumulation, and cleaned on a regular (if required) or as necessary basis; and − Flood dykes and site drainage to be installed to protect sites from flash flooding. − Snow accumulations to be monitored and snow to be removed if necessary so as to avoid build up.	EA PMU and subproject IA	PMU supported by ESSS and ADB	Included in EA and subproject IA design, construction and operation budgets

ADB = Asian Development Bank; EA = Executing Agency; IA = Implementing Agency; PMU = Project Management Unit.

Table 2: Myangad Solar PV Plant Environmental Monitoring Plan (EMoP)

Subject	Parameter	Location	Frequency	Implemented by	Supervised by	Source of Funds
A. Pre-construction Phase						
Air Pollution	Dust/particulates Monitoring (PM_{10}, $PM_{2.5}$)	Construction sites	Once before construction commences	Construction contractor EHS Officer	PMU, local environmental authority at its discretion	IA: IA Budget
Noise	Noise level Monitoring	Construction sites	Once before construction commences	Construction contractor EHS Officer	PMU, local environmental authority at its discretion	IA: IA Budget
B. Construction Phase						
Erosion and Spoil	Compliance inspection of soil erosion management measures.	Construction sites, spoil disposal sites	Monthly during construction; and once after completion of spoil disposal	IA environmental and social staff, supported by ESSS	PMU, local environmental authority at its discretion	IA: IA Budget ESSS: PMU Budget
Noise	Noise level Monitoring	Construction sites	Twice during construction	Construction contractor EHS Officer	PMU, local environmental authority at its discretion	IA: IA Budget
Air Pollution	Compliance inspection of site maintenance measures.	Construction sites, spoil disposal sites	Monthly during construction; and once after completion of spoil disposal	IA environmental and social staff, supported by ESSS	PMU, local environmental authority at its discretion	IA: IA Budget ESSS: PMU Budget
	Dust/particulates Monitoring (PM_{10}, $PM_{2.5}$)	Construction sites	Twice during construction	Construction contractor EHS Officer	PMU, local environmental authority at its discretion	IA: IA Budget

Subject	Parameter	Location	Frequency	Implemented by	Supervised by	Source of Funds
Surface and Groundwater	Visual compliance inspection of wastewater mitigation measures.	Construction sites	Monthly during construction of tower bases near rivers	IA environmental and social staff, supported by ESSS	PMU, local environmental authority at its discretion	IA: IA Budget ESSS: PMU Budget
Flooding	Review of works scheduling to ensure works are not undertaken during risk times for flooding.	Contractors work plan	Review works schedule prior to start of construction, and periodically as required, especially prior to spring melts and summer rains.	PMU environmental and social staff, supported by ESSS	PMU, local environmental authority at its discretion	PMU SS: PMU Budget ESSS: PMU Budget
Solid Waste	Compliance inspection of domestic and construction waste collection and disposal	Waste collection and disposal sites.	Monthly	IA environmental and social staff, supported by ESSS	PMU, local environmental authority at its discretion	IA: IA Budget ESSS: PMU Budget
Hazardous and Polluting Materials	Compliance inspection of hazardous materials management and recycling.	Storage facilities for fuels, oil, chemicals and other hazardous materials. Vehicle and equipment maintenance areas.	Monthly	IA environmental and social staff, supported by ESSS	PMU, local environmental authority at its discretion	IA: IA Budget ESSS: PMU Budget
Socioeconomic Impacts	Visual inspection of construction site to check construction site safety, community safety, implementation of GRM, accidents involving public and workers, public complaints, etc.	Working sites near sensitive receptors	Monthly	IA environmental and social staff, supported by ESSS	PMU, local environmental authority at its discretion	IA: IA Budget ESSS: PMU Budget

Subject	Parameter	Location	Frequency	Implemented by	Supervised by	Source of Funds
	All near miss, no lost time, lost time and fatal accidents recorded and reported against a performance standard of zero incidents	Construction sites	Monthly	IA	EA, local environmental authority at their discretion	IA budget
	Compliance inspection to determine if workers have appropriate PPE	All construction sites	Monthly	PMU safeguard staff supported by ESSS	PMU, local environmental authority at its discretion	PMU SS: PMU Budget ESSS: PMU Budget
C. Operation Phase						
Solid and Hazardous Wastes	Compliance inspection of hazardous materials management and recycling.	Storage facilities for fuels, oil, chemicals and other hazardous materials. Vehicle and equipment maintenance areas.	Annually	IA	EA, local environmental authority at their discretion	IA operating budget
Flora and Fauna	Bird strikes and deaths	Transmission line	Monthly	IA	EA, local environmental authority at their discretion	IA operating budget

Subject	Parameter	Location	Frequency	Implemented by	Supervised by	Source of Funds
	Compliance inspection of worker and community health and safety measures	Solar plant, transmission line	Annually	IA	EA, local environmental authority at their discretion	IA operating budget
Health and Safety	All near miss, no lost time, lost time and fatal accidents recorded and reported against a performance standard of zero incidents	Solar plant, transmission line	Annually	IA	EA, local environmental authority at their discretion	IA operating budget

ADB = Asian Development Bank; EA = Executing Agency; IA = Implementing Agency; PMU = Project Management Unit.

G. Environment Reporting

Internal Reporting

18. During construction periods the subproject contractor will be responsible for conducting internal reporting on construction activities, including compliance with the EMP. Results will be reported through quarterly reports to the IA.

19. The IA will submit semi-annual reports to the PMU on EMP implementation based on subproject contractor internal reporting and the results of compliance inspection monitoring.

Reporting to ADB

20. The PMU with support from the ESSS will submit environmental monitoring reports semi-annually during construction and annually during the first two years of operation on EMP implementation to the ADB. The semi-annual/annual environmental monitoring reports will include (i) progress made in EMP implementation; (ii) overall effectiveness of the EMP implementation (including public and occupational health and safety); (iii) environmental monitoring and compliance; (iv) institutional strengthening and training; (v) public consultation, information disclosure and GRM; and (vi) any problems encountered during construction and operation, and the relevant corrective actions undertaken. ADB will disclose the English version of the reports on its website. An environmental monitoring report template is presented in **Appendix V** of the IEE.

H. Training and Capacity Building

21. The PMU has been running for a number of years now and has good environmental management capacity. To ensure effective implementation of the EMP, the capacity of contractors will be strengthened. The main training emphasis will be to ensure that the contractors are well versed in environmentally sound practices and are able to undertake all construction and operation with the appropriate environmental safeguards. The training will focus on both construction and operation phases of the subproject. The training program is summarized in **Table 4.**

Table 4: Myangad 19.8 MW Solar PV Plant institutional strengthening and training.

Topic	Attendees	Contents	Frequency	Cost USD
EMP Implementation	Subproject contractors	EMP contents, EMP adjustment if needed, prepare CEMPs, roles and responsibilities, monitoring, supervision and reporting procedures	Once prior to subproject construction	1,500
Grievance Redress Mechanism (GRM)	Subproject contractors	GRM procedures; roles and responsibilities		
Environmental Protection	Subproject contractors	Pollution control on construction sites (air, noise, wastewater, solid waste)		
Environmental Monitoring Plan (EMoP)	Subproject contractors	Monitoring methods, data collection and reporting requirements		

Safety Training	Subproject contractors	Traffic safety, construction safety, road safety, occupational safety

I. Estimated EMP Budget

22. The estimated budget for environmental mitigation and monitoring are summarized in **Table 5.**

Table 5: Myangad Solar PV Plant estimated EMP budget.

EMP Item	Unit	Unit Cost	Estimated Cost (USD) Taishir Wind # Units	Cost
Construction Phase				
Mitigation Measures	Cost	-	- Included in Construction Costs -	
Inspection & Monitoring	Monthly Cost	$ 500	6	$ 3,000
Training	Program Cost	$ 1,500	1	$ 1,500
Public Consultation	Costs	$ 500	2	$ 1,000
Subtotal				*$ 5,500*
Operation Phase				
Mitigation Measures	Annual Cost	-	- Included in Construction Costs -	
Inspection & Monitoring	Monthly Cost	$ 250	2	$ 500
Training	Program Cost	$ 500	1	$ 500
Public Consultation	Costs	$ 500	1	$ 500
Subtotal				*$ 1,500*
TOTAL				**$ 7,000**

Source: ADB PPTA consultants. Does not include mitigation measures or PMU costs.

J. Mechanisms for Feedback and Adjustment

23. **Corrective Actions.** Based on environmental inspection and monitoring reports, the PMU with the assistance from the ESSS shall decide whether (i) further mitigation measures are required as corrective actions, or (ii) some improvements are required for environmental management practices.

24. The effectiveness of mitigation measures and monitoring plans will be evaluated by a feedback reporting system. Adjustment to the EMP will be made, if necessary. The need to update and adjust the EMP will be reviewed when there are design changes, changes in construction methods and program, negative environmental monitoring results or inappropriate monitoring locations, and ineffective or inadequate mitigation measures. The PMU will inform ADB promptly on any changes to the subproject and needed adjustments to the EMP. The updated EMP will be submitted to ADB for review and approval, and will be disclosed on the ADB project website.

Appendix II: Myangad Solar PV Plant General Environmental Impact Assessment (GEIA) Decision and Detailed Environmental Impact Assessment (DEIA) Approval

1. MECC General Environmental Impact Assessment (GEIA) Decision Requiring the Preparation of a Detailed Environmental Impact Assessment (DEIA)

"СЭРГЭЭГДЭХ ЭРЧИМ ХҮЧИЙГ НЭМЭГДҮҮЛЭХ ТӨСӨЛ"-Д

МОНГОЛ УЛСЫН
БАЙГАЛЬ ОРЧИН, УУР АМЬСГАЛЫН ӨӨРЧЛӨЛТИЙН ЯАМ

Засгийн газрын XII байр, Барилгачдын талбай 3,
4 дүгээр хороо, Чингэлтэй дүүрэг, Улаанбаатар хот, 15170
Утас: 26 19 66, Цахим шуудан: contact@mecc.gov.mn,
Цахим хуудас: www.mecc.gov.mn

2025.03.19 № 12/1310

танай _____-ны №_____-т

Ерөнхий үнэлгээний дүгнэлт хүргүүлэх тухай

Танай компаниас боловсруулж ирүүлсэн Ховд аймгийн Мянгат сумын нутагт хэрэгжих "19.8 МВт-ийн нарны цахилгаан станц"-ын төсөлд Байгаль орчинд нөлөөлөх байдлын үнэлгээний тухай хуулийн 7 дугаар зүйлийн 7.3 дахь хэсэг, Засгийн газрын 2023 оны 02 дугаар сарын 08-ны өдрийн "Журам шинэчлэн батлах тухай" 58 дугаар тогтоолын 2 дугаар хавсралтаар батлагдсан "Байгаль орчны нөлөөллийн үнэлгээ хийх журам"-д заасан аргачлалын дагуу байгаль орчны нөлөөллийн ерөнхий үнэлгээ хийж, байгаль орчны нөлөөллийн нарийвчилсан үнэлгээ хийлгэх шаардлагатай гэж үзэв.

Ерөнхий үнэлгээний гүйцэтгэлийн хуудаст заасан нарийвчилсан үнэлгээний явцад тодруулах асуудлууд, онцгойлон анхаарах чиглэлийг харгалзан байгаль орчны нөлөөллийн нарийвчилсан үнэлгээний тайлан, байгаль орчны менежментийн төлөвлөгөөг эрх бүхий мэргэжлийн байгууллагаар хийлгэж 2025 оны 4 дүгээр улиралд багтаан тус яаманд ирүүлэхийг үүгээр мэдэгдье.

Ерөнхий үнэлгээний гүйцэтгэлийн хуудсыг хавсаргав.

Хавсралт 7 хуудастай.

ЕРӨНХИЙ ШИНЖЭЭЧ Г.ЭНХМӨНХ

1525001107

БАЙГАЛЬ ОРЧИН, АЯЛАЛ ЖУУЛЧЛАЛЫН ЯАМ

ЕРӨНХИЙ ҮНЭЛГЭЭНИЙ ГҮЙЦЭТГЭЛИЙН ХУУДАС

2025 оны 03-р сарын 17 **Улаанбаатар хот**

Дугаар 2025/ЗА-07

Төсөл хэрэгжүүлэгчийн нэр, хаяг: Сэргээгдэх эрчим хүчийг нэмэгдүүлэх төсөл, Улаанбаатар хот, Хан-Уул дүүрэг, 3-р хороо, Чингисийн өргөн чөлөө, Засгийн газрын 14-р байр, РД:8310114;
Холбоо барих утас, И-мэйл хаяг: 70043479.
Төслийн нэр: "19.8 МВт-ийн нарны цахилгаан станц"-ын төсөл.
Төсөл хэрэгжих нутаг дэвсгэр,байршил: Ховд аймгийн Мянгат сумын нутаг дэвсгэрт хэрэгжинэ.
Орон нутгийн санал: Сумын засаг даргын 2025.01.17-ний өдрийн 01/22 дугаар албан бичиг, И-Монгол цахим системийн **O99-2503-000201** тоот хүсэлтийг үндэслэв.
Газарзүйн байршил, координат:

Д/д	Уртраг	Өргөрөл
1.	420387.30	5344412.53
2.	420833.02	5345197.74
3.	421525.32	5345096.45
4.	421291.15	5344504.03

	Ерөнхий үнэлгээний гол шалгууруул	Нийцсэн	Нийцээгүй	Нарийвчилсан үнэлгээ хийх шаардлагатай	Үндэслэл, тайлбар
Байгаль орчныг хамгаалах хууль тогтоомжийн нийцэл	Монгол улсад хүчин төгөлдөр мөрдөгдөж байгаа байгаль орчныг хамгаалах болон байгаль орчинд нөлөөлөх байдлын үнэлгээний тухай хууль тогтоомжийн холбогдох заалт	Тийм			Нарийвчилсан үнэлгээний явцад хууль тогтоомжийн нийцлийг нарийвчлан тодорхойлох
Төрийн бодлого, шийдвэрийн нийцэл	Тереес баримтлах бодлогын баримт бичиг, Стратегийн үнэлгээний дүгнэлт, зөвлөмжийн холбогдох заалт	Тийм			Нарийвчилсан үнэлгээний явцад хууль тогтоомжийн нийцлийг нарийвчлан тодорхойлох
Төслийн байршил, түүнтэй холбогдох шалгууруул	Газрын тухай хууль тогтоомжид нийцсэн эсэх	Тийм			Нарийвчилсан үнэлгээний явцад хууль тогтоомжийн нийцлийг нарийвчлан тодорхойлох

	Төсөл хэрэгжих нутаг дэвсгэр нь хүний нөлөө, байгаль цаг уурын өөрчлөлтөд эмзэг, мэдрэмтгий эсэх			Тийм	
	Төсөл хэрэгжих нутаг дэвсгэр, түүний ойр орчимд улс, орон нутгийн хэтийн хөгжилд ашиглахаар төлөвлөсөн, сөрөг нөлөөлөлд өртөж болзошгүй газар байгаа эсэх			Тийм	
	Болзошгүй хуримтлагдах нөлөөлөл үүсгэх эсэх			Тийм	
Төслийн байгаль орчны нөлөөллийн урьдчилсан үнэлгээ	**Агаарын чанар**				
	Бохирдуулагч болон аюултай, хортой бодис агаар мандалд ялгаруулах, эсэх			Тийм	
	Дуу чимээ, доргио чичиргээ, гэрлийн болон дулааны нөлөөлөл, цахилгаан соронзон цацраг үүсэх, эсэх			Тийм	
	1. Төслийн явцад орчны бохирдлыг тооцож, үйл ажиллагааныаас агаарт үзүүлж болзошгүй нөлөөллийг тодорхойлох, 2. Төслийн үйл ажиллагааныаас гарах хатуу, шингэн хог хаягдлын байгаль орчинд үзүүлэх сөрөг нөлөөллийг тогтоож, арилгах, бууруулах, байгаль орчинд халгүй аргаар зайлуулах арга хэмжээг төлөвлөх,				
	Усан орчин				
	Гадаргын болон газрын доорх усны нөөцийн хомсдол үүсэх, эсэх			Тийм	
	Цэнгэг усны нөөцийг ашиглах, эсэх			Тийм	
	Гадаргын болон газрын доорх усанд бохирдол үүсэх, эсэх			Тийм	
	1. Газрын доорхи болон гадаргын усны нөхцөл байдлыг тодорхойлж, төслийн үйл ажиллагааны явцад ашиглах усны эх үүсвэр, хэмжээг тодорхойлж, түүнтэй уялдуулан нарийвчилан тооцох;				

	2. Төслийн үйл ажиллагаанаас усны нөөц, горим чанарт үзүүлэх нөлөөллийг тогтоож, түүнд тавих хяналт, хугацаа, хөрөнгө зардлыг нарийвчилан тооцох; 3. Усны алдагдлыг багасгах, усыг хэмнэлттэй ашиглах технологийн хувилбарыг судалж, тайланд тусгах; 4. Ахуйн бохир усны хэмжээ, найрлагыг нарийвчилан тогтоож, түүнийг байгаль орчинд халгүйгээр зайлуулах арга хэмжээ, түүнд шаардагдах зардлыг тооцох; 5. Усны тухай хууль, тогтоомж болон бусад хууль тогтоомжоор хориглосон хязгаарласан бусийн дэглэмийг зөрчихгүй байх талаар зөвлөмж боловсруулж тайланд хавсаргах;				
	Хөрсөн бүрхэвч				
	Хөрсөн бүрхэвч эвдрэх, эсэх			Тийм	
	Хөрс бохирдуулах эсэх			Тийм	
	Хөрс доройтох, цөлжих эсэх			Тийм	
	1. Төслийн үйл ажиллагааны явцад хөрс, газрын хэвлийд үзүүлэх сөрөг нөлөөлөл, түүнийг багасгах, арилгах, цөлжилт, хөрсний эвдрэлээс урьдчилан сэргийлэх арга зам, түүнд шаардагдах хөрөнгө зардлыг тооцох; 2. Хатуу, шингэн хог хаягдал, техник технологийн ашиглалтын явцад хөрс бохирдуулахаас урьдчилан сэргийлэх арга хэмжээг төлөвлөх; 3. Олон сэлаа зам гаргах, хөрс бохирдох, эвдрэхээс сэргийлэх, тогтсон нэг орц, гарцыг тогтоох; 4. Эвдэрсэн газрыг нөхөн сэргээх төлөвлөгөөг холбогдох зураг төслийн хамт боловсруулж, тайланд хавсаргах;				
	Ургамлан нөмрөг				
	Ургамлан нөмрөг, ой мод өртөх эсэх			Тийм	Ургамлан нөмрөг өртөнө.
	Ховор, нэн ховор ургамлын төрөл зүйл өртөх, эсэх			Тийм	Нарийвчилсан үнэлгээгээр тодорхойлох
	1. Төслийн үйл ажиллагаа явуулахад өртөх талбайн ургамлын нэр төрөл, тархалтыг тогтоох, ховор болон нэн ховор ургамал байгаа эсэх талаар дүгнэлт гаргаж, хэрэв тэдгээр нь төслийн үйл ажиллагааны явцад өртөхөөр байвал түүнийг хамгаалах, болон шилжүүлэх арга хэмжээ, түүнд шаардагдах хөрөнгө зардлыг төлөвлөх; 2. Эдэлбэр газар, орчныг тохижуулах, ногоон байгууламж байгуулах талаар мэргэжлийн түвшний зөвлөмжийг шаардагдах зардлын хамт боловсруулж, тайланд тусгах; 3. Төслийн үйл ажиллагааны улмаас сөрөг нөлөөлөл өртөж болзошгүй биологийн төрөл зүйлийн бүрэлдэхүүнийг нарийвчилан тогтоож, хамгаалах арга замыг цогц байдлаар шийдэхэд зөвлөгөө өгөх, тайланд тусгах;				
	Амьтны аймаг				
	Зэрлэг амьтдын амьдрах орчинг доройтуулах, эсэх			Тийм	

	Ховор, нэн ховор амьтан өртөх, эсэх			Тийм	
Нийгмийн нөлөөллийн урьдчилсан үнэлгээ	**Нутгийн оршин суугчид**				
	Газар эзэмших, ашиглах эрх зөрчигдөх, эсэх	Тийм			
	Нутгийн оршин суугчдын нийгмийн байдалд сөрөг нөлөөлөлтэй, эсэх			Тийм	
	Нөлөөлөлд өртөж болзошгүй төв, суурин газар байгаа, эсэх			Тийм	
	Нүүлгэн шилжүүлэх асуудал үүсэх, эсэх			Тийм	
	Түүх, соёлын биет өв				
	Сөрөг нөлөөлөлд өртөх түүх, соёлын үнэт зүйлс бий эсэх			Тийм	
	Хүний эрүүл мэндэд нөлөөлөх нөлөөлөл				
	Нутгийн иргэд, оршин суугчдын эрүүл мэндэд сөрөгөөр нөлөөлөх эсэх			Тийм	
	Төслийн бүх үе шатанд хүний эрүүл мэнд, амь насанд эрсдэл үүсэх эсэх			Тийм	
	1. Төслийн үйл ажиллагаа болон байгалийн гамшгаас үүдэн гарч болзошгүй ослын үнэлгээ хийж, ослоос сэргийлэх, түүнийг багасгах, арилгах арга хэмжээг тодорхойлж тайланд тусгана.				
Нэгдсэн дүгнэлт: **Ерөнхий үнэлгээний гүйцэтгэлээр уг төсөлд байгаль орчны нөлөөллийн нарийвчилсан үнэлгээг Байгаль орчин, ногоон хөгжлийн сайдын 2014 оны "Аргачлал батлах тухай" А-117 дугаар тушаалын хавсралтын дагуу хийлгэн, нарийвчилсан үнэлгээний тайланг тус яаманд 2025 оны 4 дүгээр улиралд багтаан ирүүлж, шүүмж хийлгэн, шийдвэр гаргуулах шаардлагатай гэж үзлээ.**					
Онцгойлон анхаарах зүйлс: 1. Төслөөс байгаль орчин, нийгэм, хүний эрүүл мэндэд учруулж болзошгүй болон гол сөрөг нөлөөллийг тодорхойлж, үнэлэх; 2. Төслийн үйл ажиллагаанаас байгаль орчинд үзүүлэх аливаа сөрөг нөлөөллийг бууруулах, урьдчилан сэргийлэх арга хэмжээг тусгасан Байгаль орчны менежментийн төлөвлөгөөг боловсруулж, түүнийг хэрэгжүүлэхэд шаардагдах зардлыг нарийвчлан гаргах;					

3. Төслийн үйл ажиллагааны явцад үнд ахуйд ашиглах цэвэр усны хэрэглээний хэмжээг эх үүсвэртэй уялдуулан, түүнээс гарах ахуйн бохир усыг тус тус нарийвчлан тооцох, түүнчлэн хог хаягдлын менежментийн асуудлыг бүлэг болгон байгаль орчинд халгүйгээр зайлуулах аргыг нарийвчлан тодорхойлох;
4. Байгаль орчныг хамгаалах төлөвлөгөө, Орчны хяналт шинжилгээний хөтөлбөрийг 5 жилээр боловсруулж, тэдгээрийг хэрэгжүүлэхэд шаардагдах зардлыг төслийн хүчин чадал, төслийн үйл ажиллагааны байдалтай уялдуулан тооцож, төлөвлөх;
5. Төслийн үйл ажиллагааны явцад баримтлах хөдөлмөр хамгаалал, аюулгүй ажиллагааны зааварчилгаа, ажиллагсдын эрүүл мэнд, ажлын байрны эрүүл ахуйн талаар зөвлөмж, дүгнэлт боловсруулах;
6. Эрх бүхий байгууллагаар баталгаажсан барилга байгууламжийн зураг төсөл, холбогдох байгууллагын зөвшөөрөл болон төслийн талаарх мэдээлэл, өмнөх суурь судалгаатай харьцуулсан мэдээлэл, шинжилгээний дүн мэдээг тус тус тайланд хавсаргах;
7. Нарийвчилсан үнэлгээ хийх явцдаа төлөөс байгаль орчин, хүний эрүүл мэндэд үзүүлж болзошгүй сөрөг нөлөөллийг тогтоон, түүнээс урьдчилан сэргийлэх, бууруулах арга хэмжээний талаар зөвлөмж боловсруулан тайланд тусгах;
8. Байгаль орчны нөлөөллийн нарийвчилсан үнэлгээний тайланг батлагдсан аргачлалын дагуу боловсруулах, тухайн баг/хорооны ИНХ-аар хэлэлцүүлэн санал, тэмдэглэл хавсаргах;
9. Тэрбум мод үндэсний хөдөлгөөний хүрээнд төслийн хүчин чадалд тулгуурлан мод тарих, модны төрөл зүйл, тоо хэмжээг тайланд тусгах;
10. Химийн бодисын сав, баглаа боодол, үлдэгдэл, хаягдлыг байгаль орчин, хүний эрүүл мэндэд халгүй аргаар цуглуулах, хадгалах, аюулгүй болгох зөвлөмжийг шинэчлэн боловсруулж, хог хаягдлын болон химийн бодисын менежментийн төлөвлөгөөг боловсруулж тайланд тусгах;
11. Цахилгаан эрчим хүч үйлдвэрлэх болон төслийн бүрэлдэхүүн хэсгээс ялгарах бохирдол дуу чимээ, физик нөлөөллийн хэмжээ, түүний тархалт, нөлөөллийн хүрээг нарийвчлан тодорхойлж зураглал үйлдэн тайланд хавсаргах;
12. Засгийн газрын 2023 оны 58 дугаар тогтоолоор батлагдсан журмын дагуу нийгмийн нөлөөллийн үнэлгээ тооцох;

Бусад зүйлс:

1. Хууль тогтоомжийг биелүүлэх, мөрдөх, төслийн үйл ажиллагаатай холбогдуулж орон нутгийн засаг захиргааны болон байгаль орчны хяналтын байгууллагаас тавигдах нэмэлт шаардлагыг цаг тухай бүрт нь ханган биелүүлж байх;
2. Нарийвчилсан үнэлгээний тайланд шүүмж хийлгэн дүгнэлт, шийдвэр гаргуулах асуудлыг ерөнхий үнэлгээгээр тогтоосон хугацаанд хэрэгжүүлэх;
3. Ерөнхий үнэлгээнд заасан чиглэл, нөхцөл, болзлоос өөр үйл ажиллагаа явуулах болон төсөлд өөрчлөлт орох, эсхүл өргөтгөх, шинэ тоног төхөөрөмж, технологи нэвтрүүлэх бүрт Ерөнхий үнэлгээнд хамрагдаж байх;

Ерөнхий үнэлгээ хийсэн:	Ерөнхий үнэлгээний үр дүнг зөвшөөрсөн:
БАЙГАЛЬ ОРЧИН, АЯЛАЛ ЖУУЛЧЛАЛЫН ЯАМНЫ ШИНЖЭЭЧ	**"СЭРГЭЭГДЭХ ЭРЧИМ ХҮЧИЙГ НЭМЭГДҮҮЛЭХ ТӨСӨЛ"-ИЙН ЗОХИЦУУЛАГЧ**
З.АЗЖАРГАЛ	**Б.СУГАР**

Unofficial Translation

Project to Increase Renewable Energy

MONGOLIA
MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE
Government Building XII, Builders Square 3, District 4, Chingeltei District, Ulaanbaatar City, 15170 Phone: 26 19 65, Email: sontact@mecc.gov.mn, - Website: www.mecc.gay

About submission of General Assessment Report

For the "19.8 MW solar power plant" project developed and submitted by your company in the area of Myangad Sum, Hovd Province. According to the methodology specified in the "Environmental Impact Assessment Procedure" approved by Article 7, Section 7.3 of the Law on Environmental Impact Assessment and Annex 2 of Government Resolution No. 58 dated February 8, 2023 "On the Revision of Regulations", it was considered necessary to carry out a general environmental impact assessment and assess the requirement for a detailed environmental impact assessment.

We hereby inform you that a detailed environmental impact assessment report and an environmental management plan should be prepared by an authorized professional organization and submitted to the Ministry by the fourth quarter of 2025, taking into account the issues to be clarified during the detailed assessment and the areas of special attention specified in the general assessment performance sheet.

Attached is the general assessment performance sheet.

The appendix has 7 pages.

Signed

GENERAL ANALYST

2. MECC Approval of Detailed Environmental Impact Assessment (DEIA)

<to be inserted when received>

Appendix III: Myangad Soum 2024 No Objection Letter Regarding Land Use and Involuntary Resettlement

ХОВД АЙМАГ
МЯНГАД СУМЫН ИРГЭДИЙН
ТӨЛӨӨЛӨГЧДИЙН ХУРАЛ
84100 Баянхошуу,Мянгад сум, Ховд аймаг
E-mail: myangadsumkhural@gmail.com

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АЗИЙН ХӨГЖЛИЙН БАНКНЫ
МОНГОЛ УЛС ДАХЬ СУУРИН
ТӨЛӨӨЛӨГЧИЙН ГАЗАРТ

Нүүлгэн шилжүүлэлтийн тухай

Тус сумын нутагт Дэлхийн банкны санхүүжилтээр байгуулагдсан 10МВт хүчин чадалтай Ховд Нар нарны цахилгаан станц 2022 оны 5 дугаар сараас цахилгаан эрчим хүчээ үйлдвэрлэн ажиллаж байна. Уг нарны цахилгаан станц нь Баянхошуу багийн Жүгнээ хар уулын урд бэлд 45 га талбайг эзэлж байна.

Азийн хөгжлийн банкны санхүүжилтээр манай сумын нутагт 17,5МВт хүчин чадалтай цэнэг хураагууртай нарны цахилгаан станц байгуулахаар төлөвлөж байгааг Эрчим хүчний яамны мэргэжилтнүүд манай суманд ажиллахдаа мэдэгдлээ.

Сумын зүгээс шинэ нарны станцыг одоо байгаа станцтай хил залгаатайгаар 55 га талбайд байгуулахад татгалзах зүйлгүй бөгөөд тус станцыг байгуулахтай холбоотойгоор аливаа газар чөлөөлөлт, нүүлгэн шилжүүлэлтийн нөлөөлөл байхгүй болохыг үүгээр мэдэгдэж байна. Нарны цахилгаан станц байгуулахаар төлөвлөж буй газрын мэдээллийг хавсралтаар хүргүүлэв.

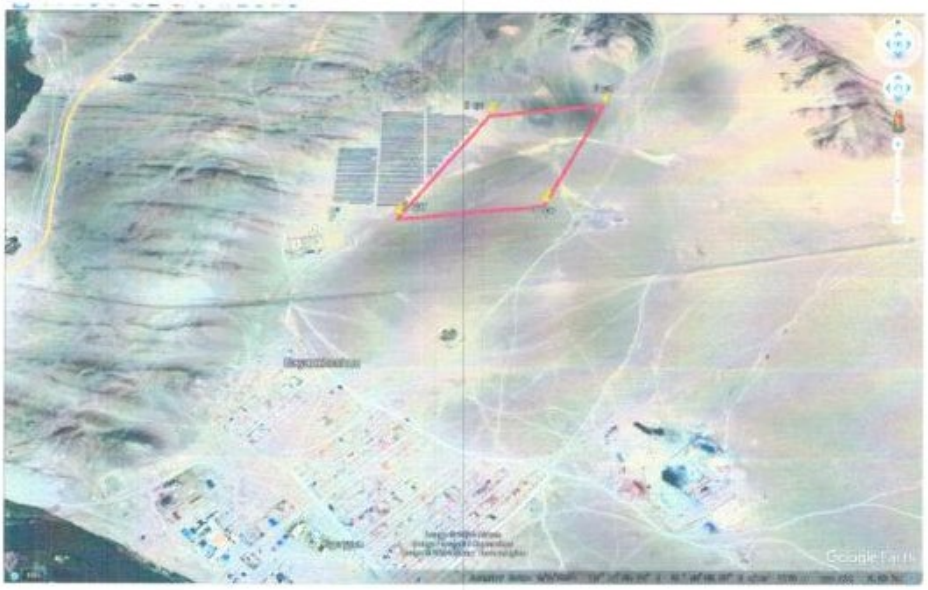
Хавсралт 2 хуудастай.

Хүндэтгэсэн,

ДАРГА Б.ИДЭРЗАЯА

НАРНЫ ЦАХИЛГААН СТАНЦ БАЙГУУЛАХААР ТӨЛӨВЛӨЖ БУЙ ГАЗРЫН ТОВЧ МЭДЭЭЛЭЛ

Байршил	Ховд аймаг			
	Мянгад сум			
	Баянхошуу баг			
Газрын нэршил	Жүгнээ хар уулын зүүн бэл			
Өндөршил	Далайн түвшнөөс дээш 1180м			
Газар зүйн координат	Цэг	Уртраг	Өргөрөг	
	1 цэг	420387.52	5344413.14	
	2 цэг	420995.90	5345487.73	
	3 цэг	421450.21	5345339.65	
	4 цэг	421031.38	5344483.24	
Хэмжээс, м	1 – 2 цэг	1234 м	2 – 3 цэг	480 м
	3 – 4 цэг	946 м	4 – 1 цэг	650 м
Талбайн хэмжээ	45 га			
Нарны цахилгаан станцын хүчин чадал	17,5МВт жилд үйлдвэрлэх ЦЭХ-ий хэмжээ дунджаар 30.6сая.кВтц			
Дэд бүтэц	➢ Мянгад 110/35/10кВ-ын дэд станцаас 0,4км алслагдсан. ➢ Мянгад – Тайшир 110кВ-ын ЦДАШ-аас 1,2км алслагдсан. ➢ Ховд – Мянгад асфальтан замаас 2 км орчим.			



Unofficial Translation

Asian Development Bank
Representative Office in Mongolia

(State Symbol of Mongolia)

Khovd aimag
Myangad Soum Citizens' Representative Khural
84100 Bayankhoshuu, Myangad Sum, Hovd Province
E-mail: myangadsmumkhural@gmail.com

Date: 2024.11.14, **№** 1/46

The 10 MW Khovd solar power plant, funded by the World Bank, has generated electricity since May 2022. It spans 45 hectares at the base of the Jugnee Khar mountain in the Bayankhoshuu Bag.

During their visit to our Soum, experts from the Ministry of Energy announced that a 17.5 MW storage solar power plant will be built there with financing from the Asian Development Bank.

The Soum does not object to constructing the new solar power plant on a 55-hectare area adjacent to the existing plant. It is announced that no land acquisition or resettlement impact will be associated with the plant's construction. The information regarding the land designated for the solar power plant construction is attached.
Sincerely,
Appendix has 2 pages.

Sincerely,

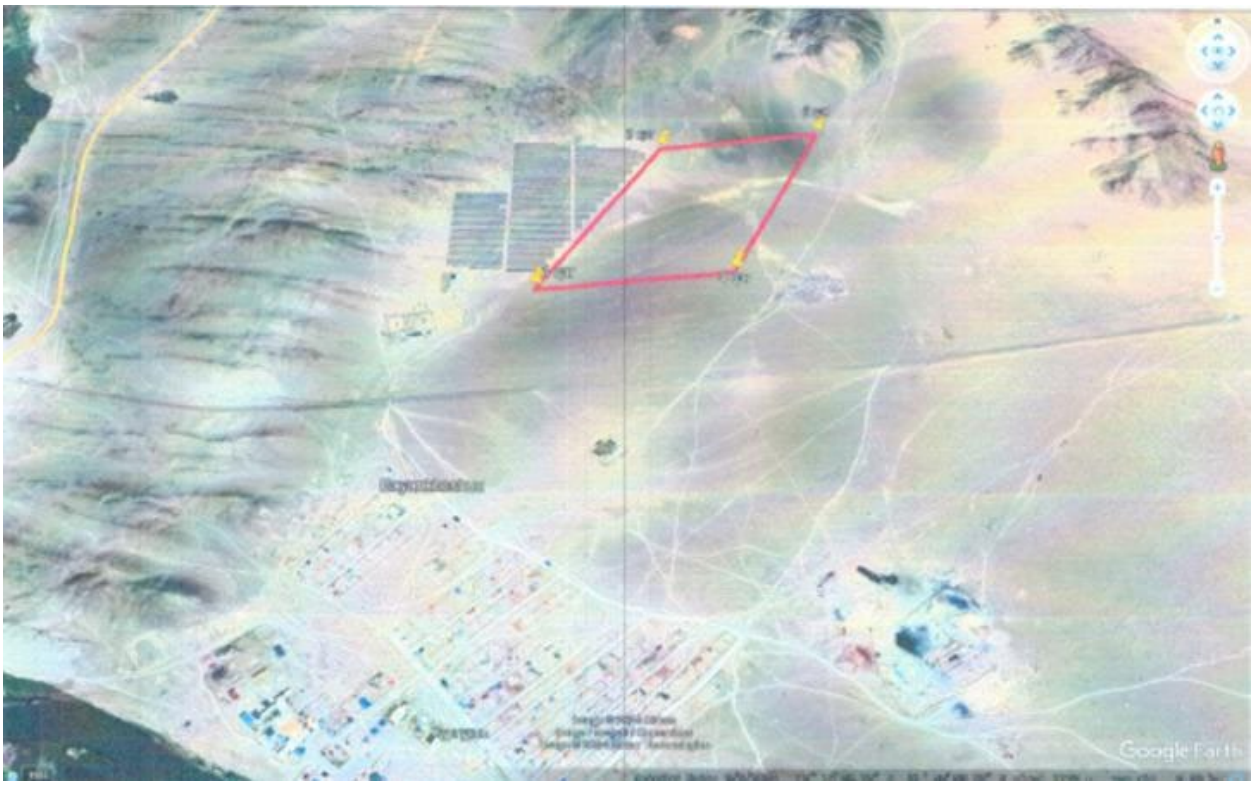
B. Iderzayaa
Chairperson of the Citizens Representative Khural

Attachment Page 1

PLANNING TO ESTABLISH A SOLAR POWER PLANT
BRIEF LAND INFORMATION

Location	Hovd Aimag			
	Myangad Soum			
	Bayankhoshuu Bag			
Name of Land	Eastern Foothills of Altai Mountains			
Elevation	1,180 masl			
Geographic Coordinates	Point	Longitude	Latitude	
	1	420387.52	5344413.14	
	2	420995.90	5345487.73	
	3	421450.21	5345339.65	
	4	421031.38	5344483.24	
Length, m	Point 1-2:	1234 m	Point 2-3:	480 m
	Point 3-4:	946 m	Point 4-1:	650 m
Area:	45 ha			
Capacity of Solar Power Plant	17.5 MW. Annual production capacity is 30.6 million kWh on average			
Infrastructure	- 0.4 km away from 110/35/10 kV substation in Myangad. - Myangad - Taishir is 1.2 km away from the 110 kV substation. - About 2 km from Hovd-Myangad asphalt road.			

Attachment Page 2



Appendix IV: Myangad Solar PV Plant Public Consultation Records, March 20, 2025

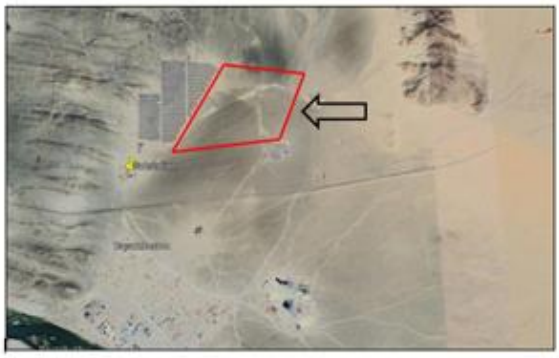
A. Myangad Soum Public Consultation Meeting Project Information Hand Out, March 20, 2025.

(A translated version was provided to participants)

Proposed Myangad 20 MW Solar Power Plant Public Consultation Meeting Information Sheet

UREP. The Government of Mongolia through the Ministry of Energy (MoE) is implementing the *Upscaling Renewable Energy Project* (UREP). UREP is developing 41.0 megawatts (MW) of solar and wind renewable energy in the Western and Altai-Uliastai Energy Systems of western Mongolia. The Project, ongoing since 2019, is being led by the Project Management Unit (PMU) on behalf of the MoE.

Myangad 20 MW Solar Power Plant. UREP is proposing to develop a new 20 MW solar power plant in Myangad soum center, on an empty 55 ha plot of land to the east of the recently constructed Khovd Nar 10 MW solar plant.



The Myangad Solar Power Plant will be comprised of over 33,000 modern, high-efficiency PV modules, and will be equipped with a 4 MW / 8 MWh lithium-ion containerized battery system which will store solar energy to help balance the power grid and reduce electricity costs.

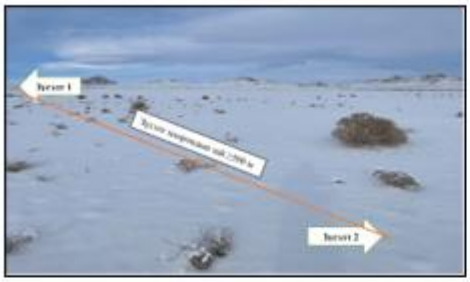
The solar power plant will be connected to the existing Myangad substation via a short double-circuit 110 kV transmission line.

Construction will start in 2025 and be completed by the third quarter of 2026. Once construction is complete the solar plant will be owned and operated by the Western Energy System.

Environmental Assessment. The solar plant is undergoing both Mongolian and ADB environmental assessments. The assessments are ongoing, but initial findings are:

Construction. Potential negative construction phase environmental impacts are low in magnitude, short to medium term in duration, and localized in scale, and may include soil erosion, construction noise, fugitive dust, wastewater, solid and hazardous waste, and risks to worker and community health and safety. No cultural

or heritage sites will be affected nor will any critical habitat. Potential negative construction phase impacts can be effectively mitigated through the application of appropriate good international construction practices and compliance with national laws and regulations and international guidelines presented in the project Environmental Management Plan (EMP).



Operation of the subproject will not produce any air pollution or noise. There are some moderate potential negative impacts during the operation phase, including risks to worker health and safety, and risks to community health and safety. Potential operation phase impacts can be effectively mitigated through good design, compliance with relevant GoM standards, and following international good practices.

Benefits. Coal-fired boilers emit sulfates, nitrogen oxides, and particulates, all of which are associated with significant impacts on the human respiratory and cardiovascular systems. The project will produce an average of 40,000 MWh per year of clean non-polluting renewable energy, and an estimated 800,000 MWh of electricity over the life span of the project. This will reduce green house gas emissions compared to grid supplied energy by an estimated 615,200 tons of CO_2.

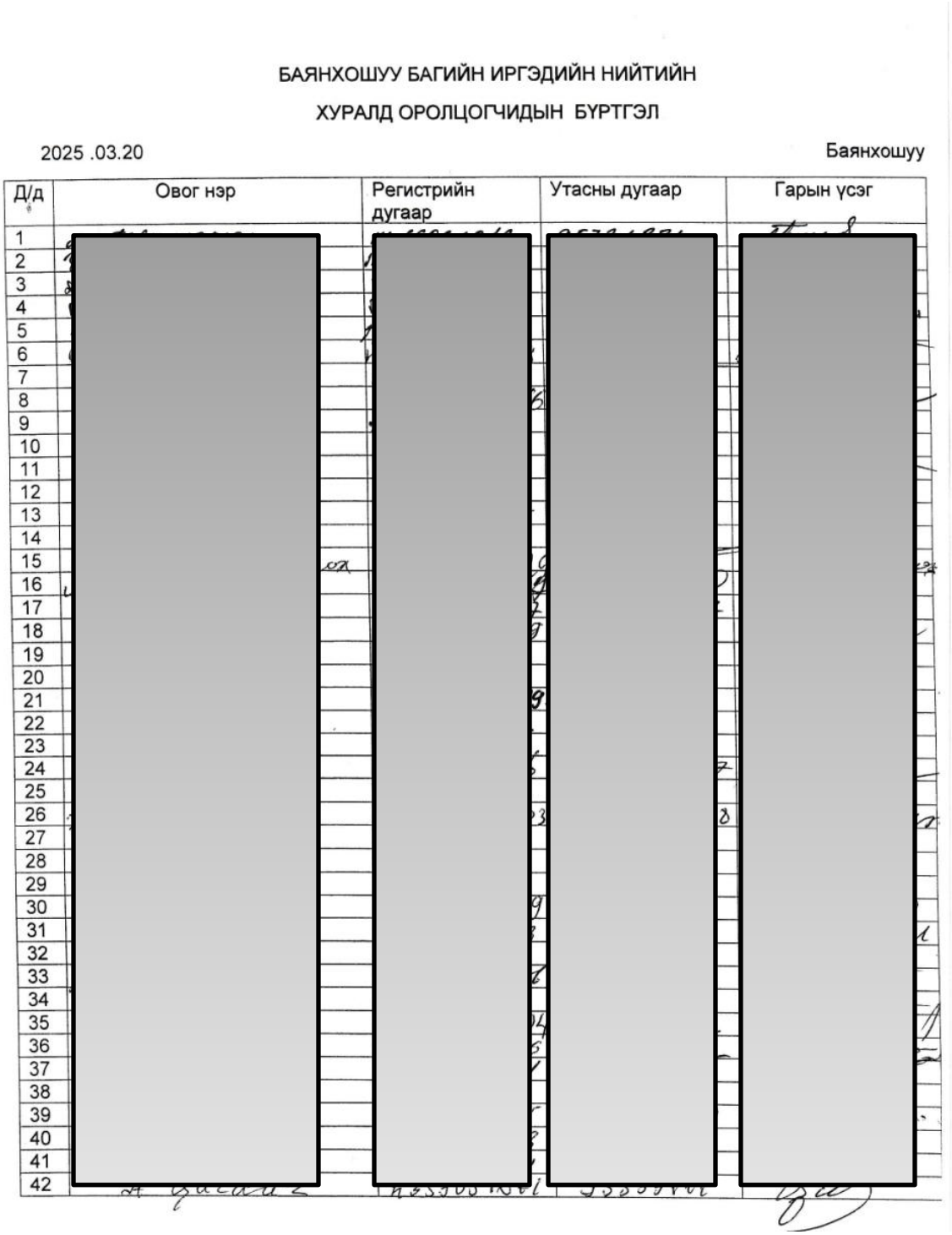
Conclusion. Overall it is expected that the project will result in significant positive environmental and socioeconomic benefits, and will not result in significant adverse environmental impacts that are irreversible, diverse, or unprecedented.

Complaints. A grievance redress mechanism has been developed to receive and facilitate resolution of complaints on social and environmental issues about the project during the construction and operation phases.

For further information, please contact:

Sugar Bayanjargal
UREP PMU Project Coordinator
bayanjargal.s@gmail.com, tel. 88112596

B. Redacted List of Myangad Soum Public Consultation Meeting Participants, March 20, 2025



БАЯНХОШУУ БАГИЙН ИРГЭДИЙН НИЙТИЙН

ХУРАЛД ОРОЛЦОГЧИДЫН БҮРТГЭЛ

2025 .03.20 Баянхошуу

Д/д	Овог нэр	Регистрийн дугаар	Утасны дугаар	Гарын үсэг
1	[redacted]			
2				
3				
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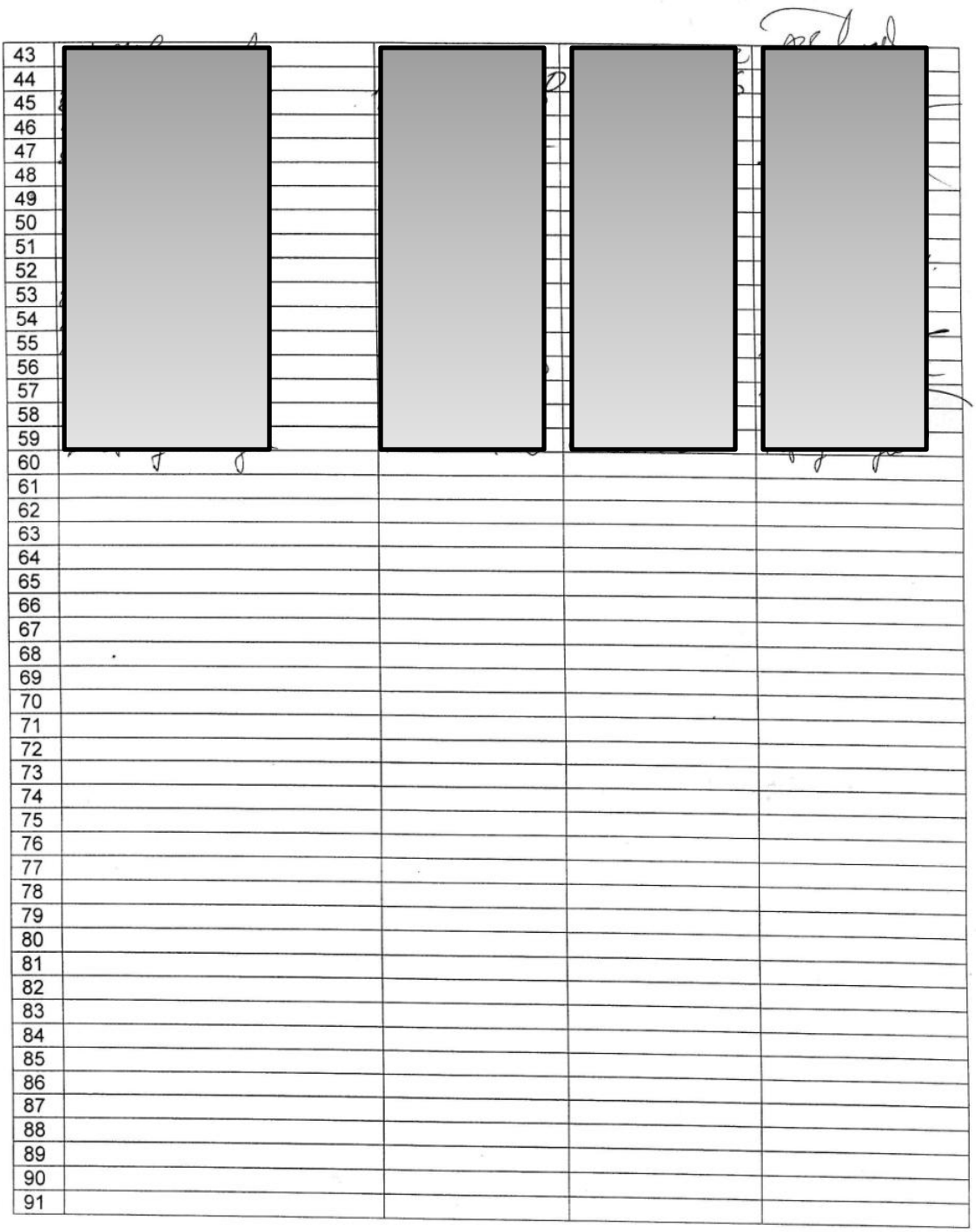

C. Myangad Soum Public Consultation Meeting Minutes, March 20, 2025.

ХОВД АЙМАГ
МЯНГАД СУМЫН
БАЯНХОШУУ БАГИЙН
ИРГЭДИЙН НИЙТИЙН ХУРЛЫН
ХУРАЛДААНЫ ТЭМДЭГЛЭЛ

2025 оны 03 сарын 20 өдөр Дугаар 02 Баянхошуу

Мянгад сумын Баянхошуу багийн Иргэдийн нийтийн хурлын хуралдаан 2025 оны 03 дугаар сарын 20-ны өдрийн 11;00 цагт тус сумын Соёлын төвийн хурлын танхимд эхлэв.

Хуралд ирвэл зохих 112 өрхөөс 59 өрхийн иргэд оролцож хурлын орц 52.6% байгааа тул хангалттай гэж үзэн Хуралдааны дэг, хэлэлцэх асуудлыг багийн нийтийн Иргэдийн хуралдааны дарга Б. Ганбаатар танилцуулав.

Хэлэлцэх асуудал: Ховд аймгийн Мянгад сумын нутагт "19.8 Мвт-ийн нарны цахилгаан станц барих" төсөл, түүний байгаль орчны нөлөөллийн нарийвчилсан үнэлгээний тайлангийн танилцуулга.

Эрчин хүчний яамны Сэргээгдэх эрчим хүчийг нэмэгдүүлэх төслөөс хэрэгжүүлэхээр төлөвлөж буй 19.8Мвт нарны цахилгаан станцын танилцуулгыг Төслийн инженер А. Эрдэнэбаатар, төслийн байгаль орчны нарийвчилсан үнэлгээний тайланг байгаль орчны зөвлөх С. Энхболд нар танилцуулав.

Б. Ганбаатар - Төслийн болон байгаль орчны талаар асуух асуулттай иргэн байна уу?

Ж. Батсайхан: энэ төсөл хэрэгжихэд орон нутгаас ажилчид авах уу? Мөн ашиглалтын үед байнгын орон тооны ажилтан энэ сумаас авах уу?

А. Эрдэнэбаатар: Нарны станц ашиглалтад орсноор шинээр ажлын байр нэмэгдэх боломж бүрдэнэ. Байнга ажиллах инженер, техникч нар цахилгааны инженер, ялангуяа сэргээгдэх эрчим хүчний чиглэлээр мэргэшсэн бол их тохиромжтой. Хэрэв Мянгад суманд ийм мэргэжлийн хүн байвал авч ажиллуулахад давуу тал болно.

Мөн барилга угсралтын явцад гүйцэтгэж компани нь орон нутгаас туслах ажилтан авч ажилуулах боломжтой.

М. Цэвээнжав: Сумын иргэд эрчим хүчний хөнгөлөлт эдлэх үү?

А. Эрдэнэбаатар: Цахилгааны тарифыг манай төсөл эсвэл Эрчим хүчний яам шийддэггүй. Эрчим хүчний зохицуулах хороо үнэ тарифыг тогтоодог. Тийм учираас бидний зүгээс энэ асуултад хариулах боломж хязгаарлагдмал байна. Энэ төслийн хүрээнд шинээр баригдах нарны станц нь цахилгаан цэнэг хураагууртай төлөвлөсөн.

Энэ өндөр ачаалалын үед болон цахилгаан хязгаарласан үед цахилгаанаар сумын хангах давуу байдал бий болох юм.

О. Мягмардаваа: Төслөөс байгаль орчинд ямар сөрөг нөлөө үзүүлэх вэ? Нарны панелаас гялбаа эсвэл хэт халах асуудал гарах уу?

Нарны станцын төсөл нь агаар бохирдуулагч хий, химийн хортой бодис хэрэглэхгүй, дуу чимээгүй, бохирдол үүсгэдэггүй байгальд эзлтэй ногоон технологи юм. Нар болон дэлгэцийн байршил нь гялбаа үүсэхээргүй байрласан байгаа. Манай улс 2017 оноос хойш олон нарны цахилгаан станцын төсөл хэрэгжиж байгаа. Эдгээр станцууд дээр ийм асуудал гаргаагүй.

Б. Ганбаатар: Нарны станцын төсөлтэй холбоотой өөр асуулт байхгүй тул тасалж, санал хураав.

Б. Мэндсайхан: Тус суманд нарны цахилгаан станцын хүчин чадал нэмэгдэж байгаад баяртай байна. Тус сумын иргэдийн ажиллах, амьдрах нөхцөл бололцоо, ажлын байр нэмэгдэх боломж бүрдэж байгаа тул төслийг дэмжиж байна.

Өөр санал хэлэх оролцогч байгүй тул санал таслав. Хуралдаанаар хэлэлцэх асуудал дууссан тул 12:45 цагт хурлыг хаав.

Шийдвэрлэсэн нь:
1. Тус багийн Иргэдийн нийтийн хуралдаанд оролцсон иргэдийн 100% саналаар 19.8Мвт нарны цахилгаан станц барих төсөл, түүний байгаль орчны нөлөөллийн нарийвчилсан үнэлгээний тайланг дэмжив.

БАГИЙН ИРГЭДИЙН НИЙТИЙН

ХУРЛЫН ДАРГА Б. ГАНБААТАР

ТЭМДЭГЛЭЛ ХӨТӨЛСӨН Д. БАТЦАЦРАЛ

Unofficial Translation
(participant names redacted to protect confidentiality)

(Symbol of Mongolian State)

Khovd aimag
Meeting Minutes of Soum Citizens' Representatives
of Bayankhoshuu Bag, Myangad soum

Date: 2015.03.20 *Number № 02* *Bayankhoshuu*

The public meeting of the Bayankhoshuu Bag in Myangad soum commenced at 14:00 on March 20, 2025, in the soum's Cultural Center meeting hall.

Fifty-nine out of 112 eligible households attended the meeting, representing 52.6% of the total attendance, which is considered sufficient. The chairman of the Bag public meeting, B. Ganbaatar, who is responsible for leading the meeting and ensuring that all agenda items are addressed, introduced the agenda.

Discussion: Presentation of the "19.8 MW solar power plant construction project in Myangad soum, Khovd aimag," along with its detailed environmental impact assessment report.

Project Engineer A. Erdenebaatar presented the 19.8 MW solar power plant, intended for implementation under the Ministry of Energy's 'Upscaling Renewable Energy Sector Project', a national initiative aimed at increasing the use of renewable energy sources. At the same time,

Environmental Consultant S. Enkhbold shared the detailed environmental assessment report for the project.

B. Ganbaatar - Do you have any questions about the project or the environment?

[redacted]: Will this project employ local workers? Will there be permanent full-time employees from this soum during its operation?

A. Erdenebaatar: The solar power plant will provide clean energy and create new job opportunities. It would be ideal if the permanent engineers and technicians were electrical engineers, particularly those specializing in renewable energy. If such professionals are available in Myangad soum, hiring them would benefit the community's economic growth.

Additionally, the contractor can enlist local workers during the construction process.

[redacted]: Will the residents of the soum receive energy discounts?

A. Erdenebaatar: Electricity tariffs are not determined by our project or the Ministry of Energy. The Energy Regulatory Commission, an independent government body, sets the tariffs based on factors such as production costs and market conditions. That is why we are limited in our ability to answer this question. The new solar power plant to be built within the framework of this project is planned to have an electric storage battery. This will provide the soum with electricity during high loads and power shortages.

[redacted]: What negative impact will the project have on the environment? Will there be problems with glare or overheating from the solar panels? A. Erdenebaatar: The project has been designed to minimize any negative environmental impact. We have taken measures to prevent glare or overheating from the solar panels, ensuring the safety and comfort of the community.

A. Erdenebaatar: The solar power plant project is an environmentally friendly green technology that does not emit air-polluting gases or harmful chemicals is silent and does not cause pollution. The location of the sun and the screen is such that glare does not occur. Our country has been implementing many solar power plant projects since 2017. Such problems have not been encountered at these plants.

[redacted]: I am happy that the solar power plant capacity in the soum is increasing. I support the project because it improves the working and living conditions of the soum's citizens and creates more job opportunities.

B. Ganbaatar: Since there were no other questions related to the solar power plant project, the meeting was adjourned and the vote was taken.

Since no other participants had any more questions or comments, the meeting concluded at 12:45, as the discussed issues had been resolved.

A decision:

1. The project to build a 19.8MW solar power plant, along with its detailed environmental impact assessment report, was supported by 100% of the citizens who participated in the team's public meeting.

Chairman B. Ganbaatar
(Sealed with signature)

Minutes of the meeting were taken by D. Battsatsral
(with signature)

D. Myangad Soum Citizen's Representative Khural Resolution in support of the proposed 19.8 MW Solar Power Plant

ХОВД АЙМАГ
МЯНГАД СУМЫН БАЯНХОШУУ БАГИЙН
ИРГЭДИЙН НИЙТИЙН ХУРЛЫН ХУРАЛДААНЫ
ТОГТООЛ

2025 оны 03 сарын 20 өдөр Дугаар 02 Баянхошуу

"19.8 Мвт-ийн нарны цахилгаан станц барих"
төслийг дэмжих тухай

Монгол Улсын Засаг захиргаа, Нутаг дэвсгэрийн нэгж түүний удирдлагын тухай хуулийн 32 дугаар зүйлийн 32.8.1, Байгаль орчинд нөлөөлөх байдлын үнэлгээний тухай хуулийн 18 дугаар зүйлийн 18.4 дахь заалтуудыг тус тус үндэслэн "19.8Мвт нарны цахилгаан станц барих" төсөл, түүний Байгаль орчны нөлөөллийн нарийвчилсан үнэлгээний тайланг хэлэлцээд багийн Иргэдийн Нийтийн Хурлаас ТОГТООХ нь:

1. Мянгад сумын Баянхошуу багийн нутагт баригдах 19.8Мвт нарны цахилгаан станц барих төслийг дэмжсүгэй.
2. Багийн Иргэдийн Нийтийн Хурлын Тогтоол, тэмдэглэл бусад холбогдох бичиг баримтыг Байгаль орчин, уур амьсгалын өөрчлөлтийн яаманд хүргүүлсүгэй.

ДАРГА Б. ГАНБААТАР

Unofficial Translation

(Symbol of Mongolia State)

Khovd aimag

Resolution of the Soum Citizen's Representative Khural

of Bayankhoshuu Bag, Myangad soum

Date: 2015.03.20 *Number № 02* *Bayankhoshuu*

In support of the project to build a 19.8 MW power plant

Following the provisions of Article 32.8.1 of the Law on Government and Territorial Units of Mongolia and Article 18.4 of the Law on Environmental Impact Assessment, the "19.8 MW Solar Power Plant Construction" project and its detailed Environmental Impact Assessment Report, the Bag Citizens' Representatives, after discussing the project, hereby DECIDE:

1. To support the construction of a 19.8 MW solar power plant in the Bayankhoshuu Bag area of Myangad Soum.

2. Submit the Resolution, protocol, and other relevant documents from the Bag Citizens' Representatives to the Ministry of Environment and Climate Change.

Chairman B. Ganbaatar

(Sealed with signature)

E. Myangad Soum Public Consultation Questionnaire, March 20, 2025.

Myangad 20 MW Solar Power Plant
Public Consultation Meeting Questionnaire

Мянгад суманд баригдах 20 МВТ нарны цахилгааны станц төслийн Олон нийтийн уулзалтын санал асуулга

Date: ***Он, сар, өдөр***		Age: ***Нас***	
Name: ***Овог,Нэр***		Gender: ***Хүйс***	
Address: ***Хаяг***			

1. In your opinion, what are the major environmental pollution issues in your area? (there can be multiple choices)
Таны бодлоор танай нутагт байгаль орчны бохирдлын гол асуудал юу вэ? (олон сонголт байж болно)

☐ Ambient air (outdoor air pollution)
Агаарын бохирдол

☐ Indoor air quality
Агаарын чанарын асуудал

☐ Noise
Дуу, чимээ

☐ Surface water pollution
Гадаргын усны бохирдол

☐ Ground water pollution
Газрын доорхи усны бохирдол

☐ Soil contamination
Хөрсний бохирдол

☐ Solid waste
Хог хаягдал

☐ I do not know
Мэдэхгүй байна

☐ Other, please specify:
Бусад, доорхи хэсэгт бичнэ үү.

.....

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.....

2. Do you support the development of renewable energy in Western Mongolia?
Монгол Улсын барүүн хэсэгт баригдах сэргээгдэх эрчим хүчний төслийг та дэмжих үү?

☐ Yes
Тийм

☐ Partially
Хэсэгчлэн

☐ No
Үгүй

☐ Uncertain
Сайн мэдэхгүй байна

3. Do you think the Myangad Solar Project can be constructed without major negative environmental impacts?
Мянгад суманд нарны цахилгаан станцыг байгаль орчны томоохон сөрөг нөлөөлөлгүйгээр барьж чадна гэж бодож байна уу?

☐ Yes
Тийм

☐ Partially
Хэсэгчлэн

☐ No
Үгүй

☐ Uncertain
Сайн мэдэхгүй байна

4. Do you think the Myangad Solar Project can be constructed without major negative social or economic impacts?
Мянгад суманд нарны цахилгааны станц барихад нийгэм, эдийн засгийн томоохон нөлөөлөлгүйээр барьж чадна гэж бодож байна уу?

☐ Yes	☐ Partially	☐ No	☐ Uncertain
Тийм	*Хэсэгчлэн*	*Үгүй*	*Сайн мэдэхгүй байна*

5. Do you think operation of the Myangad Solar Project will have a positive impact on the environment of Myangad soum?
Мянгад сумын нарын цахилгаан станцын үйл ажиллагаа Мянгад сумын байгаль орчинд эерэг нөлөө үзүүлнэ гэж бодож байна уу?

☐ Yes	☐ Partially	☐ No	☐ Uncertain
Тийм	*Хэсэгчлэн*	*Үгүй*	*Сайн мэдэхгүй байна*

6. Do you think operation of the Myangad Solar Project will have a positive impact on the social and economic development of Myangad soum?
Мянгад сумын нарны цахилгаан станын төсөл ашиглалтанд орсноор Мянгад сумын нийгэм, эдийн засгийн хөгжилд эерэг нөлөө үзүүлнэ гэж та бодож байна уу?

☐ Yes	☐ Partially	☐ No	☐ Uncertain
Тийм	*Хэсэгчлэн*	*Үгүй*	*Сайн мэдэхгүй байна.*

7. Did you get enough information about the project from the project public discussion?
Төслийн хэлэлцүүлгээс төслийн талаар хангалттай мэдээлэл авч чадсан уу?

☐ Yes	☐ Partially	☐ No	☐ Uncertain
Тийм	*Хэсэгчлэн*	*Үгүй*	*Сайн мэдэхгүй байна.*

8. How long have you been living in Myangad soum?
Та Мянгад суманд хэр удаан амьдарч байгаа вэ?

☐ 1-3 years	☐ 4-8 years	☐ 9 or more	☐ I do not live here
1-3 жил	***4-8 жил***	***9 болон түүнээс их***	***Энэ суманд амьдардаггүй***

9. Do you have any additional comments you want to make about the proposed solar project?
Санал болгож буй нарны цахилгаан станц төслийн талаар танд хэлэх нэмэлт санал байна уу?

.....

.....

.....

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Thank-you for your participation!
Судалгаанд оролцсонд баярлалаа.

Redacted sample completed questionnaire

Мянгад суманд баригдах 20 МВТ нарны цахилгааны станц төслийн Олон нийтийн уулзалтын санал асуулга

Proposed Myangad 20 MW Solar Power Plant
Public Consultation Meeting Questionnaire

Он, сар, өдөр: Date:	2025.03.20	***Нас:*** Age: 43	43
Овог, Нэр: Name:	[redacted]	***Хүйс:*** Gender:	♂
Хаяг : Address:	[redacted]		

1. ***Таны бодлоор танай нутагт байгаль орчны бохирдлын гол асуудал юу вэ? (олон сонголт байж болно)***
In your opinion, what are the major environmental pollution issues in your area? (there can be multiple choices)

☐ *Агаарын бохирдол* Ambient air (outdoor air pollution)
☐ *Дотор Агаарын чанарын асуудал* Indoor air quality
☐ *Дуу, чимээ* Noise
☐ *Гадаргын усны бохирдол* Surface water pollution
☐ *Газрын доорхи усны бохирдол* Ground water pollution
☑ *Хөрсний бохирдол* Soil contamination
☑ *Хог хаягдал* Solid waste
☐ *Мэдэхгүй байна* I do not know
☐ *Бусад, доорхи хэсэгт бичнэ үү.* Other, please specify:

2. ***Монгол Улсын баруун хэсэгт баригдах сэргээгдэх эрчим хүчний төслийг та дэмжих үү?***
Do you support the development of renewable energy in Western Mongolia?

☑ *Тийм* Yes ☐ *Хэсэгчлэн* Partially ☐ *Үгүй* No ☐ *Сайн мэдэхгүй байна* Uncertain

3. ***Мянгад суманд нарны цахилгаан станцыг байгаль орчны томоохон сөрөг нөлөөлөлгүйгээр барьж чадна гэж бодож байна уу?***
Do you think the Myangad Solar Project can be constructed without major negative environmental impacts?

☑ *Тийм* Yes ☐ *Хэсэгчлэн* Partially ☐ *Үгүй* No ☐ *Сайн мэдэхгүй байна* Uncertain

4. ***Мянгад суманд нарны цахилгааны станц барихад нийгэм, эдийн засгийн томоохон нөлөөлөлгүйээр барьж чадна гэж бодож байна уу?***
Do you think the Myangad Solar Project can be constructed without major negative social or economic impacts?

☑ *Тийм* Yes ☐ *Хэсэгчлэн* Partially ☐ *Үгүй* No ☐ *Сайн мэдэхгүй байна* Uncertain

5. ***Мянгад сумын нарын цахилгаан станцын үйл ажиллагаа Мянгад сумын байгаль орчинд эерэг нөлөө үзүүлнэ гэж бодож байна уу?***
Do you think operation of the Myangad Solar Project will have a positive impact on the environment of Myangad soum?

☑ *Тийм* Yes ☐ *Хэсэгчлэн* Partially ☐ *Үгүй* No ☐ *Сайн мэдэхгүй байна* Uncertain

6. ***Мянгад сумын нарны цахилгаан станын төсөл ашиглалтанд орсноор Мянгад сумын нийгэм, эдийн засгийн хөгжилд эерэг нөлөө үзүүлнэ гэж та бодож байна уу?***
Do you think operation of the Myangad Solar Project will have a positive impact on the social and economic development of Myangad soum?

☑ *Тийм* Yes | ☐ *Хэсэгчлэн* Partially | ☐ *Үгүй* No | ☐ *Сайн мэдэхгүй байна* Uncertain

7. ***Төслийн хэлэлцүүлгээс төслийн талаар хангалттай мэдээлэл авч чадсан уу?***
Did you get enough information about the project from the project public discussion?

☑ *Тийм* Yes | ☐ *Хэсэгчлэн* Partially | ☐ *Үгүй* No | ☐ *Сайн мэдэхгүй байна* Uncertain

8. **Та төслийн гомдол барагдуулах механизмийн талаар *хангалттай* мэдээлэл авч чадсан уу?**
Did you get enough information about the GRM from the project public discussion?

☑ *Тийм* Yes | ☐ *Хэсэгчлэн* Partially | ☐ *Үгүй* No | ☐ *Сайн мэдэхгүй байна* Uncertain

9. ***Та Мянгад суманд хэр удаан амьдарч байгаа вэ?***
How long have you been living in Myangad soum?

☐ ***1-3 жил*** 1-3 years | ☐ ***4-8 жил*** 4-8 years | ☑ ***9 болон түүнээс их*** 9 and more | ☐ ***Энэ сумандаа амьдардаггүй*** Not living here

10. ***Санал болгож буй нарны цахилгаан станц төслийн талаар танд хэлэх нэмэлт санал байна уу?***
Do you have any additional comments you want to make about the proposed solar project?

1. Мянг. сумаас ажилчид [illegible] станцын барилгад [illegible].
2. Сумын төвийн тог (цахилгаан) үнийг бууруулах

Судалгаанд оролцсонд баярлалаа.
Thank-you for your participation!

F. Analysis of Myangad Soum Public Consultation Questionnaire Results, March 20, 2025.

Number of Meeting Participants: 59
Number of Returned Completed Questionnaires: 36
Number Men who Completed Questionnaire: 19
Number Women who Completed Questionnaire: 17
Age Range: 22-72
Average Age: 46

Question	Response, %								
1. In your opinion, what are the major environmental pollution issues in your area? (there can be multiple choices)	Ambient air quality (outdoor air pollution)	Indoor air quality	Noise	Surface water pollution	Ground water pollution	Soil contam-ination	Solid waste	I do not know	Other, please specify
	19	*9*	*9*	*25*	*13*	*28*	*88*	*0*	*0*

Question	Response, %				
	Yes	**Partially**	**No**	**Uncertain**	**No Answer**
2. Do you support the development of renewable energy in Western Mongolia?	*66*	*3*	*16*	*16*	*0*
3. Do you think the Myangad Solar Project can be constructed without major negative environmental impacts?	*53*	*6*	*19*	*19*	*3*
4. Do you think the Myangad Solar Project can be constructed without major negative social or economic impacts?	*53*	*6*	*19*	*22*	*0*
5. Do you think operation of the Myangad Solar Project will have a positive impact on the environment of Myangad soum?	*41*	*0*	*28*	*31*	*0*
6. Do you think operation of the Myangad Solar Project will have a positive impact on the social and economic development of Myangad soum?	*69*	*3*	*9*	*9*	*9*
7. Did you get enough information about the project from the project public discussion?	*53*	*16*	*19*	*6*	*6*
8. Did you get enough information about the GRM from the project public discussion?	*56*	*13*	*22*	*3*	*6*
9. How long have you been living in Myangad soum?	*6*	*0*	*84*	*0*	*9*

10. Do you have any additional comments you want to make about the proposed solar project?	- Reduce electricity prices in the soum center. - Good luck. - Renovation of the local playground, school yard, and dormitory in the village is a need. - Same comment as above. - Will the station have a negative impact on the local community? Is it possible to plant trees outside the station? - During the implementation of the project, will Myangad soum be provided with constant electricity, will herders' households be provided with affordable electricity, and will the soum residents ill be provided with jobs? - Providing jobs for the people of the soum during the implementation of the power plant project, and in the future providing jobs for the indigenous people is important. - I would like to see our rural herders have permanent positions. - Renovation of the school dormitory and playground. - In the future, the soum will work together with the local communities to create development opportunities, and connect with the energy-rich local communities in the Western Region to ensure that households and businesses get sufficient electricity. - Sufficient electricity supply. - Notify the authorities of the possibility of providing electricity price discounts to the citizens of the soum. - Provide electricity discounts to local consumers. - We need cheaper electricity to reduce the electricity costs of the people. - Create jobs for rural pastoralists - Renovate the playground and school fence of the local school.

Appendix V: Environmental Monitoring Report Template

Environmental Monitoring Report

Semi-annual Report
{Month Year}

Mongolia: Upscaling Renewable Energy Sector Project , Phase II:

Myangad 19.8 MW Solar PV Plant Subproject

Prepared by the Ministry of Energy for the Asian Development Bank for the Asian Development Bank.

CURRENCY EQUIVALENTS
(as of {Day Month Year})

Currency unit	–	Mongolian Tughrik
MNT1.00	=	$
$1.00	=	MNT

ABBREVIATIONS

WEIGHTS AND MEASURES

NOTES

(i) The fiscal year (FY) of the Ministry of Energy ends on 31 December.

(ii) In this report, "$" refers to US dollars.

TABLE OF CONTENTS