Nur-Kashkadarya Solar PV and Battery Energy Storage System

Volume II - Environmental & Social Impact Assessment

Document Information

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Glossary

Term	Definitions
Area of Influence (AOI)	The area over which the impacts of the Project are likely to be felt as well as any reasonably foreseen unplanned developments induced by the Project or cumulative impacts
Associated facilities	Facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable
Baseline surveys	Gathering of data to describe the existing physical, biological, socioeconomic, health, labour, cultural heritage, or any other variable considered relevant before project development
Biodiversity	Variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems
Chance finds	Archaeological or cultural sites and artefacts, including such items as ceramics, tools, buildings, burials, etc., previously unrecognized in baseline studies that are discovered during exploration activities
Consultation	Consultation is a two-way process of dialogue between the project company and its stakeholders. Stakeholder consultation is about initiating and sustaining constructive external relationships over time
Critical habitat	Either modified or natural habitats supporting high biodiversity value, such as habitat required for the survival of critically endangered or endangered species
Cultural heritage	Defined as resources with which people identify as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions
Cumulative impacts	The combination of multiple impacts arising from existing projects or activities, and/or anticipated future projects or activities
Direct area of influence	Considers the physical footprint of the projects such as the right of way, construction sites, work staging area and area affected during operational works (e.g., traffic patterns)
Effluent	Wastewater - treated or untreated- that flows out of a treatment plant, sewer, or industrial outfall
Emission	Pollution discharged into the atmosphere from smokestacks, other vents, and surface areas of commercial or industrial facilities; from residential chimneys; and from motor vehicle, locomotive, or aircraft exhausts
Environmental and Social Impact Assessment (ESIA)	A forward-looking instrument that can proactively advise decision-makers on what might happen if a proposed activity is implemented. Impacts are changes that have environmental, political, economic, or social significance to society. Impacts may be positive or negative and may affect the environment, communities, human health and well-being, desired sustainability objectives, or a combination of these
Environmental and Social Management Plan (ESMP)	Summarises the company's commitments to address and mitigate risks and impacts identified as part of the ESIA, through avoidance, minimization, and compensation/offset, and monitor these mitigation measures
Health Safety Social Environmental Management System (HSSE-MS)	A part of the Project's overall management system that includes the organizational structure, responsibilities, practices, and resources necessary for implementing the project-specific management program. This program is developed through the environmental and social assessment of the Project and is aimed at ensuring quality, occupational health and safety, and environmental protection.
Good International Industry Practice (GIIP)	Exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally or

Term	Definitions
	regionally. The outcome of such exercise should be that the project employs the most appropriate technologies in the project-specific circumstances
Grievance mechanism	Procedure provided by a project to receive and facilitate resolution of affected communities' concerns and grievances about the project's environmental and social performance
Habitat	Terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment
Hazardous waste	By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Substances classified as hazardous wastes possess at least one of four characteristics—ignitability, corrosivity, reactivity, or toxicity— or appear on special lists
Indigenous peoples	Defined by the World Bank E&S Framework as a distinct social and cultural group possessing the following characteristics in varying degrees: (a) Self-identification as members of a distinct indigenous social and cultural group and recognition of this identity by others; (b) Collective attachment to geographically distinct habitats, ancestral territories, or areas of seasonal use or occupation, as well as to the natural resources in these areas; (c) Customary cultural, economic, social, or political institutions that are distinct or separate from those of the mainstream society or culture; and (d) A distinct language or dialect, often different from the official language or languages of the country or region in which they reside
Indirect area of influence	Includes area which may experience project related changes in combination with activities not under the direct control of the project
Information disclosure	Disclosure means making information accessible to interested and affected parties (stakeholders). Communicating information in a manner that is understandable to stakeholders is an important first and ongoing step in the process of SE. Information should be disclosed in advance of all other engagement activities, from consultation and informed participation to negotiation and resolution of grievances. This will make engagement more constructive
Intangible cultural heritage	According to the 2003 UNESCO convention for the safeguarding of intangible cultural heritage, manifestations of intangible cultural heritage include: Oral traditions and expressions, including language; Performing arts; Social practices, rituals and festive events; Knowledge and practices concerning nature and the universe
Land acquisition	All methods of obtaining land for project purposes, which may include outright purchase, expropriation of property and acquisition of access rights, such as easements or rights of way
Livelihood	Full range of means that individuals, families, and communities utilize to make a living, such as wage-based income, agriculture, fishing, foraging, other natural resource-based livelihoods, petty trade, and bartering
Magnitude	The assessment of magnitude is undertaken in two steps. Firstly, the magnitude of potential impacts associated with the Project are categorized as beneficial or adverse. Secondly, the beneficial or adverse impacts are categorized as major, moderate, minor or negligible based on consideration of several parameters
Modified habitat	Land and water areas where there has been apparent alteration of the natural habitat, often with the introduction of alien species of plants and animals, such as agricultural areas
Natural habitat	Land and water areas where the biological communities are formed largely by native plant and animal species, and where human activity has not essentially modified the area's primary ecological functions
Occupational health and safety	The range of endeavours aimed at protecting workers from injury or illness associated with exposure to hazards in the workplace or while working
Project affected people	Individuals, workers, groups or local communities which are or could be affected by the project, directly or indirectly, including through cumulative impacts

Term	Definitions
Renewable energy	Energy sources derived from solar power, hydro, wind, certain types of geothermal, and biomass
Sensitivity	The sensitivity of a receptor is determined based on the review of the population (including proximity / numbers / vulnerability), presence of biological features of the site and the surrounding area, soil, agricultural suitability, geology and geomorphology, proximity of aquifers and watercourses, existing air quality, presence of any archaeological features etc
Significance	Significance of impact considers the interaction between the magnitude and sensitivity criteria
Solid waste	Material with low liquid content, sometimes hazardous. Include municipal garbage, industrial and commercial waste, sewage sludge, wastes resulting from agricultural and animal husbandry operations and other connected activities, demolition wastes and mining residues
Stakeholders	Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project or the ability to influence its outcome, either positively or negatively
World Bank Group EHS Guidelines	Technical reference documents for environmental protection and set out industry-specific examples of 'international good practice'. Projects are expected to comply with the levels and measures identified in the General EHS Guidelines where host country requirements are less stringent or do not exist

Acronyms

Acronym	Definition
AC	Alternating Current
ADB	Asian Development Bank
AoA	Analysis of Alternatives
AoI	Area of Influence
AP	Action Plan
BESS	Battery energy storage system
CBD	Convention on Biological Diversity
CBO	Community Based Organisations
CCTV	Closed circuit television
CHA	Critical Habitat Assessment
CHS	Community Health and Safety
CLO	Community liaison officer
CSR	Corporate Social Responsibility
DC	Direct Current
EBRD	European Bank of Reconstruction and Development
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPC	Engineering, Procurement, and Construction
EPRP	Emergency Preparedness and Response Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan

Acronym	Definition
FAO	Food and Agriculture Organisation
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
GIS	Geographical Information System
GOU	Government of Uzbekistan
HSSE-MS	Health Safety Social Environmental Management System
HMWMP	Hazardous Material and Waste Management Plan
HR	Human resources
IFC	International Finance Corporation
ILO	International Labour Organisation
IP	Indigenous peoples
IUCN	International Union for Conservation of Nature
LLA	Land lease agreement
LRP	Livelihood Restoration Plan
MAWR	Ministry of Agriculture and Water Resources
MPC	Maximum permitted concentration
MSK-64	Medvedev–Sponheuer–Karnik scale
ML	Local Magnitude
NCR	Non-compliance report
NTS	Non-Technical Summary
O&M	Operation and Maintenance
OESMP	Operational environmental and social management plan
OHTL	Overhead transmission line
OHS	Occupational Health and Safety
OPEX	Operating Expenditures
PM	Particulate Matter
POPs	Persistent organic Pollutants
PPA	Power Purchase Agreement
PPE	Personal Protective Equipment
PPP	Public private partnership
PRs	Performance Requirements
PS	Performance Standards
PV	Photovoltaic
RoW	Rights of Way
SEP	Stakeholder Engagement Plan
SWID	Sericulture and Wool Industry Development
SWMP	Site Waste Management Plan
TTMP	Traffic and Transportation Management Plan
ToR	Terms of Reference
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
USTDA	United States Trade and Development Agency

Acronym	Definition
WBG	World Bank Group
WHO	World Health Organisation
WPZ	Water Protection Zone

1 Introduction

1.1 Background

Abu Dhabi Future Energy Company PJSC (“Masdar”) has been awarded by the Ministry of Energy, Government of Uzbekistan (GOU), to design, build, finance, construct, commission and operate, maintain and transfer (DBFOMT) the Nur-Kashkadarya Solar photovoltaic (PV) Project with a capacity of 300 MWAc and 75 MW/75 MWh Battery Energy Storage System (BESS) (“Project"). The Project will be implemented through a long-term, i.e., 25 years power purchase agreement (a “PPA”) between Nur-Kashkadarya Solar PV FE LLC Foreign Enterprise and JSC National Electric Grid of Uzbekistan (“NEGU”).

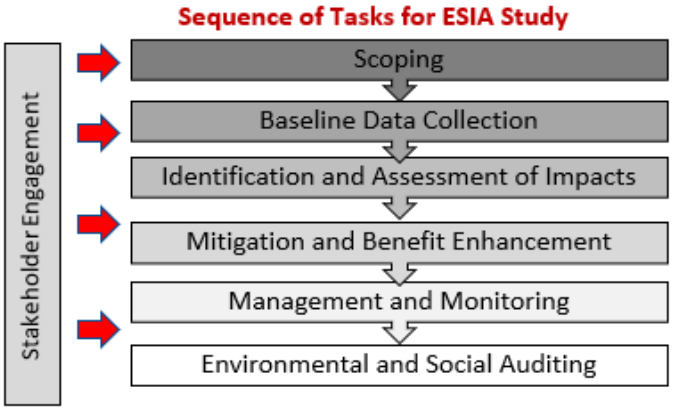
The Project will support Uzbekistan to:

- Reduce energy dependence on carbon-based fuels.
- Meet renewable energy targets to deploy 5 GW of renewable energy by 2025.
- Reduce greenhouse gas emission rates.

Masdar has appointed Juru Ltd. (Juru or the ESIA Consultant) to perform an Environmental and Social Impact Assessment (ESIA) for the Project. The ESIA will be developed in accordance with national standards, the requirements of the International Finance Corporation (IFC) Environmental and Social Policy (ESP) (2012) and supporting Performance Standards (PSs), Asian Development Bank (ADB) Safeguards Policy Statement (SPS) 2009, and European Bank for Reconstruction and Development (EBRD) Environmental and Social Policy 2019 (ESP 2019) Performance Requirements (PRs) and the Equator Principles IV (EPIV).

The Project was required to undergo a National environmental impact assessment (National EIA) process with the Ministry of Natural resources for approval. A positive conclusion on the Stage I and Stage II of the National EIA was received on August 30, 2024. The sequence of steps for the EIA and ESIA study is presented in Figure 1. This report presents the findings of the environmental and social impact assessment process.

Figure 1: ESIA process - sequence of steps (source: Juru)



2 Project overview

The total Project land take covers approximately 733 ha of desert landscape in the Guzar and Kamashi districts approximately 55km km south-west of Shahrisabz and 12 km northeast of Guzar cities in Qashqadaryo region of Uzbekistan (Figure 2). The proposed site is located immediately adjacent to an existing 220kV/500kV substation and a regional road (M39) runs immediately north of the site (Figure 3). A water pipeline ("Yakkabog-Guzor") operated by Kashkadarya Uzsuvtaminot runs parallel to the M39 and must be crossed during the access road construction. The nearest communities are Yangiabad, Khalqabad, and Batosh from Guzar district and Aynakul from Kamashi district (Figure 4).

Figure 2: Project location

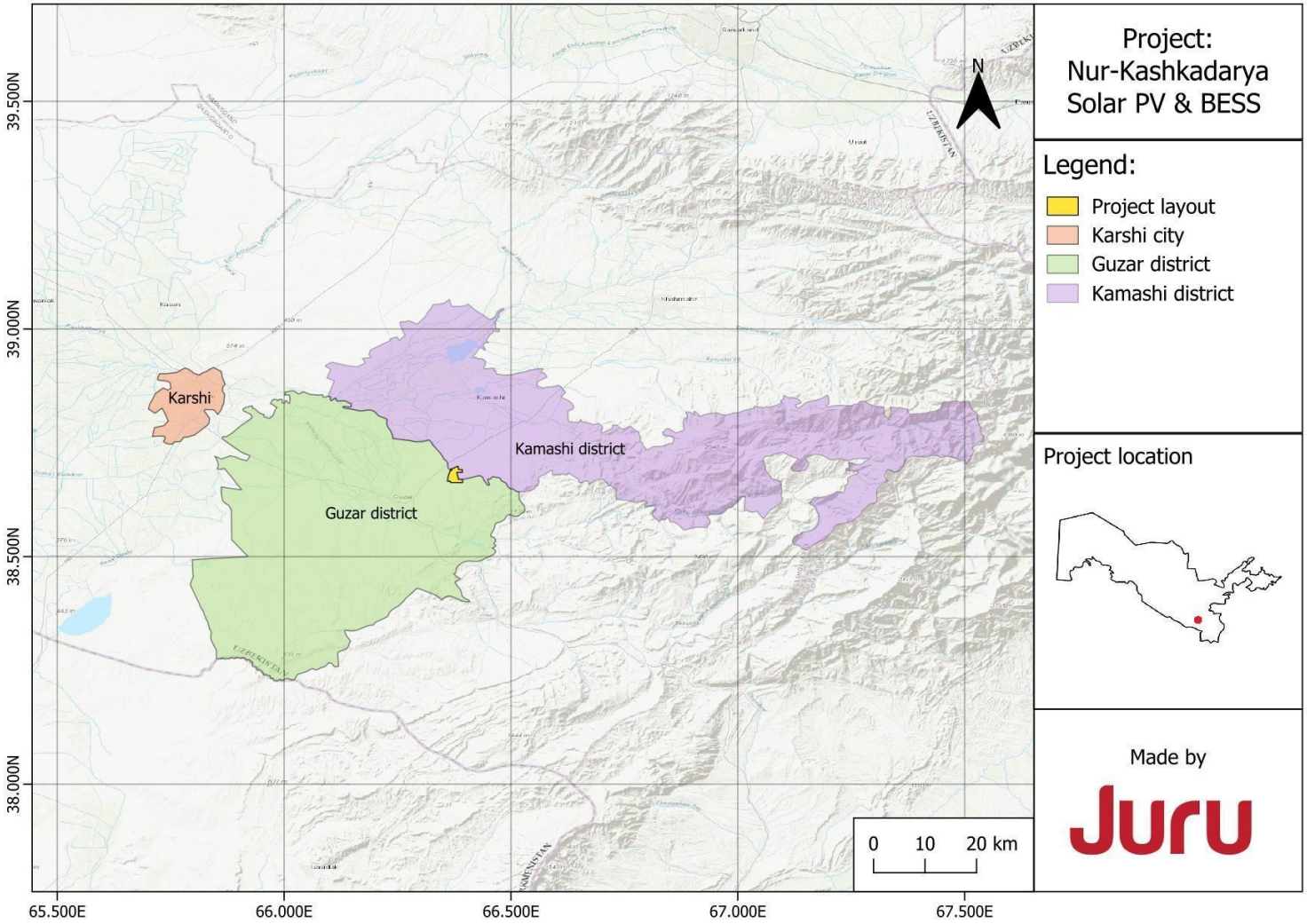


Figure 3: Site location

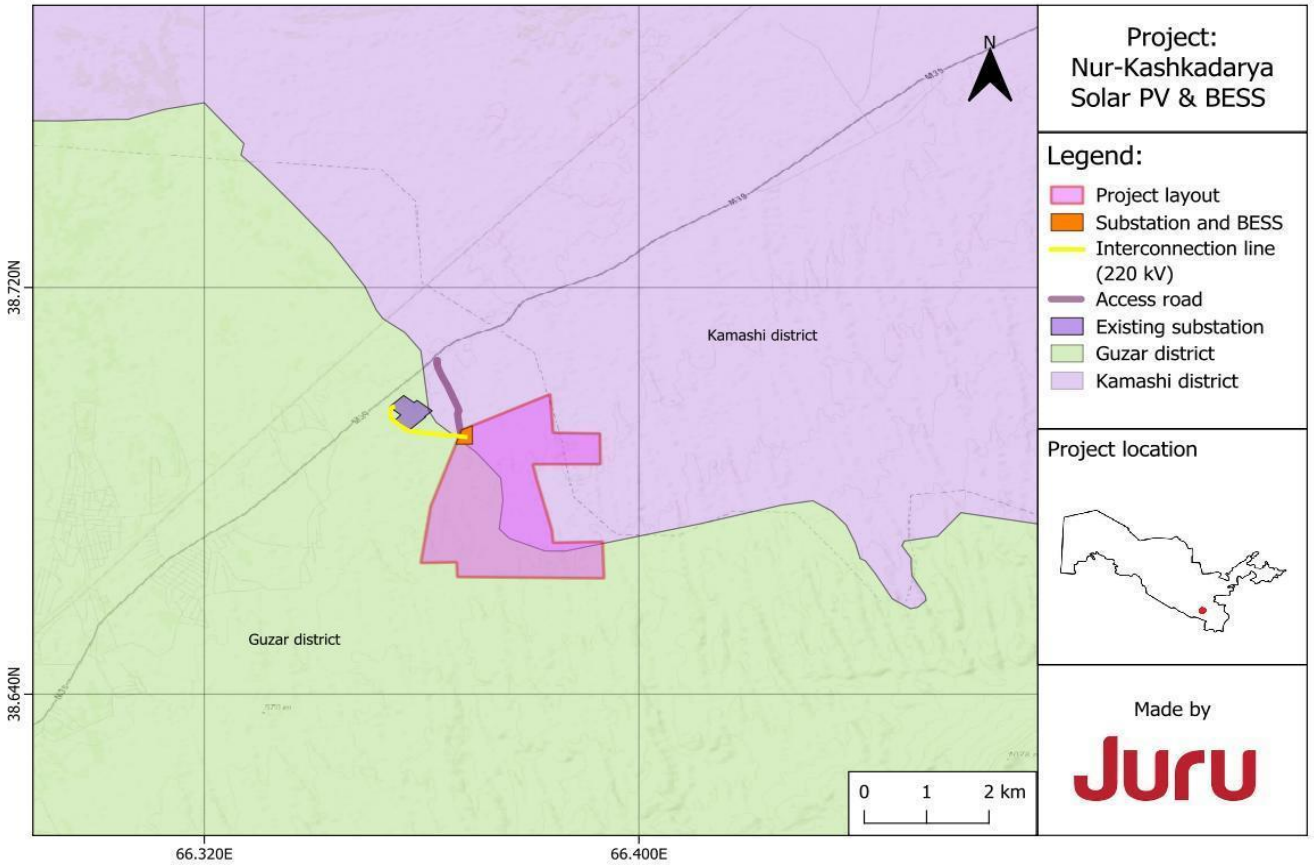
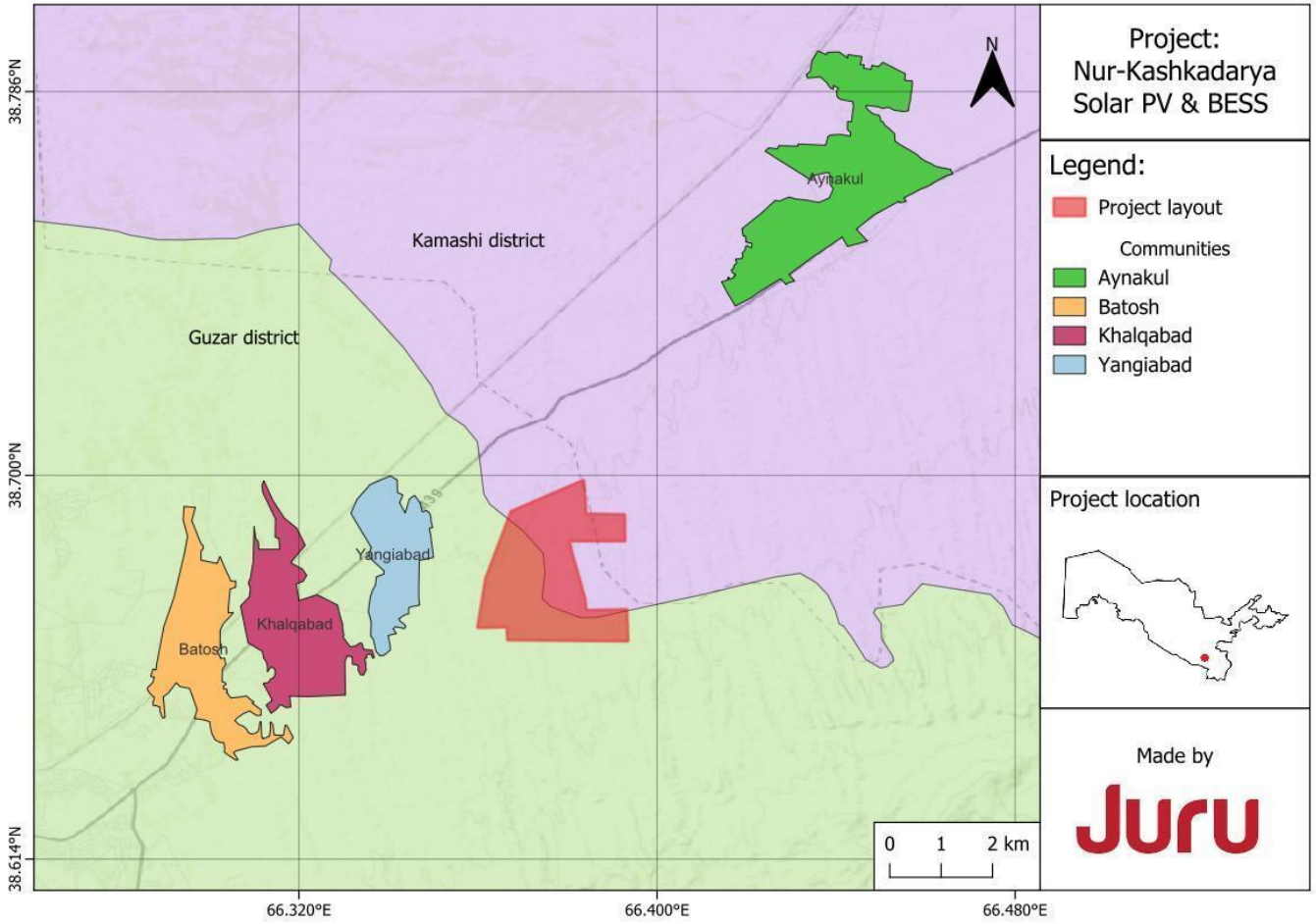


Figure 4: AoI communities



2.1 Purpose of the ESIA

The purpose of this ESIA is to:

- Identify and evaluate potential environmental and social impacts that the Project may have on the environment and communities within its area of influence (AOI) (positive and negative).
- Avoid, or where avoidance is not possible, minimize, mitigate, or compensate adverse environmental or social impacts and issues to workers, affected communities and persons, and the environment from project activities, including involuntary resettlement impacts.
- Implement a systematic approach to stakeholder engagement (SE) to build and maintain a constructive relationship with stakeholders, particularly the directly affected communities.
- Determine whether there are any involuntary resettlement impacts (e.g., land acquisition, displacement; and ascertain any adverse impacts on livelihoods for the local population.
- Define environmental and social management requirements through the effective use of environmental and social management plan (ESMP) and relevant resettlement documentation.
- Align with national requirements for environmental and social impact assessment.
- Demonstrate compliance with Lender requirements.

2.2 Project proponent

MASDAR

Mission "To be a global clean energy developer, with a reputation of being the partner of choice. We meet the needs of clients and communities alike"

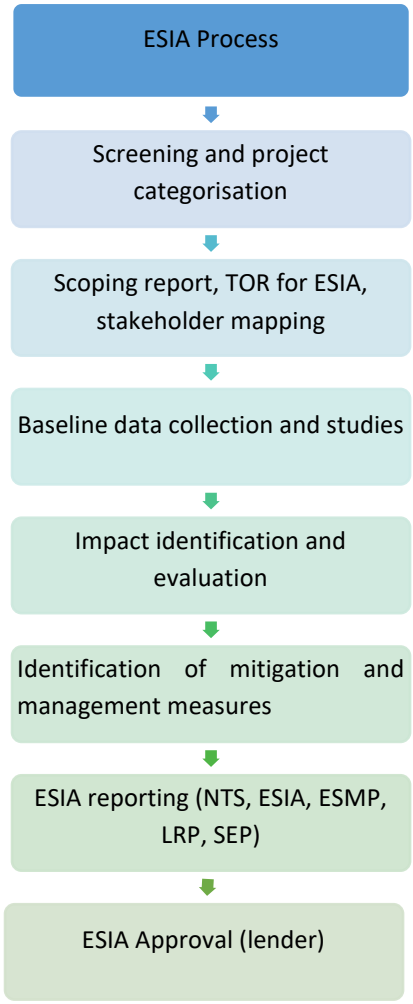
Masdar's mission is to develop, invest in and deliver high-quality, sustainable and economically viable clean energy projects locally and globally. Masdar will develop the Nur-Kashkadarya Solar Project. Masdar has over a decade of experience as a renewable energy developer and investor. Masdar invests in and contributes to innovative global projects, including large, utility-scale renewable energy power plants, community grid projects, and individual solar home systems. It is active across 40 countries and has developed some of the world's most significant solar and wind energy projects. Masdar has invested or committed to invest in renewable energy projects with a gross capacity of over 20 GW. In Uzbekistan, Masdar has 100 MW utility-scale PV solar plant in operation and another 1,600 MW of projects under various stages of development i.e., financial closing and construction.

2.3 ESIA approach

The sequence of steps for the ESIA study is presented in Figure 5.

A scoping exercise was completed in March 2023 to define the ESIA terms of reference (TOR). The scoping report and ESIA TOR are provided in Volume III Technical Appendices.

Figure 5: ESIA process - sequence of steps (source: Juru 2021)



- Field surveys were performed between September 2023 to April 2024 and included:
- Biodiversity surveys for flora, mammals, reptiles, amphibians and birds.
- Air quality, noise, surface water and soil baseline surveys.
- Socio-economic survey.
- Archaeological survey.

These are elaborated further in section 5.2 and baseline survey reports are provided in Volume III Technical Appendices.

In addition a supplementary survey for Central Asian Tortoise was performed in October 2024 and is elaborated in the biodiversity baseline section below.

Mitigation and management measures identified in the impact assessment sections have been collated into a Project ESMP (Volume IV) for implementation across subsequent phases of the development cycle. Requirements for livelihood restoration are outlined in the LRP (Volume V).

SE has been performed throughout the ESIA process and is summarised in section 5. A SEP and evidence of SE performed are provided in Volume VI.

2.4 ESIA structure and schedule

The ESIA contains the following volumes:

- Volume I: Non-Technical Summary (English, Russian, Uzbek)
- Volume II: ESIA Main Report (English, Russian) (this document)
- Volume III: ESIA Technical Appendices and Supporting Documents (originating language) including:
    - Nur-Kashkadarya Scoping Report and ESIA TOR
    - Physical baseline survey reports (noise, water, air, soil)
    - Biodiversity baseline reports (birds, mammals, herpetofauna, flora and habitats)
    - Archaeological investigation reports
    - Human rights impact assessment
    - Climate change risk assessment
    - Technical specifications (seismic, pipeline crossing)
- Volume IV: Environmental and Social Management Plan (ESMP) (English, Russian)
- Volume V: Livelihood Restoration Plan (LRP) (English, Uzbek)

- Volume VI: Stakeholder Engagement Plan (SEP) (English, Uzbek), including:
    - Annexe A: Scoping and ESIA notification leaflet (English and Uzbek)
    - Annexe B: Project grievance form
    - Annexe C: Stakeholder engagement records

This ESIA report is structured as follows:

- Section 1: Introduction
- Section 2: Project Overview
- Section 3: Project description including needs case and analysis of alternatives.
- Project description including needs case and analysis of alternatives.
- Section 4: Policy, legislative and institutional overview
- Section 5: Baseline description
- Section 6: Stakeholder engagement
- Section 7: ESIA assessment methodology
- Section 8: Impact Assessment
- Section 9: Environmental and social management
- Section 10: Conclusion

2.5 Project schedule

Table 1 summarises the key milestones for the ESIA and the Project.

Table 1: Project ESIA Schedule

Activity	Date
Scoping	September 2023
Consultation on national EIA	October 2023- July 2024
Submission of national EIA	End-August 2024
Submission of draft ESIA	End-August 2024
Finalise ESIA	March 2025
Finalise ROW and land agreements / compensation	May 2025
Limited notice to proceed (NTP)	June 2025
Financial close	July 2025
Notice to Proceed	August 2025
Commercial Operation Date	December 2026
Expected Lifetime	25 years for PV; 10 years for BESS

2.6 ESIA team and project contact information

Juru Consulting Ltd. will perform the ESIA study. The team of Juru specialists involved in the Project is presented in Table 2.

JURU CONSULTING LLC, UZBEKISTAN
Name: Oleg Khegay, Zarina Gafurova
Address: 10A, Chust Str., Tashkent, Uzbekistan, 100077
Email: guzar_solarpv_esia@juru.org
Phone: +998 90 515 03 92

Table 2: ESIA Team

Name	Position
Nicola Davies	Project Manager & Environmental Expert
Caleb Gordon	International Biodiversity Expert
Marianne Lupton	International Social Specialist
Oleg Khegay	Local Environmental Specialist
Anna Ten	Local Biodiversity Expert
Zilola Kazakova	Local Social/Resettlement Specialist
Zarina Gafurova	Local Social/Resettlement Specialist
Timur Abduraupov	Local Herpetologist
Natalya Beshko	Local Botanist
Abdulhoshim Turgunov	National EIA Expert

3 Project Description

3.1 Needs case

Uzbekistan has abundant renewable energy resources (solar and wind) and renewable generation potential. This potential has remained virtually untapped due to a lack of incentives, experience, historically subsidised natural gas prices for the country's gas-fired thermal power plants that constitute over 80% of the total power generation capacity, and low tariffs.

The GOU aims to increase its renewable power supply and has adopted the 2030 Energy Strategy, which defines several objectives and directions for electricity supply. One of the Energy Strategy objectives includes developing and expanding renewable energy sources (RES) to at least 25% by 2030 (a total RES capacity of 10 GW) and its integration into the unified power system. To fulfil this objective, the GOU intends to "Ensure diversification in power and heat energy sectors through the increased share of renewable energy sources and creation of renewable energy investment project mechanism utilising PPP [public-private partnership] approaches, enhancement of government policies related to the development of renewable energy sources, demonstration of renewable projects". This strategy aligns with Uzbekistan's obligations under the Paris Agreement on Climate Change.[1,2.] Specifically, the GOU has set a target to increase solar power production to five gigawatts (GW) by 2030.

In May 2019, the laws of the Republic of Uzbekistan, "On the use of renewable energy sources" and "On public-private partnership", were adopted creating a regulatory and legal framework to accelerate the implementation of renewable energy projects such as this one. Uzbekistan plans to increase the share of renewable energy sources to 25% by 2030.

The Nur-Kashkadarya PV and BESS Project is part of the Uzbek Solar 3 program, which aims to enable the rapid roll-out of competitively priced, utility-scale solar PV power in Uzbekistan through a largely standardised joint World Bank Group (World Bank, IFC and MIGA) solution based on a templated PPP transaction.

This Project wholly supports the objectives of the sustainable environmental energy policy described above including:

- Reduce energy dependence on carbon-based fuels.
- Meet RES targets.
- Reduce greenhouse gas emission rates.

3.2 Analysis of Alternatives

The alternatives considered for the Project are broadly categorised as follows, and discussed in more detail below:

[1] Law of the Republic of Uzbekistan "On Ratification of the Paris Agreement" (No.ZRU-491 dated 02.10.2018).

[2] National Determined Contribution (NDC) is defined din updated NDC document 2021 Updated National Determined Contribution 2021

- No project alternative
- Options for alternative renewable energy generation
- Options for alternative sites
- Options for alternative PV technology

3.2.1 No project alternative ("do nothing")

Under the no-project alternative the Project would not be constructed. If the Project is not built the following outcomes will be realised:

- No direct capital investment in the area
- Reduced indirect socio-economic benefits (service providers)
- Reduced in tax revenues for the local economy.
- Reduced economic development and possibilities for the improvement in the social welfare of people in the region
- Slowdown in the diversification of energy generation in Uzbekistan resulting in a greater reliance on fossil fuels and wind power.
- No contribution of 300 MW of renewable power towards Uzbekistan overall target of 5 GW.
- Displacement of CO2 emissions as the energy production from the Project would substitute generation from fossil-fuelled fired generation plants in the short and medium term.

3.2.2 Technology alternative

Uzbekistan is promoting an aggressive diversification strategy including both wind and solar to meet Uzbekistan's goal of 25% renewable energy by 2030. As such wind energy could be considered a viable technology alternative to contribute to Uzbekistan's goal of 25% by 2030. A comparison of wind energy versus solar energy is provided in Table 3 below. For the below comparison we have assumed that both technologies would employ an energy storage system in line with Uzbekistan regulation. The comparison highlights that while both offer a lot of benefits, solar can be concentrated in a much smaller area and typically can have lower ecological risks (if the site is well selected).

Table 3: Comparison of wind and solar for achieving renewable targets

Technology	Advantages	Disadvantages
Solar	• Renewable technology- free fuel- with CO2 emissions only considered with lifecycle assessment of equipment manufacture- no CO2 emissions from general operations. • Typically, low maintenance • Poverty reducing benefits. • Recent technological advancements result in	• Power only possible during sunlight hours • Relative inefficiency / square meter • Generally, not seen as suitable for base load power given intermittent energy source. • Fewer employment opportunities compared to hydroelectric and thermal power plants. • Panel efficiencies reduce over time (though typically manufacturers offer maximum degradation guarantees)

	greater efficiency and lower costs,	• Can be concentrated in relatively small areas of land. • Only site-specific impacts on biodiversity.
Wind	• Renewable technology- free fuel- with CO2 emissions only considered with lifecycle assessment of equipment manufacture- no CO2 emissions from general operations. • Contribute to Uzbekistan goal of 25% by 2030. • Poverty reducing benefits.	• Only suitable for areas with high wind intensity/regularity • Dependent on wind, allowing little scope for increasing power generation if needed: generally, not seen as suitable for base load power given inconsistencies in generation. • Typically needs large areas of land. • Wind turbines sometimes considered as visually detrimental to the surrounding landscape. • Environmental impacts associated with birds relevant in Uzbekistan

3.2.3 Alternative sites and design/layouts – main site

The Site was part of a wider country wide site selection process undertaken by the GOU and supported by specialist consultants. The conclusion of this report identified “site 4” as the preferred site i.e. the Guzar solar PV site.

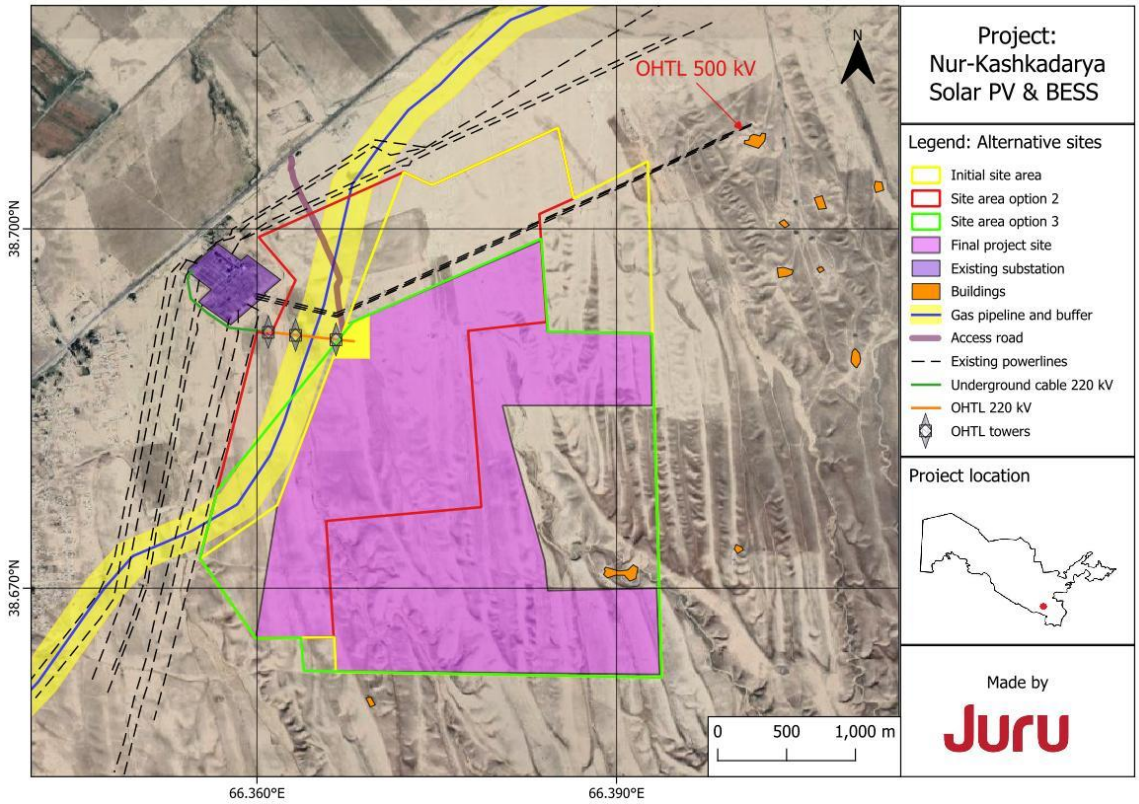
As described in the Guzar Solar PV Site Suitability Report (Pre-FS), prepared by Suntrace GmbH on behalf of IFC a screening exercise for site selection was performed that identified the initial site 4 area available as 1227 ha (Figure 6 – yellow boundary). This report also noted that a high-voltage OHTL crossing the Project area was identified as required to be carved out of the overall layout to maintain the health protection zone (HPZ) setback.

During the ESIA process further site surveys and consultation identified permanent residential buildings of local residents, ephemeral streams, an area allocated as hydrocarbon deposits, and a gas pipeline crossing the Project site. A water pipeline was also identified running parallel to M39 road which is required to be intersected by the new access road.

Following a review of E&S infrastructure constraints, an optimised a project location was chosen to avoid these areas (gas pipeline, hydrocarbon deposits and gullies linked to the ephemeral stream) resulting in new project site (pink polygon).

As a result, an optimized PV area of 731 ha was determined to minimize risks and negative impacts on the Project and its receptors. In addition, the site has been optimised to take account of necessary setbacks for ephemeral surface water courses and hilly terrain, not suitable for construction.

Figure 6: Initial available area (yellow) and optimised footprint (pink)



The sizing of the Project has also been carried out with the following technical criteria in mind:

- Maximize the occupied area, respecting the minimum required easements and distances.
- Maximize annual power generation.
- Optimization of cabling lengths.
- Optimization of earthworks and trenches that directly affect the ground.

3.2.4 Alternative sites and design/layouts - grid connection

One of the biggest E&S constraints when developing a solar project can be the grid connection. The decision to connect the Project directly to the existing Substation further supported the final optimisation and reduced the E&S impacts associated with the grid connection. A routing report for connecting to the neighbouring Guzar substation was conducted[3] in July 2024, three options for the interconnection have been considered:

- Option 1: Underground 220kV cable to the northwest side of the existing "Guzar 500kV substation.
- Option 2: Overhead transmission line (OHTL) from the Project substation to the existing "Guzar 500kV" substation (routing north or south side of the substation).
- Option 3: Combined OHTL and underground cable from the Project substation (total 1,578 metres: 658 metres of OHTL and 915 meters of underground cable) to the existing "Guzar

[3] 300 MW GUZAR SOLAR PROJECT IN UZBEKISTAN GUZAR PV PLANT – ROUTING REPORT, GUZ-PD-RR-PR0001, Juru and Masdar, 18 July 2024.

500kV substation via southern side of the substation. This option starts as an overhead line, which allows the line to cross above the gas pipeline in the safest possible way, before crossing the existing 500 kV overhead lines (around 60 meters to the existing overhead lines), at point 3-1 it transitions to the cable line and connects to the substation in the northwest

Considerations for the final connection included existing OHTL's and gas pipeline around the proposed site, current land use and biodiversity sensitivity as summarised in Table 4. In the end it was determined that livelihood impacts for the combined option were preferable over the cable route to the north of the site.

As a result, routing Option 3 were recommended by NEGU and based on Juru`s request letter JEC-OUT-24-449 from 13.05.2024, "Qashqadaryo MET" (Branch of JSC "NEGU" for Kashkadarya region of Uzbekistan) approved Option 3 (combined OHTL and cable line

Table 4: Qualitative comparison of the grid connection options for connection from the Project substation to the existing "Guzar 500kV substation

Option	Safety	Rank	Land use	Rank	Biodiversity	Rank	Total
Option 1	Shortest route underground	1	Cable route will pass through nearby homestead located adjacent to the site	3	Modified habitat which can be restored to pre-condition once buried. No ongoing biodiversity impact	1	5
Option 2	OHTL required to cross multiple OHTL and gas pipeline	3	ROW for ~1578 m required for which land compensation and some livelihood restoration for temporary impacts will be required.	2	Modified habitat. OHTL will pose a potential collision risk to birds and require mitigaition along the whole length (1278m)	3	8
Option 3	OHLT required to cross gas pipeline but buried under OHT reducing risks to workers of live works).	2	ROW for 658m required for which land compensation and some livelihood restoration for temporary impacts will be required.	1	Modified habitat. OHTL will pose a potential collision & electrocutionrisk to birds and require mitigation along the whole length (658m)	2	5

3.2.5 Alternative technology - solar PV panels

Water scarcity is a widespread problem in most regions of Uzbekistan. In this context, water supply and an optimal use of water resources for the PV plant was considered an issue of upmost importance. A key consideration in the selection of the PV panel was the water need and availability. Typically, cleaning schedule optimization and dry-cleaning methods are preferred to minimize the annual volume of water used for panel cleaning during the operation phase. Masdar considered a number of panel cleaning systems including wet cleaning systems, and dry-cleaning systems before settling on a dry-cleaning solution representing the most resource friendly option.

For this Project, bifacial photovoltaic modules based on half-cut monocrystalline silicon technology, widely proven in numerous facilities throughout the world, has been selected. Monocrystalline silicon offers high efficiency and good heat tolerance characteristics with a small footprint. Polycrystalline technology has a lower efficiency and doesn't have any other significant advantages over monocrystalline e.g., recyclability. The main advantage is that they are generally cheaper. The monocrystalline option was selected as the optimum solution for this site.

To optimize the available surface area, an independent row 1P tracker has been selected. The advantages of this system compared to a multi-stack tracker are less maintenance of the PV Plant and greater flexibility of implementation.

3.2.6 Alternative water supply options (construction and potable water needs)

Different options for water supply were investigated, for feeding into the panel selection but also for construction water and potable water supply. The outcome of the review did not reveal an obvious sustainable water source nearby therefore it strongly influenced the selection of dry-cleaning PV technology (as described above) and the use of the municipal water supply to tanker water to site.

3.3 Project location and setting

There will be a permanent land take totalling 733.113 ha incorporating:

- 731 ha for the Project PV Site,
- 0.032 ha for the tower footprints
- 0.381 ha for the cable route ((including a 1m security setback on each side)
- 1.7 ha for the access road. (based on approximately 1700 m long 10 m ROW)

This land will be leased to the Project SPV. Temporary land take is also associated with clearing the 220 kV OHTL (~698 m with a 30 m setback either side of the conductor).

The proposed Project site is immediately adjacent to the 500kV Guzar substation in the Guzar and Kamashi districts (55 km south-west of Shahrisabz and 12 km northeast of Guzar cities in Qashqadaryo regions) of Uzbekistan (Figure 2). Immediately parallel to the northern boundary of the site is the regional road M39 that runs between Shahrisabz and Guzar. To the west is the existing 220kV/500kV Guzar substation Figure 15 and Figure 16).

The site is crossed by an existing 500kV transmission line (Figure 8). The access road crosses a water pipeline and gas pipeline. Water has accumulated in a man-made pond due to leakages from the pipe. Local herders use this surface water for watering their livestock (Figure 9).

Figure 7: Unpaved Road across the Project site

Figure 8: Existing OHTL in the exclusion area in the northern part of the Project site

Figure 9: Leakage from the underground water pipeline (outside the Project boundaries)

Figure 10: Ravine in north east

This Site topography is flat on the west (Figure 11 and Figure 13) and becoming more undulating to the east and almost devoid of vegetation (Figure 12). There are no permanent waterbodies or rivers on the site, however there are some large ravines and a number of seasonal/ ephemeral channels running from south-southeast and from a north-northwest direction (Figure 10 and Figure 14). The site is predominately used for grazing and some agricultural purposes.

Table 5: Key reference features of the site

Sl. No.	Particular	Description
1.	Site Location	Qashqadaryo region, Uzbekistan

2.	Coordinates	Latitude: 38.686605° North Longitude: 66.369380° East Universal Transverse Mercator (UTM) coordinates (Zone 41)
3.	Maximum Temperature	45.8 °C
4.	Minimum Temperature	-23 °C
5.	Design Ambient Temperature	-20°C to 45 °C
6.	Maximum Wind Speed	39m/s
7.	Relative Humidity	90%
8.	Average Rainfall	300 mm per year
9.	Corrosion Category	C3
10.	Maximum Altitude	232 m

Figure 11: Rain fed fields on the Project site

Figure 12: Camel thorn on the Project site

Figure 13: Guzar substation looking northwest from the Project site

Figure 14: Ravines in the east of the site

Figure 15: Project setting (map view)

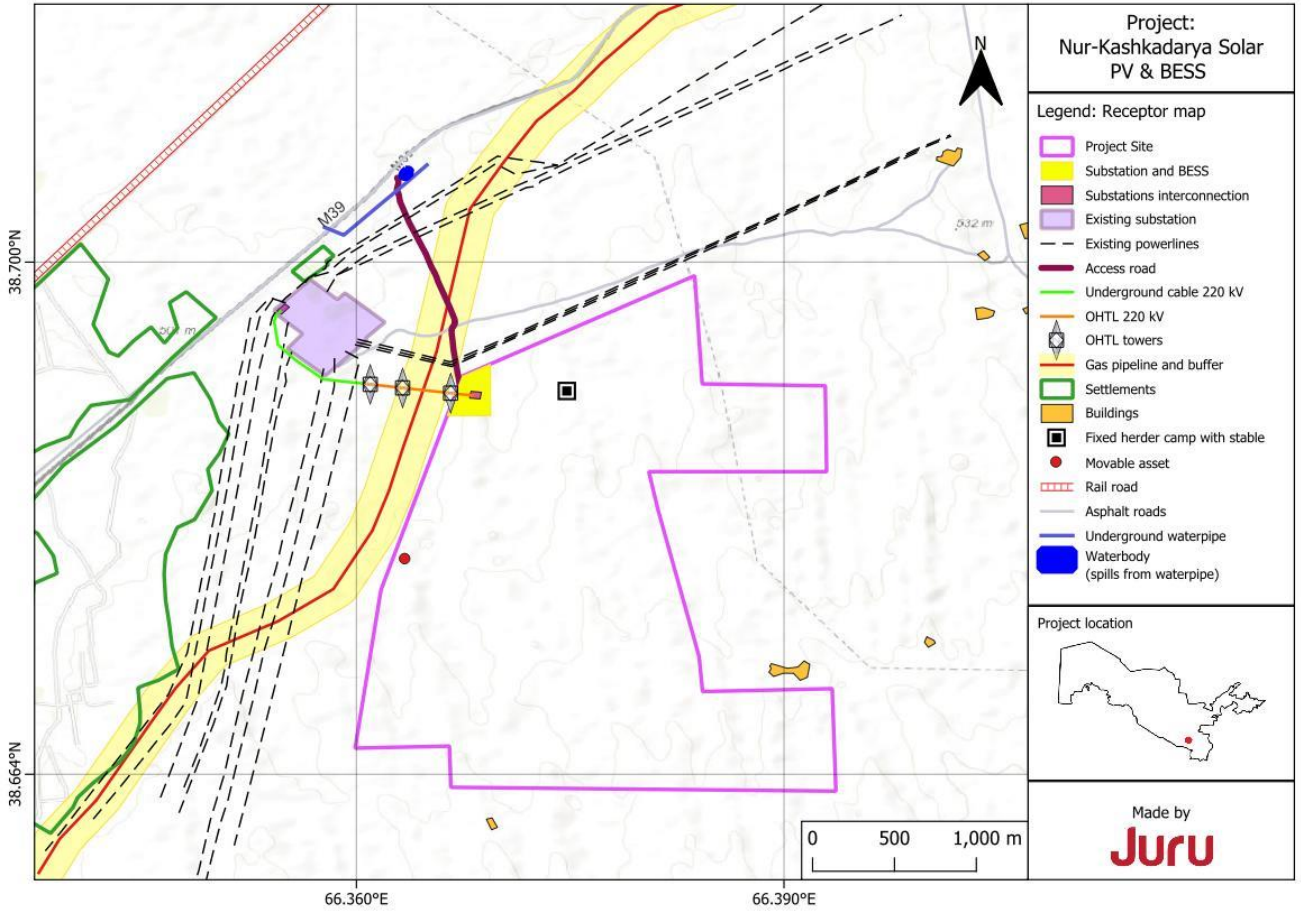
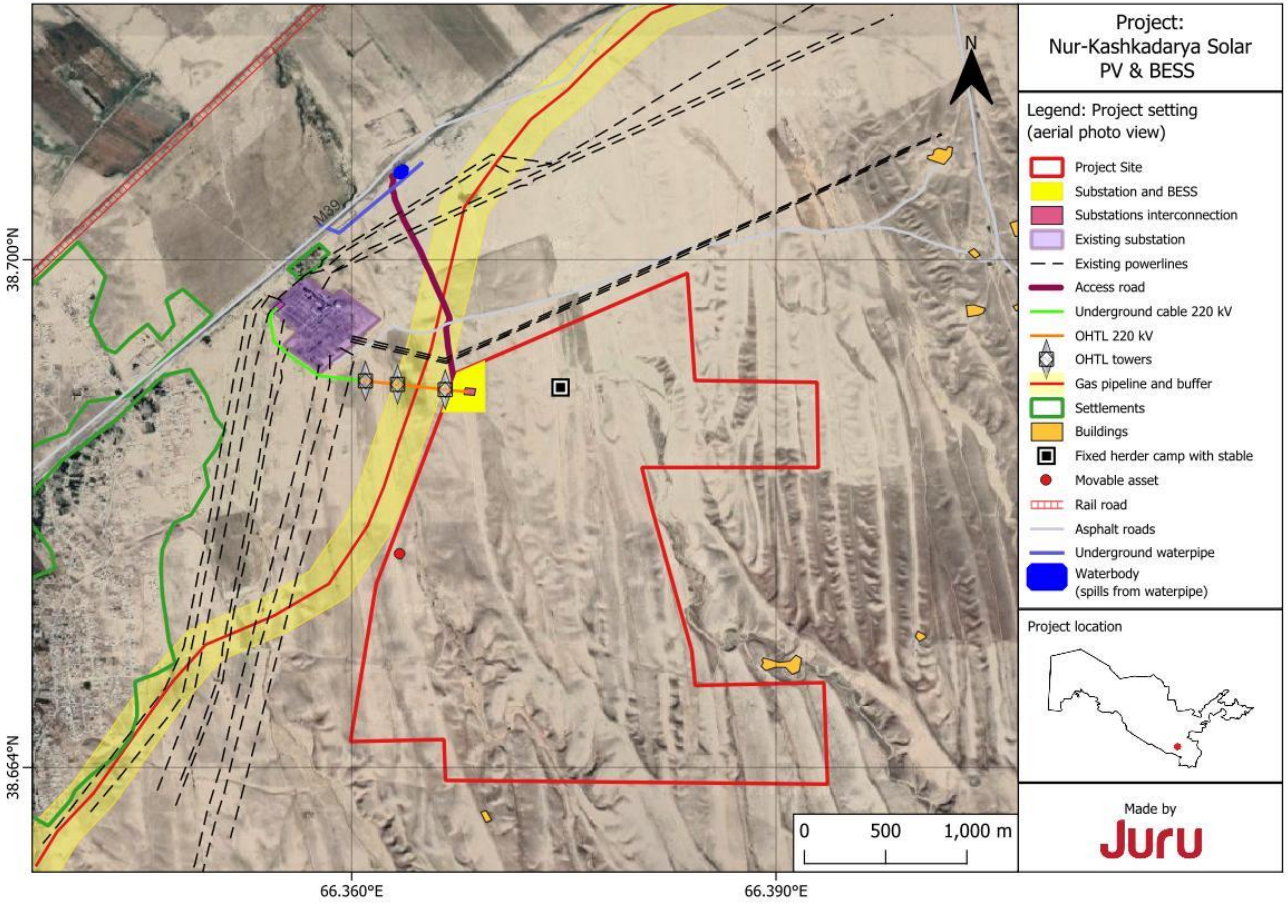


Figure 16: Project setting (aerial photo view)



3.4 Project receptors and land use status

There are total of four communities that are located near to the Project site. From the Guzar district there are three communities namely Yangiabad, Khalqabad, and Batosh and one community Aynakul from Kamashi district (Figure 4).

The Guzar substation is located to the northern part of Project site. There are three house structures that belong to one household, located next to the Guzar substation, that may be impacted by the construction of the Project access road. Construction impacts are expected to be related to construction nuisance (dust, noise and traffic etc) but will be temporary (refer to section 8) therefore there is no need identified for these houses to be relocated and IR impacts are not triggered.

Site visit observations revealed that the majority of the Project site is designated as farmland, with a small part allocated for grazing and livestock activities (Figure 17). The land is not irrigated and is farmed using rainfall only. People consulted during the scoping site visit stated that there had been a severe drought in 2023 and many of the crops did not survive, therefore the land was predominantly being used for grazing livestock at the time of the scoping report. Previously land has been used to grow wheat, chickpeas, rye and livestock feed.

During the scoping site visits, households located just outside the Project site (Figure 18) (particularly to the northwest) stated that they informally (i.e., without a lease agreement) use the Project land for grazing their livestock seasonally.

Some local community members have constructed temporary structures such as herder camps and stables that are only used during certain months of the year.

Three structures (a herders camp, a round stable and a movable trailer) are identified on the site. These structures are mostly used for resting during the day, and their use is sporadic during the months of March and November, when it coincides with their herding patterns. They are not permanent residential structures. Nor are they legally registered. It is expected, given that farmers wish to continue to use their land, that it will be necessary to relocate these structures onto the farmers' remaining land. The relocation and replacement value of these structures has been determined in the LRP (Volume VI).

Should there be any physical or economic displacement due to temporary land use or additional land used during construction and operation, affected people, if any, will be entitled to provisions based on the type of loss and according to the entitlement matrix in the LRP.

Figure 17: Livestock grazing from Project Site

Figure 18: House outside the Project boundaries

Figure 19: Temporary herder camp and stable

Figure 20: Herder's movable trailer on the Project site

There will be a permanent land take totalling 733.09 ha incorporating:

- 731 ha for the Project PV Site,
- 0.028 ha for the tower footprints
- 0.362 ha for the cable route ((including a 1m security setback on each side)
- 1.7 ha for the access road. (based on approximately 1700 m long 10 m ROW)

Temporary land take is also associated with clearing the 220 kV OHTL (~698 m with a 30 m setback either side of the conductor).

Land use receptors impacted by the Project can be summarised as per Table 6. In total the following are considered for the Project:

- Three Government entities (State Committee on SWID, Kamashi District Municipality and Guzar District Municipality)
- Two government managed LLC /Private Enterprise ("land management companies")
- 7 farms, 1 PE and 1 LLC (F01-F09) are all considered farms (two farms F03 and F08 are owned by the same Project affected person (PAP));

- herders (H01 – H04) who use the land to graze owned livestock at the Project site (without any formal agreement to use the land);
- 22 workers (W01-W20 and W22-W23)4 8 seasonal workers and 14 permanent workers;
- 22 livestock rental household (LRH - LRH01-LRH22),) that rent animals to other PAPs.

In total 165 PAPs5 members of the families of the farmers, herders and workers.

Facilities such as customs area, construction and erection staging (unloading, site storage, workshop) areas, construction (workers) camps, spoil disposal sites, OHTL and underground cable construction and access tracks established for the new 220 kV OHTL are all currently planned to be completed within the Project site. However, if this changes for any reason, they could take up additional land temporarily during the construction stage. The temporary land take areas will be estimated during detailed engineering design and a suitable site will be identified for this purpose. The Project Company will seek to enter into a direct transaction agreement for the rental of this land. No compulsory use rights will be enforced in relation to this land.

Table 6: Categories of potential impacted land use (names of farms are withheld for confidentiality purposes)

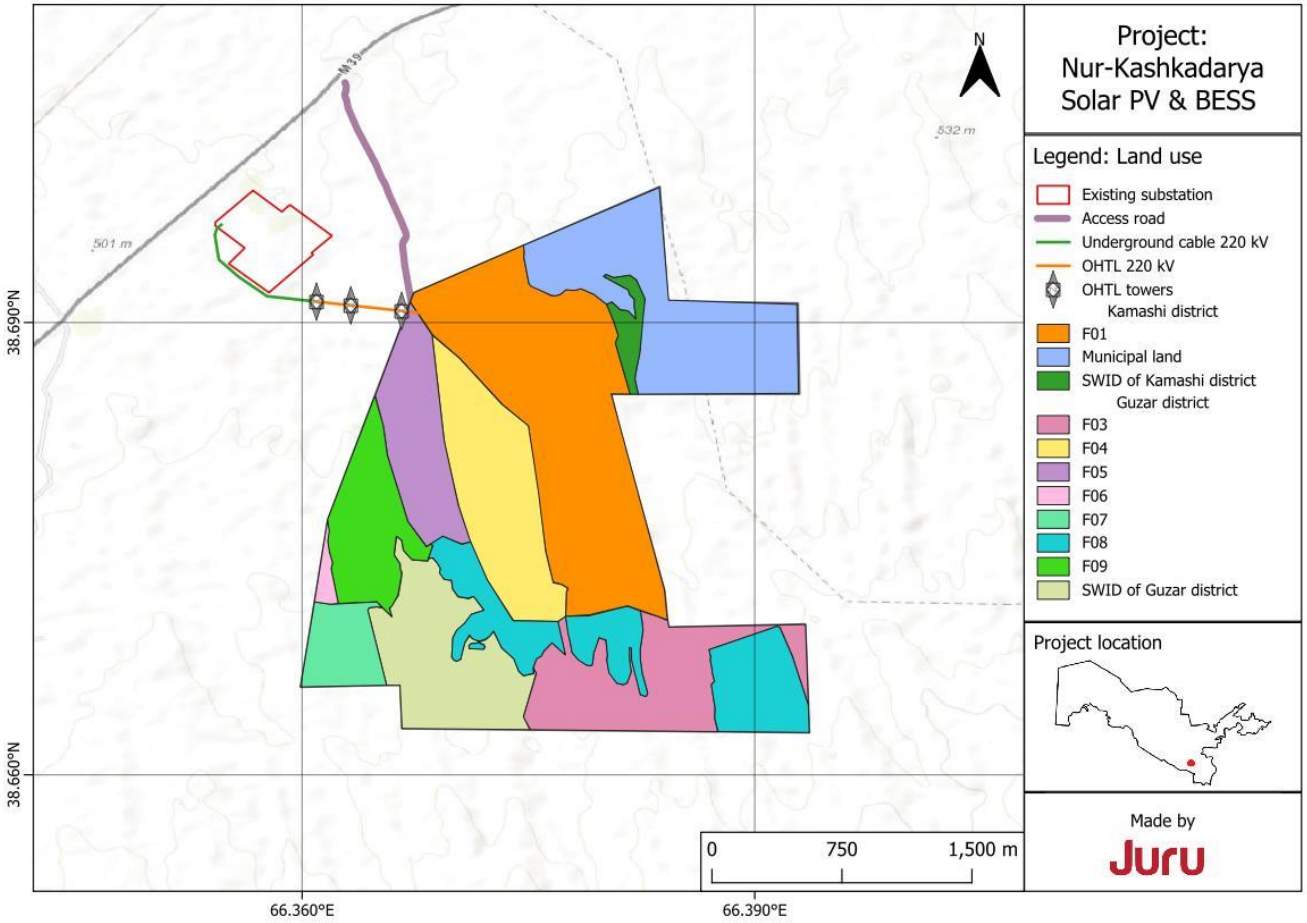
District	Landowner	Land management company	Farmer	Worker	Land area for the Project site (ha)	Land area for access road (ha	Land area for OHTL (ha)	Land area for cable (ha)
Kamashi District	Kamashi District Municipality	-	F01	W01-W6, W19	180.7	0.482		
			F02	-		1.189		
		Reserve land			107			
	SWID	Bobur Murodaliyevich Private Enterprise (PE)			11.56	0.029		
Guzar District	Guzar District Municipality	-	F03	W09-W11	78.8			
			F04	W07, W18	79.4			
			F05	W12-W14	50.7		0.012	

[4] Note: Worker W21 is no longer considered affected. W21's name was provided to Juru by F06, but upon attempting to contact them, F06 stated that they had never had such a worker. In order to confirm the information received, Juru contacted the local municipality and the Ministry of Agriculture, which also confirmed that they are not a worker on the Project site.

[5] Note, this number of PAH is an estimate, as some PAH were not able to be consulted.

District	Landowner	Land management company	Farmer	Worker	Land area for the Project site (ha)	Land area for access road (ha	Land area for OHTL (ha)	Land area for cable (ha)
			F06	W15, W22-W23	3.54			
			F07	W08, W20	24.5			
			F08	-	74.2			
			F09	W16-W17	47.6			
	SWID	Guzar Korakul Cluster LLC	F05	-	73		0.016	
								0.362
Total	-	-	9	22	731	1.7	0.028	0.362

Figure 21: Land use mapping

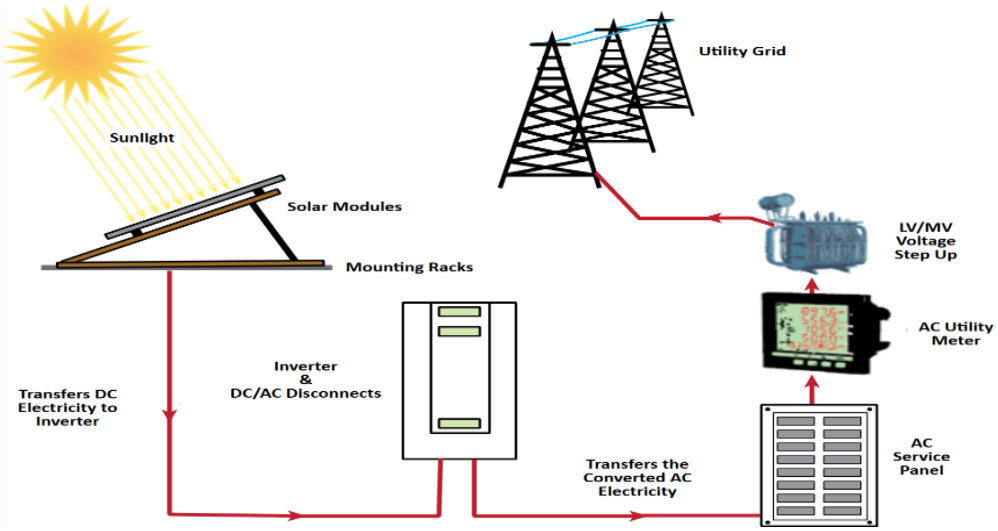


3.5 Project components

3.5.1 Overview

Photovoltaic (PV) power uses solar panels to convert sunlight into electricity by converting solar radiation into direct current (DC) electricity. PV inverters convert the DC to AC, and route to small transformers that will raise the voltage from low voltage (LV) to medium voltage (MV). Then, the energy generated will be conducted through an underground medium voltage (MV) network of 35 kV to the 35/220 kV Substation. At the 35/220 KV substation the voltage is raised again to connect to the main grid system. An overview of the process is illustrated in Figure 22.

Figure 22: Overview of the PV process (compiled from IFC, 2015)



3.5.2 Primary component - PV Plant

A description of the primary components of the PV Plant is provided in Table 7.

Table 7: Description of PV Plant components

Project components	Summary description
PV panels and tracking system	Bifacial photovoltaic modules based on Half-Cut monocrystalline silicon technology are planned to be used. Approximately 578,088 modules across about 20646 strings (28 modules per string) will be required for a total nameplate capacity of 341MWp and total power 300MW. Each module is approximately 2.3m x 1.2m.
Trackers	The modules will be set on a horizontal (north-south) axis to track the sun's position. The structure of the trackers will be installed employing direct driving to the ground whenever possible to a minimum depth determined by the geotechnical studies. Only if direct driving is not possible will a pre-drilling method be used.
LV electrical Installation	The Low Voltage Electrical Installation is considered to refer to the downstream of the LV/MV transformers located in each of the Power Stations of the Solar PV Plant. It is the connection between PV

Project components	Summary description
	modules on each string, between strings and string inverters and the inverters and the low voltage panel of the power station.
Invertors	Inverters convert the DC electricity produced by PV arrays into AC electricity compatible with utility grids. In addition, PV inverters often provide system protection and data communications. A total of 1100 inverter units are expected to be installed.
Medium voltage (MV) (35kV) internal cabling	The MV power station comprises the MV cells and the power transformer, which is responsible for raising the output voltage of the inverters (800 V) to 35 kV. An MV ungrounded power network connects the MV power stations with the 35/220 kV Substation. The MV cables will run in trenches (directly buried or under a tube, depending on the section).
Control System	The PV Plant's monitoring and control system will be based on open products on the market and will include the SCADA and the Plant's control system, as well as all the necessary equipment to communicate with the rest of the Facility's systems

PV Panels 	MVS 8850-LV “Power Station” 
	

3.5.3 Primary components - Battery Energy Storage System

The Project 35kV / 220kV air-insulated substation will transform the generation and BESS output voltage levels to 220 kV through two power transformers for the PV generation and another for BESS and the associated electrical devices. The air insulated switchyard shall have the following systems:

- 220 kV MV switchgear
- Substation control building
- Protection and control panels.
- AC/DC auxiliary power supply panels.
- DC battery banks (in a separate room) and chargers.
- One MV/LV transformer for supplementary services.
- Telecom panels.
- Other rooms (offices, warehouse, toilets, etc.).
- Secure entrance and gate post building.
- Two firefighting tanks.
- Oil collector with treatment facilities for oiled effluents.

Battery energy storage systems (BESS) can help address the intermittency of solar power and enable a power system to respond rapidly to large fluctuations in demand, making the grid more responsive and reducing the need to build back up power plants.

A BESS is a set of energy accumulators that, through an electrochemical process, can store electrical energy. The BESS consists mainly of batteries and a battery control and monitoring system (BMS). As depicted in Figure 23, the smallest, indivisible battery unit is called a cell, within which chemical reactions occur. Cells are connected within modules. These modules are equipped with voltage, current and temperature sensors to monitor the state of the cells. The modules, in turn, are connected inside cabinets, commonly called battery racks, until the desired system DC voltage level is reached at the design level. The battery racks also contain additional control and protection module. The battery monitoring system (BMS) monitors the primary variables, such as evoltages, currents and temperatures, at the level of the modules included in the rack and the cell. The stored power is transformed when needed by the power conversion system in the form of DC by the batteries into AC and vice versa by executing the appropriate current control to discharge and charge the batteries.

The BESS will consist of : [6]

- A power conversion system (PCS) suitable for outdoor installation on a user-furnished concrete pad or the user-furnished box pad.
- Lithium-ion-phosphate (LFP) battery with a design life expectancy rating of 10 years under site operating conditions, suitable for outdoor installation, and a battery management system (BMS). Any replacement / modification required to meet Warranty requirement or design life shall be included in scope.
- An Energy Storage Unit as per type tested design and SOC
- DC Cables.
- Instrumentation and communication cables.
- Interfacing to meet statutory requirements and comply with Local Grid Code. All required hardware (AI & DI Cards).
- Fire detection, suppression & protection system.
- HVAC system for BESS.

The BESS, and associated equipment, shall be provided in self-contained National Electrical Manufacturers Association (NEMA) enclosure(s) rated for the site conditions with adequate ventilation and multiple layers of protection. Hazard and fire protection includes gas extinguishing method using NOVEC1230 and water or liquid Fire Fighting (Suppression) System) (FFS) aligned with NFPA 855 along with the detection of the combustible gas like hydrogen or carbon monoxide and their exhaust system. Any battery chemicals leakages will be collected be the drain siphon incorporated to the battery enclosure for appropriate disposal off site. Waste firefighting water will be collected by water pits for disposal off site.

The FFS include smoke detector, control panel, alarm device, exhaust pipe and bump head. It uses clean fire suppression gas to minimize the second loss.

The BESS will be housed in outdoor container system comprising 27 containers (9340mm x 2600mm x 1730mm) with an installed capacity of 3.73 MWH per container with LFP batteries 3.2V 280 Ah in each module (see Table 8 below). Thermal conditioning systems shall maintain ambient temperature

[6] Guzar feasibility Study report, MOE, ADB, September 2022, Dornier Group.

within warranty requirements to minimise the chance of fire spread or thermal runaway. The BESS components and associated ancillary equipment shall have working space clearances required by local code, and electrical circuitry shall be within weatherproof enclosures marked with the environmental rating suitable for the type of environment in compliance with NFPA standards. All BESS containers will be locked to prevent unauthorised access.

Table 8: Total number of components for assembling BESS batteries

Battery Blocks	Total Quantity
Battery containers	27
Number of racks per 1 container	10
Number of modules per 1 rack	8
Number of modules per 1 container	80
Number of modules per 27 containers	2160
Number of cells per 1 battery module	52 battery cells (3.2V / 280 Ah) in each battery module
Number of cells per 1 container	4160
Total cells per 27 containers	112320

The BESS shall be segregated from PV plant and shall have its own separate transformer for connection at 220kV bus and a separate meter to measure the incoming and outgoing energy. To convert current from alternating to direct current and vice versa, BESS will be equipped with 54 hybrid inverters.

The areas between and around equipment will be finished with gravel and kept free of vegetation or other material that could act to spread a fire. The Project will have a dedicated Emergency Preparedness and Response Plan (including medical response procedure) in place.

The lifetime of the BESS is >6000 cycles, after this time BESS will either be decommissioned by Project Company or transferred to the offtaker. There are typically 15 battery clusters in one battery container as per Figure 23.

Figure 23: A: Battery cell (175×27×200mm), B: Battery Pack (contains 40 52 battery cells), C: Battery Cluster (contains 18 80 battery packs).

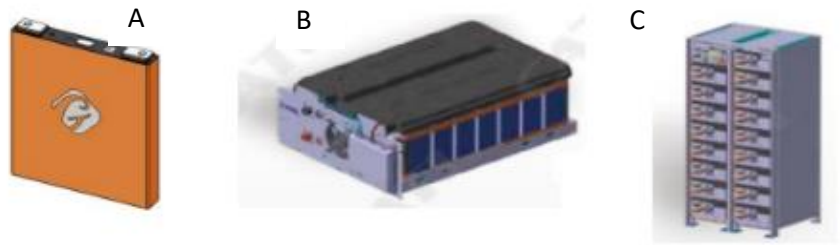
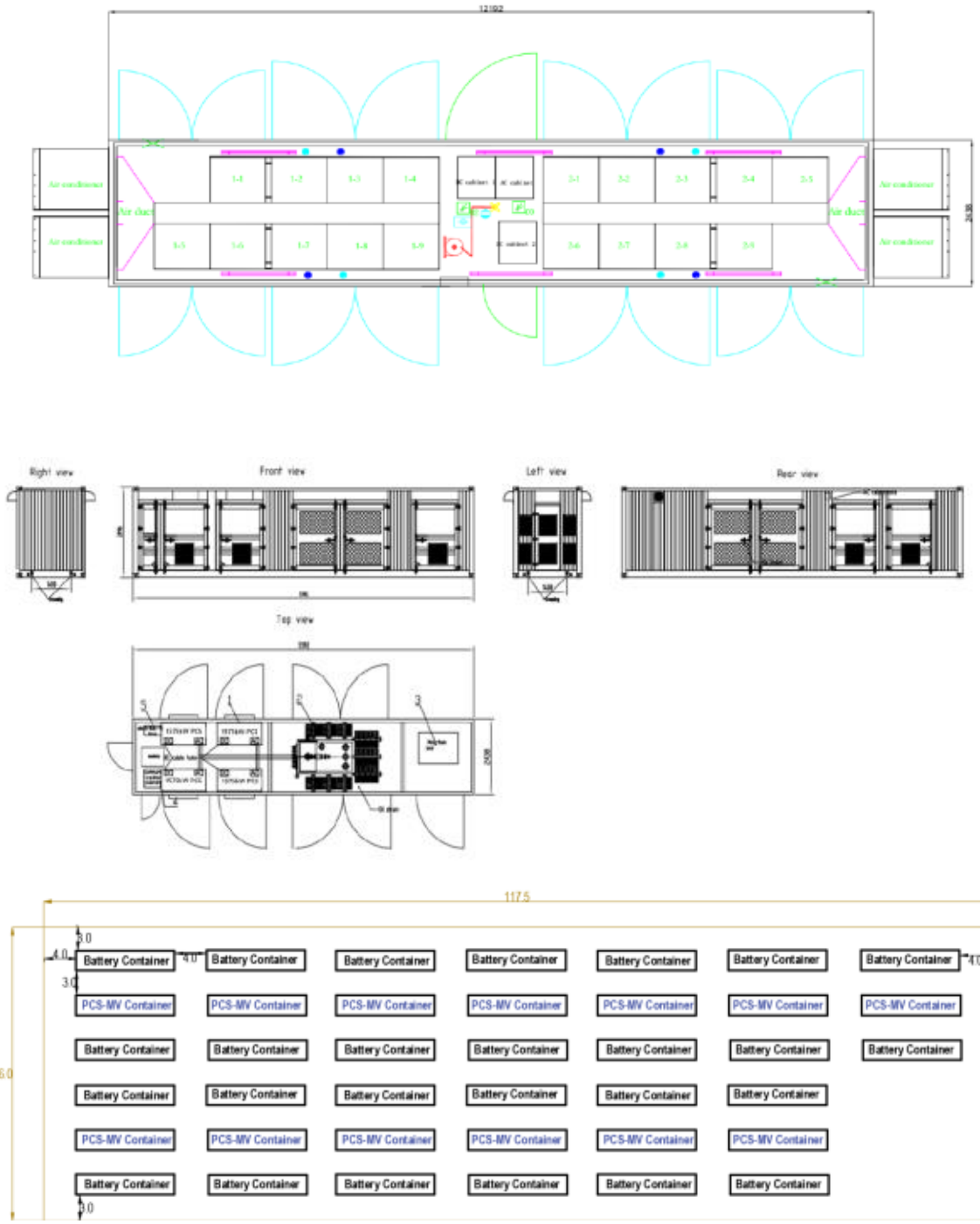


Figure 24: Typical BESS container layout and preliminary arrangements for BESS and transformer container

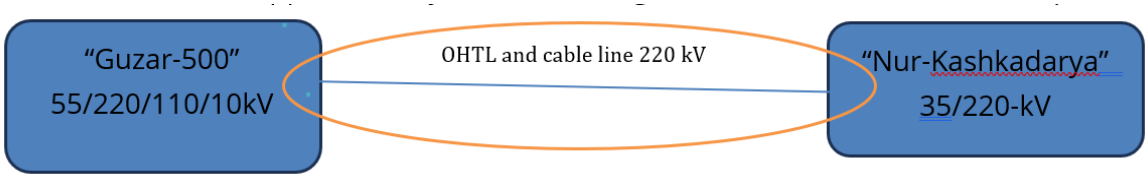


3.5.4 Substation and grid connection

The Project substation will connect to the existing "Guzar 500kV substation" via combined 220kV OHTL and underground cable a total of 1,578 m in length to the northwest side of the plant[7]: the grid

[7] The northwest connection point, although not the closest, has been identified as the the only area within the existing substation where the necessary connection point can be made. A full description of the alternatives considered will be provide din the ESIA.

connection starts as an OHTL (658 meters), then goes underground and continues as an underground cable (915 metres) (Figure 25).



The Project 35kV / 220kV air-insulated substation will transform the generation and BESS output voltage levels to 220 kV through two power transformers for the PV generation and another for BESS and the associated electrical devices. The air insulted switchyard shall have the following systems:

- 220 kV MV switchgear
- Substation control building
- Protection and con trol panels.
- AC/DC auxiliary power supply panels.
- DC battery banks (in a separate room) and chargers.
- Two MV/LV transformer for supplementary services.
- Telecom panels.
- Other rooms (offices, warehouse, toilets, etc.).
- Secure entrance and gate post building.
- Two firefighting tanks.
- Oil collector with treatment facilities for oiled effluents.

The end-user connection will comprise air Insulated Switchgear (2 bays) with underground cable termination that then connects to the existing 220KV switchgear via transfer busbar scheme. All end-user work will all be within the existing substation boundary in the northwest corner of the site in an available area of approximately 30 x 90 meters. In addition, some work is required to extend the existing 500/220kV control room. Relay equipment will be installed in the existing 110kV control room. The interconnection system will incorporate protection, control and communication equipment meeting national and international standards.

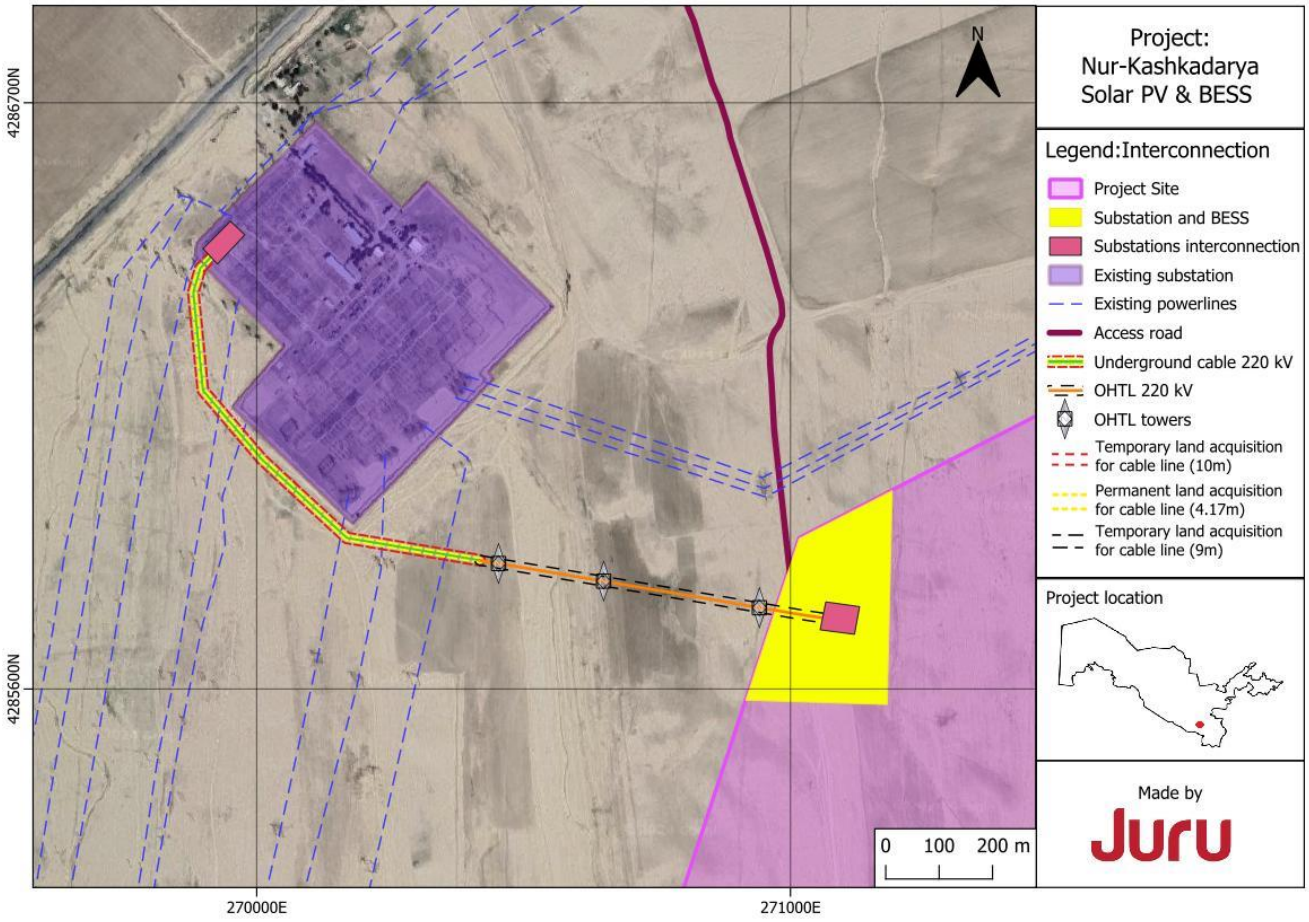
A new ROW (62.8 metres – 25m either side of the outer conductor plus 12.8m OHLT width) is required to be established for the OHTL and compensation and setback requirements as per national law will be required.89

A smaller protection area is required for an underground connection (10 metre either side of the cable during construction, with a 1 metre security zone for operation and maintenance (see also section 4.7.9) and 4.17 m permanent servitude/ROW.

[8] Livelihood impacts and compensation requirements will be outlined in the project Livelihood Restoration Plan (LRP).

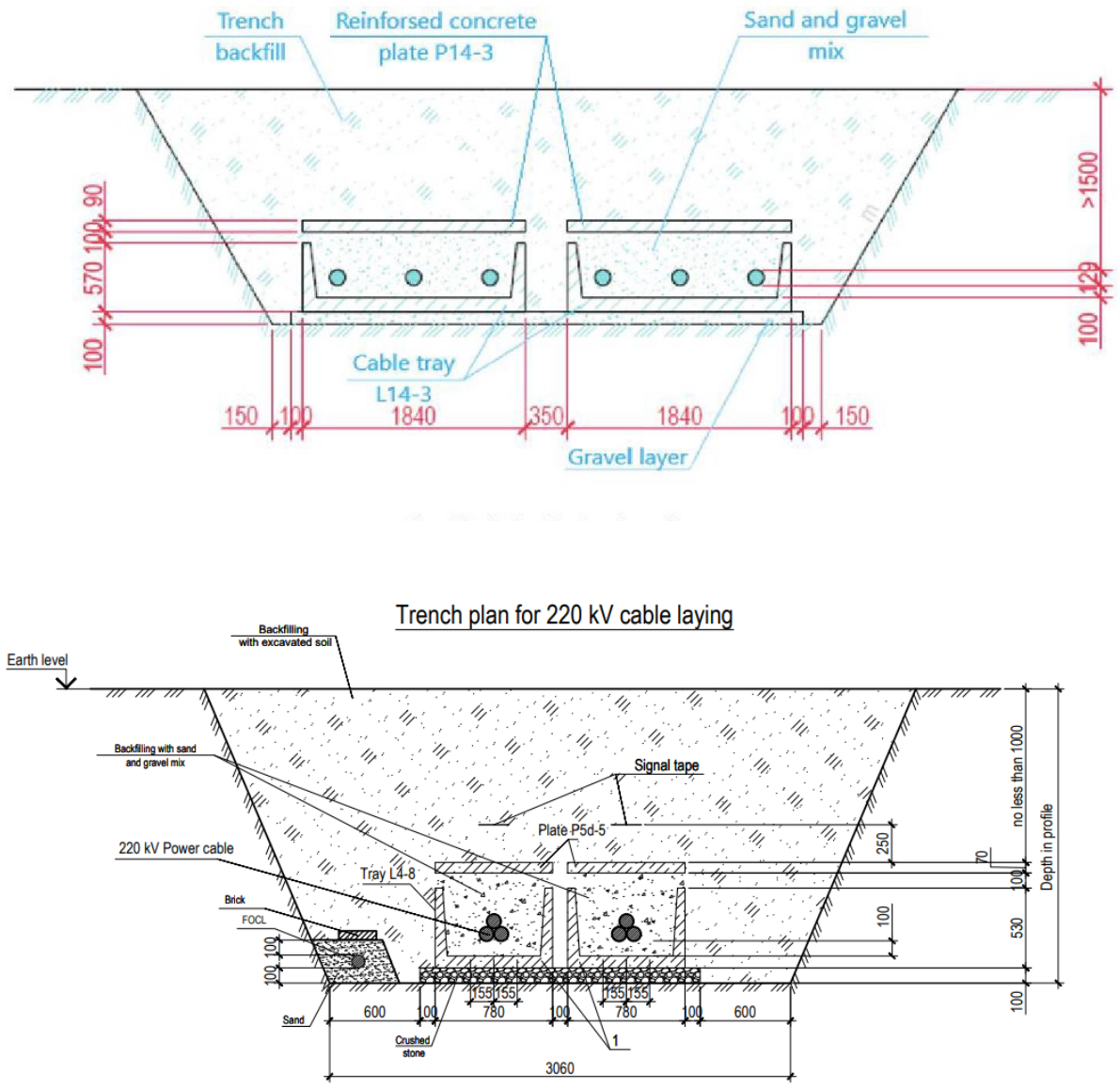
[9] Livelihood impacts and compensation requirements will be outlined in the project Livelihood Restoration Plan (LRP).

Figure 25: Grid connection



The underground cable design will be two parallel 220kV underground cable of 800mm^2 XLPE buried directly in ground in trenches with concrete reinformed on the cable trays as shown in Figure 26.

Figure 26: Underground cable trench



The OHTL is planned to have three towers. Since the OHTL will cross an underground gas pipeline, Uztransgaz issued technical specifications for the crossing. These specifications are summarised below and provided in full in the Technical Appendix (Volume III)

The technical conditions for the intersection of the 220kV overhead transmission line (OHTL) between the “Guzar” substation and a 300MW solar power plant with the existing "Guzar-Kamashi" main gas pipeline require specialized design and compliance with relevant regulations, including KMK 2.05.06-97, VSN 51-1-80, PUE, PTEMG, and other normative-technical documents in force in the Republic of Uzbekistan. The intersection design must adhere to Uzbekistan's technical norms, ensuring the safety of both infrastructures. A key requirement is the installation of a control and measuring point with

protective devices against induced currents at the intersection, referencing a unified design solution in line with technical regulations for gas pipelines.

It is expected that the towers can be sited well outside the pipeline safety set back. Nevertheless, construction work near the pipeline must follow specific safety protocols, such as manual excavation within 2 meters of the pipeline and restricting mechanized work and equipment placement outside buffer zones as per Table 4 of KMK 2.05.06-97. Movement of machinery over the pipeline is prohibited unless the area is properly equipped with a gravel embankment and concrete slabs, ensuring a minimum height of 1.4 meters between the pipeline and the road surface. All construction activities near the pipeline must be supervised by a representative of the Mubarek Department of Main Gas Pipelines, with prior notification required five days before work begins. One of the principal roles of this supervisor will be ensuring that buffer zones / safety setbacks are maintained. It is essential that distances/buffer areas are maintained throughout the works, and this is reflected in the ESMP and construction management plans.

The design documents for the intersection must be submitted for approval to “Uztransgaz” JSC and the Mubarek Department. The design organization holds responsibility for ensuring compliance with Uzbekistan's technical standards and the guidelines of “Uztransgaz” JSC. The design documentation will be submitted before the works commences.

3.5.5 Access road and internal roads

The Project site is located adjacent to the main road (M-39), between Shahrisabz and Guzar (Figure 27). The M-39 road is directly connected to Tashkent and the nearest logistics hubs are Karshi and Samarkand. The distance from the Project Site to Samarkand along the M-39 road is approximately 130km and to Karshi is approximately 50km. The town of Shahrisabaz is not considered as a logistics hub due to the fact that it is difficult for large vehicles to cross the Takhta Karacha Pass. The distance from the site to Shahrisabz by road is approximately 55km and about 10km to Guzar. In order to get to the Project site, a short access road from the main road (M-39) will be constructed (1,700m long and 10m wide).

Since the road will cross an underground gas pipeline, «Uztransgaz» provided a Technical Conditions for the crossing (refer to Technical Appendix).

The technical conditions for the intersection of the designed asphalt road for heavy-duty trucks with the existing "Guzar-Kamashi" gas pipeline (325 mm diameter) require compliance with national regulations and guidelines, including KMK 2.05.06-97, VSN 51-1-80 and other applicable regulatory documents (full list of documents provided in the text of Technical Conditions). The design must be carried out by a licensed organization, with the intersection performed at an angle of 90° where possible, or no less than 60°. Identification and traffic control signs must be installed at the intersection, along with electrochemical protection for the pipeline to prevent corrosion. Excavation within 2 meters of the gas pipeline must be conducted manually, and any mechanized work or equipment placement must be done under strict safety protocols, with a representative from Muborak Department of Main Gas Pipelines overseeing activities.

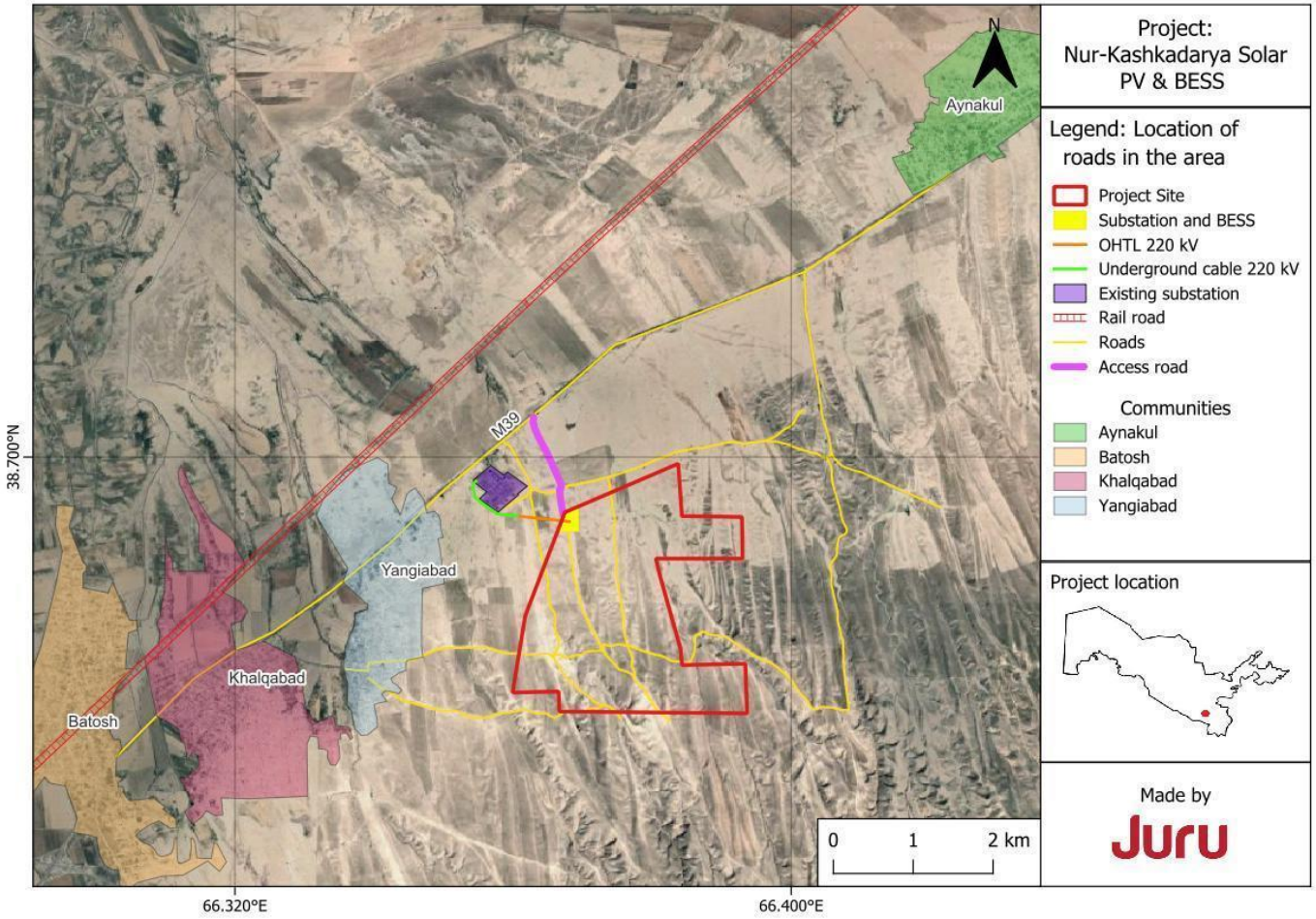
Additionally, measures must be developed and agreed upon with Muborak MGQB for the safe execution of works, including ensuring the stability of the soil near the gas pipeline. Equipment crossings over the pipeline must be properly organized, maintaining a minimum clearance of 1.4 meters. Payment for any vented natural gas during the connection of the new pipeline section must be considered in the project costs. Compliance with industrial safety standards and a positive conclusion from the industrial safety expertise is mandatory. The design organization is responsible for ensuring adherence to these regulations and must also provide author supervision during the reconstruction phase until the facility is accepted into operation. The final project documentation must be submitted to “Muborak MGQB” and “Uztransgaz” for approval.

The main road (M-39) is a double lane road between the two cities of Shahrisabz and Yakkabog, and a single lane between Yakkabog and Guzar. Viaducts and overhead lines/structures and some road damage (potholes, cut-outs, etc.) were observed on the road from Shahrisabz to the site, see Figure 28 for map of the road network around the Project Site.

Figure 27: Existing Road near the site

The proposed internal road layout uses north-south oriented internal (paved/unpaved) service roads (4 m wide) to access the different inverters and areas of the PV plant and a few east-west internal service roads. The total length of the internal road network is approximately 50 km.

Figure 28: Road network in the area



3.5.6 Seismic considerations

Uzbekistan has defined code for construction of infrastructure in different seismic zones (Seismic Code of Uzbekistan - refer to Technical Appendix III). The Project will comply with these technical requirements at all times and will employ an engineering design team to oversee this aspect.

3.5.7 Water supply and treatment

The Project will require water for construction works (e.g., for curing and foundations) and domestic use operations, as described in section 8.5. Potable water will likely be may be bottled and delivered to Site. Construction water (unpotable water) will be delivered on a regular basis supplied from the Guzar Municipality water plant.

Based on the projected water consumption volumes, the Project does not require long-term significant water storage or a dedicated water borehole. Water will be supplied form the Guzar municipal water treatment plan and delivered by tanker to the Site. The following key assumptions regarding water use are highlighted and will be verified as part of the ESIA:

- Cement will be delivered to site via truck or on-site using a temporary facility dedicated for the Project.
- During operation, dry cleaning will be used for module cleaning,
- Septic tanks will store 2,500 litres of sewage water and then will collect off-site for treatment during construction and operation.

3.5.8 Hazardous materials and waste

Any fuel, oil or other hazardous gases, liquids or solids that are stored on site will be contained in an appropriately secure location, with bunding and a Hazardous Material and Waste Management Plan (HMWMP) that ensures that materials are stored in accordance with the requirements asset out in the respective material safety data sheets (MSDS).

Regarding the waste management, all waste will be managed by licensed contractors and using licensed facilities for disposal and aligned with GIP. The EPC contractor is required as per Masdar's HMWMP to assess the disposal facilities. Disposal of solid waste will be at the closest sanitary landfill to the project site that aligns with GIP. The key and minimum criteria that define a sanitary landfill are identified in the HMWMP. If any of the requirements are not met, the disposal facility will not be used for the purpose of disposal of solid waste for the project and the next closest sanitary landfill will be identified.

The final approved disposal facilities for the project are as follows:

- Disposal of solid waste facility to be updated at least 1 month prior to commencement of construction
- Disposal of hazardous waste facility to be updated at least 1 month prior to commencement of construction

- Disposal of recyclable waste to be updated at least 1 month prior to commencement of construction

Furthermore, the EPC Contractor E&S Manager will be required to undertake an inspection on the final waste disposal facilities that the authorized contractors will utilize for disposal of waste streams. The inspection will aim to ensure that the disposal facilities are management and operated in line with Good International Industry Practice (GIIP).

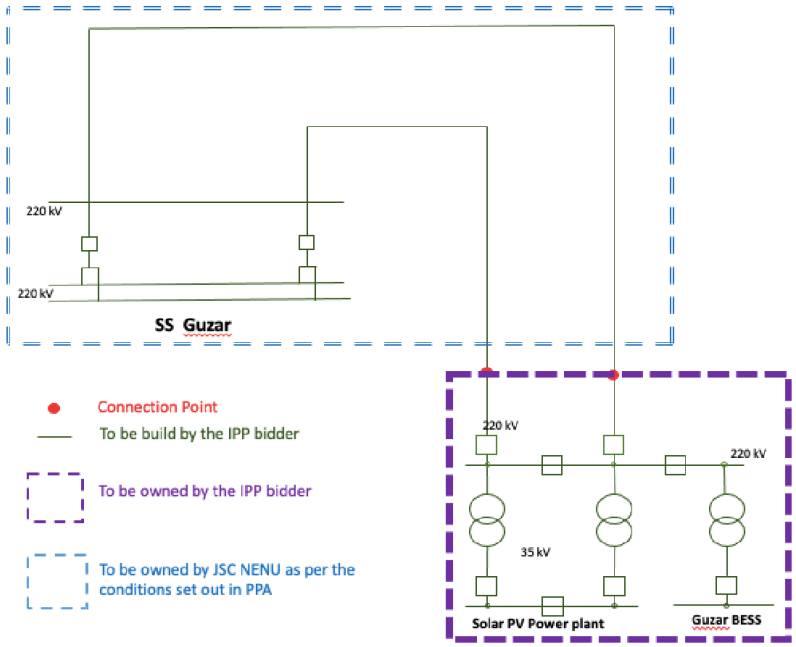
A waste manifest (or Chain of Custody Form) will be used as per which details the type/ amount of waste that is generated by EPC Contractor, transferred by the licensed waste collector from the site and disposed at final location. The EPC Contract will also require contractors to segregate their waste to support recycling opportunities and ensure correct disposal of general waste and hazardous waste. Electrical waste, specifically POV panels and batteries will be retuned to the supplier for recycling following principles of the Basel Convention.

3.5.9 Associated facilities

Under IFC PS1, associated facilities are defined as facilities that are not funded as part of the Project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable. The scope of project will include the design, supply, installation, testing and commissioning of all electrical equipment at the Project and the grid connection and as such are considered part of the Project scope.

No associated facilities are identified in connection with this Project. Ownership arrangements for the various components are summarised in Figure 29. No further consideration of associated facilities will be included in the ESIA.

Figure 29: Construction and ownership arrangements



3.5.10 Supporting infrastructure

Supporting infrastructure for the construction and operation phase includes:

- On-site buildings (operational control centre, office, and welfare facilities)
- diesel generator for emergency power supply
- guard house
- laydown area (temporary)
- new drainage system
- emergency response (fire suppression, hydrants, water storage tanks).

The PV Plant will have a storage drainage system that allows the evacuation of rainwater outside the PV Plant. The drainage system options are currently at the design stage and have not yet been finalized. No groundwater is observed at the Project site however, the area will be kept dry by designing the buildings to enable runoff away from structures and to ensure drainage for both subsurface and surface water to protect foundations.

3.5.11 Security system

The Project security system will have the following features:

- Security and Human Rights Management Plan
- Private security guards (unarmed) (number to align with the number of workers on site)
- Perimeter security system (including lighting)
- Access control system
- Closed-circuit television (CCTV) system (operation only)
- Monitored and alarms in the access doors to the MV Power Stations or any other building of the installation (operation only).

The system itself will be responsible for automatically managing the alarm signals, first checking if it is an unwanted alarm. At the point of intrusion, the system will send a warning signal to the security centre and the person responsible will verify the alarm notify as necessary third-party security forces, firefighters, etc. During construction, security guards will employ additional security measures using permanent surveillance. Lighting will also be provided along the boundary of the PV Site, and substation.

3.6 Project accommodation

Contractors and subcontractors will be allowed to rent offsite accommodation following a process of selection which will be described in the Labor and Working Conditions Management Plan and provided it meets the requirements of the "Worker's Accommodation Processes and Standards": Guidance Note by IFC and EBRD and adheres to the management and measures stipulated in this ESIA. Contractors may develop on-site temporary purpose-built accommodation, but this is not envisaged at this time, although it is considered in the ESIA. While accommodation outside the local villages is preferred, using accommodation in the local villages is not prohibited as along as it meets the requirements of the IFC/EBRD Guidance note on accommodation standards and the relevant consultation is performed with the social departments at the Guzar and Kamashi municipalities and community leaders in advance.

Offsite temporary accommodation (purpose built) is not planned at this time, but if required may be adopted. The EPC will conduct a detailed housing analysis prior to mobilisation and define in the Accommodation Management Plan the final strategy. Further considerations relating to accommodation and community health and safety are outlined in section 8.11 below.

3.7 Project workforce

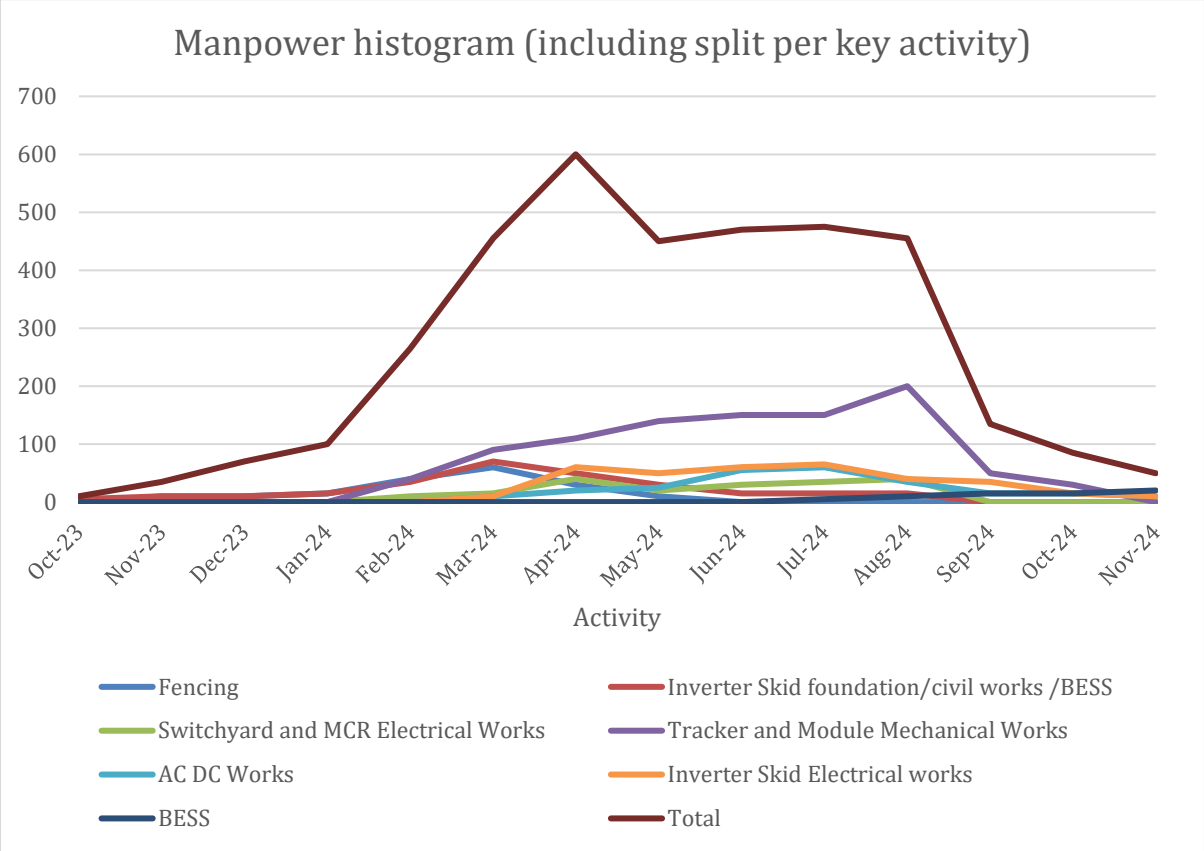
The construction phase will last 12 to 18 months. The following graph depicts the approximate number of workers (conservative) at each stage of the construction (civil work, electrical, mechanical installation and commissioning).

The works will be led by an engineering, procurement and construction (EPC) contractor who will have a number of contracts with suppliers and sub-contractors for the following activities:

- Transportation contractor
- Civil works /balance of plant contractor
- Electrical contractor (PV site) (low voltage)
- Electrical contractor (medium and high voltage)
- Service suppliers (accommodation, geotechnical surveys, road construction, security, catering)

Figure 30 depicts a typical manpower mobilisation for the construction of a solar project. for each activity of the construction (civil work, electrical, mechanical installation, and commissioning). The total workforce required during the peak construction period could reach approximately 600 workers (made up of skilled expatriate workers and semi-skilled and non-skilled local workers.

Figure 30: Typical manpower plan



3.8 Project development process

3.8.1 Overview

The Project development process follows the following stages:

Mobilisation (including detailed design, project implementation activities, local permit requirements, procurement and contracting);

- Site set up and clearance (approximately 2 months after LNTP);
- Construction (including mobilisation, site preparation, testing and commissioning);
- Operation; and
- Decommissioning.

The expected duration of each phase is as follows:

- Earthworks: 3 months
- Piling works: 2 months
- Concrete works: 2 months
- Installation works: 3 months
- Commissioning works: 2 months

An overview of the project activities for each phase is presented below.

- Mobilisation phase
  - Transportation of civil construction materials to site
  - Storing of materials
  - Recruitment of local workforce / services
  - Identification of local materials
- Site set up
  - Construction of temporary site facility, offices
  - Procurement
- Construction phase - civil works
  - Secure site
  - Construct internal access road
  - Earthworks
  - Piling works PV Site (The piling work will be ramming type without concrete),
  - Substation works (concrete quantity in step-up station will be around 5000~7000m3, the intention is to source the concrete from an offsite batching plant with capacity to provide approximately a 25~30m3/h.
  - Cabling excavations (220kV underground cable and internal low voltage cable trenches)
  - OHTL tower excavations (tower foundation)
  - Transportation of abnormal loads materials to site (e.g., transformers)
- Construction of operations building stores and maintenance yard
  - Enabling work
- Installation and Commissioning phase - mechanical and electrical works
- PV/BESS infrastructure installation
  - Excavation for placement of tracking system
  - Construction of SS
  - Installation of SS equipment
  - Installation of OHTL towers and cables
  - Commissioning
- Operation phase
  - Operation of PV / BESS project.
  - Day to day maintenance
  - Periodic / planned maintenance
  - Monitoring
- Decommissioning phase (construction)
  - Reinstatement of excavated areas
  - Removal of construction materials
  - Rehabilitation of temporary storage and accommodation areas

The type of equipment to be used during the construction works includes:

- PV Farm:
- Excavator: 30 sets
- Loader: 10 sets

- Bulldozer: 10 sets
- Grader: 10 sets
- Dump Truck: 80 sets
- Forklift: 10 sets
- Sprinkler Truck 20 sets
- Mobile Crane: 4 sets
- Step-Up Station:
- Concrete Mixer: 4 sets
- Concrete Boom Pump: 2sets
- Excavator: 6 sets
- Loader: 3 sets
- Sprinkler Truck 4 sets
- Mobile Crane: 4 sets

No temporary overhead line power source is envisaged to be set up at the site. All power will be from mobile generators.

3.8.2 Transportation of components

The PV and BESS system transportation from the factory will be a combination of sea and land freight. The available routing solutions are given hereunder:

- Direct Rail Route traditional route from China origins via Kazakhstan up to Tashkent hub or nearby logistics hubs of Karshi and Samarkand;
- Sea Rail Route via Turkey alternative route, by sea to Mersin port in Turkey and further by rail to destination; or
- Sea Rail Route via Baltic Sea alternative route, by deep sea to Baltic ports, and thereafter by rail to destination.

3.8.3 Operation and maintenance (O&M)

The PV and BESS Plant will be maintained and operated by skilled personnel, ensuring that the system is in optimal condition and that all parts are fully serviced and functional. Routine maintenance will likely be undertaken on the PV and BESS equipment twice a year. This typically consists of a major maintenance period and a minor maintenance period. The major maintenance is relatively non-intrusive and involves checking connections and inspections. This will encompass all PV and BESS equipment, including the fire system. Minor maintenance is typically a visual inspection and rectification of any accumulated noncritical defects.

During operation, all works on the Site will be controlled under safe work systems. This means all work is risk assessed to protect personnel and equipment. The PV Plant and BESS operation will be managed following the OESMP and an Health Safety Social Environmental Management System (HSSE-MS).

3.8.4 End-of-life disposal/decommissioning

With regards to the decommissioning of the PV and BESS components, the requirements will be determined during the ESIA for application during the procurement contract stage, these will set an obligation in respect of PV components/battery returned by the supplier for recycling.

4 Policy, Legislative and Institutional Framework

This section sets out the Uzbek and Lender framework applicable to the Project.

4.1 Relevant government ministries

Key organisations with responsibility for environmental management in Uzbekistan are:

- Cabinet of Ministers of the Republic of Uzbekistan (COM);
- Ministry of Natural Resources (MNR)10; and
- The Center for State Ecological Expertise, which is under the MNR.

The Cabinet of Ministers of the Republic of Uzbekistan governs the executive body in the Republic of Uzbekistan following the Constitution of the Republic of Uzbekistan (Article 98) and the Law of the Republic of Uzbekistan "On the Cabinet of Ministers of the Republic of Uzbekistan" (new edition of 2019). The COM exercises the following main functions:

- Implements measures on rational use and protection of natural resources.
- Coordinates the work of state bodies on joint conducting of natural protection events.
- Implements a large-scale ecological program of national and international importance; and
- Takes measures to eliminate the consequences of accidents and disasters as well as natural disasters.

The Ministry of Ecology, Environmental Protection and Climate Change (MEEPCC) is the main regulating body of state administration on environmental protection issues. The primary responsibilities of the MEEPCC include ensuring the implementation of a unified state policy on environmental safety, environmental protection, and the use and reproduction of natural resources; and enforcing state control over the compliance of ministries, state committees, departments, enterprises, institutions, and organisations, as well as individuals, with respect to the use and protection of land, mineral resources, water, forests, flora and fauna, and atmospheric resources. Structurally, the MEEPCC consists of the central unit (located in Tashkent), regional units (oblast) and local (district) units.

The Center for State Ecological Expertise: The Center for State Ecological Expertise's activities are directly related to the evaluation of materials for EIA and the issuance of documents determining compliance with environmental requirements for planned or executed business and other activities, as well as determining the admissibility of the implementation of the object of environmental expertise.

Due to the cross-cutting nature of sustainable development and the environment, virtually all other state bodies have some responsibility towards them. Other stakeholders that are relevant to the Project are listed below.

[10] Ministry of Natural Resources was organised on a basis of State Committee of Environmental Protection of Uzbekistan by the Presidential Decree of January 25 2023 No. UP-14 "On priority organizational measures for the effective establishment of the activities of the Republican Executive Authorities"

- Ministry of Energy of the Republic of Uzbekistan.
- Ministry for Emergency Situations of the Republic of Uzbekistan.
- Ministry of Health of the Republic of Uzbekistan.
- Ministry of Poverty Reduction and Employment.
- Ministry of Water Management of the Republic of Uzbekistan.
- Ministry of Agriculture of the Republic of Uzbekistan.
- Cadastre Agency under the Ministry of Economy and Finance of the Republic of Uzbekistan.
- Forestry Agency under the Ministry of Natural Resources of the Republic of Uzbekistan.
- Hydrometeorological Service Agency (Uzhydromet) under the Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan.
- Inspection of Mining, Geology and Industrial Safety Control (Kontekhnazorat) under the Ministry of Mining Industry and Geology of the Republic of Uzbekistan.
- Ministry of Internal Affairs of the Republic of Uzbekistan.

4.2 Constitution of Uzbekistan

The constitution of Uzbekistan has the following provisions relating to environmental aspects:

- Article 41: Everyone has the right to ownership.
- Article 49: Everyone has the right to a favorable environment, reliable information about its condition.

The state creates conditions for the implementation of public control in the field of urban development activities in order to ensure the environmental rights of citizens and prevent harmful impacts on the environment.

The state, in accordance with the principle of sustainable development, implements measures to improve, restore and protect the environment, maintain ecological balance. Article 61: Citizens are obliged to protect the historical, spiritual, cultural, scientific and natural heritage of the people of Uzbekistan.
The historical, spiritual, cultural, scientific and natural heritage is protected by the state.

Article 62: Citizens are obliged to treat the natural environment with care.

4.3 Law on Nature Protection, 1992 as Amended in 2021

This law is the key national environmental law for the protection of the environment and the sustainable use of resources and the right for the population to a clean healthy environment.

This law states legal, economic, and organizational basis for the conservation of the environment and the rational use of natural resources. Article 24 of this law states that the State Environmental Expertise (SEE) is a mandatory measure for environmental protection, preceded to decision making process. In addition, the law prohibits the implementation of any Project without approval from SEE.

It should be noted that Article 53 of this law confirms that if an international treaty concluded by the Republic of Uzbekistan establishes rules other than those provided for by the legislation of the

Republic of Uzbekistan on nature protection, the rules of the international treaty shall be applied, except in cases where the legislation of the Republic of Uzbekistan establishes stricter requirements.

4.4 Law on Environmental Control, 2013 as Amended in 2022

The main objectives of this law include:

- Prevention, detection and suppression of violation of legislative requirements relating to environmental protection and rational use of natural resources.
- Monitoring the state of the environment, identifying situations that can lead to environmental pollution, irrational use of natural resources, pose a threat to the life and health of citizens.
- Determination of compliance with environmental requirements of any ongoing economic development activities.

Ensuring compliance with the rights and legitimate interests of legal entities and individuals performing their duties in relation to environmental protection and sustainable use of natural resources.

The Article 7 of this law states that, the objects of environmental control are:

- Land, its subsoil, waters, flora and fauna, and atmospheric air;
- Natural and man-made sources of impact on the environment; and
- Activities, action or inaction that may lead to pollution of the environment and irrational use of natural resources, create a threat to the life and health of citizens.

4.5 National Environmental Impact Assessment (EIA)

According to the list of activities subject to state ecological expertise, which is established by the Resolution of Cabinet of Ministers No. 541 "On further improvement of the environmental impact assessment mechanism' (2020), power-generating facilities are categorized as follows depending on the level of impact on the environment[11]:

- Thermal, photovoltaic, wind power and other power-generating facilities with a capacity of 300 MW or higher – Category I (high risk);
- Thermal power plants and other power-generating facilities with a capacity of 100 MW to 300 MW – Category II (medium risk);
- Thermal, photovoltaic, wind power, and other power-generating facilities with less than 100 MW capacity – Category III (low risk).

This Project will be categorized as Category I.

The national EIA has been prepared by Juru in parallel to the Lender ESIA process following the process outlined below. Compliance with national requirements and a positive Environmental Approval are pre-requisites to compliance with Lender requirements. The main regulatory body for national EIA in

[11] Under the Resolution of Cabinet of Ministers of Uzbekistan, No 541, all economic activities are classified into one of four categories of environmental impact: Category I (high risk), Category II (medium risk), Category III (low risk) and Category IV (local impact).

Uzbekistan is the Ministry of Ecology, Environmental Protection and Climate Change (MEEPCC) of the Republic of Uzbekistan.

The MEEPCC performs its activities on the basis of the following legal acts:

- Presidential Decree of January 25 2023 No. UP-14 On priority organizational measures for the effective establishment of the activities of the Republican Executive Authorities;
- Presidential Decree of April 21, 2017 No. UP-5024 "On improving the system of public administration in the field of ecology and environmental protection";
- Resolution of the President of the Republic of Uzbekistan of April 21, 2017 No. PP-2915 “On measures to ensure the organization of the activities of the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection”;
- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated January 15, 2019 No. 29 “On Approving the Provision on the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection”;
- Resolution of the President of the Republic of Uzbekistan dated October 3, 2018 No. PP-3956 “On measures to ensure the organization of the activities of the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection”;
- Decree of the President of the Republic of Uzbekistan, dated 30.12.2021, №-76 "On measures for environmental protection and organization of activities of state bodies in the field of environmental control";
- Resolution of the Cabinet of Ministries of the Republic of Uzbekistan dated October 7, 2020. No.541 “On measures for the further improvement of environmental impact assessment”; and
- Other laws and by-laws related to nature protection.

The national EIA procedure is regulated by:

- Law of the Republic of Uzbekistan “On Ecological Expertise” (2000); and
- Regulations "On the State Environmental Expertise", approved by the Resolution of Cabinet of Ministers No. 541 “On further improvement of the environmental impact assessment mechanism’ (2020).

The Resolution specifies the legal requirements for EIA in Uzbekistan. According to the Resolution, the State Environmental Expertise (SEE) is a type of environmental examination carried out by specialized expert divisions to set up the compliance of the planned activities with the environmental requirements and determination of the permissibility of the environmental examination object implementation.

The state unitary enterprise "The Center of the State Environmental Examination" of the MEEPCC, carries out the state environmental examination of EIA of the objects of economic activity classified as categories I and II of environmental impact (high and medium risk).

The state unitary enterprise "The Center of the State Environmental Examination" of the Republic of Karakalpakstan, or the relevant regions performs the state environmental examination of EIA of the

objects of economic activity classified as categories III and IV of environmental impact (low risk and local impact).

For this Project the SEE will be performed by the Centre of State Environmental Examination.

National EIAs in Uzbekistan consist of three stages to obtain the Environmental Approval:

- Stage I - Preliminary EIA report – initial and mandatory stage;
- Stage II – Statement on Environmental impacts is a non-mandatory stage and can be skipped if local regulator is satisfied with assessment provided in Preliminary EIA report.
- Stage III – Statement on Environmental Consequences - is the final stage and output that should be prepared and submitted to the regulator after completing construction/reconstruction works and before the commissioning of the project.

Alignment of ESIA and National EIA report

Stage I Preliminary EIA report - The Preliminary EIA report must contain following information:

- the state of the environment prior to the implementation of the planned activities,
- the population of the territory, land development, analysis of environmental features;
- situational plan with an indication of the geographical coordinates of the object in question,
- available recreational areas, settlements, irrigation, land-improvement facilities, farmland,
- power lines, transport, water, gas pipelines and other information about the area;
- the envisaged (planned) main and auxiliary objects, used equipment, technologies,
- the use of natural resources, materials, raw materials, fuel, analysis of their impact on the environment (both during construction and operation phases);
- expected emissions, discharges, wastes, their negative impact on the environment and ways to minimize them (both during construction and operation phases);
- storage and disposal of waste (both during construction and operation phases);
- analysis of alternatives to the planned or ongoing activities and technological solutions from the standpoint of nature conservation, taking into account the achievements of science, technology and best practices;
- organizational, technical, technological solutions and measures that exclude negative environmental consequences and reduce the impact of the object of examination on the environment;
- analysis of emergency situations (with an assessment of the likelihood and scenario of preventing their negative consequences);
- forecast of environmental changes and environmental consequences as a result of the implementation of the object of examination;
- environmental measures to prevent the negative effects of the implementation of the object of examination; and
- results of public hearings.

It is necessary to highlight, that based on changes in local regulation, public hearings must be conducted in accordance with the procedure indicated in the law, represent all environmental impact assessments (to be justified by calculations) for construction and operation phases (if applicable).

Stage II Statement on Environmental impacts – during this phase additional information is provided in relation to key issues e.g., where specific modelling or impact assessment has been required. It is possible the outputs of the finalized EIA process could be communicated at Stage I which may negate the need for additional information to be provided (under Stage II) thus streamlining the approval process and the issue of permits for construction.

The Statement on Environmental impacts should include:

- supporting materials (extract from PPA agreement; Presidential decree);
- Situation plan signed by the ecologist from the local ecology department and developer;
- baseline conditions;
- assessment of environmental problems of the selected site based on the results of engineering and geological surveys, models and other necessary studies;
- environmental analysis of technology in relation to identified problems of the site;
- results of public hearings (MoMs);
- reasoned studies of environmental measures to prevent the negative effects of the implementation of the object of examination
- Hydrogeological report;
- Approvals and non-objections of the relevant authorities;
- Letter from Sanitary Epidemiological Wellbeing Department on the size of Sanitary Protection Zone;
- Environmental management plan;
- Environmental monitoring plan.

Stage III Statement on Environmental Consequences is the final stage of the SEE process and shall be carried out prior to the commissioning of the project. The report describes in detail the changes in the project made as a result of the analysis of the SEE during the first two stages of the EIA process, the comments received during public hearings, the environmental standards applicable to the project in relation to waste generation, water discharge, air emissions, and the environmental monitoring requirements related to the project, as well as the main conclusions.

A positive conclusion on the Stage I and Stage II of the National EIA was received on August 30, 2024. A further clarification process on some of the conditions is ongoing, however the key requirements addressed in the positive conclusion relate to:

- Adherence of the project to waste management regulation Decree RUz. No. 40 dated 01/28/2021 "On measures to further improve the procedure for carrying out work with construction waste.
- Vegetation restoration and tree planting.
- Manage risks from electrical systems through the use of automated systems.
- Confirmation of bird mitigation measures as outlined in this ESIA.
- Conduct hydrogeological studies pre-construciton.

- Submit a land management plan indicating specific measures for the reclamation of disturbed lands after construction work (annex to the BMP)
- Durgin Stage 3 provide further information on waste management approach and volumes generated.
- Before the commissioning of facilities, a Statement of the Environmental Consequences (SEC) should be developed, which is clarified environmental standards of maximum permissible emissions of pollutants substances into the atmosphere and standards for the waste generation and disposal. The SEC shall be submitted for State environmental expertise in accordance with the procedure established by law (Stage III).

Required permits and licenses are provided in a preliminary permit register in Technical Appendices, Volume III. A permit register will be maintained for the Project duration and reviewed and updated regularly.

4.6 Applicable E&S Legislation and Standards

4.6.1 Environment and Cultural

The following Laws are relevant to the Project:

- The Law of the Republic of Uzbekistan № 837-XII “On Water and Water Use” (1993) as amended in 2024;
- The Law of the Republic of Uzbekistan № 73-II “On Ecological Expertise” (2000) as amended in 2021;
- The Law of the Republic of Uzbekistan № 353-I “On Atmospheric Air Protection” (1996, amended on 21.04.2024);
- The Law of the Republic of Uzbekistan № 409 “On Protection and Use of Vegetation” (1997) as amended in 2016;
- The Law of the Republic of Uzbekistan № 408 "On Protection and Use of the Wildlife" (1997) as amended in 2023;
- The Law of the Republic of Uzbekistan № 710-II “On Protected Natural Reserves” (2004) as amended in 2022;
- The Law of the Republic of Uzbekistan № 362-II “On Wastes” (2002) as amended in 2023;
- The Law № 393 “On the sanitary and epidemiological well-being of the population” (2015) as amended in 2023;
- The Resolution of the Cabinet of Ministries of the Republic of Uzbekistan №541 “On further improvement of the environmental impact assessment mechanism’ (2020) as amended in 2023;

The Resolution of Cabinet of Ministries of the republic of Uzbekistan № 820 “On measures to further improve the economic mechanisms for ensuring nature” (2018) as amended in 2021;

- The Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No 14. “On approval of the regulation on the procedure for the development and agreement of projects with environmental standards” (2014) as amended in 2018;

- Resolution of Cabinet of Ministers of Republic of Uzbekistan No.95 “On approval of general technical regulations of environmental safety” (2020) as amended in 2022;
- Law No. ZRU-229 “On protection and use of the objects of archaeological heritage” (13 October 2009);
- Law No. 269-II “On the Protection and Use of Cultural Heritage Sites (30 August 2001, as amended);
- Presidential Decree No. R-5181 “On improving the protection and use of objects of tangible cultural and archaeological heritage” (16 January 2018);
- Presidential Decree no. PP-4068 “Regarding the strengthening of the protection, management and enhancement of tangible and intangible cultural heritage” (19 December 2018);
- SanPin № 0127-02 “Sanitary Procedures for inventory, classification, storage and disposal of industrial waste”
- SanPiN of the Republic of Uzbekistan dated 29/7/2002 No 0128-02 – “Hygienic classifier of toxic industrial wastes in the Republic of Uzbekistan
- SanPiN № 0157-04 “Sanitary requirements to the storage and neutralization of solid domestic waste on special grounds in Uzbekistan”.
- SanPiN of the Republic of Uzbekistan dated 16/11/2011 No 0300-11 “Sanitary Rules and Standards for managing collection, inventory, classification, treatment, storage and disposal of industrial waste in the context of Uzbekistan.
- Regulation “On the Procedure for the Disposal, Collection, Pay Settlement, Storage and Removal of Waste Industrial Oils” annexed to the Decree of the Cabinet of Ministers dated 04/09/2012 No.258.
- Regulation on the Procedure for Handling Coloured and Black Metal Scrap" annexed to the Decree of Cabinet of Ministers dated 06/06/2018 No. 425.
- SanPiN No. 0158-04 - Sanitarian Rules and Norms on collection, transportation and disposal of wastes containing asbestos in Uzbekistan.

4.7 Applicable National Environmental Standards

4.7.1 Environmental

Uzbekistan has a large set of specific standards that refer to emissions to air, including particular matter (PM) including fine particles like $PM_{2.5}$, nitrogen oxides/dioxide (NO_x and NO_2), carbon monoxide (CO), sulphur dioxide (SO^2) and hydrocarbons (HC), effluent discharge, and noise standards, as well as standard to handle and dispose specific wastes ranging from sewage to hazardous wastes. The following summarizes these laws and standards along with other international best practice standards. The ESIA will compare all standards and recommended ‘project standards’ are highlighted in bold below.

4.7.2 Air quality and emission to air

National Standards – Air quality in Uzbekistan is measured against Maximum Permissible Concentrations (MPC) and Maximum Permissible Emissions (MPE). Only MPC are applicable for this Project as there are no permanent direct source emissions. Although temporary generators used for

construction purposes emit a variety of pollution into the air including PM, $PM_{2.5}$, and NO_x ,these emissions are covered under the MPC standard.

Ambient Air Quality Standards, or MPCs, are established by SanPiN 0293-11 (May 16, 2011). According to the United Nations Environment Program (UNEP), Uzbek national ambient air quality standards align with World Health Organization (WHO) standards as adopted by the World Bank Group (WBG) in WBG Environment Health and Safety (EHS) guidelines – General (2007).[12] The MPCs relevant to the Project are shown in Table 9. The EU air quality guidelines are also presented in Table 8 for understanding alignment with EU requirements. For this ESIA, EBRD require the most stringent guidelines to be applied, considering compliance with national standards at all times.

Table 9: Project Air Quality Limit values (the most stringent project standard is highlighted in green)

Pollutant	Averaging Period	Objective	Uzbekistan MPC (µg/m³)	EU AQ Guidelines (µg/m³)	WHO Ambient Air Quality Guidelines (µg/m³)	Comment
$PM_{2.5}$	Daily		-	-	15	
$PM_{2.5}$	Annual	Limit value	-	25	5	
PM_{10}	30 minutes	Limit value	500		-	
PM_{10}	24 Hour	Limit value	300	50	45	Not to be exceeded more than 35 days per year
PM_{10}	Monthly	Limit value	100	-	-	
PM_{10}	Annual	Limit value	50	40	15	
NO2	30 minutes	Limit value	85	-	-	
NO2	Hourly	Limit value	-	200	200	Not to be exceeded more than 18 hours per year
NO2	Daily		60	-	25	
NO2	Monthly		50	-	-	
NO2	Annual	Limit value	40	40	10	

[12] https://wedocs.unep.org/bitstream/handle/20.500.11822/17141/Uzbekistan.pdf?sequence=1&isAllowedy

Pollutant	Averaging Period	Objective	Uzbekistan MPC (µg/m³)	EU AQ Guidelines (µg/m³)	WHO Ambient Air Quality Guidelines (µg/m³)	Comment
SO2	Hourly	Limit value	5025)0 (single)	350	-	Not to be exceeded more than 24 hours per year
NO	30 minutes	Limit value	60	-	-	-
NO	Daily	Limit value	250	-	40	-
NO	Monthly	Limit value	120	-	-	-
NO	Annually	Limit value	600	-	-	-
SO2	30 minutes		500	-	-	-
SO2	24 hours	Limit value	200	125	10 (Maximum daily 8 hour mean)	Not to be exceeded more than 3 days per year
SO2	Monthly	Limit value	100	-	-	-
SO2	Annually	Limit value	50	-	-	-
CO	30 minutes	Limit value	5000	-	-	-
CO	Maximum daily 8 hour mean	Limit value	4000	10	-	-
CO	Monthly	Limit value	3500	-	-	-
CO	Annually	Limit value	3000	-	-	-

4.7.3 Environmental noise

National noise standards are set out in "SanPIN No. 0331-16. Admissible noise level into the living area, both inside and outside the buildings" and is used to ensure the rules of acceptable noise levels for residential areas in Uzbekistan. These rules and regulations establish permissible noise parameters in residential, public buildings and residential buildings of populated areas created by external and internal sources, as well as general requirements for measurements, measurement methods and hygienic noise assessment at research sites. Evaluation of the sound level at the calculation point is performed for the day and night period of the day (from 07:00 to 23:00 hours and from 23:00 to 07:00

hours) and considers the maximum intensity of the sound source level during the half-hour period. Table 10 presents the permissible noise levels for the premises most relevant for the project. To meet WBG guideline requirements noise impacts should not exceed the levels presented in Table 10 or result in a maximum increase in background levels of 3 dB at the nearest receptor location off site. For this ESIA, the most stringent guidelines will be applied, considering compliance with national standards at all times. The recommended "Project standards" are highlighted in bold below.

Table 10: Noise limits from SanPiN No. 0331-16 and WBG Noise Level Guidelines (project standard in bold)

Purpose of premises or territories	Time SanPIN 0331-16 (WBG noise levels)	SanPiN No. 0267-09	WBG Noise Level Guideline
Territories adjacent to homes, clinics, dispensaries, rest homes, boarding houses, nursing homes, childcare facilities, schools and other educational institutions, libraries.	From 7 am to 11 pm (7 am to 10 pm)	55 dB(A)	55 dB(A)
	From 11 pm to 7 am (10 pm to 7am)	45 dB(A)	45 dB(A)
Industrial; commercial	From 7 am to 11 pm (7 am to 10 pm)	-	70
	From 11 pm to 7 am (10 pm to 7am)	-	70

The levels are almost identical to WBG noise level guidelines which are based on the standards of the World Health Organisation (WHO) with the exception of the periods where WBG standards are slightly more stringent, defining night-time noise as applicable at 22:00 instead of 23:00 under national standards.

4.7.4 Workplace noise

SanPiN No. 0325-16. Sanitary Standards for Permissible Noise Levels at the Workplace sets out requirements to protect the health of staff in the workplace in Uzbekistan. This standard provides acceptable noise levels for various types of work, the most relevant of which are listed in Table 11 **.** In addition, the WBG provides noise limits for various working environments, which are also illustrated in Table 11**.** These limits will be applied to the Project operation phase and apply mostly to workers in the Project substation and the BESS.

Table 11: Working environment Noise Limits (operation only)

Type of work, workplace	SanPiN No. 0325-16	General EHS Guidelines of WBG
Performance of all types of work at permanent workplaces in industrial premises and at enterprises operated since March 12, 1985	80 dB (A)	
Heavy industry		85 Equivalent Level La_{eq}, 8h
Light industry		50-65 Equivalent Level La_{eq}, 8h

* Laeq- equivalent average sound pressure level

4.7.5 Water quality

In Uzbekistan, water resource management, allocation and use falls under the Ministry of Agriculture and Water Resources (MAWR), which oversees national authorities, i.e., provisional and district departments of agriculture and water resources, and inter-provincial and inter-district canal management authority.

No temporary or permanent discharges (construction, operation) to surface water bodies are envisaged, and no work within or over the adjacent water bodies (ephemeral water channels) is proposed. However, the following regulations are relevant if this approach changes.

- Sanitary requirements for development and approval of maximum allowed discharges (MAD) of pollutants discharged into the water bodies with waste waters (SanPin No. 0202-06)

SanPiN No 0255-08, which provides the maximum permissible concentrations for hygienic assessment of the level of water bodies (Table 12).

In Uzbekistan, all water bodies are categorised into four categories and applied to the respective water quality standard. For this Project, the fishery water use standard for water quality is applicable as the most conservative standard.

Table 12: Criteria for pollutants in the water of surface water bodies by category of use

Name of parameters	Fishery water use	Cultural and domestic water use.	Domestic Drinking water	Irrigation water use
COD, mgO2/ dm^3	15	40	30	40
BOD, mgO2/ dm^3	3	3-6	3-7	10
pH	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
Total suspended solids mg/ dm^3	15	30	30	50

Name of parameters	Fishery water use	Cultural and domestic water use.	Domestic Drinking water	Irrigation water use
Mineralization mg/ dm^3	1000	1000	1000–1500	1000
Sulphates mg/ dm^3	100	500	400-500	
Chloride mg/dm^3	300	350	250-350	
Ammonium nitrogen (NH4+N)	0,5	2	0.5	1.5
Nitrite nitrogen (NO2-N)	0.02	0.5	3	0.5
Nitrate nitrogen (NO3-N)	9.1	25	45	25
Nitrites	0.08	3.3	3	
Nitrates	40	45	45	
Phosphates (PO4-)	0.3	1	3.5	1
Ether - soluble	0.05	0.8	0.8	0.8
Petroleum products	0.05	0.3	0.1	0.3
Surfactants	0.1	0.5	0.5	0.5
Phenol	0.001	0.001	0.001-0.1	0.001
Fluorine (F)	0.05	1.5	0.7	1
Arsenic (As)	0.05	0.05	0.05	0.1
Iron (Fe)	0.05	0.5	0.3-3	5
Chrome (Cr6-)	0.001	0.1	0.05	0.1
Copper (Cu)	0.001	1	1	1
Zinc (Zn)	0.01	1	3	5
Cyanides	0.05	0.1		

Name of parameters	Fishery water use	Cultural and domestic water use.	Domestic Drinking water	Irrigation water use
Lead (Pb)	0.03	0.1	0.03	0.2
Nickel (Ni)	0.01	0.1	0.1	
Cadmium (Cd)	0.005	0.01		
Cobalt (Co)	0.1	1		
Molybdenum (Mo)	0.0012	0.5	0.25	
Strontium (Sr2+)		2	7	
Selenium (Se)	0.001		0.01	
Rodanids	0.1			
Mercury (Hg)		0.005	0.0005	

4.7.6 Waste management

Waste management laws relevant to the Project are listed below and key requirements described in the following sections:

- Law of the Republic of Uzbekistan “On wastes” (2002) amended in 2023”; and
- SanPin № 0127-02 “Sanitary Procedures for inventory, classification, storage and disposal of industrial waste”

Law of the Republic of Uzbekistan “On wastes” (2002) amended in 2023.

The principal objective of this law is to prevent the negative impacts of solid wastes on human lives and health as well as the environment, reduce waste generation and encourage rational use of waste reduction techniques. Key provision relevant to the Project are:

- Article 19 Provided generated waste is subject to export and import operations, or hazardous waste is subject to transportation, an environmental certification procedure shall be completed by the Project to confirm compliance with sanitary and environmental norms and standards associated with waste management.
- Article 20 states that transportation of hazardous waste shall be in specially designated types of vehicles with a waste certificate and permit. The responsibility for safe transportation of hazardous waste shall be with the transporting organisation.
- Article 22 of the Law on Wastes specifies the general requirements for waste storage and disposal. Waste disposal of recyclable waste is prohibited in Uzbekistan. In addition, storage and disposal of waste in the environment including in nature conservation and protected

areas, settlements, health and recreational areas or historical and cultural facilities is prohibited.

SanPiN No 0127-02- "Sanitary Procedures for inventory, classification, storage and disposal of industrial waste"

This regulation and norm ensure optimal hygienic accounting and inventory of industrial wastes, determination of toxicity index and classification of industrial waste by hazard classes with optimal selection of ways to neutralise and utilise them.

SanPiN of the Republic of Uzbekistan dated 29/7/2002 No 0128-02 – "Hygienic classifier of toxic industrial wastes in the Republic of Uzbekistan. Hazardous waste is classified into four groups known as "hazard classes". Waste hazards are assessed based on this law. Hygienic classifier of industrial hazardous waste and SanPiN No 0127-02-Sanitary procedures for industrial waste inventory, classification, storage and disposal. Waste hazard classes include:

- Class I: Extremely hazardous waste;
- Class II: Highly hazardous waste;
- Class III: Moderately hazardous waste;
- Class IV: Low hazardous waste.

Other relevant regulations and standards are listed below and their requirements will be incorporated into the ESIA assessment:

- SanPiN № 0157-04 "Sanitary requirements to the storage and neutralization of solid domestic waste on special grounds in Uzbekistan";
- SanPiN of the Republic of Uzbekistan dated 16/11/2011 No 0300-11 "Sanitary Rules and Standards for managing collection, inventory, classification, treatment, storage and disposal of industrial waste in the context of Uzbekistan;
- Regulation "On the Procedure for the Disposal, Collection, Pay Settlement, Storage and Removal of Waste Industrial Oils" annexed to the Decree of the Cabinet of Ministers dated 04/09/2012 No.258;
- Regulation on the Procedure for Handling Coloured and Black Metal Scrap" annexed to the Decree of Cabinet of Ministers dated 06/06/2018 No. 425; and
- SanPiN No. 0158-04 - Sanitarian Rules and Norms on collection, transportation and disposal of wastes containing asbestos in Uzbekistan.

4.7.7 Land rights, acquisition and resettlement

The following land Laws are relevant to the Project:

- Civil Code of the Republic of Uzbekistan (1997) as amended on 8.11.2022.
- Land Code of the Republic of Uzbekistan (1998) as amended on 1.10.2022.
- Law of the Republic of Uzbekistan on State Land Cadastre No.666-I of 28.08.1998.
- Presidential Decree № UP-5495. Decree "On measures on cardinal improvement of investment climate in the republic of Uzbekistan".

- Appendix No. 2 to the Resolution of the Cabinet of Ministers № 146 (2011), regulation "On the Procedure for Compensation for Losses of Landowners, Users, Tenants and Owners, as well as Losses of Agricultural and Forestry Production".
- Resolution № 911 of the Cabinet of Ministers (2019) "On the Procedure for withdrawing land plots and compensation to owners of immovable property located on the land plot.
- Law No 781 "On procedures for the withdrawal of land plots for public needs with compensation" October 1st, 2022.13
- Law No. 781 specifies cases when the land plots can be acquired for public need, among which construction (reconstruction) of roads and railways of national and local significance is also specified. Law No. 781 also prescribes land acquisition procedures, procedures for communication with project-affected people (PAPs), compensation calculations, and demolition of affected assets. From October 1st, 2022, all projects requiring land acquisition for public needs should be managed following this Law.

4.7.8 Right of way and land acquisition process in Uzbekistan

Procedures to establish a right of way (ROW) in Uzbekistan are the same for legal entities and individuals. ROW or limited use of a land plot is determined in the Land Code of Uzbekistan, Civil Code (under the term servitude), and the Resolution of Cabinet of Ministries No.911 dated 16.11.2019. All grid interconnection works are expected to be undertaken within the existing ROW; however, for completeness, the requirements for establishing a ROW are presented below, and their applicability will be confirmed during the ESIA process.

Article 30 of the Land Code (LC) determines engineering, electrical power and other lines and constructions as a reason for receiving the right to servitude. Following Article 30 of the Land Code, Article 173 of the Civil Code (CC), and Article 30 of Annex 1 of the Resolution of Cabinet of Ministers No. 1060 dated December 29, 2018, servitude is established by agreement between persons demanding the establishment of servitude and the owner, user, lessee, proprietor of the land plot. If they do not achieve consent, the servitude shall be established by a court decision at the user's claim. The agreement on servitude shall be subject to state registration and preserved when the land plot is transferred to another person. Servitude agreements can be terminated in cases of the cessation of the reason according to which it was established.

Article 173 of CC also states that the burdening of a land parcel by servitude does not deprive the owner of the parcel of the rights of possession, use, and disposition of this parcel.

Calculation and compensation of losses due to servitude agreement are performed following Law No 781 "On procedures for the withdrawal of land plots for public needs with compensation" (if it is a project for public needs) the Resolutions of Cabinet of Ministers No.146 from 25 May 2011 "On measures to improve the procedure for granting land plots for urban development activities and other non-agricultural purposes" and No. 911 from 16 November 2019 "On additional measures for

13 Law 911 and Law 781 work alongside each other to address land withdrawal and compensation matters.

enhancing modalities of providing compensation on withdrawal and allocation of land plots and safeguard the property rights legal and physical entities".

Article 86 of the LC states that losses caused to the owners of land parcels, landowners, land users and lessees are liable to be fully refunded (including the lost profit) in the case of limitation of their rights in connection with land acquisition. Refunding of losses is carried out at the expense of the resources of the corresponding centralized funds for compensation of losses to individuals and legal entities in connection with the seizure of land plots from them for public needs and by enterprises, establishments and organizations the activity of which causes limitation of rights of land parcel owners, landowners, land users and lessees or worsening the quality of the neighbouring lands in the order established by legislation.

Article 173 of the CC states that the parcel owner burdened with the servitude has the right unless otherwise provided by a Law, to demand from the person in whose interests the servitude is established proportional payment for the use of the parcel.

4.7.9 National norms and standards for underground transmission cables

The grid interconnection works is expected to require a new 220kV underground cable. There is no right of way required to be established for the underground cable between the site and the existing substation, however a safety zone of one meter either side of the cable is required to be set up as described below.

Resolution of the Cabinet of ministers of the Republic of Uzbekistan No.1050 "On Approval of Rules for Protection of Electric Grid Facilities" (2018) establishes the following **security zone** for underground cables:

- along underground cable power lines - in the form of a part of the surface of a plot of land located underneath the subsoil plot (to a depth corresponding to the depth of laying cable power lines), limited by parallel vertical planes spaced on both sides of the OHTL from the outer cables at a distance of 1 meter, and when cable lines pass in cities under sidewalks - 0.6 meters towards buildings and structures and 1 meter towards the roadway.

4.7.10 National norms and standards for overhead transmission lines and substations

An essential standard for establishing OHTL is SanPiN No.0350-17 "For the Protection of Atmospheric Air in Populated Areas of the Republic of Uzbekistan" (2017). This standard defines health protection zones (HPZ) for OHTL.

The required size of the ROW for an OHTL and OHTL towers is determined under "Land Allocation Standards for Electrical networks with Voltage of 0.4 - 750 kV" (KMK 2.10.08-97).

According to these standards, the width of land for temporary allocation for OHTL can be determined as the distance between the wires of the outer phases (or phases farthest from the support shaft) plus two meters in each direction. For overhead power lines with a voltage of 500 and 750 kV, land is provided for the construction period in three separate strips 5 m wide for each phase.

For this project, a 25m either side of the outer conducted width set back is applicable to OHTL.

Other relevant national laws and regulations to OHTL projects include:

- Resolution of Cabinet of Ministers of Republic of Uzbekistan No.95 “On approval of general technical regulations of environmental safety” (2020).
- Decree of the Cabinet of Ministers of the Republic of Uzbekistan No.1050 “On approval of Rules for Protection of Power Grid Facilities, 2018”.
- SanPiN RUz No. 0236-07 “Sanitary norms and rules to ensure safety for people living near high voltage power transmission lines, 2007”.

Relevant national laws and regulations to Substations:

- “Land Allocation Standards for Electrical networks with Voltage of 0.4 - 750 kV” (KMK 2.10.08-97);
- Resolution of Cabinet of Ministers of Republic of Uzbekistan No.95 “On approval of general technical regulations of environmental safety” (2020);
- “Rules for the Installation of electrical installations”, approved by the Uzgosenergonadzor dated February 13, 2004, No. 84;
- SanPiN RUz No. 0119-01 “Sanitary norms of permissible levels of electric fields of industrial frequency (50 Hz)”.

4.7.11 Labour and employment

The labour policy in Uzbekistan is applied at the national government level and is reflected in the following relevant laws, regulations, and national social programmes.

- Labour Code of the Republic of Uzbekistan 1996 as amended on 30.04.2023.
- Law “On the employment of the population” No. 642 of 20.10.2020. (Amendments are currently being made)
- Resolution of the Ministry of Labour and Social Protection of the Population No. 88/1, and Ministry of Health of the Republic of Uzbekistan No. 1, registered on 21.01.2010, reg. number N 2071 “On approval of the Regulation on requirements for preventing the use of minors' labor”.
- Decree No. 133 of 11 March 1997 to approve normative acts necessary for the realization of the Labour Code of the Republic of Uzbekistan as amended on 29.07.2021.
- Decree of the Cabinet of the Ministers No. 1011 of 22 December 2017 "On Perfection of the Methodology of Definition of Number of People in Need of Job Placement, including the Methodology for Observing Households with Regard to Employment Issues, also for the Development of Balance of Labour Resources, Employment and Job Placement of Population" as amended on 09.07.2019.
- Decree of the Cabinet of the Ministers No. 965 of 5 December 2017 "On the Measures of Further Perfection of the Procedure of Establishment and Reservation of Minimum Number of Job Places for the Job Placement of Persons who are in Need of Social Protection and Face Difficulties in Searching Employment and Incapable of Competing in Labour Market with Equal Conditions” as amended on 29.09.2020.

- Decree No. 964 of 5 December 2017, "On the Measures for Perfection of the Activity of Self-Government Bodies Aimed at Ensuring Employment, Firstly for the Youth and Women".
- Resolution № 706 of the Cabinet of Ministers of the Republic of Uzbekistan of 25.10.2024, “On approval of the regulations on the procedure for providing outstaffing services”.

As a member of the International Labour Organization (ILO) since 1992, Uzbekistan has ratified 17 ILO conventions, including the eight fundamental conventions (in bold in Table 13 below).

Table 13: Labour Conventions Ratified by Uzbekistan

Convention	Date
Universal Declaration of Human Rights (1948)	1991
CCPR - International Covenant on Civil and Political Rights (1966)	28-Sep-95
Convention on the Elimination of All Forms of Intolerance and of Discrimination Based on Religion or Belief (1981)	30-Aug-97
EU Partnership and Cooperation Agreement (1996)	21-Jun -96
C029 - Forced Labour Convention, 1930 (No. 29)	**13-Jul-92**
P029 - Protocol of 2014 to the Forced Labour Convention, 1930	16-Sep-19
C087 - Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)	**12-Dec-16**
C098 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98)	**13-Jul-92**
C100 - Equal Remuneration Convention, 1951 (No. 100)	**13-Jul-92**
C105 - Abolition of Forced Labour Convention, 1957 (No. 105)	**15-Dec-97**
C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111)	**13-Jul-92**
C138 - Minimum Age Convention, 1973 (No. 138) Minimum age specified: 15 years	**06-Mar-09**
C182 - Worst Forms of Child Labour Convention, 1999 (No. 182)	**24-Jun-08**
C081 - Labour Inspection Convention, 1947 (No. 81)	19-Nov-19
C122 - Employment Policy Convention, 1964 (No. 122)	13-Jul-92
C129 - Labour Inspection (Agriculture) Convention, 1969 (No. 129)	19-Nov-19
C144 - Tripartite Consultation (International Labour Standards) Convention, 1976 (No. 144)	13-Aug-19
C047 - Forty-Hour Week Convention, 1935 (No. 47)	13-Jul-92

Convention	Date
C052 - Holidays with Pay Convention, 1936 (No. 52)	13-Jul-92
C103 - Maternity Protection Convention (Revised), 1952 (No. 103)	13-Jul-92
C135 - Workers' Representatives Convention, 1971 (No. 135)	15-Dec-97
C154 - Collective Bargaining Convention, 1981 (No. 154)	15-Dec-97
CEDAW - Convention on the Elimination of All Forms of Discrimination against Women	19-Jul-95
C187 - Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)	14-Sep-21

Measures have been enacted via a national action plan to implement these conventions into national law, including a legal and institutional framework to prevent forced labour. The legislation of the Republic of Uzbekistan (Constitution, Labour Code, Law on Employment) prohibited the use of child and forced labour. Article 7 of the Labour Code stipulates that forced labour, namely compulsion to perform work under the threat of some form of punishment (including as a means of labour discipline) is prohibited.

4.8 Lender requirements

The following Lender requirements will be considered to provide maximum flexibility to the Project financing. The Project will principally set out to comply with the requirements of ADB, EBRD and IFC.

4.8.1 International Finance Corporation (IFC)

The Project will principally set out to comply with the requirements of the IFC Performance Standards 2012 (IFC PSs), including:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts.
- Performance Standard 2: Labour and Working Conditions
- Performance Standard 3: Resource Efficiency and Pollution Prevention.
- Performance Standard 4: Community Health, Safety, and Security.
- Performance Standard 5: Land Acquisition and Involuntary Resettlement.
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.
- Performance Standard 7: Indigenous Peoples.
- Performance Standard 8: Cultural Heritage.

IFC PS1 establishes the importance of: (i) integrated assessment to identify the social and environmental impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters

that directly affect them; and (iii) management of social and environmental performance throughout the life of the project.

IFC PS2 through IFC PS8 establish requirements to avoid, reduce, mitigate or compensate for impacts on people and the environment and to improve conditions where appropriate. While all relevant social and environmental risks and potential impacts should be considered as part of the assessment, IFC PS2 through IFC PS8 describe potential social and environmental impacts that require particular attention in emerging economies and sensitive and critical natural and human environments. Where social or environmental impacts are anticipated, they are to be managed through an Health Safety Social Environmental Management System (HSSE-MS) consistent with the requirements of IFC PS1.

IFC PS3 refers to the World Bank Group (WBG) Environment, Health and Safety (EHS) Guidelines. These guidelines are the technical reference documents for environmental protection and set out specific examples of good international industry practice (GIIP). The General EHS Guidelines contain information on crosscutting issues applicable to projects in all industry sectors, including geothermal. They guide performance levels and measurements considered achievable at a reasonable cost by new or existing projects using existing technologies and practices. This Project is expected to comply with standards and guidelines identified in the General EHS Guidelines alongside host country requirements.

The Project is expected to be assigned a Category B under potential IFC Environmental and Social Policy i.e. "Business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures".

4.8.2 World Bank Group Guidelines

The EBRD PRs and IFC PSs refer to the World Bank Group (WBG) Environment, Health and Safety (EHS) Guidelines as general guidance for implementing GIIP. The EHS Guidelines applicable to the Project include the following:

- WBG General EHS Guidelines (April 2007) - cover the four areas of the environment; occupational health & safety (OHS); community health & safety (CHS); construction and decommissioning; and
- WBG EHS Guidelines Electric Power Transmission and Distribution (April 2007).

4.8.3 EBRD Policy

The ESIA will also consider the E&S requirements of the EBRD as set out in the following:

- The European Bank for Reconstruction and Development (EBRD) Environmental and Social Policy 2019 (ESP 2019);
- EBRD PRs:
    - PR1 – Assessment and Management of Environmental and Social Risks and Impacts;
    - PR2 – Labour and Working Conditions;
    - PR3 – Resource Efficiency and Pollution Prevention and Control;
    - PR4 – Health, Safety and Security;

- PR5 – Land Acquisition, Restrictions on Land Use and Involuntary Resettlement;
- PR6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- PR7 – Indigenous Peoples;
- PR8 – Cultural Heritage;
- PR10 – Information Disclosure and Stakeholder Engagement.

With reference to EBRD ESP 2019, Appendix 2, this project is proposed to be categorised as Category "B". A project is categorised B when its potential environmental and/or social impacts are typically site specific, and/or readily identified and addressed through effective mitigation measures. EBRD will determine the scope of environmental and social appraisal on a case-by-case basis. Category B projects do not require EBRD disclosure of key ESIA documents over and above the requirements of PR10.

4.8.4 Asian Development Bank

ADB SPS 2009 sets out three key safeguard policies as follows:

- Safeguard Requirements 1: Environment;
- Safeguard Requirements 2: Involuntary Resettlement (IR); and
- Safeguard Requirements 3: Indigenous Peoples (IP) (not expected to be triggered for this Project).

The requirements of these safeguards are aligned with the requirements of EBRD PRs and IFC PSs (as outlined above) relating to identification of impacts, the requirement to develop and implement plans to avoid, minimize, mitigate, or compensate for the potential adverse impacts; and to ensure affected people are informed and consulted during project preparation and implementation. SPS 2009 requires projects to reflect internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines (refer to section 4.7.2 above).

Broadly speaking, ADB SPS 2009 is aligned on the topics of climate change, gender and biodiversity, however key ADB policy documentation relevant to this Project includes:

- ADB Social Protection Strategy (2001);
- ADB Access to Information Policy (2018); and
- ADB Gender and Development Policy (1998).
- An Initial Environmental Examination (IEE)[14] including the supporting documentation listed below was prepared in September 2022 in accordance with ADB SPS 2009. Supporting documentation/assessments are listed below[15].

[14] Initial Environmental Examination Report for Utility-Scale Solar Photovoltaic and BESS PPP Project in Guzar District, Qashqadaryo Region of the Republic of Uzbekistan Project no.: 49407-005 Client: Ministry of Energy, Uzbekistan & ADB – Asian Development Bank, September 2022 (Draft 2), Uzbekistan: Solar Public-Private Partnership Investment Program (Tranche 2), Dornier Suntrace GmbH.

[15] For the purpose of this ESIA, these document have been superseded by the documents and assessment performed for this ESIA package.

- Project environmental management plan (EMP)
- Biodiversity Management and Evaluation Plan
- COVID health & safety risk mitigation measures
- Critical habitat assessment16
- Site Suitability report17
- Social Safeguard Due Diligence Report18

The preparation of the IEE was supported by consultations with the Project community in December 2021 and January 2022. The Project is categorised as category B project for Environment and IR and C for IP. The outputs from the IEE process will be verified and considered in the preparation of the ESIA.

4.8.5 Equator Principles IV (2020)

The Equator Principles (EPs) are voluntary standards signed up by various financing institutions to serve as a common baseline and risk assessment framework. EP4 includes ten principles covering:

- Review and categorisation
- E&S Assessment
- Applicable E&S Standards
- E&S Management and EP Action Plan
- Stakeholder Engagement
- Grievance Mechanism
- Independent Review
- Covenants
- Independent Monitoring and Reporting
- Reporting and Transparency

This Project is likely to be categorised as "Category B" under EP4. As such, it must apply the requirements of the applicable IFC PSs and WBG EHS Guidelines as defined above. The project must also implement effective SE, grievance management and an Health Safety Social Environmental Management System (HSSE-MS). EP4 also sets out specific requirements relating to Human Rights in line with the United Nations Guiding Principles on Business and Human Rights (UNGPs) by requiring a human rights due diligence (HRDD) and improving the availability of climate-related information, such as the Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) to

[16] Guzar Solar PV Critical Habitat Assessment for Utility-Scale Solar Photovoltaic PPP Project in Guzar District, Qashqadaryo Region of the Republic of Uzbekistan, MOE, ADB, September 2022, Suntrace GmbH.

[17] Guzar Solar PV Site Suitability Report (Pre-FS) for Utility-Scale Solar Photovoltaic PPP Project in Guzar District, Qashqadaryo Region of the Republic of Uzbekistan, MOE, ADB, October 2021, Suntrace GmbH.

[18] Social Safeguard Due Diligence Report for Utility-Scale Solar Photovoltaic PPP Project in Guzar District, Qashqadaryo Region of the Republic of Uzbekistan, MOE, ADB, July 2022, Suntrace GmbH

incorporate a Climate Change Risk Assessment (CCRA) for the assessment of potential transition and physical risks of Projects.

4.8.6 Good International Industry Practice (GIIP)

The Project will also follow GIIP. Including, but not limited to:

- Voluntary Principles on Security and Human Rights (est. 2000); (http://www.voluntaryprinciples.org/);
- United Nations Guiding Principles for "Protect, Respect and Remedy" Human Rights Framework (2011); (https://www.business-humanrights.org/en/un-secretary-generals-special-representative-on-business-human-rights/un-protect-respect-and-remedy-framework-and-guiding-principles);
- United Nations Code of Conduct for Law Enforcement Officials; and (https://www.un.org/ruleoflaw/blog/document/code-of-conduct-for-law-enforcement-officials/);
- Addressing Gender-Based Violence and Harassment: Emerging Good Practice for the Private Sector (https://www.ebrd.com/gbvh-good-practice.pdf)
- United Nations Basic Principles on the Use of Force and Firearms by Law;
- Use of Security Forces: Assessing and Managing Risks and Impacts (February 2017);
- Worker's Accommodation: Processes and Standards (Guidance Note by IFC and EBRD, 2009), and
- Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets, 2007.
- World Bank (2016a). Managing the Risks of Adverse Impacts on Communities from Temporary Project Induced Labor Influx. The World Bank, Washington, D.C.

4.8.7 International conventions and agreements

Fundamental conventions and agreements (in addition to the ILO conventions mentioned in Table 13 signed and ratified by Uzbekistan that are relevant to the Project are provided in Table 14.

Table 14: Conventions relevant to the Project that Uzbekistan has ratified

Convention name
ENVIRONMENT / CLIMATE CHANGE
United Nations Framework Convention on Climate Change (UNFCC) (New York, 1992) (Official Gazette of RM no. 61/97) including Paris Agreement (joined April 2017)
United Nations Convention on Biological Diversity (Official Gazette of RM no. 54/97)
United Nations Convention to Combat Desertification (UNCCD) (26/12/2006)
Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (05/26/1993)
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (12/22/1995)
The Convention on the Protection and Use of Transboundary Watercourses and International Lakes
Convention Concerning the Protection of the World's Cultural and Natural Heritage (ratified 1993)
Convention for the Safeguarding of the Intangible Cultural Heritage. Paris (ratified 2008)
Convention on International Trade in Endangered Species of Wild Fauna and Flora (07/01/1997)
Convention on the Conservation of the Migratory Species of Wild Animals (Bonn Convention) (05/01/1998)
Convention on Wetlands of International Importance, especially the Waterfowl Habitats of Aquatic Birds (Ramsar Convention) (1975) (ratified 2001)
Vienna Convention for the Protection of the Ozone Layer (1985).
Montreal Protocol to Protect the Ozone Layer (including 1990 and 1999 amendments)
Convention on Environmental Impact Assessment in a Transboundary Context (Espoo, 1991) - the 'Espoo (EIA) Convention'
Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (Aarhus Convention) (Official Gazette of RM no. 40/99

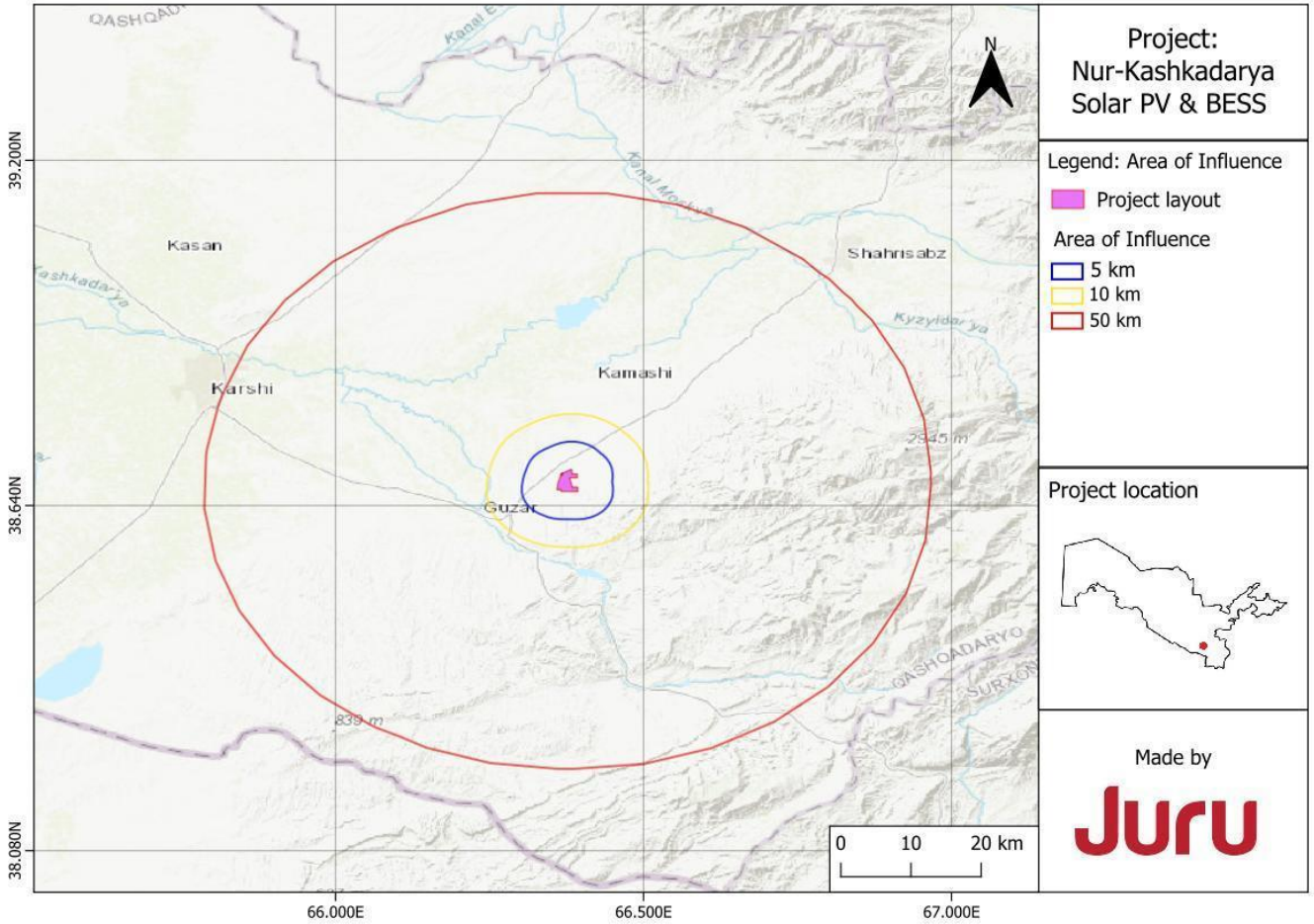
5 Baseline Conditions

5.1 Area of influence

The direct AOI is defined by where Project impacts may be felt or observed, e.g., the zone of visual impact or the distance from the working area where noise or air quality impacts may be identified. The indirect AOI area is defined as where secondary or induced benefits or impacts may be realized, including employment impacts or impacts from an influx of workers. The ESIA will define the direct

and indirect AOI for each respective topic under consideration. Figure 31 below shows indicative AOI at 5km, 10km and 50km (for information only).

Figure 31: Project area and general AOI



5.2 Baseline data collection – summary of activities

Baseline data collection to inform the ESIA has been obtained from primary and secondary source information. The Scoping site visit was performed on 11 and 12 September 2023 by the following specialists from Juru:

- Viktoria Filatova (Senior environmental consultant)
- Anna Ten (Senior biodiversity expert)
- Oleg Khegay (Environmental consultant)
- Asad Nabiev (Social/resettlement consultant)

The Scoping report is provided in Volume III, Technical Appendix. The ESIA baseline data review and field studies were conducted in early 2024 as described below and in the baseline reports provided in Volume III, Technical Appendix.

- Desk-based review of laws, policies, reports from the relevant governmental and non-governmental institutions and existing national and international publicly available information data from websites.
- Review of the ADB Initial Environmental Examination Report – Uzbekistan: Solar Public-Private Partnership Investment Program (Tranche 2) prepared by Dornier Group from September 2022
- Review of the ADB Social Safeguard Due Diligence Report for Utility-Scale Solar Photovoltaic PPP Project in Guzar District, Qashqadaryo Region of the Republic of Uzbekistan prepared by Dornier Group from July 2022
- Review of the ADB Site Suitability Report (Pre-FS) for Utility-Scale Solar Photovoltaic PPP Project in Guzar District, Qashqadaryo Region of the Republic of Uzbekistan prepared by Suntrace from October 2021
- Review of the Critical habitat assessment Report for Utility-Scale Solar Photovoltaic PPP Project in Guzar District, Qashqadaryo Region of the Republic of Uzbekistan prepared by Suntrace from January 2022
- IBAT PS6 & ESS6 Report. Generated under licence 1781-26131 from the Integrated Biodiversity Assessment Tool on 17 January 2022 (GMT). www.ibat-alliance.org
- Scoping /ESIA site visit to identify physical, biological and socio-economic features on the Project site and 10 km AoI, in particular, to identify any: wells, boreholes on the Project infrastructure utilities such as network cables, OHTLs, gas pipelines, water pipelines etc waste municipal landfills, disposals in the vicinity of the Project site. reivew of existing concrete batching plant in the areaexisting OHTLs crossing the Project site soil contamination and air emissions sources (anthropogenic) cases.
- Ground truth baseline locations for air, noise, soil and water baseline monitoring locations.
- Understand the existing road quality
- Check location of the structures on site indicated in the previous studies
- Perform terrestrial scoping ecology walk-over in the area of the project site and underground cable
- Perform consultations with local stakeholders and scoping meetings with local khokimiyats

- Distribute Project leaflet with GRM information
- Baseline surveys and ESIA data collection
    - Noise baseline surveys - 21 October 2023 to 26 October 2023 - 5 locations determined as nearest sensitive receptors (NSRs).
    - Air quality (CO, SO2, NO, NO2, and PM2.5, PM10) - 21 October 2023 to 26 October 2023 - 5 locations determined as NSRs
    - Water quality – 25 October 2023 to 26 October 2023 - one location (man-made water source at the north of the Project site)
    - Soil quality - 21 October 2023 to 26 October 2023 - 5 locations representative of the Project site.
- Biodiversity desk top review and fields studies as follows:
    - Flora and Habitats - October 12, 2023, March 16, 2024, and April 06, 2024.
    - Birds – Autumn 2023 and Spring 2024 (two vantage points and visual/acoustic bird point count surveys at four locations).
    - Herpetofauna (amphibians and reptiles) – 5 and 6 April 2024 and October 2024
    - Mammals - 12 October 2023.
- Archaeological Field Studies by National Center for Archaeology of the Academy of Sciences of the Republic of Uzbekistan
    - Screening field work – March 2024
    - Archaeological Investigation (as follow up to the screening outcomes) – May/ June 2024

5.3 Physical Overview

5.3.1 Climate

Uzbekistan has an arid and continental climate characterised by large variations in temperature within days and between seasons. Large parts of the country (79% by area) feature flat topography either in the form of semi-desert steppes or desert zones, including desert areas in the far west that have formed due to the drying of the Aral Sea.

The majority of the territory of Uzbekistan is attributed to a moderate climate zone. According to the criteria of the UNESCO world map of desertification and the UN convention to combat desertification, the country has an aridity index from 0.03 to 0.20 which categorises it as an arid region, subject to intensive desertification and droughts. The southern part of the country is located in the arid subtropical climate zone. In the west, the climate is sharply continental with dry, hot summers and relatively cold snowless winters and a moisture deficit, with a significant excess of evaporation over precipitation. The remaining south-eastern areas have a continental climate, including the area covering the largest cities of Tashkent and Samarkand, and contain high mountains forming part of the Tien-Shan and Gissar-Alai Ranges[19].

The Kashkadarya region is located in the basin of the Kashkadarya River on the western slope of the Pamir-Alai Mountains. In the mountainous east, the climate is moderately humid, while in the plains the

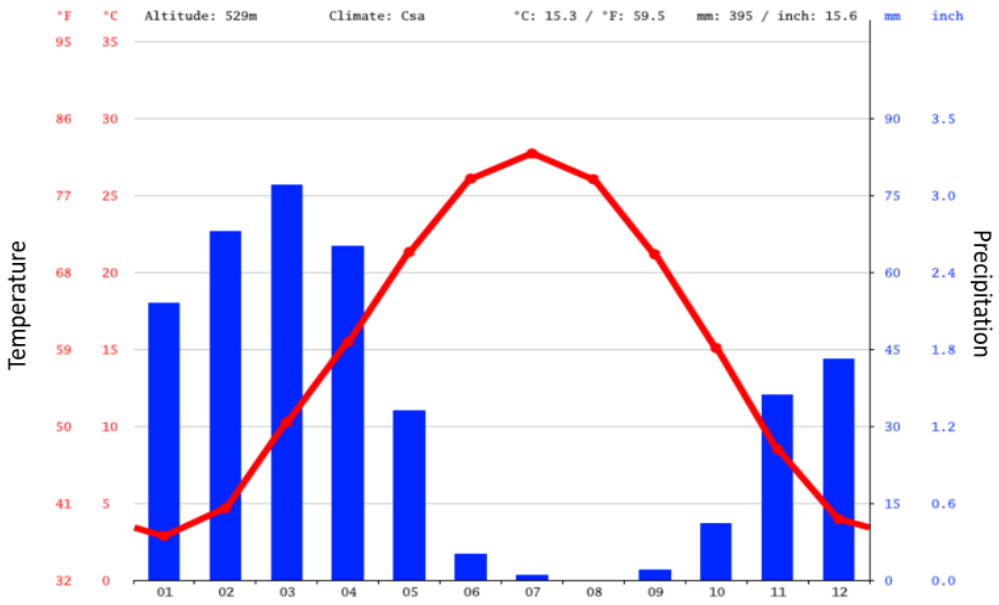
[19]https://climateknowledgeportal.worldbank.org/sites/default/files/2021-09/15838-Uzbekistan%20Country%20Profile-WEB.pdf

weather is colder in winter and hotter and drier in summer. The project area in Guzar district exhibits a hot desert climate (Köppen classification BWh). High temperatures, scarce rainfall, abundant sunshine, and low humidity characterize the arid conditions (see Figure 32 and Figure 33).

Figure 32: Average monthly statistics of air temperature and precipitation

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	2.9 °C (37.2) °F	4.7 °C (40.4) °F	10.3 °C (50.5) °F	15.5 °C (59.9) °F	21.3 °C (70.4) °F	26.1 °C (78.9) °F	27.7 °C (81.9) °F	26 °C (78.9) °F	21.2 °C (70.1) °F	15.1 °C (59.1) °F	8.5 °C (47.3) °F	4 °C (39.1) °F
Min. Temperature °C (°F)	-1.9 °C (28.5) °F	-0.9 °C (30.4) °F	4.1 °C (39.4) °F	8.5 °C (47.4) °F	13.4 °C (56.1) °F	17.3 °C (63.1) °F	19.2 °C (66.5) °F	17.8 °C (64) °F	13.4 °C (56) °F	8.3 °C (46.9) °F	3.1 °C (37.6) °F	-0.8 °C (30.5) °F
Max. Temperature °C (°F)	8.4 °C (47) °F	10.4 °C (50.6) °F	16 °C (60.9) °F	21.5 °C (70.7) °F	27.8 °C (82) °F	32.9 °C (91.3) °F	34.5 °C (94.1) °F	33.1 °C (91.5) °F	28.5 °C (83.3) °F	22.1 °C (71.8) °F	14.6 °C (58.3) °F	9.8 °C (49.6) °F
Precipitation / Rainfall mm (in)	54 (2)	68 (2)	77 (3)	65 (2)	33 (1)	5 (0)	1 (0)	0 (0)	2 (0)	11 (0)	36 (1)	43 (1)
Humidity(%)	63%	62%	60%	58%	46%	33%	34%	38%	42%	48%	59%	62%
Rainy days (d)	7	8	8	6	4	1	0	0	0	2	5	5
avg. Sun hours (hours)	6.9	7.5	8.6	10.4	12.4	13.3	13.1	12.3	11.2	9.7	7.8	7.1

Figure 33: Average monthly precipitation and temperature variability at the project Site



Precipitation in the Guzar district displays a marked seasonal variation, with the driest conditions occurring in August. During this month, rainfall levels plunge to an extreme low of 0 mm, indicative of an exceptionally arid climate. Conversely, the wettest period transpires in March, when precipitation averages 77 mm, accounting for the majority of the annual rainfall.

5.3.2 Climate projections

Uzbekistan is exposed to a range of weather-related extreme events, including dust storms, mudflows, floods, drought, and avalanches and is significantly threatened by climate change, with serious risks already in evidence.[20] Historical trends indicate an increasing average temperature of 0.13°C per decade between 1901 and 2013, rising more steeply (0.51 °C per decade since 1983) with a temperature increase greatest at low altitudes and more prevalent during the winter months. The average number of days with a maximum of 40°C in the central part of the Kyzylkum desert has increased from 10 days in the 1950s to more than 20 days in 2016[21] [22]. Uzbekistan climate projections, based on the Projections of the World Bank Climate Change Knowledge Portal, are as follows[23]:

- Increase in annual mean temperature of 1.3 to 2.1°C by 2030, 1.8 to 3.3°C by 2050, and 2.0 to 5.4°C by 2085.

[20] World Bank's Overview of Climate Change Activities in Uzbekistan (October 2013) https://openknowledge.worldbank.org/bitstream/handle/10986/17550/855660WP0Uzbek0Box382161B00PUBLIC0.pdf?sequence=1andisAllowed=y

[21] Climate Service Center Germany. 2016. Climate-Fact-Sheet: Uzbekistan.

[22] http://www.un-gsp.org/sites/default/files/documents/tnc_of_uzbekistan_under_unfccc_english_n.pdf The 3rd National communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change. Tashkent 2016.

[23] https://www.climatelinks.org/resources/climate-risk-profile-uzbekistan Uzbekistan Climate risk profile, (17/02/2022)

- Increase in annual maximum temperature of 2.1 to 6.3°C and increase in minimum temperature of 2.2 to 5.6°C by 2085.
- There will be an increase in long-lasting heat waves from three to nine days by 2030, between four and 17 days by 2050, and between six and 43 days by 2085.
- Anticipated change in total annual precipitation ranges from a decrease of three per cent to an increase of 12 % by 2030 and a decrease of 6 % to an increase of 18 % by 2085, with most projections showing an increase.
- Likely increased precipitation between November and April, with precipitation in other months remaining stable or decreasing slightly.
- Dry spells are expected to grow longer by up to four days by 2085.
- An overall increase in arid conditions due to changing precipitation patterns and increased temperatures.
- Increase in the intensity of heavy rain events by 3 to 11 % and frequency by 7 to 36 % by 2030, and in intensity by 7 to 23 % and frequency by 12 to 74 % by 2085. 24,25
- The number of hot days in Uzbekistan to increase by 28.6 days by 2040-2059, under an Representative Concentration Pathways (RCP)26 8.5 scenario.
- The number of tropical nights (minimum temperature above 20°C) is projected to increase over 31 days by 2040-2059, under an RCP 8.5 scenario27.

5.3.3 Air quality

Soil conditions of the territory are Xerosols soils (according to the FAO classification). These soils are particularly susceptible to wind erosion and making the site prone to dust generation. No anthropogenic sources (e.g., stacks or campfires) of air pollution within 500 m of the Project site except fugitive gas emissions arising from vehicle emissions on the adjacent road (to the north-west) were identified.

Air quality (AQ) measurements was recorded at five locations over 15-minute intervals. The measurements for carbon monoxide (CO), sulphur dioxide (SO2), nitrogen oxide (NO), nitrogen dioxide (NO2), particular matter (PM2.5, PM10) was carried out from 21 October 2023 to 26 October 2023 at the 5 nearest receptors, as described in Table 15 and illustrated in Figure 34. A full description of the survey is provided in Volume III: ESIA Technical Appendix. The results are summarised in Table 16.

Table 15: Location of NSRs

Location	Description	Coordinates Latitude	Coordinates Longitude
NA 1	At residential building	38.684781°	66.349324°

[24] Climate Service Center Germany. 2016 (https://www.climate-service-center.de/products_and_publications/fact_sheets/climate_fact_sheets/index.php.en)
[25] Tashkent. 2016. Third National Communication of the Republic of Uzbekistan Under the UN Framework Convention on Climate Change.
[26] Representative Concentration Pathways (RCP) are climate change scenarios to project future greenhouse gas concentrations.
[27] RCP 8.5 is a high emission scenario also referred to as “business as usual”.

NA 2	SS Guzar 500 kV station (approx. 160m to a site)	38.699655°	66.356572°
NA 3	Residential building	38.671622°	66.346525°
NA 4	Residential building	38.707488°	66.401703°
NA 5	Residential building near main road M39	38.684302°	66.337829°

Figure 34: Noise and air monitoring location

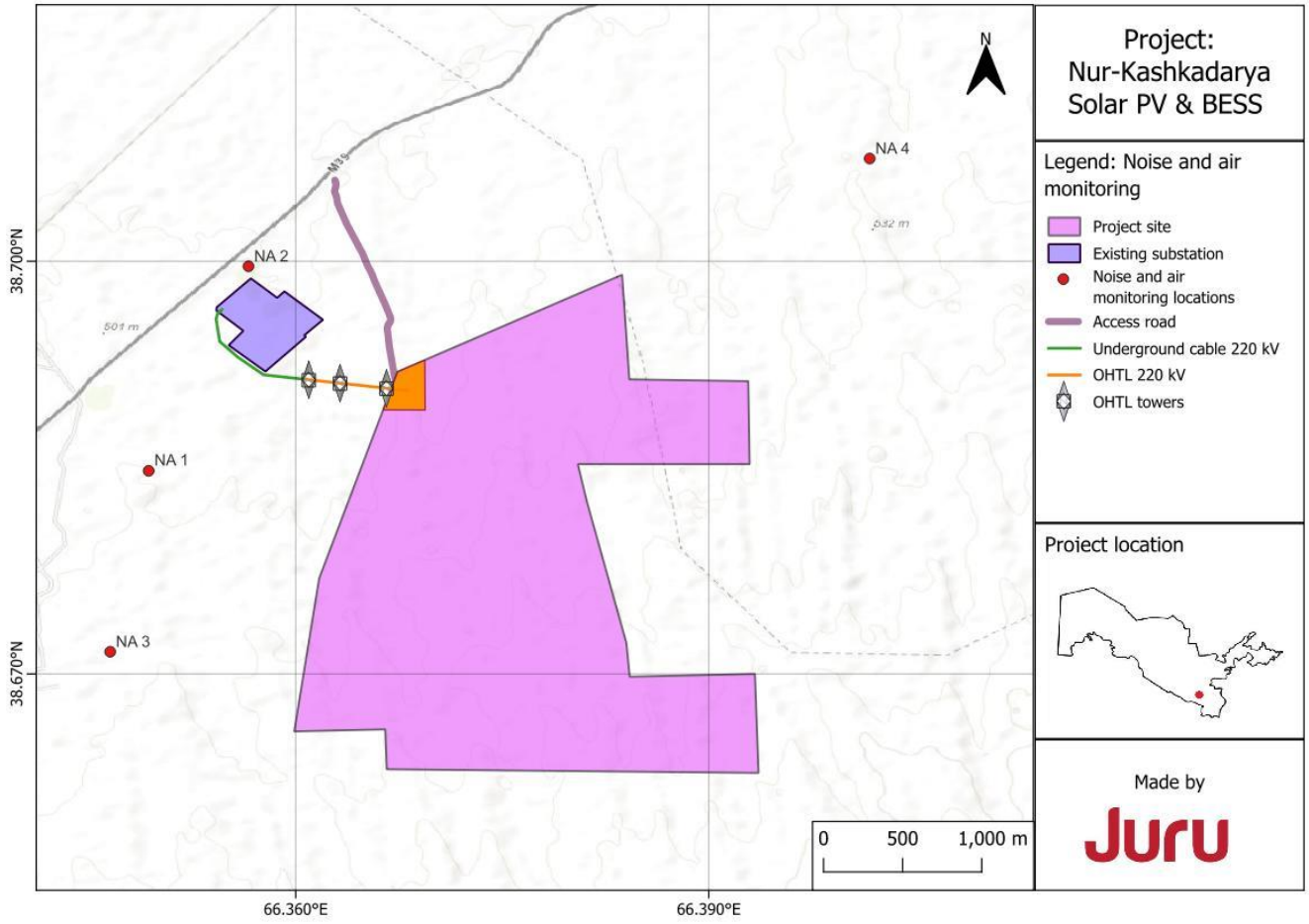


Table 16: 15-minute average concentrations for 24 hr measurement per location (in µg/m3) (daily Project standard and MPC standard at end of table in µg/m3)

Location	Date	Time Period	CO	CO2	NO	NO2	NOx	SO2	PM2.5	PM10
			avg	avg	avg	avg	avg	avg	avg	avg
NA 1	21-22 October	15 min	279.45	795.15	0	13.91	2.57	0.34	7.62	9.22
NA 2	23-23 October	15 min	157.18	781.32	1	19.11	9	0	9.71	10.85
NA 3	23-24 October	15 min	161.28	786.09	0	12.96	0	0	9.25	10.03
NA 4	24-25 October	15 min	125.06	768.72	0	16.22	0	0	9.33	10.32
NA 5	25-26 October	15 min	128.80	771.83	0	28.13	0	0	8.32	9.69
MPC (Daily)			4000	N/A	250	60	N/A	200	N/A	300
Project standard (Daily)			4000		40	25		10	15	45

The concentration of carbon monoxide (CO) in the air ranges from 125.06 to 161.28 µg/m³ on average and stands out only at location NA 1 with a concentration of 279.45 µg/m³. The concentration of carbon dioxide (CO_2) in the air varied slightly, from 768.72 to 795.15 µg/m³. Among nitrogen oxides (NO, NO_2, NOx), nitrogen dioxide (NO_2) had the highest concentration, ranging from 12.96 to 28.13 µg/m³. Concentrations of other gas forms did not exceed 2.57 µg/m³. Sulfur dioxide (SO_2) did not exceed 0.34 µg/m³ at any point or had a concentration below the detection limit. Suspended particles did not exceed a concentration of 10.85 µg/m³. None of the substances exceeded national standards and the airshed can be considered non-degraded.

5.3.4 Noise

No industrial noise sources within 500 m of the project site exist. Noise measurements taken using an unattended noise meter at five different locations over two different periods: daytime (07:00-23:00) and nighttime (23:00-07:00). The measurements are given in decibels (dBA). The following parameters were recorded: LA_{eq}, LA_{max}, LA_{min}, LA_{10}, LA_{90}. The LA_{eq} level is the equivalent continuous sound pressure level over the measurement period 10 minutes. LA_{max} is an indicator of the highest sound level during the measurement period; the LA_{min} is the lowest level during the measurement period; LA_{90} is used as a descriptor of background noise levels and LA_{10} is the noise level which is achieved for 10% of the monitoring period and is often used to describe road traffic noise.

Monitoring locations were chosen based on proximity to the proposed Solar PV and BESS area and to provide representative conditions for the NSRs that may be affected by the Project.

Noise monitoring was carried out from 21 October 2023 to 26 October 2023 (NA1, NA2, NA3, NA4, NA5). The first group includes points NA 2 and NA 5, located near the M39 highway. The Substation (NA2) is approximately 160m from the Project boundary.

A full description of the survey is provided in Volume III: ESIA Technical Appendix. The results are summarized in Table 17.

The results indicate that all baseline noise levels are below noise standards for residential areas. For locations NA 1, NA 3, and NA 4, which are not influenced by road noise from the M39 highway, monitoring indicated low baseline noise levels between 37.63 dBA to 41.27 dBA daytime (versus the 55dBA standard) and 32 dBA to 38 dBA nighttime (versus the 45 dBA Project standard). None of these locations exceeded the National noise standards, with a noise activity margin of at least 13 dBA during the day and 6 dBA at night.

Locations NA 2 and NA 5 are directly on the highway, which is the main contributor to background noise levels. Equivalent noise levels (L_{Aeq}) at these points are 49.90 and 59.38 dBA during the day and 50.54 and 52.30 dBA at night, respectively. Overall, the data indicates fluctuations in noise levels across different locations and time periods, predominantly influenced by road noise, with nighttime generally registering lower noise levels compared to daytime.

Table 17: Summary of average noise values for 24 hr measurement per location, dBA (10-minute intervals)

Location	Date	daytime / night-time	Standard (MPC and EHS guidelines)	Time Period / Interval	LAeq, avg	LAmax, average	LAmin (average)	LA10, min	LA10, avg	LA10, max	LA90, min	LA90, avg	LA90, max
NA 1	21-22 October	07:00-23:00	55	10 min	41.27	61.32	27.19	34.4	42.24	55	25.5	30.92	37.4
		23:00-07:00	45		38.99	52.23	30.18	31	39.79	47.2	24	32.37	39.4
NA 2	22-23 October	07:00-23:00	55	10 min	49.90	66.96	37.54	47	52.68	59.2	33.5	40.79	56.3
		23:00-07:00	45		50.54	64.54	42.03	45	51.60	64.2	31.3	44.24	56.9
NA 3	23-24 October	07:00-23:00	55	10 min	37.63	57.77	25.33	28.1	39.36	47.6	22.9	29.01	37.8
		23:00-07:00	45		34.35	51.49	22.94	30.7	36.94	50.1	21.5	26.76	36.4
NA 4	24-25 October	07:00-23:00	55	10 min	38.48	60.82	24.19	26.9	34.01	55.8	22.9	25.86	30.8
		23:00-07:00	45		32.73	51.36	20.84	21.5	30.20	54.2	18	22.75	27.9
NA 5	25-26 October	07:00-23:00	55	10 min	59.38	77.25	38.85	51.3	62.44	67.2	31.7	44.87	51.8
		23:00-07:00	45		52.03	70.76	27.88	43	53.21	60.6	23.2	33.22	45.4

5.3.5 Soils and topography

The Project site is situated in the Guzar district, positioned in the eastern part of the Kashkadarya region in southern Uzbekistan. The landscape of Guzar district is dominated by the foothills and plains extending from the southwestern Gissar mountain range. Elevations rise across the district within approximately 600 meters. The district's soil composition is influenced by its geographical location, climate, and human activities.

The project area is characterized by Grey-brown soils. These soils have formed over time on the skeletal-fine grained alluvial sediments of the subaerial deltas of the Kashkadarya river. They are brownish gray at the surface characterized by a light topsoil layer low in humus content.

A soil survey was performed in October 2023. An analysis of the soil samples taken from identified locations within the project sites is provided in Table 17. The methodology and results are presented in full in Volume III, Technical Appendix. Figure 35 shows the locations and coordinates of the sample points.

Chemical and physical characteristics have been covered by the analysis. The pH values for all collected soil samples spanned a narrow alkaline range from 7.74 to 8.13. All locations showed very low nitrate content, ranging only between 2.0 and 2.87 mg/kg. For sampling points S1 and S2, concentrations of copper (Cu) and zinc (Zn) proved modestly higher than the other sites. However, across all sampling locations, the concentrations of nickel (Ni), chromium (Cr), zinc (Zn), and copper (Cu) exceeded the the Maximum Permissible Concentration (MPC) set by standard SanPiN № 0191-05[28].

The results of the analysis are presented in Table 18. The reference values of the standards, for which exceedances are observed, are highlighted in the table with shaded cells.

According to national criteria, these metals fall into the category of moderately hazardous substances. However, it is notable that the concentrations of these metals remain below the acceptable international values, such as Dutch interventional values. The full methodology and results are presented in full in Volume III: ESIA Technical Appendix. No specific considerations are noted with regard to existing soil quality.

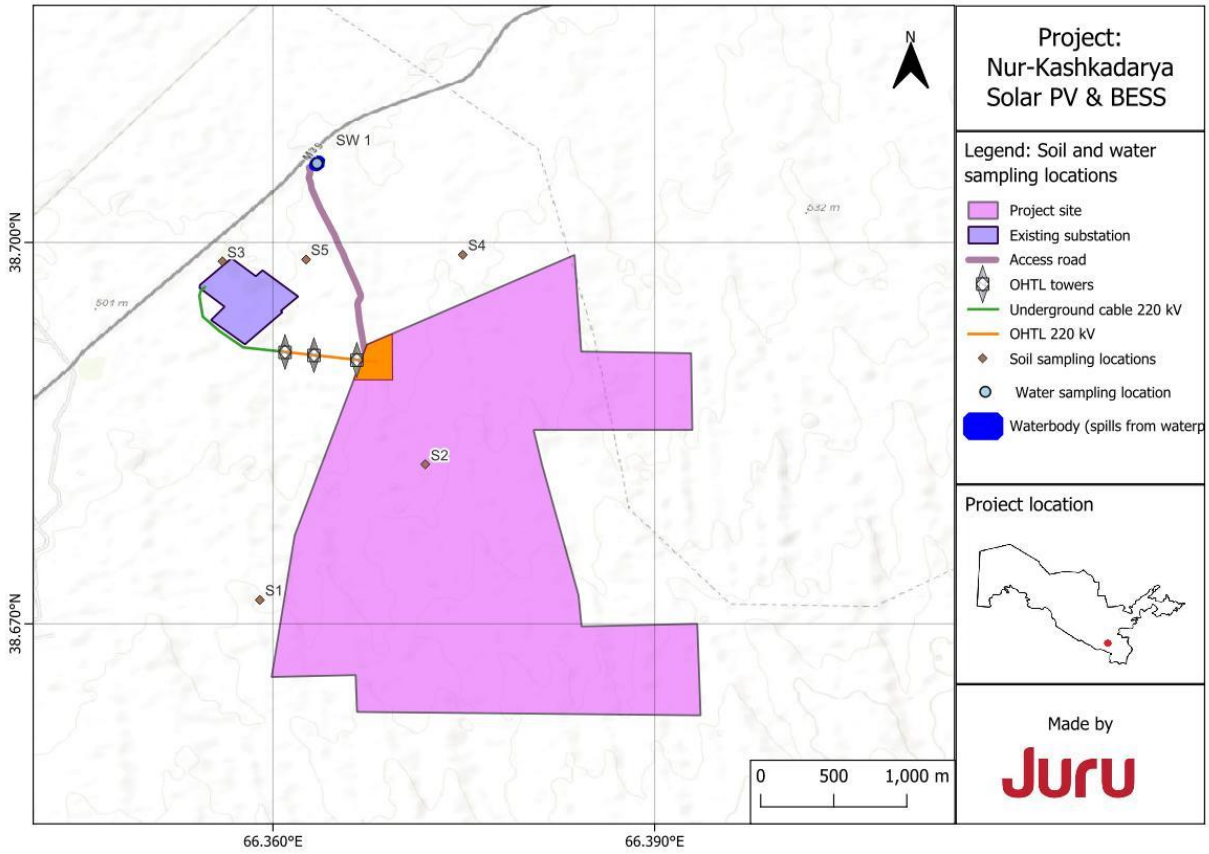
[28] Source: SanPiN №. 0191-05 "Maximum permissible concentrations (MPC) and Approximate permittable concentrations of exogenous harmful substances in soil" https://lex.uz/docs/1905543

Table 18: Results of the soil analyses

Name of parameters	Locations					The lower limit of detection	MPC in mg/kg	Dutch intervention Value / Target Value[29]	
	S1	S2	S3	S4	S5				
pH	7.95	8.13	7.86	7.74	7.85	1-14	-	-	-
Nitrate (NO3), mg/dm^3	2.03	2.47	2.46	2.61	2.87	10-6 mg/kg	130.0 (gross content)	-	-
Chromium (Cr), mg/kg	59.2	57.6	51.9	54.4	57.1	1.0 mg/kg	6.0	180	-
Manganese (Mn), mg/kg	597	620	560	590	668	20 mg/kg	1500.0 (gross content)	-	-
Nickel (Ni), mg/kg	35.6	37.7	32.9	32.7	41.3	1.0 mg/kg	4.0	100	35
Copper (Cu), mg/kg	82.5	90.6	36.2	33.5	37.6	1.0 mg/kg	3.0	190	36
Zinc (Zn), mg/kg	196	140	64.2	60.5	68.8	1.0 mg/kg	23.0	720	140
Cadmium (Cd), mg/kg	0.560	0.453	0.283	0.262	0.408	0.005 mg/kg	-	13	0.8
Mercury (Hg), mg/kg	0.041	0.067	0.057	0.049	0.080		2.1	36	0.3
Lead (Pb), mg/kg	29.7	26.7	17.8	18.8	19.4	0.1mg/kg	32.0	530	85

Figure 35: Soil sample locations

[29] Dutch Standards for Soil and groundwater Contamination (2013).



5.3.6 Geology and seismicity

Uzbekistan's territory is related to the active tectonic structure of the lithosphere of Western Tian-Shan, the development of which results in the formation of deep fault networks.[30] The collision of the Eurasian and Indian plates has led to a region of substantial crustal compression in Central Asia. As a result of this convergence and shortening of the crust, deformation occurs, leading to frequent high-magnitude earthquakes throughout the region, including the eastern part of Uzbekistan. A considerable amount of the territory of Uzbekistan (including the Project site) belongs to the zone of seismic intensity VII (very strong) Medvedev–Sponheuer–Karnik scale (MSK-64 scale) (see Figure 45). [31] In Uzbekistan and surrounding regions, several earthquakes with Local Magnitude ML ≥ 7 and intensity of ground shaking in epicentral areas I0 with 9–10 points by (MSK-64) in historical and modern times.

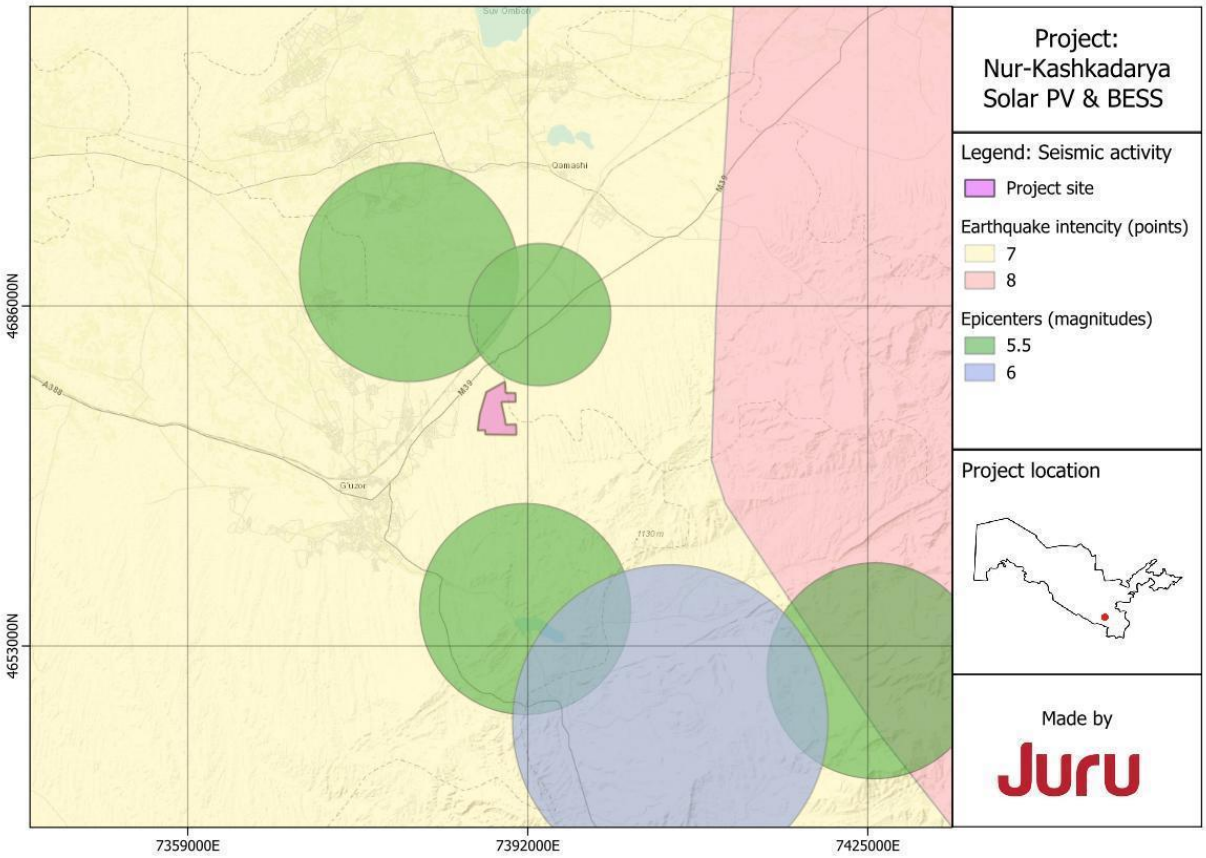
Figure 36 shows the complex variant of M_{max} (Maximum magnitudes) constructed based on seismological design techniques. In most cases, values of M_{max} calculated by seismological and seismotectonic methods fit each other (deviations were in the range of 0.2–0.4 magnitude units),

[30] Mavlyanova N. et al (2004): Seismic code of Uzbekistan. Proceedings 13th World Conference on Earthquake Engineering Vancouver, B.C., Canada. August 1-6, 2004. Paper No. 1611

[31] Medvedev-Sponheuer-Karnik (MSK) scale. This is similar to the Modified Mercalli Intensity scale used in the United States and Europe.

confirming the reliability of made constructions[32]. The site is located in an area which may experience earthquakes with Local magnitude ML ≥ 7.

Figure 36: Seismic zoning near the project area



5.3.7 Surface water

There are no permanent surface water features (including wells or boreholes) within the Project site.

Adjacent to the Project area is a man-made pond formed from the leakage from a water pipe which therefore constitutes tis water body as an artificial water body and is not subject to protection as a "water object" under the legislation of the Republic of Uzbekistan, as it lacks the characteristics of a natural water regime. It may display some water regime features, as the presence of water is constant. However, in this case, the water body is formed artificially, and its regime entirely depends on the pipe malfunction rather than natural processes, which are typical for natural water bodies.

Key indicators of a water regime, such as water inflow (from the pipe) and a constant water level (the pond does not dry up), may be present. However, other important characteristics, such as seasonal fluctuations in water levels or natural inflow-outflow, are absent. The puddle formed by the leaking pipe

[32] Complex of general seismic zoning maps OSR-2017 of Uzbekistan (Turdali Usmanalievich Artikov, Roman Solomonovich Ibragimov)

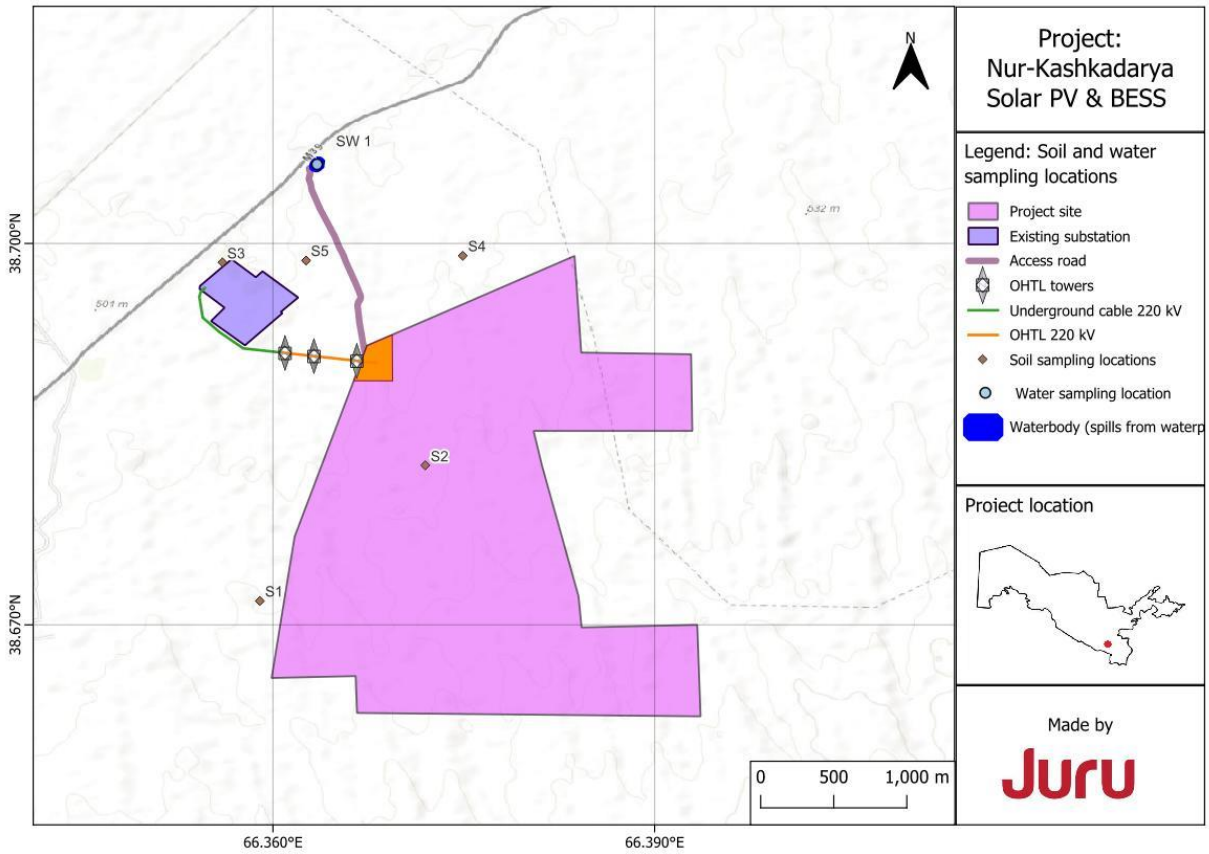
does not respond to natural phenomena, such as rainfall or snowmelt, and therefore cannot be fully classified as a water body with a natural water regime.

Thus, it can be said that while such a waterpond may display artificial water regime characteristics, it cannot be considered a natural water body with a full-fledged natural water regime.

It is noted that local farmers use this water body to water their cattle and therefore water quality analysis has been performed and compared against national standards for the information purposes and to enable the Project to monitor Project impacts on the water body to ensure no contamination results from Project activities.

A water sample was taken from a man-made water body on the 25 and 26 October 2023. Figure 37 shows the location of the sample`s point (SW 1).

Figure 37: Water quality sampling location



The water quality appears to be environmentally safe according to the values of the measured parameters: there are no exceedances of MPC of harmful substances or deviations in pH. There are no discernible signs of pollution within the sample, and the observed values fall within acceptable limits for regulatory standards.

The pH level of 7.22 is slightly alkaline. Chloride and sulfate contents of 18 mg/L and 8.7 mg/L are safely below MPC. With a turbidity reading of just 0.06 mg/dm3, the sample exhibits high clarity devoid of suspended solids interference.

The electrical conductivity of the water, which can indicate the presence of dissolved salts, is 949 µS/cm, within the normal range. The level of dissolved oxygen is 8.9 mgO2/dm3, a healthy level necessary for aquatic life. Chromium levels are notably low, with an absence of the more toxic Cr+6. Moreover, the concentrations of heavy metals in the sample are significantly below the MPC, affirming the water's adherence to regulatory standards and its suitability for various applications.

Table 19: Results of water analysis

Name of parameters	Locations	The lower limit of detection	MPC Fishery water use33
	W1		
pH	7.22	1-14	6.5-8.5
Turbidity mg/dm3	0.06	0.001	40
Chlorides (Cl-) mg/dm3	18	0.5	300
Sulphates (SO42-) mg/dm3	8.70	2	100
Ammonium NH4- mg/dm3	<0.05	0.05	0.5
Electrical conductivity µS/cm	949	10	-
Dissolved oxygen mgO2/dm3	8.9	-	-
Total suspended solids mg/dm3	0.00	-	15
Chromium Cr3+ mg/dm3	0.008	0.002	0.05
Chromium Cr6+ mg/dm3	0.00	0.002	0.001
Cadmium (Cd) mg/dm3	<0.0001	0.0001	0.005
Copper (Cu) mg/dm3	0.003	0.002	0.001
Lead (Pb) mg/dm3	0.00014	0.0002	0.03
Manganese (Mn), mg/ dm3	0.016	0.0002	-
Mercury (Hg) mg/dm3	0.00001	-	-
Nickel (Ni) mg/dm3	0.0052	0.002	0.01

[33] This Fishery standard is used for information purposes only as the water body does not constitute a natural water source.

Name of parameters	Locations	The lower limit of detection	MPC Fishery water use33
	W1		
Zinc (Zn) mg/dm3	0.0072	0.0002	0.01
Arsenic (As) mg/dm3	0.0017	0.0001	0.05

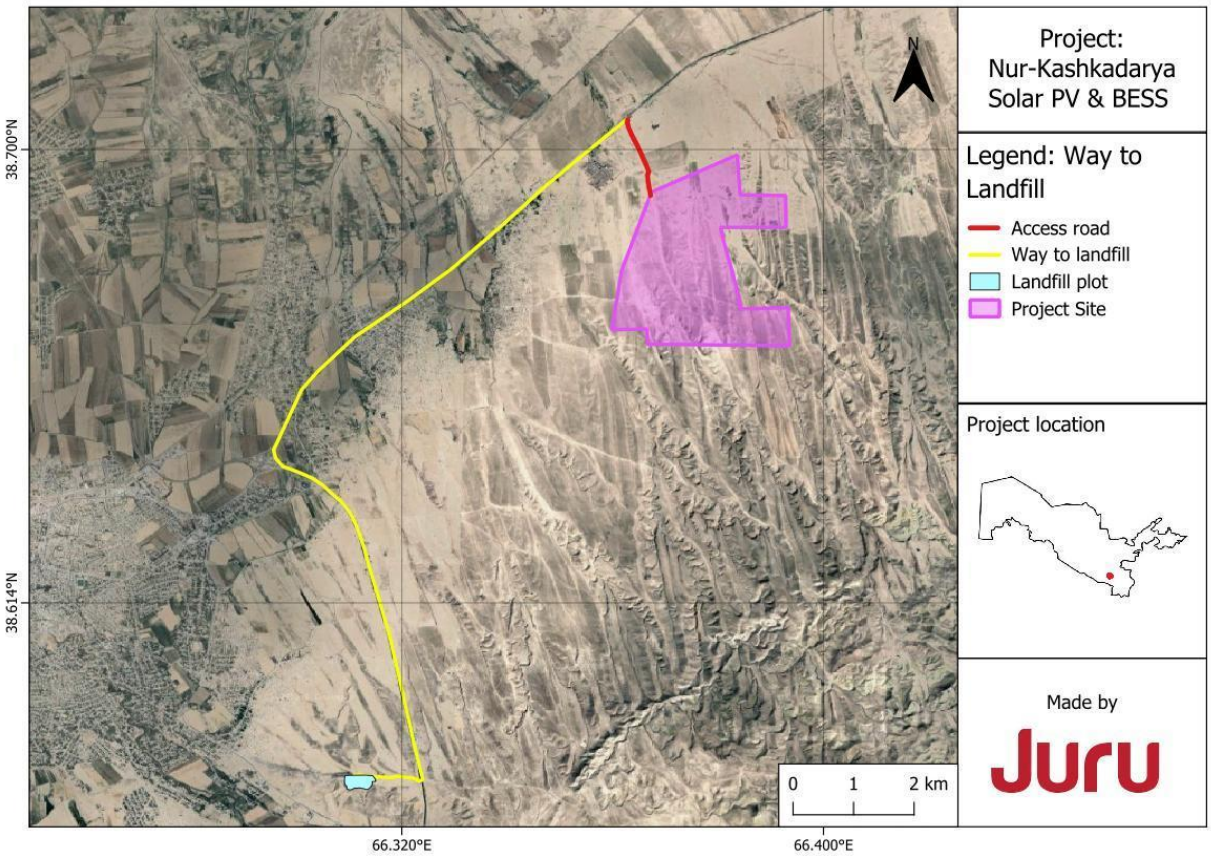
5.3.8 Groundwater

Groundwater levels were not encountered at the Site, however, the area will be kept dry by designing the buildings to enable runoff away from structures and to ensure drainage for both subsurface and surface water to protect foundations. Drainage design will be sized for 1:100-year storms and consider future climate change predictions in sizing. Further groundwater studies will be conducted by the EPC during the pre-construction survey work to confirm the groundwater profile at the site.

5.3.9 Waste services

Telephone consultations with representatives of the local municipality revealed that the nearest landfill designated for disposing waste is located 19.8 km from the Project site (Figure 38). The landfill is owned by the Sardor Binokor LLC (regional operator authorized to manage a waste in Project region). The landfill is licensed for construction waste (general waste and low level hazardous waste). Other wastes including hazardous waste and recyclable waste are also handled via this waste facility for onward transfer to a suitable recycling or hazardous waste disposal facility in Tashkent. It is expected that the landfill design will not align with GIIP and therefore transfer of wastes to alternative suitable locations further afield within Uzbekistan will be required in accordance with Masdar HMWMP. Separate disposal of hazardous liquid wastes will also likely be required. Requirements for performing further due diligence of proposed facilities is set out in later sections of this report.

Figure 38: Route to landfill of regional waste disposal operator and landfill plot



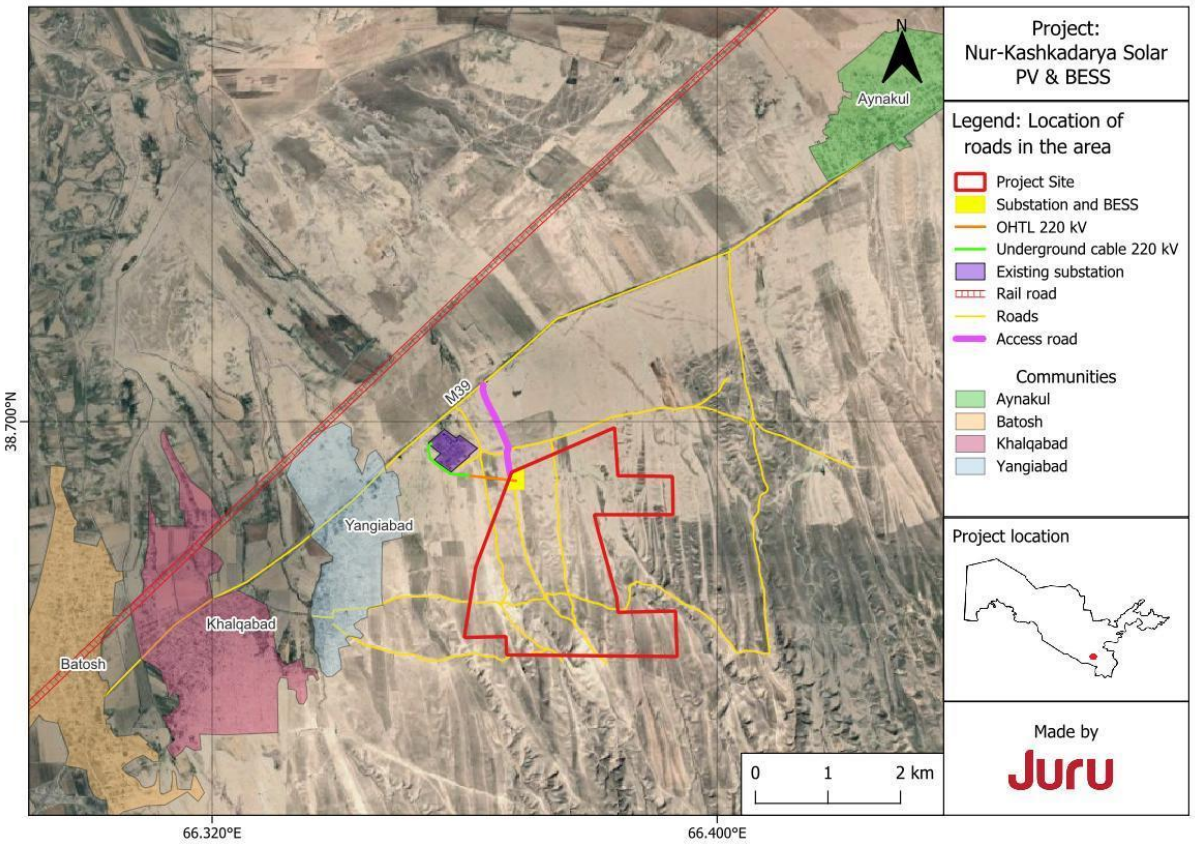
5.3.10 Local road network

The total length of local roads in Kashkadarya region is 3.4 thousand km. The length of the railway in the region is 401 km. The main railway lines are Kogon – Karshi – Dushanbe, Karshi – Kitab, Karshi – Samarkand – Tashkent. Most of the railways in the region are electrified.

The main road (M39) is located at the northwest side of the Project site and is mainly used for surrounding industrial facilities as well as by local communities. This road is used by residents of both districts Kamashi and Guzar. The M39 road is directly connected to Tashkent and the nearest logistics hubs such as Karshi and Samarkand.

Figure 39 below illustrates the location of roads in the area.

Figure 39: Roads network in the Project Area



5.3.11 Airfields

The closest airfield to the Project site is Qarshi International Airport in Uzbekistan (53 km from the Project site). No public airfields were identified within 10km of the Project site.

5.3.12 Utility supply and communication network

When respondents of the socioeconomic survey were asked how stable the electricity supply is in their community, 12.8% respondents responded that their electricity supply is unstable in winter, while 42.2% of respondents stated that electricity supply is unstable all year round. According to 45% of survey respondents the electricity in the AOI communities is stable all year round.

A total of 43% survey respondents from Khalkabad community are connected to the centralized gas system. 2.5% in Khalkabad and 4.5% respondents in Batosh community have access to the gas facility, but it does not work. Other survey respondents including the members of Yangiabad and Aynakul communities stated that they are not connected centralized gas supply.

There is no centralized heating in place in any of the AOI communities. For heating, in Yangiabad community respondents stated that mostly burning dry manure and electricity are used, while respondents from Khalkabad, Batosh and Aynakul communities are mostly reliant on burning wood or plant materials and dry manure for heating. For cooking in Khalkabad, Batosh and Aynakul communities

predominantly use gas cylinders. In Yangiabad community wood or plant materials are mostly used together with gas cylinders for cooking.

Mobile networks in Uzbekistan are available only in villages, and their working zones are not distributed in unpopulated areas such as the Project Site. It is possible to use 3G and 4G in most parts of the district; Figure 39 below represents the coverage areas for Beeline as the provider with the best coverage in the AOI. Figure 40 represents the coverage areas for Uztelecom.

Figure 40: Beeline Mobile network coverage in the Kashkadarya region (near Project site) (Source: https://beeline.uz/)

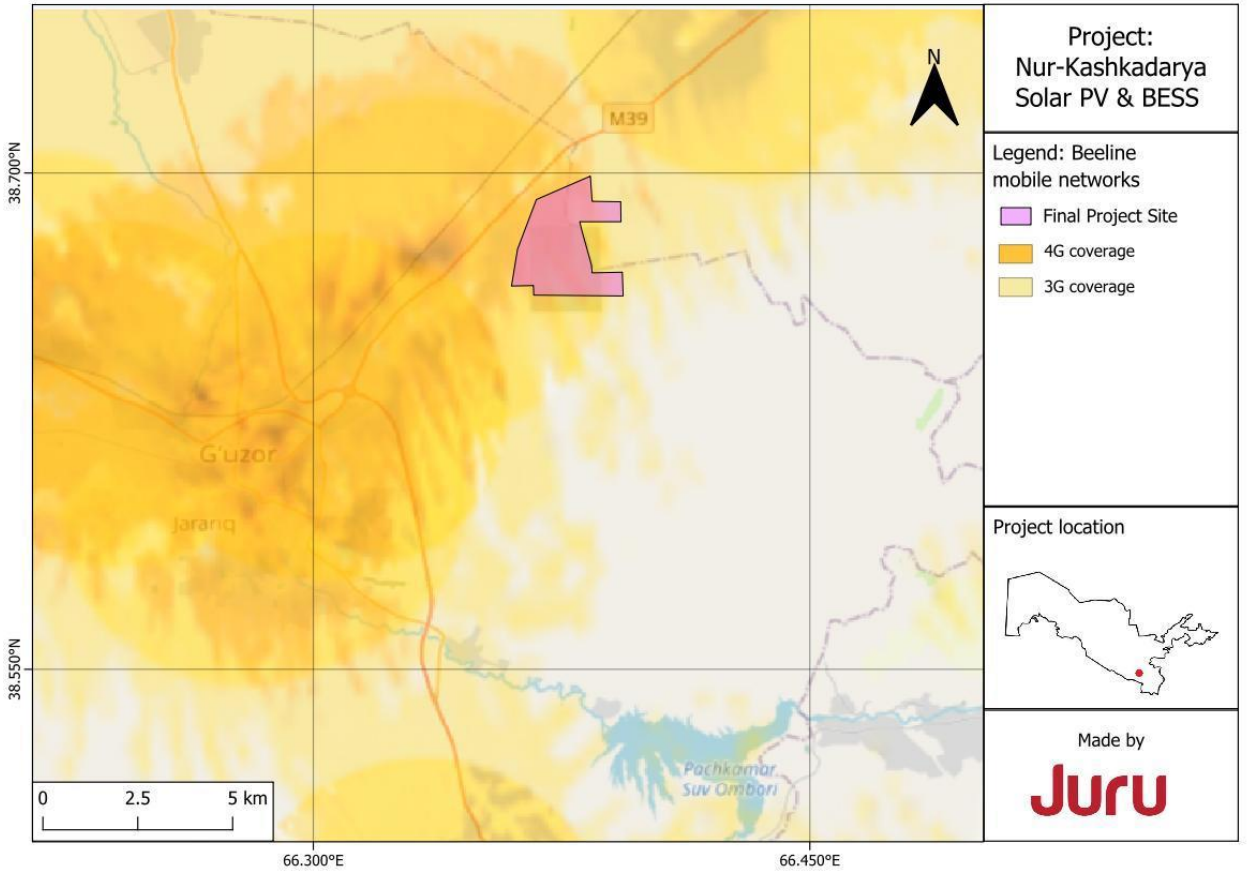
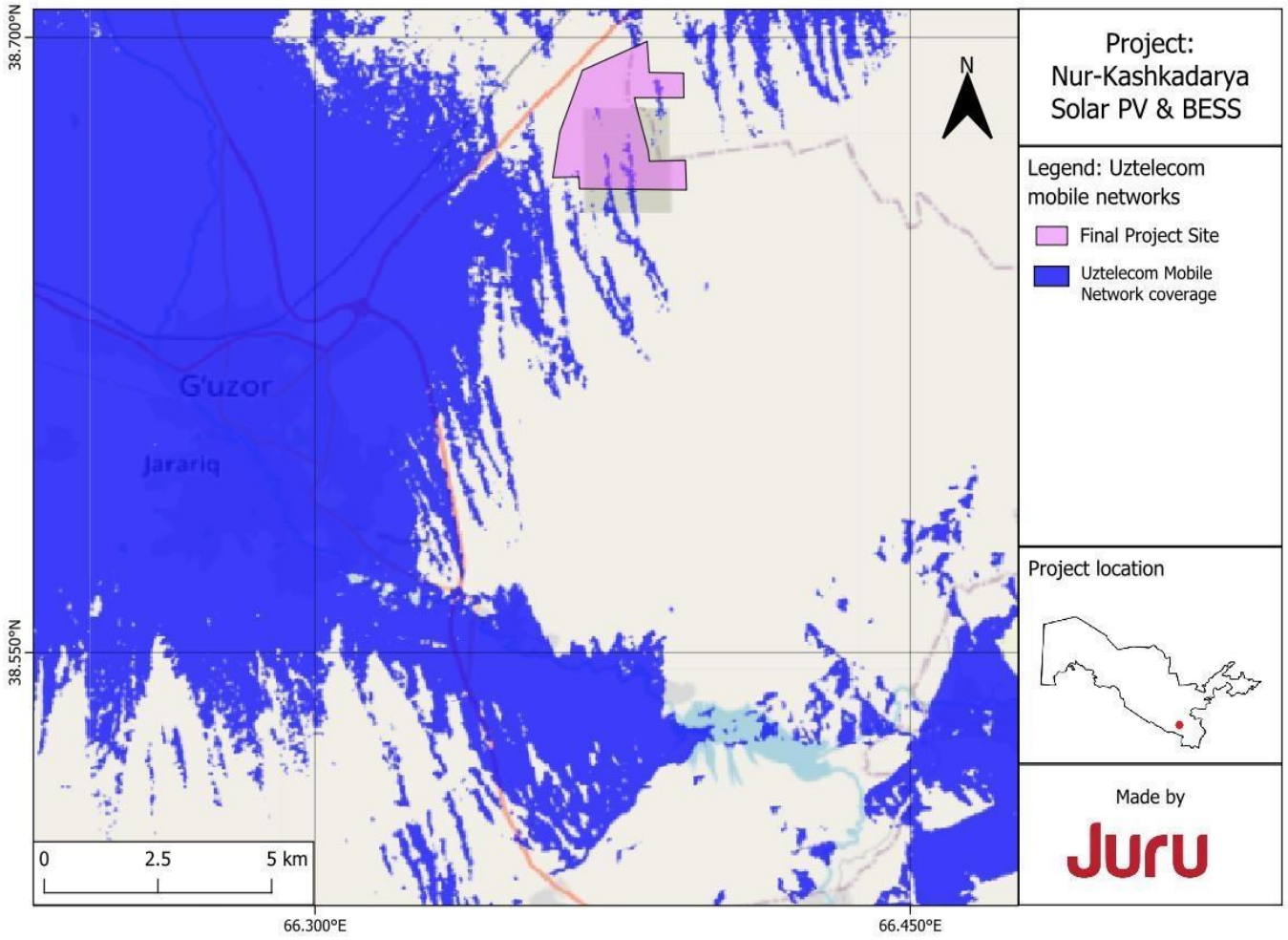


Figure 41 : Uztelecom Mobile network coverage in the Kashkadarya region (near Project site) (Source: https://uztelecom.uz/)



5.4 Socio-economic overview

This section provides information on the socio-economic baseline conditions of the Project AoI communities. The baseline provides important contextual information for predicting impacts but will also be used for benchmarking existing conditions in order to assess the effectiveness of the proposed mitigation measures.

The socio-economic baseline will describe the following topics:

- Political and administrative structure;
- Population and demographics;
- Economy
- Employment;
- Education

Health, safety and security

- Poverty and equity
- Vulnerable groups;
- Land Use and Livelihoods;
- Traffic and transportation
- Language and ethnicity
- Indigenous people
- Cultural Heritage
- Human rights; and
- Gender

A socio-economic profile of the AOI was developed, through a socio-economic survey of households in the AOI communities, which was undertaken on October 12-17, 2023. A total of 358 surveys were undertaken in the total population of 4,209 households of the AoI communities. Which gives a 95% confidence level and a 5% margin of error for the sample size[34] (this relates to approximately 9% of the population). Table 20 provides the total number of surveys undertaken in each AoI community. Survey respondents were selected randomly to provide a representative selection of the Project communities.

Table 20: Surveys undertaken in AoI communities

Name of community	Total households	Number of surveys undertaken	Percentage of households
Yangiabad	1,151	96	8%
Khalkabad	934	79	8%

[34] https://surveyplanet.com/sample-size-calculator

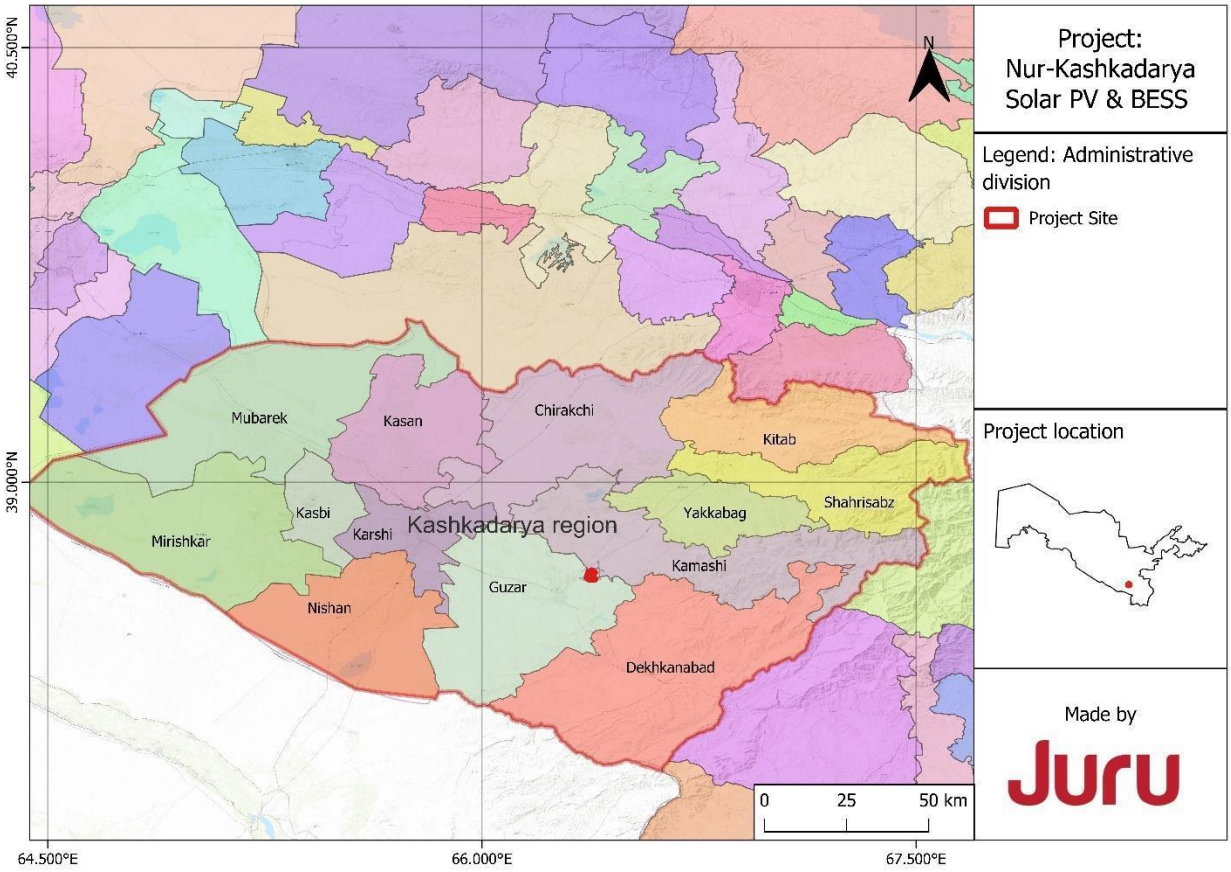
Name of community	Total households	Number of surveys undertaken	Percentage of households
Batosh	1,022	89	9%
Aynakul	1,102	94	9%
Total	4,209	358	9%

5.4.1 Political and administrative structure

Kashkadarya Region

Kashkadarya region is situated in the south-eastern part of Uzbekistan in the basin of the river Kashkadarya and on the western slopes of the Pamir-Alay mountains. It borders the Samarkand region, Bukhara region, and Surkhandarya region as well as the Republics of Tajikistan and Turkmenistan. The territory of Kashkadarya region is 28,570 km². The administrative centre of the region is Karshi city, located in the southwestern part of Kashkadarya region. Administratively Kashkadarya region is divided into 14 different districts, of which the Guzar and Kamashi districts are impacted by the Project (Figure 41).

Figure 42: Administrative division of Kashkadarya region



Guzar District

According to the information provided by the Statistics Agency under the President of the Republic of Uzbekistan, Guzar District comprises an area of 2,660 km² and consists of one city, five towns and 80 rural settlements.

Kamashi District

The Kamashi District comprises an area of 2,660 km² and consist of one city, five towns and 115 rural settlements as per the information provided by the Statistics Agency under the President of the Republic of Uzbekistan.

Surrounding communities

There are four communities within close proximity of the Project site, they are Yangiabad, Khalkabad, Batosh and Aynakul communities, these are considered the area of impact (AOI) communities. Their location is shown in Figure 4 above.

Table 21 summarises the main information regarding each AOI community.

Table 21: AoI communities

Name of community	Approximate distance to the Project site	Total area of the community
Yangiabad	1.2 km	217.5 ha
Khalkabad	2.4 km	184 ha
Batosh	approx. 4.9 km	148.4 ha
Aynakul	5.3 km	101.19 ha

5.4.2 Population and demography

Kashkadarya region

As of 1 January 2023, the permanent population in Kashkadarya region was 3,482,300 people, among them, the urban population totalled 1,491,600 people (42.8% of the population) and the rural totalled 1,990,700 people (57.2% of the population). As of 1 January 2022, the population density in Kashkadarya region was 109 people/km2. This is a higher population density that the average for Uzbekistan (66.6 people/km2) and it is increasing, but only by a fraction of a percentage per year35.

Guzar District

The population of Guzar District as of 1 January 2023 was 217,300 people, the district is largely rural, with the urban population totalling 51,000 people (23.5% of the population) and the rural totalling 166,300 people (76.5% of the population). The ethnic composition of Guzar District is predominantly Uzbek (93.2%), with the remainder of the district coming from the following ethnic groups Tajiks (5.5%), Russians (0.2%) and representatives of other nationalities (1.1%). According to the data given in the district passport, women make up 49% of the total population and men make up 51%.

Kamashi District

The population of Kamashi District is also largely rural. As of 1 January 2023, the population was 286,800 people, among them, the urban population totalled 68,100 people (23.7% of the population) and the rural population totalled 218,700 people (76.3% of the population). There is no significant difference between the number of men and the number of women in the district. As of 1st April 2022, the number of men was 143,070 (50.7%), while the figure for women was 138,784 (49.3%).

Yangiabad community

[35] https://www.city-facts.com/kashkadarya/population

Yangiabad community is located approximately 1 km (at the closest point) to the north-west of the Project site and has a total of 1,151 households. According to the information provided by the khokimiyat, the total number of residents is 6,510.

Khalkabad community

Khalqabad community is located approximately 2.4 km north-west of the Project site. The total area of the community is 184 ha, and the total number of households is 934. According to the information provided by the khokimiyat, the total number of residents is 4,936.

Batosh community

Batosh community is located approximately 4.9 km north-west of the Project site. The total area of Batosh community is 148.4 ha, and the total number of households is 1,022. According to the information provided by the khokimiyat, the total number of residents is 4,907.

Aynakul community

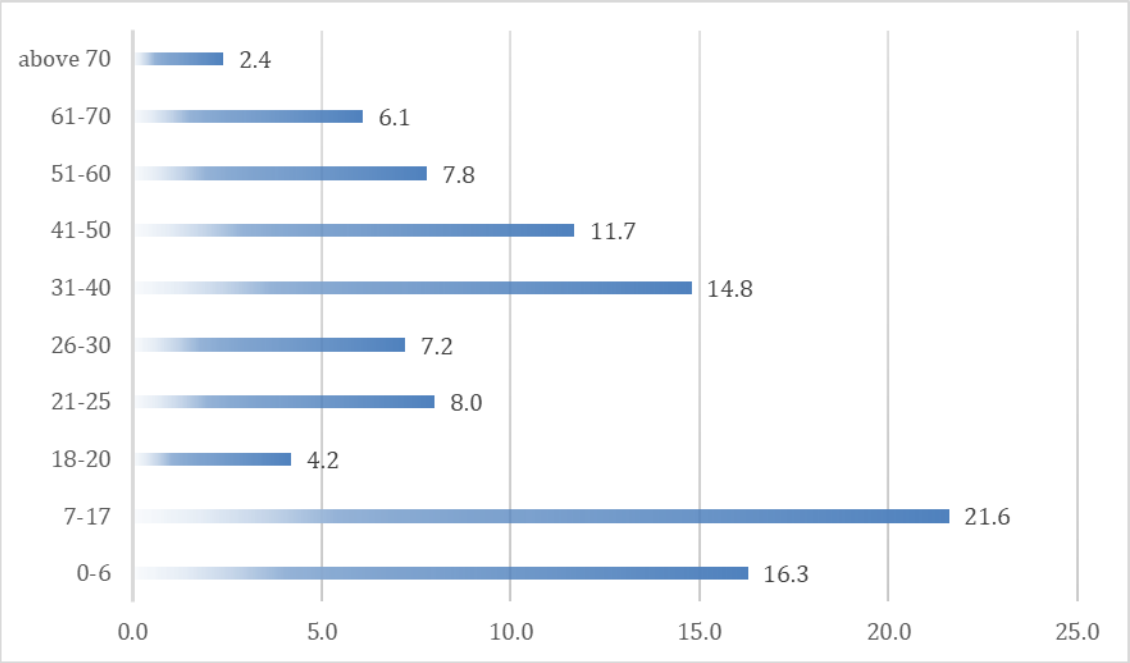
Aynakul community is located approximately 4.3 km north-east of the Project site. The total area of the community is 101.19 ha, and the total number of households amounts to 1,102. According to the information provided by the khokimiyat, the total number of residents is 5,677.

AOI communities

The gender distribution of the AOI communities, based on October 2023 survey information showed that it is fairly consistent with the district statistics, with slightly more men (50.8%) than women (49.2%). The majority of the households in the surveyed communities are male headed households at 85.5%, with households headed by women making up 14.5% of all surveyed households.

The members of the surveyed households aged between 7-17 years made up the largest individual age group (21.6%), as shown in Figure 42 below.

Figure 43: Age of surveyed household members



Migration

Based on statistic data provided by the Kashkadarya Regional Municipality, in 2022, the total number of people who immigrated (both from within Uzbekistan and from other countries) to the region was 91,380[36] (2.6%). The total number of migrants (both to other locations within Uzbekistan and to other countries) was 16,427 people[37] (0.5%) and the balance of migration was minus 7,289 people.

The number of immigrants in Guzar district was 391 people (0.2%) in 2022, while 722 people (0.3%) migrated from the district. Regarding Kamashi district 167 people (0.1%) immigrated to the district, and 1,279 people (0.4%) migrated in the same year.

Approximately 22.1% of the surveyed households stated that they have household members who have migrated to work in other regions of Uzbekistan or abroad. A total of 92 immigrants were identified in 79 households. Of the 79 households, 81.1% had one person that had migrated, in 13.5% of households two people had migrated and in 5.4% of households three or more people had migrated. Thus, showing a higher level of migration in the surveyed households than in the general population.

5.4.3 Economy

Kashkadarya region

[36]https://www.qashstat.uz/uz/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=297&id=3440&Itemid=1000000000000

[37]https://www.qashstat.uz/uz/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=297&id=3445&Itemid=1000000000000

The gross regional product of Kashkadaraya region is made up of agricultural, forestry and fishery sectors 35.9%, industry (including trade) 18.8%, construction 6.8%, retail, consumer and food services 7.1%, transportation and storage, information and communication 5.5% and other sectors 25.9%.

As of January 2023, there were 8,869 active enterprises and organizations in the Kashkadarya region. The largest number of enterprises were in the trade (3,189) and agriculture, forestry and fishery (1,850) sectors of the region.

Guzar district

The economy of the Guzar district is focused on industry, animal husbandry and building materials. There are 13 joint ventures, 350 small industrial enterprises and one large industrial enterprise ("Gissarneftegaz" LLC JV, "Shurtangaz Chemical Complex" LLC," Kitob Ip Yigiruv" JSC) in the district.

Kamashi district

There are 3,017 enterprises in Kamashi District, of which 1,136 are in agriculture, 368 in industry, 171 in construction, 713 in trade, the remaining 629 enterprises belong to other sectors. The number of small business enterprises is 2,705, among them 2,594 are active enterprises. Small businesses make up 63.2% of all industry enterprises, 64.3% of all investment enterprises and almost all of the enterprises related to agriculture, construction, and trade are small businesses (99.7%, 100% and 98.9% respectively).

AOI communities

During the site observations it was found that people in the AOI communities generally make a living through farming activities and breeding livestock.

5.4.4 Employment

Kashkadarya region

The average monthly salary of a person living in Kashkadarya region was 3,200,935 UZS (approximately USD $261) per statistics provided for the third quarter of 202338. As of 2022 the economically active population in the region was 1,331,50039, and the level of economic activity of the population was 68.3%40 and the unemployment rate is 9.3%.

Guzar District

In Guzar district, the economically active population was 83,100 in 2022, among them 75,400 people were employed and the rest 7,700 were unemployed. Therefore, the unemployment rate in the district was 9.3%. As of 2022, the average monthly salary in the district was 3,113,072 UZS (approximately USD $254).

Kamashi District

The number of economically active people in Kamashi District in 2022 was 107,500, and 9,900 of them were reported as unemployed. Therefore, the unemployment rate in the district was 9.2% in 2022. The average monthly salary in Kamashi district was considerably low compared to Guzar district and the regional data as a whole. It made up 2,077,096 (approximately USD $169)[41].

AOI communities

According to the community passports for the AOI communities:

- In Yangiabad community 663 people have permanent jobs, while 176 people are officially registered as unemployed and 275 women are homemakers.
- In Khalkabad community the number of people who are permanently employed is 905, 146 are officially unemployed, and153 were homemakers.
- In Batosh 1,251 people work permanently in the local enterprises and organizations, and 268 people are homemakers.
- In Aynakul community the unemployment rate is high compared to other communities. 608 community members have permanent jobs, and 482 people are officially registered as unemployed. The number of homemakers is also high at 482 people.

Figure 44 below provides information on the occupation of the household members in the surveyed households. Survey respondents were employed in a number of different sectors, with no one sector

[38]https://www.qashstat.uz/uz/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=298&id=4072&Itemid=1000000000000

[39] https://api.siat.stat.uz/media/uploads/sdmx/sdmx_data_554.pdf

[40] https://api.siat.stat.uz/media/uploads/sdmx/sdmx_data_532.pdf

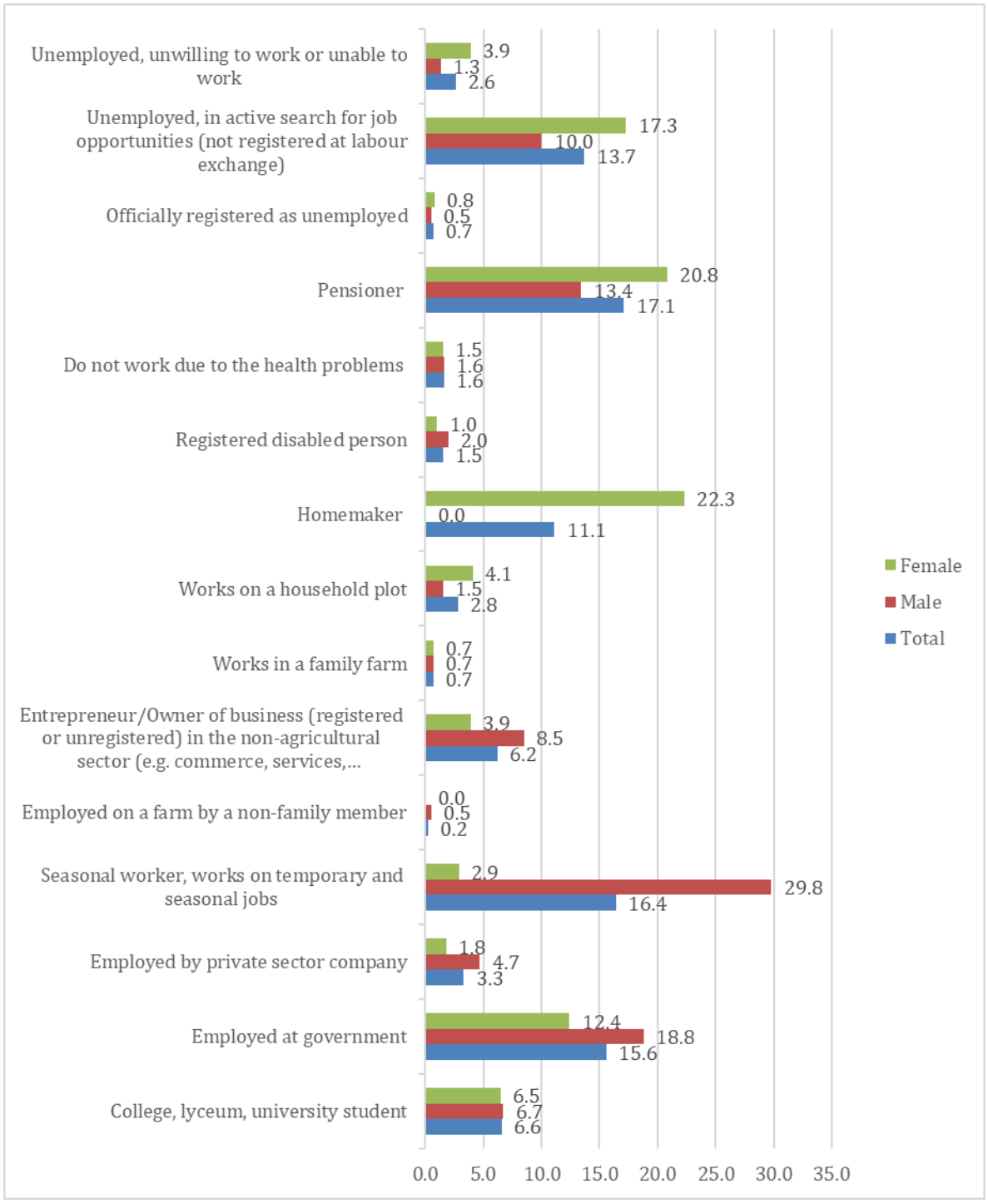
[41] https://api.siat.stat.uz/media/uploads/sdmx/sdmx_data_500.pdf

accounting for the majority of respondents. The two largest areas of occupation were pensioners (17.1%), and people employed in the government sector (15.6%). Of the total respondents 0.7% are officially registered as unemployed while those that are not registered unemployed, but in search of a job made up another 13.7% and 2.6% were unemployed, but unable/unwilling to work.

While there is no specific mention of employment in agriculture or farming, 13.9% of AOI community members noted that they use their land plots to produce products for both personal consumption and for sale, and 0.6% of said they use their land plots only for sale.

Looking at just men in the surveyed households the largest occupation was working in seasonal jobs (29.8%), while for women acting as a home maker was the predominant occupation (22.3%).

Figure 44: Occupations in surveyed communities



Employment opportunities can vary depending on the demographics group from which the person comes. As Uzbekistan has societal and religions norms relating to women and their role in the home, there may be social stigma for women being employed outside of the home, both from their family, and from potential employers (women in the AOI are mostly employed as homemakers see above). Other vulnerable groups, such as the disabled, and elderly may not be considered for employment due to real or perceived disabilities. The poor may have difficulty travelling to or applying for employment opportunities. Inequalities may also be identified in the income provided to members of vulnerable

groups, and because of their vulnerable status they may not feel able to fight for parity in income payments.

The following table provides a summary of employment by age group. This shows that the majority of unemployed people are between 21-50 years of age. The rate of overall unemployment is high compared to the regional and district levels, which were around 9.3%. However, the number of officially registered unemployed is lower (the percentage below includes both registered and unregistered unemployed). The registered unemployed in the AOI is 0.7% (this may be because to be officially registered, people need to go to the capital, which takes time and costs money that they may not have).

Table 22: Employment by age group

Age range	Student	Working	Private sector	Farm (non-member)	Seasonal worker	Business owner	Family farm	Home plot	Home-maker	Disabled	Health problems	Pensioner	Unemployed	No answer	Total
0-10	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100 %
11-20	86%	1%	0%	0%	3%	1%	0%	0%	3%	0%	0%	0%	6%	0%	100 %
21-30	16%	15%	4%	0%	16%	8%	1%	3%	16%	0%	0%	0%	20%	1%	100 %
31-40	1%	19%	3%	0%	27%	10%	1%	3%	12%	2%	0%	0%	20%	1%	100 %
41-50	0%	20%	6%	0%	20%	9%	0%	3%	15%	3%	3%	1%	19%	1%	100 %
51-60	1%	24%	3%	1%	8%	3%	1%	3%	8%	1%	7%	27%	12%	2%	100 %
61+	0%	1%	1%	1%	0%	1%	0%	0%	1%	1%	0%	95%	0%	1%	100 %

Source: Socioeconomic survey 2023.

According to the Statistics Agency of Republic of Uzbekistan, in 2022 yearly total income per capita in Uzbekistan was 17,772,800 UZS (approximately USD $1449), monthly income per capita made up 1,481,066 UZS (approximately USD $121). However, the yearly figure for Kashkadarya region is a bit lower than the country-wide data, making up 14,610,800 UZS (approximately USD $1,191) in the same year. The monthly income per capita in the region was 1,217,567 UZS (approximately USD $99)[42]. The average family income reported by survey respondents was 5,365,100 UZS (approximately USD $438) with a per capita income of 976,000 UZS (or USD $80), which is much lower than the regional average. Survey respondents were asked what they considered to be the main threats that impact their income, 37.2% of all respondents chose lack of irrigation water, unemployment was a concern for 36% respondents, 24.6% respondents have no threats, and 22.9% respondents indicated that rising prices for consumer goods was a threat. Respondents were allowed to select multiple answers. Table 23 below provides more information.

Table 23: Main threats that impact income of respondents

	Yangiabad	Khalkabad	Batosh	Aynakul	Total
No threats	34.4	25.3	10.1	27.7	24.6
Decrease in prices for agricultural products	0.0	5.1	3.4	3.2	2.8
Lack of irrigation water	33.3	44.3	44.9	27.7	37.2
Rising prices for consumer goods	16.7	17.7	33.7	23.4	22.9
Unemployment	33.3	38.0	41.6	31.9	36.0
Economic shocks	1.0	6.3	5.6	6.4	4.7
Ecological/Environmental Impairment	2.1	0.0	2.2	0.0	1.1
Decreased precipitation	1.0	0.0	0.0	0.0	0.3
Increasing inflation rates	0.0	0.0	2.2	0.0	0.6
Difficult to answer	1.0	6.3	1.1	2.1	2.5

*Multiple options could be selected

5.4.5 Education

The right to education is guaranteed to all citizens of the Republic of Uzbekistan under the Constitution. The State oversees education and provides free education up to secondary school. Almost 100% of the Uzbek population has completed upper secondary education in 2021 the rate completed was 96.6%

[42] https://api.siat.stat.uz/media/uploads/sdmx/sdmx_data_329.pdf

with women at a rate of 96.0% and men slightly higher with a rate of 97.7%[43] . According to UNESCO, in Uzbekistan the literacy rate is practically universal for both men and women and constitutes almost 100 %[44].

At the end of 2022, there were 557 pre-school educational organisations in Kashkadarya region and for the academic year 2022-2023 there were 1,220 general education institutions, and nine higher educational institutions in the region.

Based on data provided by the khokimiyats, in Guzar district there are 188 kindergartens, 78 schools and 87 libraries and in Kamashi district, there are 95 schools and 24 kindergartens.

Table 24 provides an overview of the number of schools and pupils at schools in the AoI communities.

Table 24: The number of educational facilities

Name of community	Local primary/ secondary schools[45]	School pupils	Kindergartens	Kindergarten pupils
Yangiabad community	2	789	7	265
Khalkabad community	2	927	6	275
Batosh community	1	935	3	240
Aynakul community	1	1,412	0	0

Source: Community passports.

The majority of the students and children from the AOI households have to travel approximately 1km to the nearest educational facility the furthest a student had to travel was 5 km.

Survey respondents were asked if their local school is equipped with the necessary equipment. Table 25 shows that respondents from Yangiabad community consider the schools to be poorly equipped or only equipped with the basics. In Khalkabad community most of the respondents (65.8%) think that schools are well equipped, in Batosh and Aynakul communities respondents considered their schools to have basic or sufficient facilities.

Table 25: AOI Communities' opinion on school facilities

Name of community	Schools have everything students need	Schools are equipped with only basic facilities	Schools are poorly equipped.	Schools are in a very bad condition	Could not answer
Yangiabad	15.6%	33.3%	33.3%	2.2%	15.6%

[43] https://data.worldbank.org/indicator/SE.SEC.CUAT.UP.FE.ZS?locations=UZ.

[44]https://uil.unesco.org/fileadmin/multimedia/uil/confintea/pdf/National_Reports/Asia%20-%20Pacific/Uzbekistan.pdf

[45] In rural locations in Uzbekistan, schools are not separated into primary and secondary schools. Instead they are merged into one and considered to be secondary schools.

Name of community	Schools have everything students need	Schools are equipped with only basic facilities	Schools are poorly equipped.	Schools are in a very bad condition	Could not answer
Khalkabad	65.8%	25.3%	5.1%	1.3%	2.5%
Batosh	43.8%	37.1%	11.2%	0	7.9%
Aynakul	36.2%	36.2%	17.0%	4.3%	6.3%
Total (average)	40.3%	33.0%	16.7%	1.9%	8.1%

Source: Socioeconomic survey, 2023.

Survey responses reported (see Table 26) that only 0.7% of household members were recorded as illiterate all of those were men. These literacy rates are similar to the national average, but slightly lower (as mentioned above Uzbekistan is close to 100% literacy). The rate of completion of secondary education in the surveyed population is 1% lower for men and 2% lower for women than the national average. Women have almost the same rate of attainment of secondary education or above, as men (95.4% compared to 95.6%) however nationally women have higher attainment (97.7% compared to 96.0). The rate of higher education is also low (10.9%) in the surveyed area, slightly more women have higher education at 11.4% than men.

Table 26: Levels of education by community and gender (not including school and preschool children)

	Yangiabad	Khalkabad	Batosh	Aynakul	Men	Women	Total
Illiterate	0.7	0.4	1.3	0.3	0.8	0	0.7
Can read and write, but did not graduate from secondary school (grades 8-9)	6.2	2.5	2.2	4.1	3.6	4.6	3.8
Graduated from high school (grades 10-11)	46.5	47.6	49.5	61.8	51.5	52.0	51.5
Secondary special (graduated from college, lyceum, vocational school, technical school)	34.8	37.1	37.8	23.5	33.3	32.0	33.1
Higher (bachelor) / postgraduate (Master's/PhD)	11.8	12.4	9.2	10.3	10.8	11.4	10.9
Total	100.0	100.0	100.0	100.0	100	100	100.0

Source: Socioeconomic survey, 2023.

Education attainment by age has been provide in the table below. It shows that the majority of those that are illiterate or that can read and write, but did not graduate high schools are over 60, although there are some people that are illiterate in other age ranges, The majority of the population that are over 40 years old have graduated high school. While the younger age groups (21-30 and 31-40) show a greater prevalence of graduation from secondary special institutions.

Table 27: *Levels of education without considering school and preschool children*

Age range	Percentage of the total survey population	Illiterate	Can read and write, but did not graduate secondary school	High school	Secondary special	Higher education	School age/No answer	Total
0-10	24%	0.0%	0%	0%	0%	0%	100%	100%
11-20	18%	0.3%	0%	19%	3%	0%	77%	100%
21-30	15%	0.3%	2%	32%	56%	10%	1%	100%
31-40	15%	0.3%	2.1%	44.7%	37.8%	13.7%	1.4%	100%
41-50	12%	0.9%	6.5%	57.6%	23.4%	10.8%	0.9%	100%
51-60	8%	0.0%	4.6%	53.6%	29.4%	11.1%	1.3%	100%
61+	9%	1.8%	12.0%	61.7%	15.0%	9.0%	0.6%	100%

Age range	Percentage of the total survey population	Illiterate	Can read and write, but did not graduate secondary school	High school	Secondary special	Higher education	School age/No answer	Total
	100%	0.4%	2.7%	31.1%	21.1%	6.5%	38.3%	100%

Source: Socioeconomic survey 2023.

Note: As this table includes children, the percentage of illiteracy is different from the table above.

5.4.6 Community health, safety and security

Public infrastructure related to the health, safety and security is primarily developed in city centres, while the towns/villages of other districts, especially in remote places, are equipped with one medical centre and police security office to support locals with basic health and security needs. General health care services provided by the government (including consultations) are free.

As of 2022 there were 543 health clinics46 and 91 hospitals47 in Kashkadarya region. The number of clinics and hospitals in Guzar district was 23 and 3 respectively. In Kamashi district the number of clinics and hospitals amounted to 33 and 2 respectively. According to data obtained from community leaders in the AOI communities, the overall picture of medical centers in Project AOI communities is as follows:

Table 28: Number of medical facilities in AoI communities

Name of administrative division	Number of medical facilities
Yangiabad community	There is one family polyclinic
Khalkabad community	There is one family polyclinic
Batosh community	There are no facilities - Residents of Batosh community go to health services in other communities
Aynakul community	There is one family polyclinic

Source: Community passports

According to the survey results health services are available for 75.1% of survey respondents within their communities. The remainder of the respondents stated that they use the health services located in the district centre or health services located within other communities. Polyclinics provide basic

[46]https://www.qashstat.uz/uz/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=292&id=3602&Itemid=1000000000000

[47]https://www.qashstat.uz/uz/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=292&sdid=3560&Itemid=1000000000000

healthcare and first aid for their local communities[48]. For any more specialized treatment, such as critical illnesses and mental health care, community members would need to travel to hospitals located in bigger population centers.

Respondents who have no access to health service in their community were asked to specify how far and where do they go for medical care:

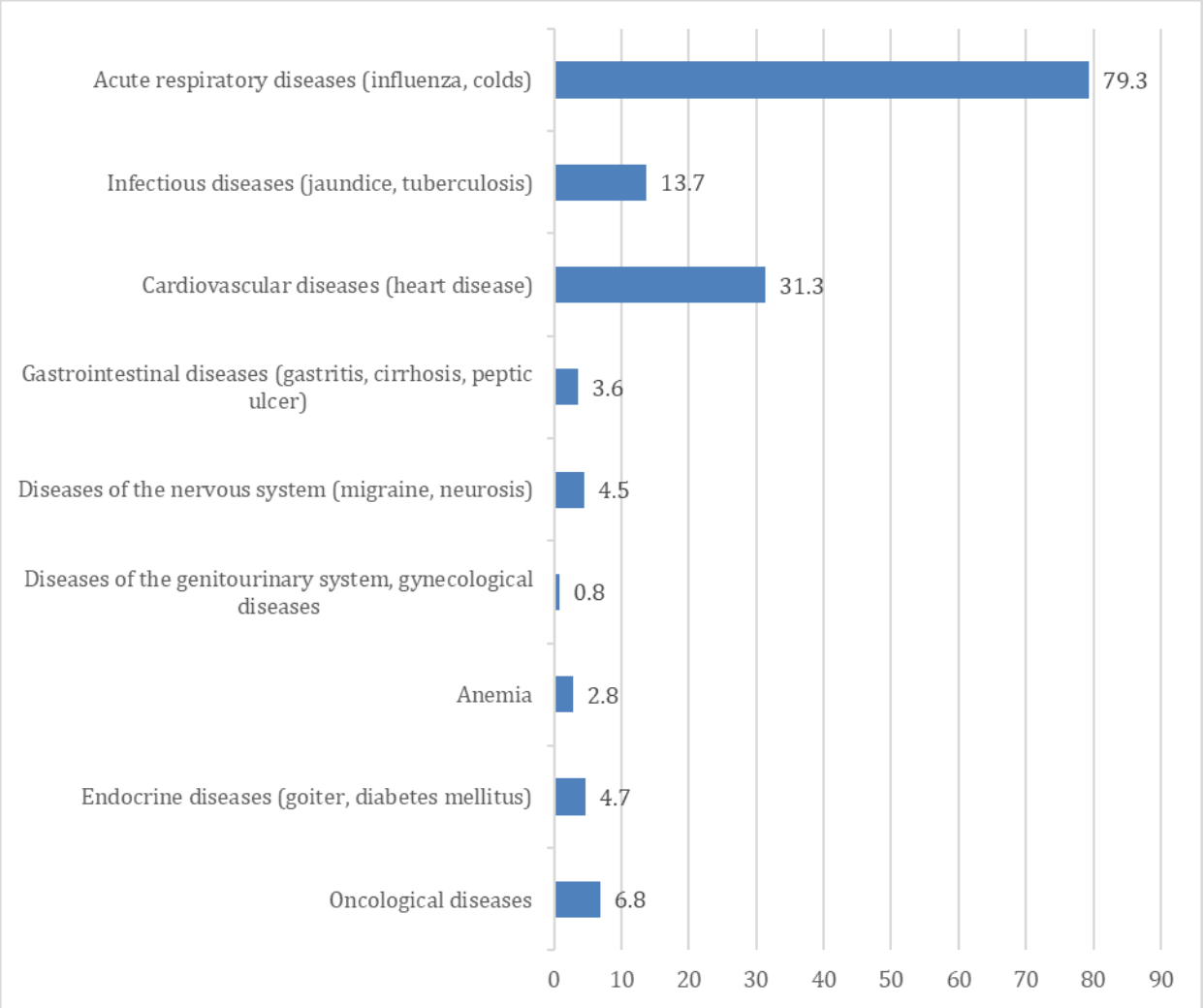
- In Yangiabad community 90% of households who have no access to local health services need to travel 2-3 km to reach the polyclinic in Khalkabad, while 10% choose to go Guzar district center.
- In Khalkabad community 100% of respondents are able to use the local health services.
- The distance people from Batosh community have to travel is around 3-4 km.
- In Aynakul community 33.3% of those who are not able to use local health services have to walk 5-6 km to reach a polyclinic situated in Kuba village, 16.7% have to travel 11 km from their homes to Kamashi district center, and 50% mentioned a polyclinic in Suva village which is 3-5 km away from their houses.

In addition, survey respondents were asked if they found their local health services to be well equipped, and 74.6% of all respondents stated that their local health facilities are well equipped, 13.7% are not satisfied, while 11.7% respondents found the question difficult to answer.

Figure 44 shows that survey respondents indicated the most prevalent diseases in AOI communities are acute respiratory diseases (these include influenza and colds), cardiovascular diseases (heart disease), and infectious diseases (jaundice, tuberculosis).

Figure 45: Most common health concerns in the AOI communities

[48] Most polyclinics also have basic maternity services.



**Total share exceeds 100% as multiple options could be selected*

Vulnerable groups can also be disproportionately impacted by health issues, or may have less resources to cope if there are health concerns in their households.

According to the Numbeo portal, Uzbekistan ranked 104th out of 142 with an index of 33.68, which means a low level of crime, in the ranking of countries by crime rate for the first half of 2022. In 2022, the number of recorded crimes in Uzbekistan was 105,215, while the figure for Kashkadarya region was 5,810.

Human Rights Watch (HRW) has reported that security services in Uzbekistan retain "enormous power" which they can use against their critics. A decree was signed in 2018 to reduce the power of the security services. However, HRW alleges that their power remains significant[49] as evidenced in the response to the 2022 protests.

[49] https://www.hrw.org/world-report/2021/country-chapters/uzbekistan#

The Uzbek constitution and laws prohibit arbitrary arrest and detention, however HRW states that there were such incidences reported, particularly in against journalists and bloggers, in 2023[50].

There is one police security office (called a district inspector) located in each of the AoI communities. The office is tasked with provision of basic security needs for the communities. Focus group respondents did not raise any concerns related to community safety and confirmed that they have trust in the security provided by the police.

On-site security will be hired by the EPC Contractor. Vulnerable and marginalized people have a slightly greater chance of being mistreated by security forces, due to their vulnerable status. However, the distance of the Project site from the nearest local communities means that the influence of security services hired for the Project will be low on community members.

5.4.7 Poverty and equity

According to the Asian Development Bank (ADB), as of 2020 a total of 11.5% of the population of Uzbekistan lived under the national poverty line. Between 2010 and 2020 the Government of Uzbekistan calculated poverty based on a minimum consumption of 2,100 kilocalories per day as recommended by the World Bank. After 2021 calculations on the poverty of the population are made by comparing the income of the population with a minimum consumption expenditure index in accordance with the Decree of the Cabinet of Ministers No. 544 of August 27, 2021. The minimum consumption expenditure index (or poverty line) is currently $2.15 and the extreme line equates to $1.90 per day (using the purchasing power parity poverty indicator as of 2021).[51]

A total of 18.7% of the working population is under the $2.15 per day poverty line and 6.6% of the working population in Uzbekistan earned less than the $1.90 per day in 2023, or are considered in extreme poverty.[52] Poverty levels in Uzbekistan had been decreasing, however they have been negatively impacted by the COVID-19 pandemic. In 2020 it was determined that 1.3% of the population (approximately 448,000 people) may have fallen into poverty as a result of COVID-19[53].

With an average monthly income of $80 ($2.67 per day) survey respondents are above both the $2.15 and the $1.90 per day extreme poverty threshold, but below the World Bank's $3.20 poverty line, designed for people living in lower-middle-income countries (LMIC), which is what Uzbekistan is considered to be. At the time of writing this report the minimum wage in Uzbekistan is 1,050,000 som ($82) and the poverty line is 621,000 som ($48). A total of 24 households (7%) have a total income as stated in the socioeconomic survey of over the minimum wage, and 113 households (31.6%) have an income of over the poverty line. That leaves 245 households (68.4%) with a reported income that is below the official poverty line.

[50] https://www.hrw.org/world-report/2024/country-chapters/uzbekistan#

[51] https://www.adb.org/countries/uzbekistan/poverty

[52] https://www.adb.org/countries/uzbekistan/poverty

[53] https://www.undp.org/press-releases/uzbekistans-health-care-system-economy-hit-hard-covid-19

The largest expenditures for survey respondents were on food (47% of expenditure on average), followed by purchase of potable water (11% of expenditure on average) and transportation (11% of expenditure on average). The large amount of expenditure on essentials such as food and water is an indicator of insecurity in the local communities.

Loans and credit appear to be readily available within the local communities as 42.7% of the surveyed households reported that they have loans they are repaying. Loan repayment for the majority of the surveyed households (72%) is less than 10% of their reported income, and 26% of households have loan repayments between 10% and 50% of their reported income. The final 2% of households have reported that their loan repayments are more than 50% of their income.

Respondents of the socioeconomic survey were asked whether they consider their income to be sufficient or not (Table 29). Only 1.4% of respondents indicated that their income is more than enough to buy anything. Nearly one quarter, 22.3%, of respondents in the AOI communities stated their income is enough for more than just basic needs, but not enough to buy anything they want, and 49.4% said their income is enough only for basic needs (food, clothing, bills). One quarter, 26.5%, of respondents stated that their income is not enough to cover basic needs, while 0.3% of the total respondents believe that their income is not enough even to buy food (only households living in Batosh community were included in this category).

Table 29: Sufficiency of incomes in AOI communities

	Yangiabad	Khalkabad	Batosh	Aynakul	Total
Income is more than enough, can buy anything	0.0	3.8	1.1	1.1	1.4
Income is enough for more than just basic needs, but not enough to buy anything	30.2	25.3	14.6	19.1	22.3
Income is enough only for basic needs (food, clothing, bills)	51.0	40.5	47.2	57.4	49.4
Income is not enough to cover basic needs	18.8	30.4	36.0	22.3	26.5
Income is not enough even for food	0.0	0.0	1.1	0.0	0.3
Total	100	100	100	100	100

Source: Socioeconomic survey, 2023.

Table 30 below provides information about main household assets of the respondents. The majority of households own a mobile phone and a TV (98.6% and 96.1% respectively), the next most owned item is a refrigerator (83.5%). Approximately one third (37.4%) of surveyed households have cars, and 27.1% of respondents stated that they have air conditioner. This level of asset ownership confirms that AOI households have enough income to satisfy their basic needs, and in some cases more than just basic needs.

Table 30: Main household assets of the respondents

Asset	Yes	No
Car	37.4	62.6
TV	96.1	3.9
Satellite dish	1.1	98.9
Washing machine	20.7	79.3
Refrigerator	83.5	16.5
Air conditioner	27.1	72.9
Greenhouse	2.0	98.0
Personal computer	9.2	90.8
Mobile phone	98.6	1.4

**total share exceeds 100% as multiple options could be selected*

5.4.8 Vulnerable groups

In Uzbekistan, vulnerable citizens are considered to be those belonging to seven categories in the "Iron book"[54]. These include:

- low-income families (based on the minimum consumption index);
- people living with a disability;
- families in need of social protection;
- single elderly people;
- permanent unemployed citizens;
- citizens who are unemployed due to COVID-19 quarantine (a remnant of the COVID-19 pandemic);
- citizens returning from severe epidemiological regions (as above).

The National Agency for Social Protection under the President of the Republic of Uzbekistan (hereinafter referred to as the Agency) was established by the Decree of the President of the Republic of Uzbekistan "On a set of measures to provide high–quality social services and assistance to the population, as well as to establish a system of their effective control" dated 01.06.2023. The Agency is an authorized state body for the development and implementation of a unified state policy in the field of social protection and provision of social services and performs its activities independently of other state bodies and organizations and their officials. The agency's mission is professional social service and social assistance to these groups.

Table 31provides an indication of the total vulnerability status of the AOI using the definitions of vulnerability provided by the khokimiyats (these are given as an indication of information available, and do not include all of the categories stated above).

Table 31: Number of vulnerable people in AoI communities

Name of district/community	Number of vulnerable people
Yangiabad community	630 low-income families, 109 people living with a disability,16 families without breadwinner, two single elderly people and 77 households with large numbers of dependent children (4 or more) (As of December 2022)
Khalkabad community	Two low-income families, 106 people living with a disability, 16 families without breadwinner, two single elderly people, and 77 households with large numbers of dependent children (As of December 2022)
Batosh community	Eight low-income families, 81 people living with a disability and 10 families without breadwinner, one household with a single parent,

[54] "Iron book" is a database for registering, identifying, eliminating and monitoring the problems of families with difficult social conditions and living conditions, as well as those under special control by sector leaders.

	one single elderly person and 11 households with large numbers of dependent children (As of July 2023)
Aynakul community	Five low-income families, 112 people living with a disability, nine families without breadwinner, two single elderly people, 18 households with single parent and 86 households with large numbers of dependent children (As of December 2022)

The Project lenders consider vulnerable groups to include people living with a disability, people living under the poverty line, the elderly, and women and children headed households, internally displaced people, ethnic minorities, the landless, people dependent on natural resources. Per the sections above, no communities considered internally displaced, or ethnic minorities have been identified with the AOI communities. The remainder of the vulnerable groups are discussed below.

- Disability - Among the surveyed households, the number of people living with a disability was 37 (10.3% of the population). Of the 37 people, 24 of them (64.9%) are living with a physical disability, seven people (18.9%) are living with an intellectual disability, and six people (16.2%) have a chronic illness.
- Poverty - Approximately 68.4% of surveyed households have an income below the poverty line (for more information on people living under the poverty line see section 5.4.7 above).
- Elderly - A total of 8.5% of the population of survey respondents is over the age of 60, with more women in this age range than men (9.9% and 8.3% respectively).
- Female and child headed - Of the surveyed households 82 or 23% were female headed households. None of the households reported as being child led (or with a household head under the age of 18 years old).
- Landless – no squatters or landless persons were identified during the site visits, or identified during consultations.
- Natural resources reliance - None of the survey respondents have identified as being dependent on natural resources. However, it is known that four herders are impacted by the Project and these households could be considered to be reliant on the natural resources from the pastures for grazing their animals.

Applicability to receive government allowances is also a measure of vulnerability in Uzbekistan. Respondents were asked if they receive a monthly low-income allowance from the government, and 13.7% respondents in AOI communities said yes, while 22.6% indicated that they should receive an allowance, but it is not provided. The remainder of respondents do not receive an allowance as their family does not fit the criteria.

Additionally, the 2% of the population that has loan repayments that make up more than half of their income could also be considered vulnerable. See also section 5.4.4 for numbers of unemployed people.

The numbers of vulnerable people in the AOI communities reflects a high level of instability and vulnerability, with up to 65% of the population considered vulnerable. Many of the people identified above are likely to have more than one form of vulnerability, therefore there may be some double counting as people that are also vulnerable are often disproportionately impacted by poverty.

A person's demographics, such as age, disability, gender and level of education can impact a person's employment opportunities, particularly in a predominantly rural area, such as the AOI communities, and thus also their poverty status. Thus, finding employment opportunities for vulnerable groups is more difficult. Buying and owning land can also be more difficult for some people, while legislation in Uzbekistan does not limit land ownership for women, societal and religious norms may. Lack of employment and access to property rights can add to a person's stability, which may result in their increasing vulnerability.

Having one or more vulnerabilities may impact a person's access to basic services, such as health services, or access to social assistance, thus reducing their capacity to bounce back from any shocks or changes in their lives.

5.4.9 Accommodation, living conditions and household amenities

In 358 surveyed households total of 1,968 people live, and each household consists of 5-6 family members. All of the respondents of the survey live in private houses, meaning that no one lives in multi-stored apartments. A total of 99.4% own their own homes, while 0.3% live in dedicated houses for work, and 0.3% live in rented houses. The majority, 84.3% of the houses, are registered (owned) under the name of a male member of the household and the remaining 15.7% registered under the name of a female member (usually the household head).

When respondents of the socioeconomic survey were asked how stable the electricity supply is in their community, 12.8% of respondents responded that their electricity supply is unstable in winter, while 42.2% of respondents stated that electricity supply is unstable all year round. According to 45% of survey respondents the electricity in the AOI communities is stable all year round.

Table 32 below gives information about the main sources of water for drinking and cooking in the AOI communities. The majority of households from all AOI communities use water that they buy from a water carrier for drinking water. In Aynakyl community more than half of the survey respondents use a water carrier, and another quarter of respondents use water from a well in their yard.

Table 32: Main sources of water for drinking and cooking in AOI communities

	Yangiabad	Khalkabad	Batosh	Aynakul	Average of the AOI communities
A pump in my or neighboring yard	1.1	0.0	0.0	11.3	2.3
Own groundwater well in the yard	1.1	11.4	2.5	24.5	8.2
Delivered water by a water carrier, for a fee	94.5	88.6	91.2	54.7	85.2
Delivered water by a water carrier free of charge	2.2	0.0	1.3	0.0	1.0

	Yangiabad	Khalkabad	Batosh	Aynakul	Average of the AOI communities
Water supply on the street or in other places of mahalla, district	0.0	0.0	5.0	9.5	3.0
Irrigation canal, ditch	1.1	0.0	0.0	0.0	0.3
Total	100.0	100.0	100.0	100.0	100.0

Table 33 below gives information about the main sources of water for other household activities in the AOI communities. As with drinking water, the use of a water carrier is the predominant source of water for all surveyed households, with Aynakul community the only community where over one quarter of the community also use groundwater wells.

Table 33: Main sources of water for other household activities in the AOI communities

	Yangiabad	Khalkabad	Batosh	Aynakul	Average of the AOI communities
A pump in my or neighboring yard	2.2	0.0	0.0	9.6	2.3
Own groundwater well in the yard	1.1	5.1	3.7	26.9	7.2
From the drainage channel/collector	1.1	0.0	0.0	0.0	0.3
Delivered water by a water carrier, for a fee	89.1	84.7	90.0	48.1	81.3
Delivered water by a water carrier free of charge	6.5	1.3	0.0	5.8	3.3
Water supply on the street or in other places of mahalla, district	0.0	0.0	5.0	9.6	3.0
Irrigation canal, ditch	0.0	8.9	1.3	0.0	2.6
Total	100.0	100.0	100.0	100.0	100.0

A total of 43% survey respondents from Khalkabad community are connected to the centralized gas system. In Khalkabad 2.5% of respondents and in Batosh 4.5% of respondents have access to the

centralized gas, but it does not work. Other survey respondents including the members of Yangiabad and Aynakul communities stated that they are not connected centralized gas supply.

There is no centralized heating in place in any of the AOI communities. For heating, in Yangiabad community respondents stated that mostly burning dry manure and electricity are used, while respondents from Khalkabad, Batosh and Aynakul communities are mostly reliant on burning wood or plant materials and dry manure for heating. For cooking in Khalkabad, Batosh and Aynakul communities predominantly use gas cylinders. In Yangiabad community wood or plant materials are mostly used together with gas cylinders for cooking.

There is no central sewerage in the AOI communities. For Khalkabad community removal of waste by the state garbage company is the most used method of waste disposal, but in Yangiabad and Batosh communities most of the waste is thrown into a pit for special waste in their yard. In Aynakul community waste is mostly taken away by private waste company. Table 34 provides an overview of waste disposal methods.

Table 34: Waste disposal methods (%)

	Yangiabad	Khalkabad	Batosh	Aynakul	Average of the AOI communities
A special pit for waste in the yard	70.8	10.1	50.6	11.7	36.9
In public trash cans on the street	12.6	5.1	4.5	9.6	8.1
Waste is taken away by a private waste company	0.0	21.5	14.6	43.6	19.8
Waste is taken away by the state garbage company	0.0	63.3	16.9	19.1	23.2
Waste is taken away by the state waste-processing company	0.0	0.0	11.2	16.0	7.0
Disposed of in a field	7.3	0.0	1.1	0.0	2.2
Waste is thrown into a valley	8.3	0.0	0.0	0.0	2.2
Used as fuel	1.0	0.0	1.1	0.0	0.6
Total	100.0	100.0	100.0	100.0	100.0

Source: Socioeconomic survey, 2023.

5.4.10 Agriculture and livelihoods

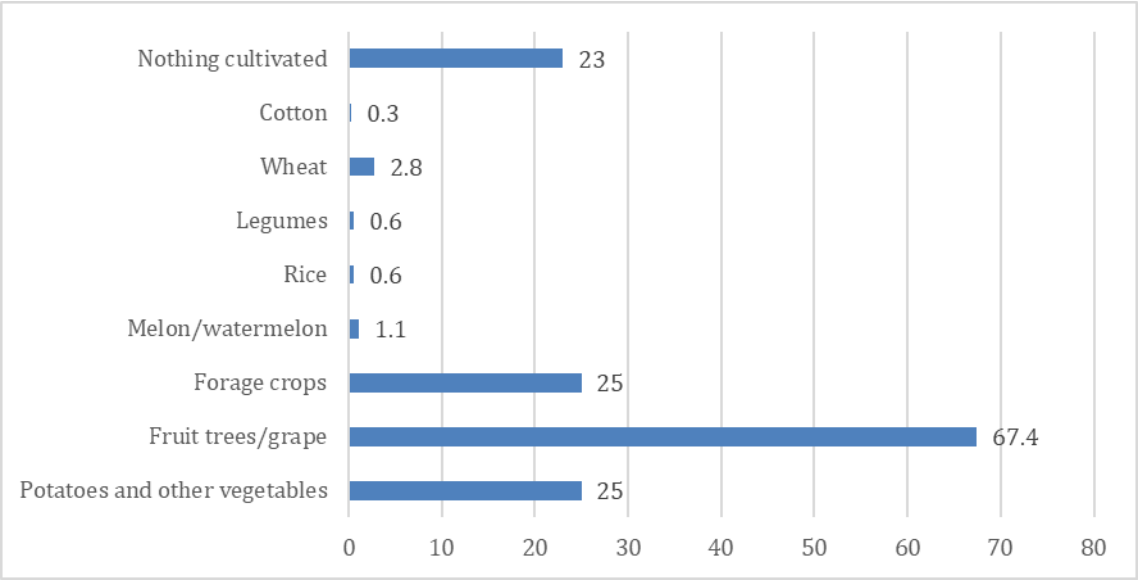
The land within the project area is leased to farmers and used by herders as idefined in section 3.4. Examples of grazing activities are provided in Figure 45 below.

Figure 46: Observed grazing activities

Most of the surveyed households have agricultural land plots (within their communities, not on or near the Project site). Of the total respondents 96.9% have only tomorka (household garden plots), while 2.8% have tomorka and other areas of land as well and 0.3% of the respondents reported that they do not have land.

The types of agricultural products respondents grew on their land plots in 2022 are provided in Figure 46. Respondents were allowed to select multiple answers.

Figure 47: Types of agricultural crops grown on agricultural land plots



When survey respondents were asked about whether they farm throughout the year or during certain seasons of the year, 60.3% of respondents stated that they engage in farming activities the whole year, while 14.0% are only active in spring, 29.6% in summer, 27.7% in autumn and only 0.7% farm in winter.

Most of the surveyed households farm their land plots for personal consumption only (85.5%), and the purpose of the remaining 13.9% of farms is both for sale and personal consumption. The minority, 0.6%, are engaged in agricultural activities for only income purposes.

Table 35 below gives information about sources of labour that surveyed households in the AOI use for their agricultural activities.

Table 35: Source of labour for their agricultural activities in the AOI

	Hired workers	Family members (adults – not children)	Family members (children)
Yangiabad	2.5	93.8	10.0
Khalkabad	2.8	97.2	0.0
Batosh	6.2	100.0	9.9
Aynakul	3.7	97.5	1.2
Total	3.8	97.1	5.4

**The total share exceeds 100%, because multiple answers could be selected*

According to the survey results, male family members (42.7%) are slightly more involved in agricultural activities than their female counterparts (32.8%). In 24.5% cases both men and women are involved together.

During the observations it was revealed that local people around the Project site graze their livestock in the Project area mostly in spring.

Respondents of surveyed households were asked about the livestock and poultry that they own. A total of 65.9% respondents indicated that they have livestock and poultry, 67.1% of them own cattle, whereas approximately half of the respondents (51.2%) who own livestock have sheep and goats. Only 2.5% breed camels, and 56.5% of households own poultry.

Ten respondents from Yangiabad, five from Khalkabad, four from Batosh and 11 from Aynakul community use the Project area for grazing. Table 36 below gives information about the purposes for which the Project site is used. The majority of households (28 households) use the land for grazing, but there are households that use the land for collecting herbs, recreation, farming and collecting manure. Please note, that the responses to this question were provided on the original Project area, and the location of the Project site has now changed.

Table 36: The purpose of the Project site usage

	Grazing	Collecting herbs	Cultural and/or recreation	Farming	Collecting manure
Yangiobod	9	1	0	1	1
Khalkobod	4	0	1	0	0
Batosh	4	1	0	1	0
Aynakul	11	2	0	0	0

	Grazing	Collecting herbs	Cultural and/or recreation	Farming	Collecting manure
Total	28	4	1	2	0

**Multiple answers could be selected*

As identified in Table 36 local herders and other local community members stated that they collect the herb peganum (or rue) on and around the Project stie. During the site visit consultation it was identified that the herbs mainly grow around the local communities and along the main road M-39 in spring. As the location of the Project site was changed, the collection of herbs is not expected to be impacted by the Project.

Consultations with local community leaders and community members has confirmed that this herb is only picked for personal use (people do not rely on them for their livelihoods) and it is abundant in the whole area. Therefore, no livelihood impacts related to the loss of herb collecting are expected and while these impacts were assessed during the preparation of the LRP, it was found that these people were not affected[55]. No impacts are expected relating to the collection of dung, as there is not expected to be a reduction in the number of animals able to be grazed in the remaining grazing areas around the site. In addition, during the LRP studies no impact on objects of cultural heritage or recreational locations was observed. The closest relevant area is a cemetery called 'Ettikul religious visiting place' which is located 870 m away from the south-eastern boundaries of the Project.

Three respondents from Yangiabad, one from Batosh and two from Aynakul community have an official agreement to undertake grazing activities within Project area (it appears that one household in Khalkabad also has an unofficial agreement, which was not disclosed in the socioeconomic surveys). Agreements of the six households are with the following entities:

- Two from Yangiabad have a contract with local farmers;
- One from Yangiabad and one from Aynakul have an agreement with the khokimiyat, and
- One from Batosh and one from Aynakul have an agreement with Agrocluster[56].

Three people from Yangiabad, one person from Khalkabad, one person from Batosh and two people from Aynakul community pay for land use as follows:

- Two people from Yangiabad pay 150,000 UZS, while remaining the remaining person from this community pays 100,000 UZS.
- One respondent from Khalkabad pays 100,000 UZS,
- One from Batosh pays 300,000 UZS.

[55] Note: Monitoring has been included in the LRP to make sure there are no livelihood impacts as a result of the herb and dung collection. Stakeholder engagement will also include consultation with herb and dung collectors to capture any unforeseen impacts.

[56] Please note that the information on land use agreements was provided for the old layout and is therefore not consistent with the information in the LRP.

- One from Aynakul community pays 50,000 UZS, while another one from the community pays 60,000 UZS57.

Of those households that use the land, 26.7% users use the land daily, 13.3% use it one or two times in a week and 60% use the area seasonally. Of the seasonal households 83.3% use the Project site in spring, 50% in summer, 22.2% in autumn and 5.6% use in winter.

5.4.11 Transport infrastructure and traffic

Respondents were asked how often they use the M39 road. Table 37 shows that the road is used 2-3 times per week, by the majority of households. Members of Khalkabad use the road the most often with 51.9% of surveyed households using the road daily.

Table 37: Frequency of usage of the road (M39) next to the Project site

	Daily	2-3 times in a week	One or two times a month	Once in a few months	Seasonally	Do not use	Total
Yangiabad	27.1	44.8	24.0	1.0	1.0	2.1	100
Khalkabad	51.9	31.6	2.5	1.3	0.0	12.7	100
Batosh	14.6	42.7	27.0	7.9	1.1	6.7	100
Aynakul	33.0	25.5	25.5	5.3	1.1	9.6	100
Total	31.0	36.3	20.4	3.9	0.8	7.6	100

Source: Socioeconomic survey, 2023.

A total of 14.6% of respondents from Yangiabad, 9.2% from Batosh and 13.8% from Aynakul community indicated that there are alternative roads to M39. Ultimately there are no viable alternatives to the M39 for heavy traffic, or vehicles travelling long distances. The two types of roads that were mentioned by respondents as possible alternatives, are internal roads and cycle roads. These would only be relevant for local traffic to avoid specific areas of congestion (if needed). During the consultations, it was identified that traffic flow is low and no heavy vehicles were identified on the internal roads.

No public transport is available within the local communities. Community members mostly use their own private cars and taxis for transportation purposes. As mentioned in section 5.4.7 a total of 37.4% of survey respondents stated that they own their own cars.

5.4.12 Language and ethnicity

The ethnic make-up of the communities as provided by the khokimiyats is:

- Yangiabad community - Uzbeks (6,471), Tajiks (38) and Azerbaijanis (one).

[57] Please note that the information on land payments was provided for the old layout and is therefore not consistent with the information in the LRP.

- Khalkabad community - Uzbeks (4,858), Tajiks (77) and Russians (one).
- Batosh community - Uzbeks (4,907), Tajiks (three) and Turkmens (one).
- Aynakul community - Uzbeks (5,675), and Tajiks (two).

The October 2023 survey identified that almost all of the people (99.5%) in the surveyed communities were Uzbek and the remaining 0.5% were Tajik. In Yangiabad 1.7% and in Batosh 0.2% of the community were Tajiks, while all of the other respondents were Uzbeks. During the site visits it was identified that all of the people in the AOI communities speak Uzbek as their first language.

The socioeconomic survey did not include questions related to religion due to sensitivity to this type of question for people in the region. However, in general, people practise Islam. Site observations as well as consultations conducted with local communities at the Scoping and ESIA stages did not reveal presence of attributes of other religions that could cause conflict or cause individuals to be more vulnerable to Project impacts.

Local community members do not use the Project site for any cultural, social or recreational purposes (as determined during studies to complete the LRP and discussed in section 5.4.10). the closest area of cultural significance is the 'Ettikul religious visiting place' which is located 870 m away from the south-eastern boundaries of the Project.

In addition to no social or cultural practices being carried out on site, local community members do not have any social or cultural practices that could be negatively impacted by the Project, or that need to be preserved or protected during the Project implementation.

5.4.13 Indigenous people

IFC PS7 defines Indigenous peoples (IPs) as a distinct social and cultural group possessing the following characteristics in varying degrees:

- Self-identification as members of a distinct indigenous social and cultural group and recognition of this identity by others
- Collective attachment to geographically distinct habitats, ancestral territories, or areas of seasonal use or occupation, as well as to the natural resources in these areas
- Customary cultural, economic, social, or political institutions that are distinct or separate from those of the mainstream society or culture and
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside

EBRD PR7 defines IPs as a social and cultural group, distinct from dominant groups within national societies, possessing all of the following characteristics:

- self-identification as members of a distinct indigenous ethnic or cultural group and recognition of this identity by others;
- collective attachment to geographically distinct habitats, traditional lands or ancestral territories in the project area and to the natural resources in these habitats and territories;
- customary cultural, economic, social, or political institutions, laws or regulations that are separate from those of the dominant society or culture; and

- a distinct language or dialect, often different from the official language or dialect of the country or region.

In the ADB SPS 2009 Safeguard Requirements 3: Indigenous Peoples (SR3) the term Indigenous Peoples is used in a generic sense to refer to a distinct, vulnerable, social and cultural group possessing the following characteristics in varying degrees (they are very similar but not exactly the same as the IFC characteristics):

Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;

- Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
- Customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and
- A distinct language, often different from the official language of the country or region.

In considering these characteristics, national legislation, customary law, and any international conventions to which the country is a party will be taken into account.

Based on the data collected during the socio-economic survey and consultation engagement with community member in the AOI, there are no Indigenous Peoples within the project AOI as defined by applicable lender criteria (IFC PS 7, EBRD PR7, ADB SR3).

5.4.14 Cultural heritage

A combination of desk study review and site visit observations (field surveys by archaeological search and excavation methods) were conducted on the planned Project site by the Academy of Sciences of the Republic of Uzbekistan, National Archaeological Center. Archaeological research was conducted in three stages: in November 2023, in March 2024, and in May/June 2024.

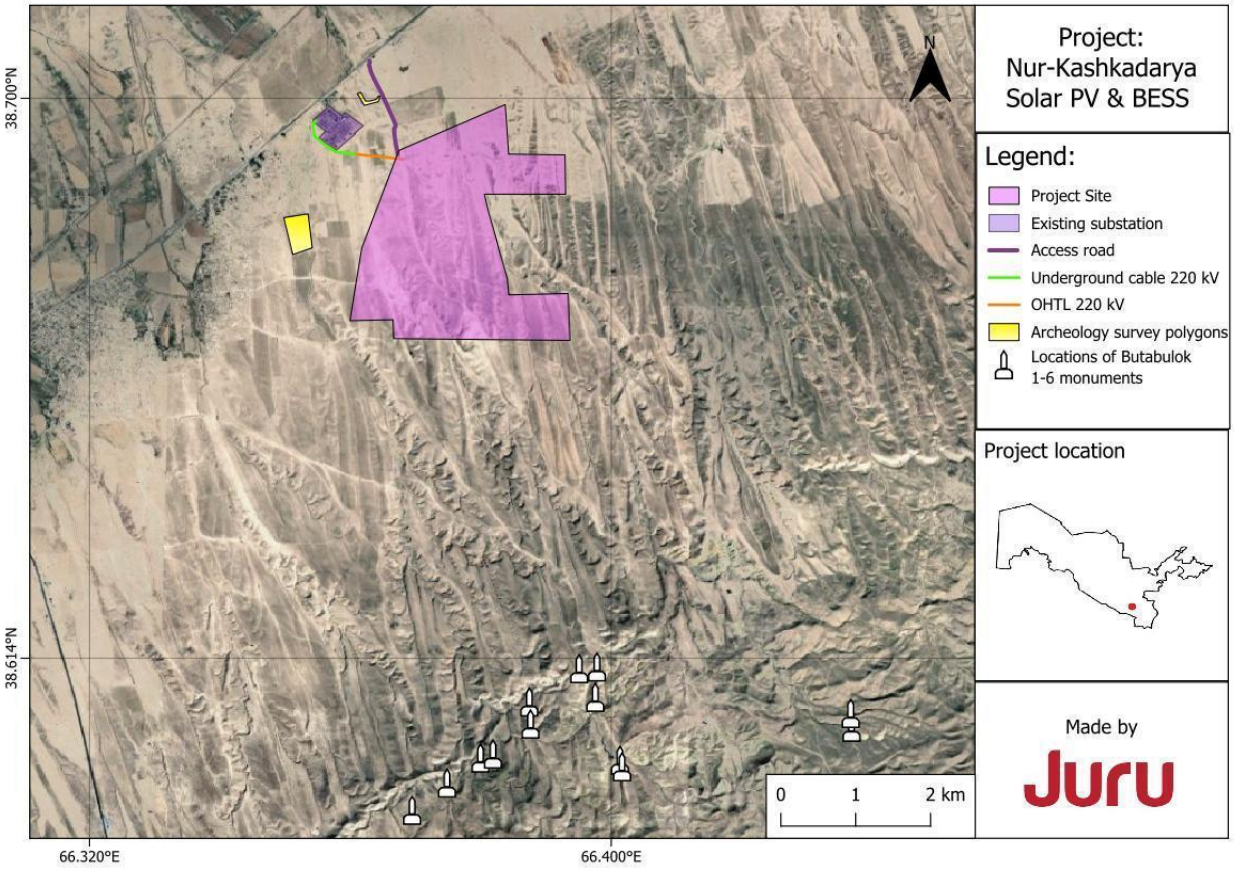
Information was provided on the general area surrounding the Project. It found that in the central part of Kashkadarya region (particularly in the area of Karshi city), the initial archaeological exploration in 1946-1948 identified approximately 30 archaeological sites of three different types. During this period, many archaeological sites from the pre-Arab invasion period were discovered. The March and May 2024 research found that a number of prehistoric workshops and settlements have been identified in the vicinity of the Butabulok spring and within the Paleogene strata both of which are outside the Project site.The initial review of the Project site in November 2023 identified areas of archaeological interest where findings, such as pottery, were discovered (the summary of the findings is presented in Table 38). One of these areas was marked by an "L" shaped polygon, located just within the Project site, while another polygon was positioned to the southwest, slightly outside the Project boundary (as seen in Figure 47). As a result of the survey, the Project's layout was adjusted to avoid these surveyed areas.

Two further, more detailed surveys (in March and May 2024) revealed no cultural layers at the project site, and all these findings were likely moved there from elsewhere, possibly by water flow.

Now the distance from the "L" shaped polygon with these findings to the access road is now approximately 40m, and it is about 870m away from the main Project site. Additionally, the rectangle-

shaped survey polygon is located around 660m from the Project site, while the closest Butabulok monument lies approximately 5600m south of the Project's southern boundary.

Figure 48: (1) Archaeology survey polygons and (2) remains of Butabulok monuments on the south of the Project site



The archaeological surveys found many stone artifacts belonging to the historical period from the Middle Palaeolithic to the Neolithic period, as well as the number of findings from the late Middle Ages and Modern Era. These artefacts were found to have been disbursed from other locations (not from any prehistoric workshops on the Project site) and were found at ground level. Table 35 provides an overview of the types of artifacts that were found on site.

Figure 49: Distance between access road and "L" shaped survey polygon

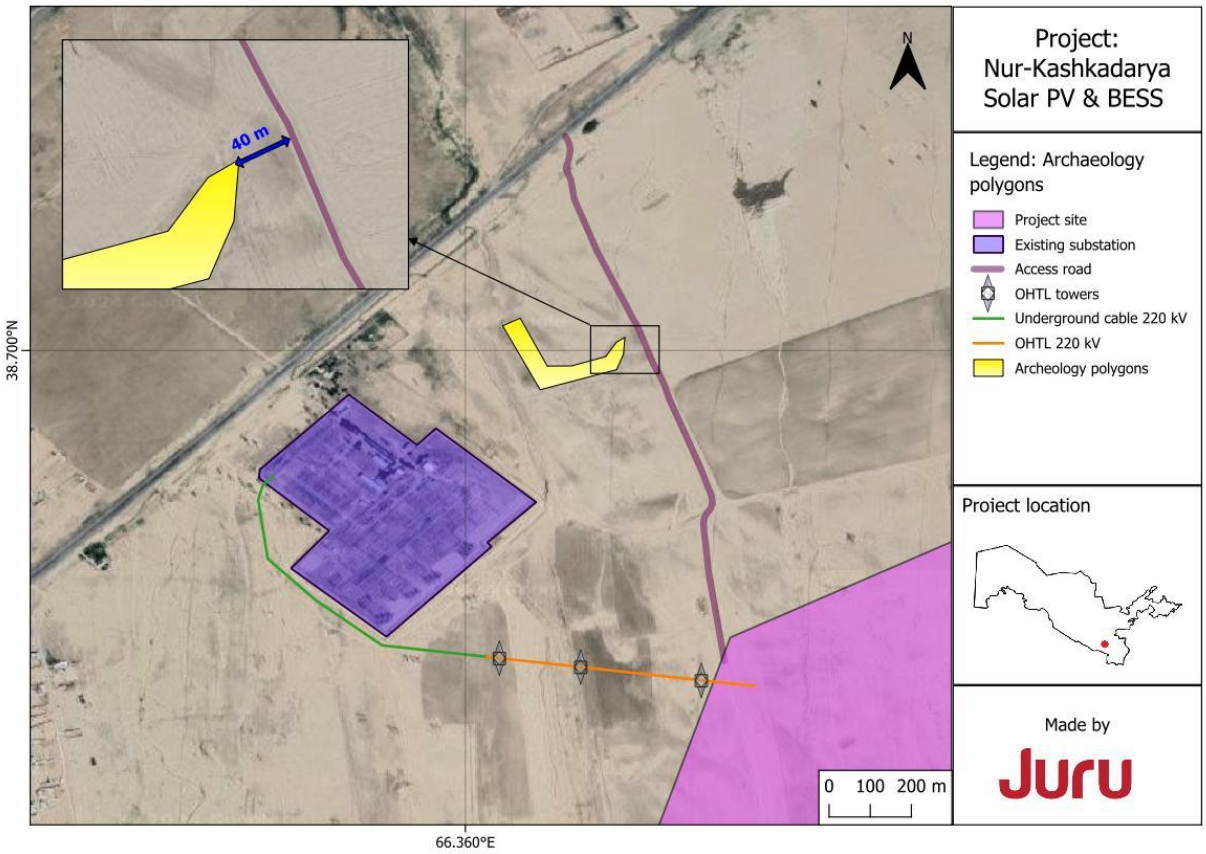


Table 38: Summary of findings – archaeological survey

№	Photo	Description	Condition of object	The field it was found	Time period object was made	Date of finding
1		Glazed and unglazed pottery	Remnants		16th to 19th centuries	Nov 2023
2		Stone implement	Distal part is broken		Neolithic period	Nov 2023
3		Pencil-shaped core	Core	Point 23	Neolithic period	Mar 2024

№	Photo	Description	Condition of object	The field it was found	Time period object was made	Date of finding
4		Core	Core	Points 29, 45, 52	Neolithic period	Mar 2024
5		A finding	Findings	Point 15	Palaeolithic period	Mar 2024
6		Ceramics and terracotta statuettes	Fragments	Points 11, 14	Ancient and Medieval	May 2024

Source: Archaeological and exploration works carried out (November 2023 – May 2024) in the areas of Guzar District of Kashkadarya Region to determine archaeological monuments, IOA, June 2024

More detailed studies conducted in March, May and June 2024 did not identify any specific artefacts or main archaeological receptors of any relevance within the Project site.

The June 2024 survey has concluded that it is possible to undertake construction works in the Project area under the supervision of an archaeologist. A detailed report on the survey work conducted can be found in Technical Appendix III.

The communities of Yangiabad and Khalqabad each have one cemetery and Aynakul community has three cemeteries, these are not expected to be impacted by the Project.

During the socio-economic survey respondents were asked if they know about any cultural sites of international, national or local importance located within the Project area or within a 5 km radius. 36 respondents said that they know of a site of cultural heritage, while the remaining respondents did not know, or found it difficult to answer. Respondents were asked that if yes, please indicate what the area of cultural heritage is. Table 39 gives information about this.

Table 39: Cultural sites mentioned by respondents

	Ancient cemetry	Ettikul religious visiting place	Hoja Buzruk Ota religious visiting place	Azillo Bobo religious visiting place	Total
Yangiabad	17	0	0	0	17
Khalkabad	0	0	0	0	0
Batosh	0	0	8	1	9
Aynakul	4	6	0	0	10
Total	21	6	8	1	36

Source: Socioeconomic survey, 2023.

None of these locations are within the Project site.

5.4.15 Human rights

As Uzbekistan is considered a member of United Nations (UN), all of the main international instruments of the UN relating to the protection of human rights and freedoms, including the UN Universal Declaration of Human Rights, Human Rights Council Resolution No. 30/15 on human rights and preventing and countering violent extremism, Convention on the Elimination of all Forms of Discrimination against Women among others, have been ratified by the government of Uzbekistan.

In order to create the necessary organizational, legal, social, economic, spiritual and moral foundations for the protection of human rights, the state policy of Uzbekistan in the field of human rights aims to prevent violations or any restriction of human rights and freedoms. In 1995-1996, two independent and effective institutions for the protection of human rights were established in Uzbekistan:

- The Human Rights Commissioner (Ombudsman) of the Oliy Majlis of the Republic of Uzbekistan; and

- The National Centre for Human Rights.

In subsequent years, special structures for the protection of human rights were established in various ministries and departments of the Republic of Uzbekistan. While the government has implemented a number of positive steps towards the protection of human rights, there remain some areas where there are risks to the human rights of Uzbek citizens. For example, homosexual relations are prohibited in Uzbekistan and restricted by Article 120 of the Criminal Code on "Sodomy".

Although Uzbekistan prohibits violence against women and girls, there is no reliable data on domestic violence in Uzbekistan where many victims remain silent for fear of bringing shame to their families (ADB, 2018). It should be noted that Uzbekistan has experienced an increase in domestic violence since the outbreak of COVID-19. Alongside the economic hardships which have resulted in income and job losses in many households, there has been an increase in the rates of physical, verbal, emotional, economic, and sexual abuse against women and girls[58].

According to the Ministry of Internal Affairs, local law enforcement in Uzbekistan issued more than 8,430 protection orders to ensure security of domestic violence victims between January to October 2020. Out of these, 4330 experienced physical abuse, while around 3,200 suffered emotional abuse (World Bank, 2021). The number of unreported cases is expected to be much higher. In over 7,600 cases, women and girls in Uzbekistan experienced violence within their own families and in almost 5,920 of these cases, the aggressors were their husbands. Survey and focus group discussion (FGD) respondents did not identify any elevated risk of gender-based violence (GBV) in the AOI communities.

Uzbekistan has a record of forced and child labour (particularly in the cotton industry, with a small incidence of forced labour in construction work under the traditional hashar system[59]). However, it has ratified the ILO conventions on forced labour, minimum age and worst forms of child labour. The incidence of forced and child labour has reduced significantly in recent years, and it is not a high risk in this type of project which employ workers through national or international companies (rather than community level organizations which may employ the hashar system), it will also require more skilled labour, which would not be able to be sourced from the local communities as forced labour.

The majority of children do not work in all AOI communities. The highest number of working children was reported in Batosh and Aynakul communities, where unpaid working on the family farm was the prevalent form of work for children. However, it should be noted that paid employment for children was identified in all AOI communities (Table 40).

[58] Women Must Play a Central Role in Uzbekistan's Recovery from the Pandemic (worldbank.org)

[59] Under hashar system community members are expected to perform voluntary work for communal benefit.

Table 40: Employment of children in the AOI Communities

Name of administrative division	Paid employment	Family farm/business	Does not work
Yangiabad community	12.5%	14.6%	72.9%
Khalkabad community	3.6%	21.4%,	75%
Batosh community	5.0%	40.0%	55.0%
Aynakul community	7.1%	38.1%	54.8%

Source: Socioeconomic survey, 2023.

The working hours of the working children are as follows:

- Yangiabad community -84.6% of the working children work 11-20 hours per week, and 15.4% work around 21-30 hours.
- Khalkabad community -66.7% of the working children spend 11-20 hours to work in a week, while remaining 33.3% work 21-30 hours.
- Batosh community - 16.7% of the working children work 1-10 hours per week, and 83.3% work around 11-20 hours.
- Aynakul community -88.2% of working children work 11 and 20 hours to work in a week, while 11.8% work 21-30 hours.

Human rights are further discussed in the Project Human Rights Impact Assessment (HRIA), Technical Appendix III.

5.4.16 Gender

Uzbekistan, particularly in the more rural areas of the country, has set male and female gender roles. With women's roles being more family and home focused and men's roles being more community and employment focused. Survey results reveal that women in the AOI communities are expected to perform domestic chores like cooking and washing, in their families; while the men are more involved in going to the market, the purchase of food and non-food items.

When respondents were asked about the main problems that women in their household face in society, especially in the workplace, almost two fifth (39.1%) of respondents stated that no challenges were faced. Following that the main concerns raised were economic inequality (23.0%), the lack of opportunities for a career (19.9%), and difficulties in accessing education and professional training (18.6%). See Table 41 below.

Table 41: Challenges faced by household members in affected communities (%)

	Yangiabad	Khalkabad	Batosh	Aynakul	Total
Economic inequality	25.0	13.9	28.1	17.0	23.0

Limited access to equal opportunities	6.3	25.3	5.6	8.5	10.9
Lack of respect	1.0	19.0	9.0	4.3	7.8
Unequal access to public services	6.3	1.3	10.1	9.6	7.0
No opportunities for career	35.4	2.5	12.4	21.3	19.9
Limited access to education, professional trainings	11.5	2.5	13.5	8.5	18.6
Weak participation in political life, governance and power	3.1	1.3	1.1	4.3	2.5
Unemployment	1.0	2.5	0.0	2.1	1.4
Neglect of women	1.0	0.0	0.0	0.0	0.3
No such problems/issues	40,6	40.5	34.8	40.4	39.1

** Multiple options could be selected*

5.4.17 Knowledge about the Project

According to the survey results, a small percentage of respondents (5.9%) reported that they had previous knowledge about the Project, and 23.5% said that they had heard about it, but not much, while remaining 70.7% of households surveyed did not have any information about the Project.

Table 42 below gives information about from which sources respondents would prefer to receive information about the progress and results of the Project. Multiple options could be selected.

Table 42: Sources of information respondents prefer

	Yangiabad	Khalkabad	Batosh	Aynakul	Total
Special Project Newsletters	37.5	13.9	0.0	1.1	13.4
TV	38.5	24.1	59.6	59.6	46.1
Radio	0.0	2.5	1.1	1.1	1.1
Social media	41.7	31.6	47.2	35.1	39.1
Public consultations	3.1	11.4	2.2	2.1	5.1
Makhalla Committee	7.3	34.2	24.7	25.5	23.8
Municipality\ energy sales company \ energy sales inspector	0.0	24.1	4.5	1.1	6.4

5.4.18 Positive expectations of surveyed households from the Project

When asked what would be the positive impacts of the Project, the majority of surveyed households expect creation of new jobs (51.4% of AoI communities), an improved power supply (48.3% of AoI communities) and 2.2% think that nothing will change, and everything will remain the same. Table 43 below provides an overview of respondent's opinions on positive impacts of the Project.

Table 43: Positive impacts of project implementation

	Yangiabad	Khalkabad	Batosh	Aynakul	Total
The power supply will improve	32.3	75.9	55.1	35.1	48.3
The conditions for doing business will improve	12.5	8.9	7.9	8.5	9.5
Electricity generation costs will decrease	5.2	7.6	5.6	5.3	5.9
The power supply voltage will improve	13.5	16.5	13.5	17.0	15.1
The cost of electricity will decrease	4.2	3.8	10.1	8.5	6.7
Ecology will improve	2.1	3.8	2.2	3.2	2.8
New jobs will be created	64.6	49.4	42.7	47.9	51.4
The activities of schools, hospitals, and other social institutions will improve	2.1	3.8	2.2	1.1	2.2
Efficiency of electricity supply will increase	18.8	3.8	15.7	14.9	13.7
Nothing will change, everything will remain the same	3.1	1.3	2.2	2.1	2.2
Living standards will increase	1.0	0.0	0.0	0.0	0.3
Difficult to answer	2.1	6.3	6.7	9.6	6.1

**total share exceeds 100% as multiple options could be selected*

Source: Socioeconomic survey, 2023.

5.4.19 Negative effects of the Project

Respondents were asked what negative impacts they would expect for the population and territory from the Project. The majority of respondents (19.6%) from in the AOI communities think that the Project will reduce grazing areas, while 17% believe that it could cause ecological/environmental damage. Responses regarding negative impact are provided in Table 44 below.

Table 44: Negative impacts of project implementation

	Yangiabad	Khalkabad	Batosh	Aynakul	Total
Housing and property may be affected during construction	2.1	3.8	4.5	1.1	2.8
Job cuts	0.0	0.0	0.0	2.1	0.6
Damage to gardens\farm\pastoral lands	3.1	2.5	3.4	4.3	3.4
Noise, dust during construction work	15.6	12.7	9.0	9.6	11.7
Damage to roads, irrigation canals, gas, water pipes, bridges	2.1	0.0	2.2	2.1	1.7
Ecological/Environmental damage	12.5	19.0	13.5	23.4	17.0
Increased pressure on social infrastructure due to the influx of labour during the construction work of the Project	0.0	1.3	2.2	0.0	0.8
Traffic due to the moving heavy machinery	1.0	1.3	2.2	1.1	1.4
Reduced grazing areas	12.5	2.5	7.9	52.1	19.6
Increased radiation levels in the Project area	0.0	0.0	0.0	3.2	0.8
The project will not harm anyone	45.8	43.1	42.7	0.0	33.5
Difficult to answer	11.5	15.2	15.7	13.8	14.0

**total share exceeds 100% as multiple options could be selected*

Source: Socioeconomic survey, 2023.

A total of 27.4% of respondents support the idea that programs to support families in need should be developed, while 23.5% believe that Project developers have to agree with local community on a Project work plan. Table 45 below includes respondents' opinions from the AoI communities on what measures can be taken to mitigate negative impacts of the Project.

Table 45: Measures to mitigate negative impacts of the Project

	Yangiabad	Khalkabad	Batosh	Aynakul	Total
Appropriate compensation for losses	19.8	16.5	10.1	13.8	15.1

	Yangiabad	Khalkabad	Batosh	Aynakul	Total
Refusal to do work that may damage the property of the population and business	11.5	32.9	9.0	6.4	14.2
Programs to support families in need	29.2	22.8	29.2	27.7	27.4
Restoration of damaged communal, irrigation and social infrastructure	18.8	6.3	19.1	24.5	17.6
Agree with local community on project work plan	19.8	3.8	41.6	26.6	23.5
Removal of tasks that may harm the ecology/ environment	15.6	7.6	9.0	11.7	11.2
Public control over the progress of the Project through the involvement of representatives of the local community	16.7	12.7	9.0	21.3	15.1
The project should not be implemented close to populated areas	0.0	2.5	0.0	0.0	0.6
No negative consequences	0.0	0.0	0.0	1.1	0.3
Difficult to answer	16.7	12.7	10.1	10.6	12.6

**total share exceeds 100% as multiple options could be selected*

Source: Socioeconomic survey, 2023.

5.5 Biodiversity

5.5.1 Introduction

The Project is located at the northern part of the Kashkadarya valley, near the foothills of the Kitab-Shakhrisabz basin, in the southern foothills of the Gissar Ridge. The Kashkadarya region is located in the basin of the Kashkadarya River on the western slope of the Pamir-Alai Mountains. In the mountainous east, the climate is moderately humid, while in the plains the weather is colder in winter and hotter and drier in summer. The project area exhibits a hot desert climate (Köppen classification BWh). High temperatures, scarce rainfall, abundant sunshine, and low humidity characterize the arid conditions. This region characterised by low density, height, diversity, and productivity of plant life, and similarly low density and diversity of animal life, though many of the species are highly adapted and specialized to survive in desert climates, and the flora and fauna include a number of sensitive species with relatively narrow ecological and geographic ranges.

The specific study area within Guzar district consists of a relatively flat plain at elevations between 490-530m. The foothills are clayey, formed by continental coal-bearing Jurassic, red-coloured Lower Cretaceous and marine-coloured Upper Cretaceous and Paleogene formations collected in simple folds. Oligocene-Miocene, Pliocene and ancient anthropogenic deposits form an orogenic complex of continental molasse that fills foothill and intermountain depressions.

There are 33 rivers in the region with a length of more than 20 km. The Project site is located approximately 12 km from the Guzardaryo river. There are no surface water bodies on the Project site. No signs of permanent water bodies were observed within the site during the site visit as well as no wells or boreholes were identified. However, periodically after heavy rainfall, temporary streams form during the wet season (spring or autumn).

Most of the Project area is occupied by fields (514.3 hectares or 82.3%). The fields are used mainly to grow wheat, but some of the area is for barley, flax and peas (chickpeas), which are traditional crops for this region. The rest of the territory is occupied by steep slopes (17.5%), since the territory is quite hilly.

The biodiversity baseline characterization for the Project has been developed by a team of national and international and biodiversity experts, and is based on a comprehensive desktop review, combined with results of baseline biodiversity studies. The desktop review, as well as baseline survey results, served as a basis to conduct an initial screening for Critical Habitat (CH) features (IFC PS6 and EBRD PR6) and Priority Biodiversity Features (PBF), (EBRD PR6) and to scope a set of biodiversity baseline surveys. The baseline section of this ESIA integrates the desktop review, baseline survey results, and includes an updated CHA/PBF assessment, intended to characterize the baseline condition of the Project's AOI (which, in the context of the CHA is equivalent to the Ecologically Appropriate Area of Analysis, or EAAA), with a focus on the biodiversity elements that have been identified either as CH features or PBF for the Project. The CHA/PBF assessment follows the latest criteria and guidance in IFC PS6[60,61] and EBRD PR6[62,63], and also includes an assessment of NH, per IFC PS6 definition. The biodiversity baseline characterization presented within this ESIA is supported by the full biodiversity baseline study reports, included in Volume III, Technical Appendix.

5.5.2 Critical habitats assessment (CHA) and assessment of priority biodiversity features

IFC and EBRD's biodiversity policies place special emphasis on the protection of the most sensitive, vulnerable, and/or irreplaceable biodiversity features. The highest priority tier of such features is defined as Critical Habitat (CH), which may be triggered by five specific criteria described in IFC PS6 and EBRD PR6. Under EBRD policy, a second tier are defined as Priority Biodiversity Features (PBF), which may be triggered by four specific criteria described in EBRD PR6. IFC PS6 does not include PBF, but

[60] International Finance Corporation (IFC), 2012. Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. January 1, 2012, IFC, World Bank Group, Washington, DC, USA.

[61] International Finance Corporation (IFC), 2019. International Finance Corporation's Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Originally published January 1, 2012, updated June 27, 2019. IFC, World Bank Group, Washington, DC.

[62] European Bank of Reconstruction and Development (EBRD), 2019. Environmental and Social Policy: EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, April, 2019. EBRD.

[63] European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD.

extends a similar second tier of protection to Natural Habitat (NH), which is defined in PS6 to include "viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition."[64] Per the policies of both IFC and EBRD, impacts to CH, NH, and PBF are to be avoided if possible, and Project activities may not proceed unless certain conditions are met. Among these conditions are specific mitigation standards that must be met in order to mitigate any unavoidable impacts, as follows: impacts to CH features must achieve "net gain" in those features; impacts to PBF and NH must achieve "no net loss" in those features.

In order to ensure that the biodiversity baseline study was aligned with both IFC PS6 and EBRD PR6, biodiversity features potentially affected by the Project were first screened against CH (IFC and EBRD), PBF (EBRD only), and NH (IFC only) criteria. This screening was used to inform the scope and design of the biodiversity baseline survey program. The biodiversity baseline survey results were subsequently evaluated following the procedures and using the specific criteria and quantitative thresholds described in IFC PS 6 and EBRD PR6 and the associated Guidance Notes, to perform an assessment of CH, NH, and PBF for all potentially affected biodiversity features. The Project does not contain any potential CH triggers related to threatened ecosystems (IFC PS6 CH criterion 4; EBRD PR6 CH criterion 1) or evolutionary processes (IFC PS6 and EBRD PR6 criterion 5). The set of biodiversity features identified either as CH, NH, or PBF in this assessment is presented, and briefly justified in Table 46. Further detail on the assessment of CH/NH/PBF is provided in the subsections that follow. These determinations of CH, NH, and PBF were then used as the basis for developing monitoring and/or mitigation plans for each biodiversity feature, as appropriate, in compliance with IFC PS 6 and EBRD PR6, as described in subsequent sections of this ESIA and the associated ESMP.

A necessary step for performing the CHA, and also assessment of PBF, is the definition of the Ecologically Appropriate Area of Analysis (EAAA), which essentially corresponds to a specialized definition of the Project's AOI for biodiversity features. IFC and EBRD define the EAAA as a species-specific concept, recognizing that a single project may have entirely different effective areas of influence on different species or biodiversity features, depending on the movement patterns, landscape connectivity, or other ecological characteristics of the species or features, hence, in principle, there is not a single EAAA for any project, but rather a different EAAA for each potentially affected species or biodiversity feature. In this case, we used a single EAAA for the CHA for each of the 10 potential CH triggering species, as they all share the characteristics of wide-ranging movements within (or over) upland habitats, and dispersive behaviours and large home ranges.

The selection of a single, large EAAA for all species is justified not as a precise reflection of the different sensitivities to the different trigger species for different ecological gradients in the environment, but as a precautionary umbrella, encompassing, and also buffering the results of a more fine-tuned approach that would have eliminated portions of the area, for example rocky or mountainous areas that are unsuitable for Central Asian Tortoise. If the results of such an analysis yield a conclusion of no CH, then a more detailed yet more restricted analysis would be superfluous. We note also that for large soaring birds, a buffer approach to defining the EAAA has a greater level of biological accuracy, as aerial species

[64] International Finance Corporation (IFC), 2019. International Finance Corporation's Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, GN38, Washington, DC.

likely to fly over the Project area primarily in transit may be relatively insensitive to ecological boundaries on the ground. Finally, we note that for species potentially triggering the migratory/congregatory species CH criterion (IFC CH criterion 3, EBRD CH criterion 4) this approach captures current GIIP, as it considers the scale of local or regional, but not migratory movements of the species.

This EAAA consists of the Project area buffered by 10 km, and is depicted in Figure 49.

With regard to evaluation of NH, the assessment was performed by considering the information on the botanical structure and species composition, level of anthropogenic impact, and habitat mapping rendered by a national botanical expert, through the lens of the IFC PS6 definitions of Natural Habitat and Modified Habitat[65]. In summary, the botanist characterized this site as follows (Vol III Nur Kashkadarya Botanical Report)

1. **Degraded Landscapes.**
   The project area exhibits heavily degraded landscapes characterized by overgrazing, desertification, and land cultivation. These activities have significantly impacted the natural vegetation cover and ecological integrity of the region.
2. **Absence of Protected Plant Species**
   Despite the potential for rare and endemic plant species to inhabit the area based on literary data, no plants requiring protection under conservation laws were found during the surveys conducted in 2023 and 2024.
3. **Anthropogenic Pressure**
   The presence of agricultural fields, fallow lands, and overgrazed habitats indicates substantial anthropogenic pressure on the area. These activities contribute to soil erosion, reduced vegetation cover, and altered ecological functions.
4. **Limited Natural Habitat Value**
   Most habitats within the project area, including non-irrigated arable lands and degraded foothills, exhibit poor to no natural habitat value due to extensive human disturbance and ecosystem degradation. Following the habitat classification scheme of IFC PS666, the entire area is best characterized as Modified Habitat, with no Natural Habitat present on the site.

In addition, the site design is such that it avoids the dry ravines, which although exhibits more vegetation cover (up to 50%) rather than less than 5% on the main site, the characteristic of the vegetation are also reflective of a highly pressurised landscape with no features of conservation value worthy of a NH categorisation.

On the basis of this assessment, it was concluded that the Project area is covered entirely by MH and does not contain any NH.

The key outcomes of the CH/NH/PBF assessment were as follows:

[65] International Finance Corporation (IFC), 2019. International Finance Corporation's Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Originally published January 1, 2012, updated June 27, 2019. IFC, World Bank Group, Washington, DC.

[66] International Finance Corporation (IFC), 2019. Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. June 27, 2019, World Bank Group, Washington, DC

1. The Project does not contain any CH triggers
2. The Project does not contain any NH

The Project has 10 PBF

Table 46: Summary of the results of the Critical Habitat, Natural Habitat, and Priority Biodiversity Features Assessment for the Nur-Kashkadarya PV Solar Project.

Feature [67]	Higher taxon	IUCN global status[68]	Uzbek status[69]	Applicable CH/PBF criterion[70]			EAAA	IUCN minimum global population estimate[71]	Determination[72]	Rationale
				Threatened/ Vulnerable Species	Range-restricted Species	Migratory/ Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
Central Asian Tortoise Testudo horsfieldii	Reptile	VU	VU	X			1	Unknown, but occurs widely across 12 Asian countries	PBF	Project not likely to result in species' up-listing to globally CR/EN, Only 1 specimen was observed during herpetological survey.

[67] The ecosystems and habitats potentially affected by the Project did not meet any of the criteria for "priority ecosystems," including "threatened ecosystems," "highly threatened or unique ecosystems" (IFC CH criterion 4 = EBRD CH criterion i), "areas associated with key evolutionary processes" (CH criterion v), or "threatened habitats" (PBF criterion i) as defined in EBRD PR6 and the associated Guidance Note 6. Neither were the criteria met for any "significant biodiversity features identified by a broad set of stakeholders or governments" (PBF criterion iii), or "ecological structure and functions needed to maintain the viability of priority biodiversity features" (PBF criterion iv), hence the only biodiversity features included in this table are species (and their habitats) that met one or more of the species-specific CH or PBF criteria/thresholds, as described in the table.

[68] https://www.iucnredlist.org/ accessed 4 May 2023

[69] Separate Uzbek national red lists for plants and animals, both published by the Uzbekistan ministry of environment in 2019.

[70] Uzbekistan is neither a member of the EU, nor a Bern Convention signatory, hence the specific CH/PBF criteria relating to habitats and species that receive special protection under EU nature legislation are not considered applicable, per EBRD GN6.

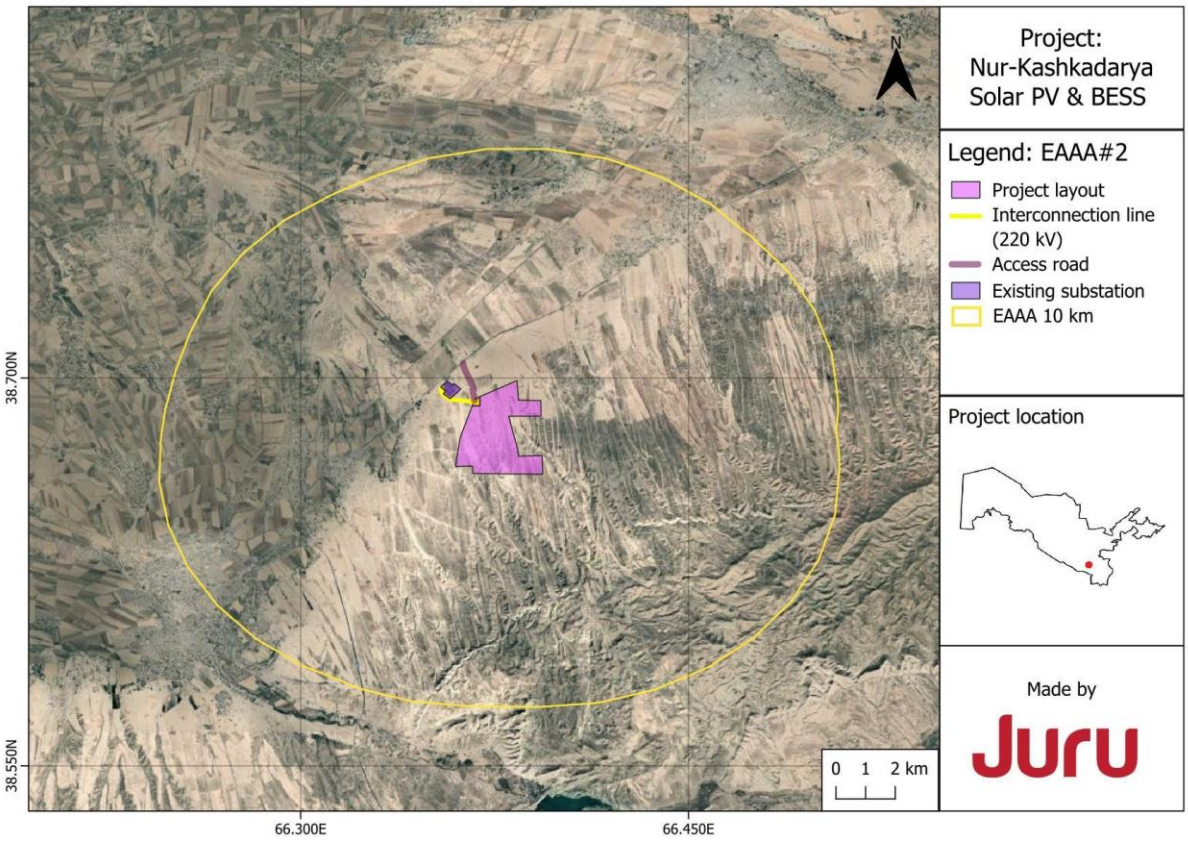
[71] https://www.iucnredlist.org/ accessed 4 May, 2023

[72] PBF = Priority Biodiversity Feature, per EBRD PR6; NH = Natural Habitat, per IFC PS6

Marbled Polecat Vormela peregusna	Mammal	VU	VU	X			1	Unknown, but widespread distribution	PBF	Project not likely to result in species' up-listing to globally CR/EN
Sociable Lapwing Vanellus gregarius	Bird	CR	VU	X		X	1	11,200	-	EAAA not likely to contain ≥ 0.5% of the global population, nor to contain ≥ 1% of the global population at any point in species' life cycle.
Egyptian Vulture Neophron percnopterus	Bird	EN	VU	X		X	1	12,400	PBF	EAAA not likely to contain ≥ 0.5% of the global population, nor to contain ≥ 1% of the global population at any point in species' life cycle
Steppe Eagle Aquila nipalensis	Bird	EN	VU	X		X	1	50,000	PBF	EAAA not likely to support ≥ 0.5% of the global population, nor to contain ≥ 1% of the global population at any point in species' life cycle
Saker Falcon Falco cherrug	Bird	EN	EN	X		X	1	12,200	PBF	EAAA not likely to support ≥ 0.5% of the global population, nor to contain ≥ 1% of the global population at any point in species' life cycle
Asian Houbara Chlamydotis macqueenii	Bird	VU	VU	X		X	1	33,000	-	Project not likely to result in species' up-listing to globally CR/EN, The habitat is not suitable for this species for breeding and migration.

Great Bustard Otis tarda	Bird	EN	CR	X		X	1	43,847	-	EAAA not likely to support ≥ 0.5% of the global population, nor to contain ≥ 1% of the global population at any point in species' life cycle
Greater Spotted Eagle Clanga clanga	Bird	VU	VU	X		X	1	3,900	PBF	Project not likely to result in species' up-listing to globally CR/EN, nor to contain ≥ 1% of the global population at any point in species' life cycle
Eastern Imperial Eagle Aquila heliaca	Bird	VU	VU	X		X	1	2,500	PBF	Project not likely to result in species' up-listing to globally CR/EN, nor to contain ≥ 1% of the global population at any point in species' life cycle

Figure 50: Illustration of the Ecologically Appropriate Area of Analysis (EAAA) used for all 10 potential CH trigger species in the CHA



5.5.3 Protected areas and internationally recognized Key Biodiversity Areas (KBA) and Important Bird and Biodiversity Area (IBA)

The Project area is not protected at national or international level. The nearest KBAs are South-west Gizzar Foothills, located 30 km east of the site, and Gissar State Nature Reserve, located 75 km from the project area. 25 km away is the Chimkurgan reservoir (IBA), 14 km to the south is the Pachkamar reservoir. 57 km to the south-west is the Talimarjan reservoir (IBA and KBA). The nearest KBAs and IBAs, as well as national protected area (PA) is presented in Table 47 and Figure 50**.**

Figure 51: Legally protected areas and internationally recognized Key Biodiversity Areas (KBA) within 50 km of the Nur-Kashkadarya Solar Project area.

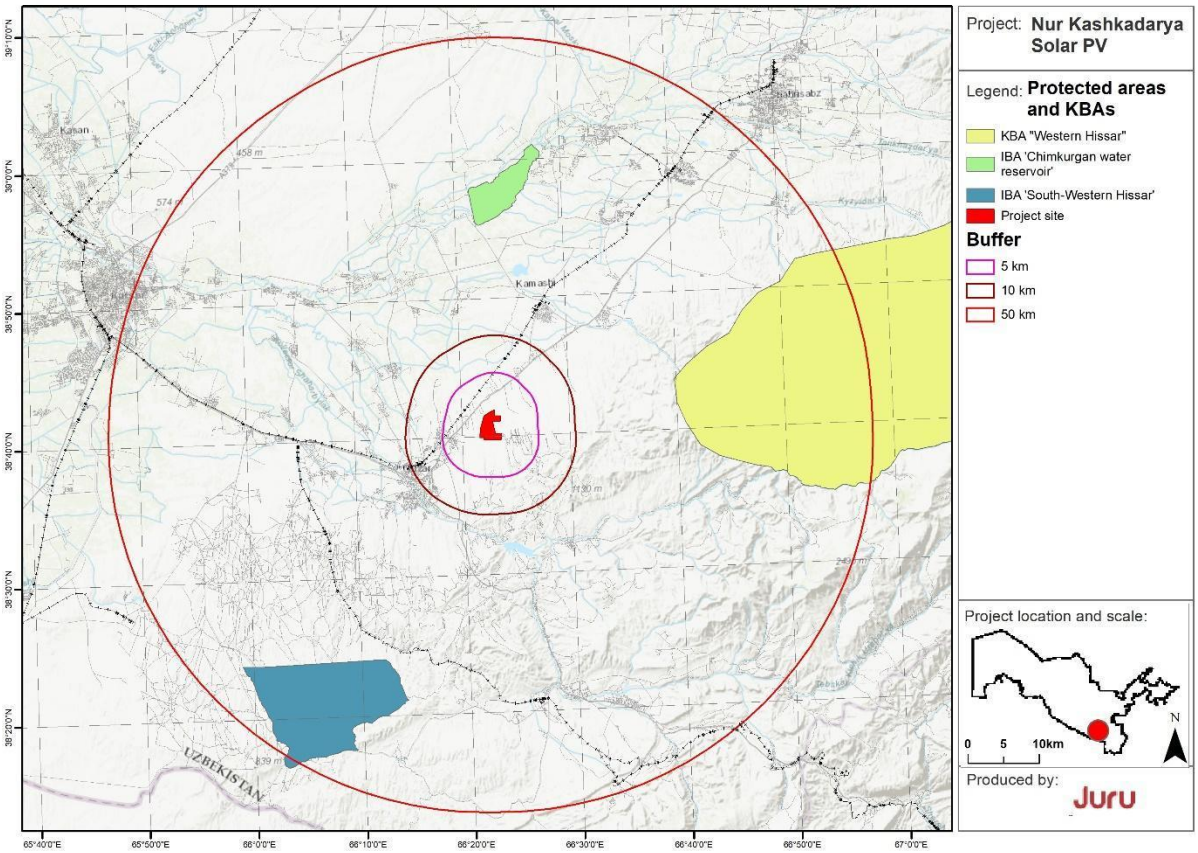


Table 47: Legally protected areas and internationally recognized Key Biodiversity Areas (KBA) and Important Bird and Biodiversity Area (IBA) within 75 km of the Nur-Kashkadarya Solar Project area.

Name	National site (IUCN Management Category)	International site	Area (km2)	Distance to project site	Organisation	Purpose
South-west Gizzar Foothills	State wildlife sanctuary (IV Category)	KBA73	196.35	30 km	Ministry of Ecology, Environmental Protection and Climate Change	Bird conservation

73 Key Biodiversity Areas Partnership (2024) Key Biodiversity Areas factsheet: South-west Gizzar Foothills (22173). Available at: https://www.keybiodiversityareas.org

Name	National site (IUCN Management Category)	International site	Area (km2)	Distance to project site	Organisation	Purpose
					of The Republic of Uzbekistan	
Gissar State Nature Reserve	State wildlife sanctuary (IV Category)	KBA74	5495	75 km	Ministry of Ecology, Environmental Protection and Climate Change of The Republic of Uzbekistan	Ornithological Nature Reserve Protected Areas
Chimkurgan reservoir	-	IBA, KBA75	41,24	25 km	-	Bird conservation
Pachkamar reservoir	-	IBA76	4,189	14 km	-	Bird conservation
Talimarjan reservoir	-	IBA, KBA77	858,55	57 km	-	Bird conservation

5.5.4 Flora and habitats

5.5.4.1 Methods

The field research on the project area was conducted using the traditional methods of botanical survey commonly used for sampling and mapping of vegetation, recognition of floristic composition and spatial patterns of plant communities (Field geobotany, 1959–1976; Granitov, 1980; Kent, 2011). The field surveys were carried out on October 12, 2023, March 16, 2024, and April 06, 2024, by national botanic experts N. Beshko and I. Maltsev.

Vegetation structure and species composition was described from 100x100 m square 13 geobotanical sample plots (SP) chosen in an area with homogeneous vegetation, representative for the Project site, but also including some areas outside of the Project site, and situated away from roads and boundaries

[74] Key Biodiversity Areas Partnership (2024) Key Biodiversity Areas factsheet: Gissar State Nature Reserve (22277). Available at: https://www.keybiodiversityareas.org

[75] Key Biodiversity Areas Partnership (2024) Key Biodiversity Areas factsheet: Chimkurgan Reservoir (22138). Available at: https://www.keybiodiversityareas.org

[76] BirdLife International (2024) Important Bird Area factsheet: Chimkurgan Reservoir. Downloaded from https://datazone.birdlife.org/site/factsheet/chimkurgan-reservoir-iba-uzbekistan on 25/07/2024.

[77] Key Biodiversity Areas Partnership (2024) Key Biodiversity Areas factsheet: Talimardzhan Reservoir (20654). Available at: https://www.keybiodiversityareas.org

between different vegetation communities (coordinates of these boundaries observed during the survey were recorded separately).

According to the International Code of Phytosociological Nomenclature (2019), plant associations were identified on the basis of composition of dominant species. The vegetation types and formations were classified in accordance with four-volume "Vegetation cover of Uzbekistan" (1971–1984).

Species cover and abundance were determined using the Braun-Blanquet scale (1965) and the DACFOR scale widely used in geobotanical and ecological studies as a rapid visual assessment technique. A full description of the Botanical baseline survey methods, and sampling effort is presented in Volume III, Technical Appendix.

5.5.4.2 Habitats

This territory consists of heavily degraded landscapes with gently undulating terrain and is almost devoid of vegetation, making it subject to additional erosion. The territory is located at the foothills of the Gissar Range. Due to the cold air flowing down from the mountains into the valley, strong winds are characteristic of this area. This is one of the reasons for the occurrence of sand and dust storms in this territory. There are no habitats in the project area that satisfy the IFC PS6 definition of Natural Habitat. The project area comprises three distinct habitats (Figure 51).

The majority of the territory is represented by non-irrigated arable lands and fallow lands with area 596 ha (Figure 54, Figure 56). The agricultural fields are situated on clayey soils. Vegetation in these habitats is absent because these areas are regularly ploughed for crop agriculture. Due to the absence or poor turf of topsoil, the loose soil substrate easily becomes airborne, forming dust and sand storms. Furrows left by the tractor during ploughing increase the surface area of the soil, thereby increasing the amount of substrate lifted into the air during storms.

The loamy foothills with ephemeral-forb vegetation have not been utilized for cultivation due to the peculiarities of the terrain. Ephemeral vegetation covers 112.5ha and grows in natural depressions of the landscape (Figure 52, Figure 53).

These habitats are actively grazed by livestock, resulting in vegetation being grazed and trampled; numerous sheep excrements were found. The soil is mostly unconsolidated, and dust storms are also common, although to a lesser extent due to the presence of vegetation.

Dry ravines and erosion gullies run through the territory from the southeast, where moisture accumulates and grassy vegetation grows (Figure 55, Figure 57). They cover 24.6ha. Ephemeral vegetation grows in place of some temporary watercourses and in natural depressions of the terrain.

All habitats within the Project site are under significant anthropogenic pressure, manifested by land cultivation and overgrazing which is reflected in the relatively low botanical species richness and

relatively high proportional representation of weedy or adventitious species among the species documented in this habitat type in the survey plots on, and near the Project site (Table 48).

This table shows a breakdown of total plant species richness, number of exotic plant species, percentage of weedy or adventitious species typical of human disturbed areas, and Natural vs Modified Habitat classification, per IFC PS6, by habitat type. Note that only the first three rows pertain to habitats/areas located on the site. The final row reflects botanical survey information collected from 5 sample points located to the south of the Project site reflecting areas which are under less anthropogenic pressure from agricultural activities.

This final row highlights botanical richness and compositional differences on the Project site versus sites with less anthropogenic pressure. Based on the low botanical species richness recorded in the botanical sampling plots located within and near the Project site, as well as the relatively high proportion of adventitious, weedy species among the species recorded, leads to a determination of Modified Habitat, per IFC PS6, for all habitats within the Project site. This is further justified with the information highlighting the distinction between these areas, and the botanically richer areas located to the south of the site, which were also sampled during the baseline survey (refer to Technical Appendix for full baseline botanical report).

Table 48: Breakdown of total plant species richness, percentage of weedy or adventitious species typical of human disturbed areas, and Natural vs Modified Habitat classification, per IFC PS6, by habitat type

Habitat Type	Total ha	# plant species recorded (# alien species)	Percentage weedy, adventitious species	Habitat Categorisation (natural or modified habitat)
Non-irrigated fields and fallow lands (on- and near site)	596	19 (2)	58	Modified Habitat
Loamy foothills with ephemeral forb vegetation (on site)	112.5	15 (0)	27	Modified Habitat
Dry ravines and erosion gullies (on site)	24.6	13 (3)	77	Modified Habitat

Habitat Type	Total ha	# plant species recorded (# alien species)	Percentage weedy, adventitious species	Habitat Categorisation (natural or modified habitat)
Loamy foothills and dry ravines (south of site)	N/A	36 (1)	31	Natural Habitat

Low botanical species richness and relatively high proportion of weedy, adventitious species, indicators of human disturbance, among the flora support the expert judgment of the national botanical expert, in concluding that all habitats of the Project site are best classified as Modified Habitats, per IFC PS6. By contrast, several of the sample plots located to the south of the site have much higher botanical species richness, including many species that are not "weeds," hence these off-site areas can reasonably be considered highly degraded Natural Habitats.

Figure 52: Habitat map of the Nur-Kashkadarya Solar Project area

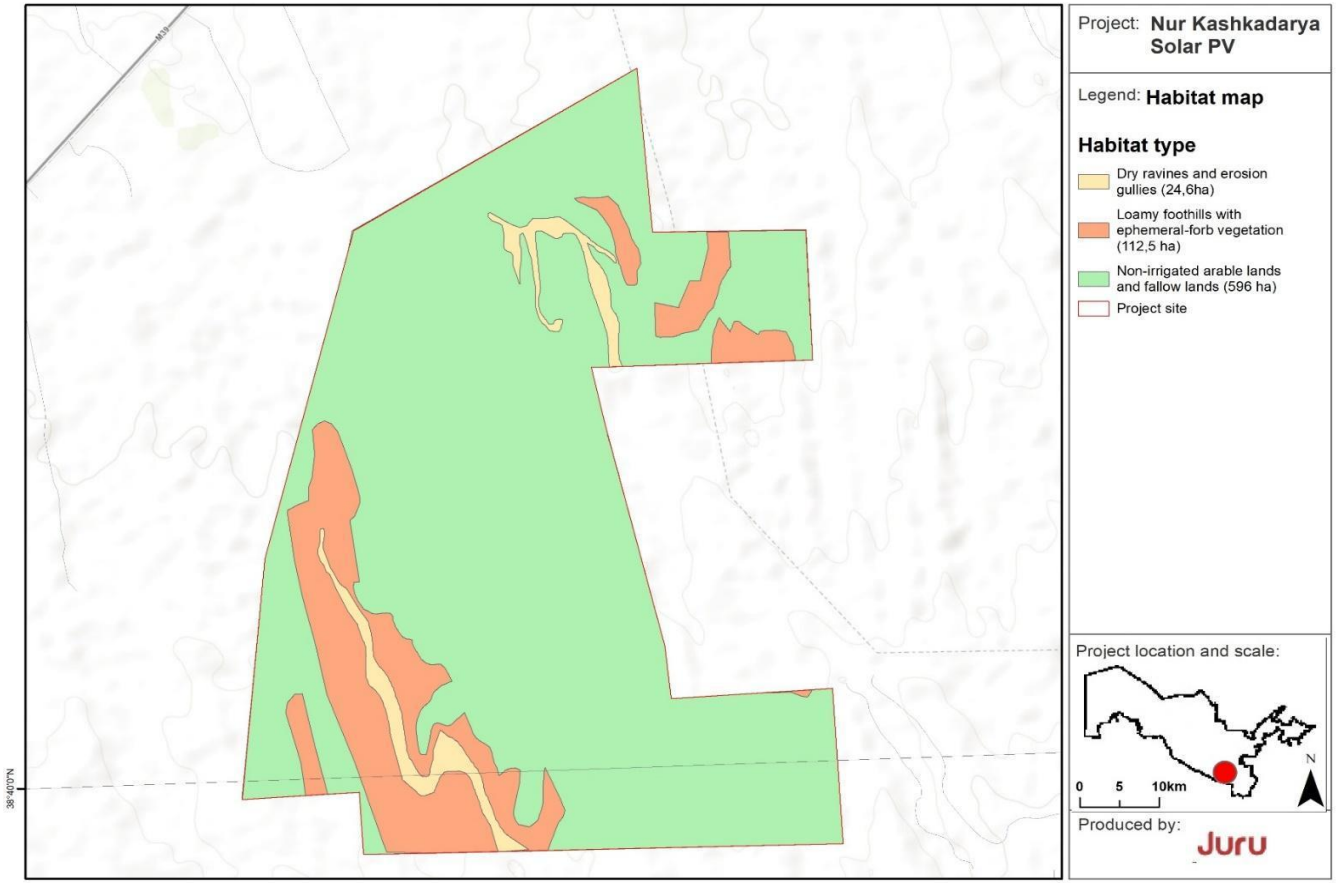


Figure 53: Clay foothills

Figure 54: Clay slopes

Figure 55: Agricultural field

Figure 56: Adjacent ravine

Figure 57: Fallow land

Figure 58: A place of accumulation of water during seasonal rainfall

5.5.4.3 Sensitive Plants

During the autumn in 2023 and spring in 2024 botanical surveys combined, a total of 46 plant species were found on the territory. Among them: 24 were perennials, 19 were annuals, two were biennials, and one was a semi-shrub. Four species were identified as alien invasive species (AIS) (Table 49).

Table 49: List of flora recorded in project area

Species	IUCN Red list	Uzbekistan Red data book	Native status	Adventitious "weedy" species associated with human disturbed habitats[78]	On site Dry ravines (# plots 0-2)	On site loamy foothills (# plots 0-1)	On and near site fallow fields (# plots 0-5)	South of site loamy foothills and/or dry ravines (# plots 0-5)
Acanthophyllum pungens	NE	none	native	No				1
Alhagi pseudalhagi	NE	none	native	Yes	2	1	2	3
Alyssum desertorum	NE	none	native	No				3
Astragalus campylorrhynchus	NE	none	native	No				3
Capparis spinosa	LC	none	native	Yes	1			1
Carex pachystylis	LC	none	native	No		1		5
Carthamus oxyacanthus	NE	none	native	Yes	2			
Centaurea iberica	NE	none	alien	Yes				1
Ceratocephala orthoceras	NE	none	native	Yes			2	4
Chrozophora tinctoria	NE	none	native	Yes	2		1	
Convolvulus arvensis	NE	none	alien	Yes	1		1	
Crocus korolkowii	NE	none	native	No				2
Cousinia microcarpa	NE	none	native	Yes				3
Cousinia resinosa	NE	none	native	No		1		3

[78] Characterizations of Uzbek botanical expert, Natalya Beshko

Species	IUCN Red list	Uzbekistan Red data book	Native status	Adventitious "weedy" species associated with human disturbed habitats[78]	On site Dry ravines (# plots 0-2)	On site loamy foothills (# plots 0-1)	On and near site fallow fields (# plots 0-5)	South of site loamy foothills and/or dry ravines (# plots 0-5)
Cuscuta campestris	NE	quarantine weed	alien	No	1			
Cynodon dactylon	NE	none	alien	Yes	2		1	
Draba verna (Erophila verna)	NE	none	native	No		1	2	4
Erodium cicutarium	NE	none	native	Yes			2	4
Euphorbia chamaesyce	NE	none	native	No	2			
Gagea chomutovae	NE	none	native	No				1
Gagea graminifolia	NE	none	native	No		1		5
Gagea olgae	NE	none	native	No		1	1	5
Gagea ova	NE	none	native	No				1
Gentiana olivieri	NE	none	native	No				2
Haplophyllum versicolor	NE	none	native	No		1	1	4
Heliotropium lasiocarpum	NE	none	native	No	1			
Holosteum umbellatum	NE	none	native	No				3
Hordeum marinum subsp. gussoneanum (Hordeum geniculatum)	LC	none	native	Yes	1			
Hordeum murinum subsp. leporinum	NE	none	native	Yes		1	2	3

Species	IUCN Red list	Uzbekistan Red data book	Native status	Adventitious "weedy" species associated with human disturbed habitats[78]	On site Dry ravines (# plots 0-2)	On site loamy foothills (# plots 0-1)	On and near site fallow fields (# plots 0-5)	South of site loamy foothills and/or dry ravines (# plots 0-5)
(Hordeum leporinum)								
Ixiolirion tataricum	NE	none	native	No		1	2	5
Lallemantia royleana	NE	none	native	No				2
Lamium amplexicaule	NE	None	Native	No				2
Medicago monantha (Trigonella geminiflora)	NE	none	native	No				4
Noccaea perfoliata (Thlaspi perfoliatum)	NE	none	native	No		1	1	
Onopordum leptolepis	NE	none	native	Yes				2
Papaver pavoninum	NE	none	native	Yes		1	2	5
Peganum harmala	NE	none	native	Yes	2	1	3	4
Phlomis thapsoides	NE	none	native	No				1
Phlomoides labiosa	NE	none	native	No				2
Poa bulbosa	NE	none	native	No		1	2	5
Prosopis farcta (Lagonychium farctum)	NE	none	native	Yes	1		1	
Ranunculus pinnatisectus	NE	none	native	No				1

Species	IUCN Red list	Uzbekistan Red data book	Native status	Adventitious "weedy" species associated with human disturbed habitats[78]	On site Dry ravines (# plots 0-2)	On site loamy foothills (# plots 0-1)	On and near site fallow fields (# plots 0-5)	South of site loamy foothills and/or dry ravines (# plots 0-5)
Ranunculus sewerzowii	NE	none	native	No		1	2	5
Roemeria refracta	NE	none	native	Yes			2	2
Taraxacum monochlamydeum	NE	none	native	No		1	2	5
Trichodesma incanum	NE	none	native	Yes	1			
Ziziphora tenuior	NE	none	native	No				2
Total species recorded					13	15	19	36
# "weedy" species recorded					10	4	11	11
% weedy species recorded					77%	27%	58%	31%

Out of the total species found, 36 have regional distributions, while 10 are cosmopolitan. None of the discovered plants are listed in the Red Book of Uzbekistan or the IUCN Red List, hence none are classified as PBFs for the Project.

Figure 59: Carex pachystylis, main dominant of native ephemeroid vegetation of foothills

Figure 60: Poa bulbosa, main dominant of native ephemeroid vegetation of foothills

Figure 61: Gagea olgae

igure 62: Crocus korolkowii

Figure 63: Peganum harmala, poisonous plant, native weed

5.5.5 Birds

5.5.5.1 Methods

The avifaunal baseline characterization was developed using a combination of desk-based review of secondary information sources and primary data gathering through an intensive bird baseline survey effort conducted within the Project area. Desktop research included a comprehensive review of available technical literature on the birds of Uzbekistan, the Suntrace CHA79 and Site Suitability Report80, as well as review of publicly available databases including, but not limited to the IUCN Red List of Threatened Species, eBird database, and BirdLife International data zone. Although a variety of secondary sources contain information regarding the avifauna of larger regions encompassing the site, or certain areas within the larger Project regions, there are no previously published studies of the avifauna of the Project site.

Primary bird survey data from the Project site included the results of baseline surveys for this ESIA conducted on 11 September, 2023 (scoping survey) plus Autumn (2023) and Spring (2024) bird surveys conducted at specific points within the project area aimed to assess the presence, abundance, and behaviour of avian species during the peaks of both migration seasons, as well as the breeding season (Technical Appendix III).

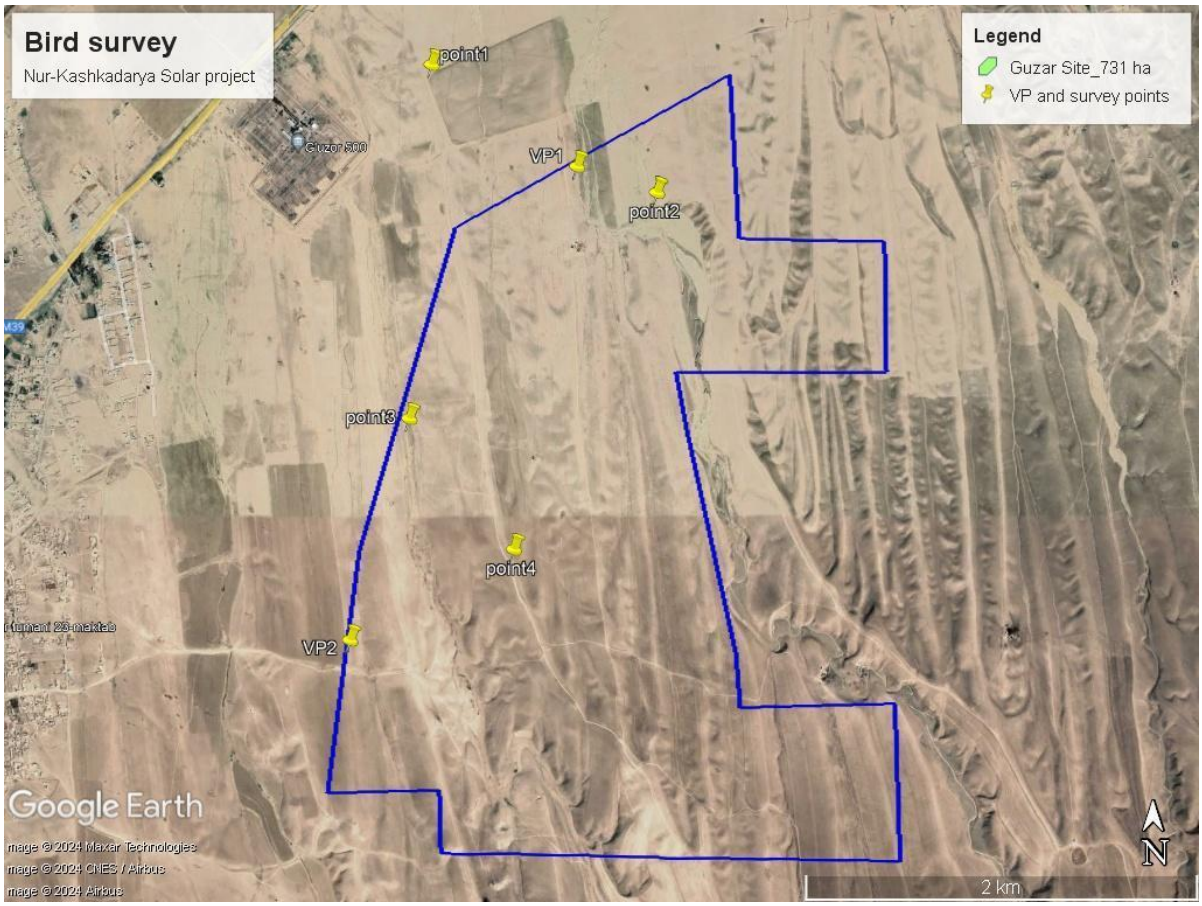
The bird survey methodologies included the following:

[79] Suntrace GmbH, 2022. Guzar Solar PV Critical Habitat Assessment for Utility-Scale Solar Photovoltaic PPP Project in Guzar District, Qashqadaryo Region of the Republic of Uzbekistan

[80] Suntrace GmbH, 2021. Guzar Solar PV Site Suitability Report (Pre-FS) for Utility-Scale Solar Photovoltaic PPP Project in Guzar District, Qashqadaryo Region of the Republic of Uzbekistan

- a preliminary walkover survey on 11 September, 2023 using unstructured observation methods
- VP bird monitoring at two vantage points (VP1 and VP2, Figure 63), with 8 hours of VP survey conducted at each of these points in each migratory season, spread across 4 separate dates per season (8 total dates), for a total of 32 hours of VP survey
- 20 minutes visual/acoustic bird point count surveys conducted at four points (points 1-4, Figure 74), with 80 minutes of VP survey conducted at each of these points in each migratory season, spread across 4 separate dates per season (8 total dates), for a total of 32 x 20-minute point count surveys conducted

Figure 64: Locations of 2 vantage points and 4 count points on the project territory



Surveys were conducted during each migration season, capturing seasonal variations in bird activity. Trained field observers recorded all birds at each point, documenting the date and time of survey, prevailing weather conditions, observed species, number of individuals per species, behavioural observations (e.g., feeding, roosting, flight), and flight height and direction for key species. Visual observations using binoculars and spotting scopes, along with auditory detections of bird calls and songs, were employed. GPS coordinates were recorded for accurate species location. A full description of the bird baseline survey methods, and sampling effort is presented in Volume III Technical Appendix.

5.5.5.2 Sensitive Bird Species

During the autumn in 2023 and spring in 2024 surveys combined, a total of 30 species were recorded on the territory – 13 species during Autumn survey and 26 species during Spring survey. Among them: 4 included in IUCN Red list and 5 in Uzbekistan Red data book (Table 50).

Table 50: List of bird species recorded in project area in Autumn 2023 and Spring 2024

Species	Common name	IUCN Red List	Uzbekistan Red data book	Autumn survey	Spring survey
Anas crecca	Common Teal				+
Anas querquedula	Garganey				+

Species	Common name	IUCN Red List	Uzbekistan Red data book	Autumn survey	Spring survey
Falco naumanni	Lesser Kestrel		NT		+
Falco tinnunculus	Common Kestrel			+	+
Gyps fulvus	Griffon Vulture		VU:D	+	+
Aegypius monachus	Cinereous Vulture	NT	NT		+
Buteo japonicus	Japanese Buzzard				+
Buteo rufinus	Long-legged Buzzard			+	+
Aquila nipalensis*	Steppe Eagle	EN	VU:D	+	+
Aquila heliaca*	Eastern Imperial Eagle	VU	VU:D		+
Grus virgo	Demoiselle crane				+
Vanellus vanellus	Northern Lapwing	NT			+
Larus cachinnans	Caspian Gull				+
Larus ridibundus	Black-headed Gull				+
Columba livia	Rock Pigeon			+	+
Melanocorypha calandra	Calandra Lark			+	+
Calandrella brachydactyla	Greater Short-toed Lark				+
Galerida cristata	Crested Lark			+	+
Alauda arvensis	Eurasian Skylark				+
Hirundo rustica	Barn Swallow				+
Motacilla alba	White Wagtail			+	
Oenanthe pleschanka	Pied Wheatear				+
Oenanthe isabellina	Isabelline Wheatear			+	+
Pica pica	Eurasian Magpie			+	
Corvus monedula	Eurasian Jackdaw			+	+
Corvus frugilegus	Rook			+	+
Corvus corax	Common Raven			+	+
Sturnus vulgaris	Common Starling				+
Total		4	5	13	26

** denotes a species identified as a PBF for the Project.*

The bird surveys in the Project area highlight its role for migrating species like cranes and raptors, including vultures and eagles, which use this territory for roosting during migration. Notably, the presence of poles associated with OHTL appears to attract migrating Steppe Eagles, indicating the ecological significance of such structures in supporting avian populations, particularly in areas affected by habitat degradation and human activities.

The baseline surveys documented the presence of the two of the potentially CH-triggering bird species on the Project area, Steppe Eagle and Imperial Eagle. For these two species, this area would only be used for migratory transit, as both species winter further south, and breed further north. Based on the small size of the EAAA and the widespread distributions of both of these species, the CHA determined that these species do not trigger CH, as the EAAA would never contain 1% or more of the global population of either species (IFC CH criterion 3), nor could the Project cause Imperial Eagle to be uplisted to globally EN or CR by IUCN (IFC CN criterion 1b), nor does the EAAA contain 0.5% or more of the global population of Steppe Eagle (IFC CH criterion 1a). Therefore, these two species are classified as PBF for the Project. A third eagle species, the Greater Spotted Eagle, is potentially present in the region purely during migration, and has the same national and international listed status as the Imperial Eagle. This species was thus evaluated against the same CH criteria, and similarly determined to be a PBF for the Project.

None of the other bird species identified as possible CH triggers for the Project were observed during the baseline surveys, (Houbara Bustard, Great Bustard, Egyptian Vulture, Sociable Lapwing, Saker Falcon, Greater Spotted Eagle). With regard to both species of bustards, the Project area's coverage primarily by bare soil renders the habitat unsuitable for breeding (Houbara Bustard) or wintering (Great Bustard), though limited migration activity is possible in either species. Thus, the potential use of the area by these species has a negligible chance of being high enough to trigger a CH determination under any of the pertinent CH criteria (Houbara Bustard: IFC CH criteria 1b, 3; Great Bustard: IFC CH criteria 1a, 1c, 3), and both of these species are classified as PBF for the Project.

Egyptian Vultures are present in Uzbekistan only during the warmer months (generally April-September), and are known to breed in mountains not far from the site, but their potential use of the site would be limited to occasional foraging forays or migratory overflights by single birds, in numbers far below those required to trigger a CH determination under either IFC CH criteria 1a or 3, hence this species is also classified as a PBF for the Project.

Sociable Lapwing is present in the region only during migratory seasons, when it can make use of a wide variety of wetland and upland habitats for migratory stopover. One of their best-known migratory stopover habitats is the shore of the Talimarjan reservoir, located ca 65 km to the SW of the Project area. The barren, upland habitats of the Project area could possibly be used as a short-term migratory stopover by this species, though the area does not have any features that are especially attractive, or likely to concentrate this species. Therefore, this species does not trigger CH under any of the pertinent criteria (IFC CH criteria 1a, 3), and is classified as a PBF for the Project.

Figure 65: Griffon vulture observed on site

5.5.6 Reptiles

5.5.6.1 Methods

The herpetological baseline characterization was developed using a combination of desk-based review of secondary information sources and primary data gathering through a field survey effort conducted within the Project area. Desktop research included review of available technical literature on the reptiles and amphibians of Uzbekistan, as well as review of publicly available databases including, but not limited to the IUCN Red List of Threatened Species and Reptile database.

The quantitative assessment of reptiles and amphibians was mainly based on transect surveys conducted on 5 and 6 April 2024 supplemented with a Central Asian Tortoise survey conducted on October 19, 2024. The transect method consists in counting individuals along a fixed line (transect), on both sides of it, with the duration of the survey determined by the known distance, which is selected depending on the type of reptile and the area. Central Asian Tortoise surveys focused on searching the area for this species' distinctively-shaped burrows. A full description of the Herpetological baseline survey methods, and sampling effort is presented in Volume III, Technical Annex.

5.5.6.2 Sensitive Reptile and Amphibian Species

The list of reptiles expected in the western foothills of the Gissar mountain range, thus potentially occurring in the Project region, was developed based on literature review, and consists of 13 species, including 4 rare species, 2 synanthropic species. Among them the most sensitive is Central Asian tortoise (Testudo horsfieldii). During the scoping site visit, interviews with local herders indicated the presence of tortoises and Desert monitor. Furthermore, 8-10 potential tortoise burrows were observed on the site during the scoping visit. The October, 2024 survey for Central Asian Tortoise produced a similar result, with 11 burrows found on the site. Reptile species potentially occurring, and documented in the project area are summarised in Table 51.

Table 51: Reptile species potentially occurring, and documented in the project area

Species name	Uzbekistan Red data book	IUCN Red list	Endemism	Scoping/literature review results
Central Asian tortoise[81] Testudo horsfieldii	VU	VU		Holes, and oral data from local herders
Turkestan thin-toed gecko Tenuidactylus fedtschenkoi			UZ, TJ, TM	Secondary data
Steppe Agama Trapelus sanguinolentus				Secondary data
Glass lizard Pseudopus apodus				Secondary data
Asian snake-eyed skink Ablepharus pannonicus				Secondary data
Gold or Schneider's skink Eumeces schneideri				Secondary data
Rapid Lizard Eremias velox				Secondary data
Caspian Monitor Varanus griseus caspius	VU:D			Secondary data
Tatary sand boa Eryx tataricus	NT			Secondary data
Spotted whip snake Hemorrhois ravergieri				Secondary data
Spotted desert racer Platyceps karelinii				Secondary data
Diadem snake Spalerosophis diadema				Secondary data
Central Asian cobra Naja oxiana	NT	DD		Secondary data

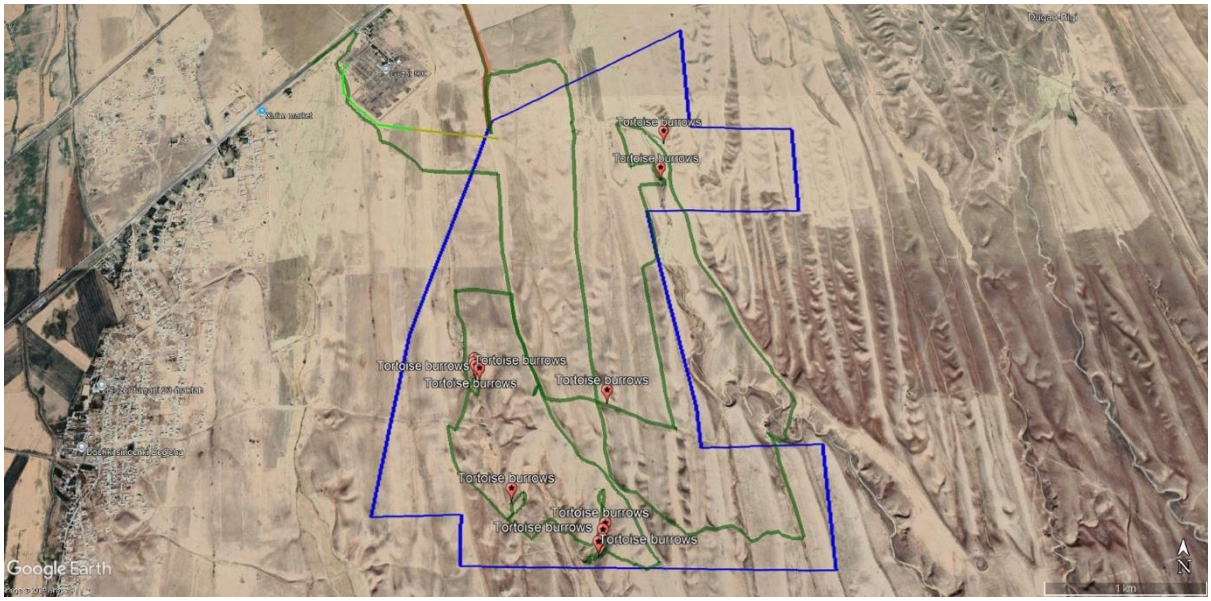
The spring 2024 reptile survey, focussed on the Central Asian Tortoise, was conducted on 5 to 6 April 2024. During the site visit four 1-2 km transects were surveyed, and more than 3500 meters were traversed additionally (Table 52). Only a single reptile, or sign of reptile occurrence was documented during these surveys: a single individual tortoise found on April 6.

During the October, 2024 Central Asian Tortoise survey, 11 burrows of this species were discovered on the site, with locations shown in

[81] Note that this was the only reptile species documented on the site during the baseline surveys for the Project (and see Table 48)

Figure 66.

Figure 66: October 2024 Central Asian Tortoise baseline survey tracks (green lines) and the locations of 11 burrows of this species discovered on site during this survey (red thumbtacks).



The territory is heavily degraded due to ploughing and overgrazing. Moreover, spring rains and mudflows led to flushing topsoil. Dust storm and strong winds are common for this territory, which is additionally contributes to degradation. However, quite dense herbal vegetation can be found in some relief depressions within the project territory (Figure 65).

Table 52: Survey transect on Nur-Kashkadarya Solar (April 2024).

No	Name of transect	Date and time	Length	Biotope	Species	Number
1	transect1	5/04/2024	1 km	Deposited lands	No species	
2	transect2	5/04/2024	1 km	Deposited lands	No species	
3	transect3	5/04/2024	2 km	Deposited lands	No species	
4	transect4	5/04/2024	1 km	Agricultural fields	No species	
5	Point-1	6/04/2024		Agricultural fields	Central Asian Tortoise	1

Figure 67: Relief depression with density vegetation

The population of Central Asian Tortoises in the Project area has been estimated at 20-30 individuals, with burrows highly concentrated in the ravines, and experiences significant fluctuations, influenced by winter and spring weather conditions, as well as the availability of food sources in the local habitat. The ploughing of virgin lands, intensive livestock grazing, and habitat development have contributed to a decrease in their numbers (Bogdanov, 1965) and the Project site is dominated by poor quality habitat for this species.

Central Asian Tortoises have been documented in the Kashkadarya region, specifically in Shakhrisyabz, Guzar (A.M. Nikolsky, 1899, 1915), and on the Ak-Rabat pass on Ak.Rabat pass (O.P. Bogdanov). The foothills of the Gissar Range, facing the Karshi plain, have been significantly developed, but in the undeveloped areas of the Chakchar Ridge foothills, the tortoise population is still present (4.5 individuals per hectare) (Bondarenko, Peregontsev, 2017). Central Asian Tortoises were also recorded in the vicinity of Unalta village (Bondarenko, Peregontsev, 2006), 5 km west of the Pachkamar reservoir, and on the slope of Mount Amanata (D. A. Bondarenko, E. A. Peregontsev, 2004).

Based on the evidence compiled in desktop review and field surveys of the site, it was determined that Central Asian Tortoise does not trigger a CH determination, as CH determination under criterion 1b (IFC, equivalent to EBRD CH criterion 2b) would only be triggered if the loss of the population of this species contained within the EAAA would likely result in the species' uplisting to globally EN or CR. This is considered unlikely, given the species' broad distribution across 12 central Asian countries, and its low abundance within the Project site, as noted above. This species is thus classified as a PBF for the Project.

Overall, the site contains an impoverished reptile/amphibian community, reflecting the highly degraded nature of the habitat within the project area, which has resulted from intensive plowing, overgrazing, and seasonal environmental impacts such as spring rains and dust storms.

5.5.7 Mammals

5.5.7.1 Methods

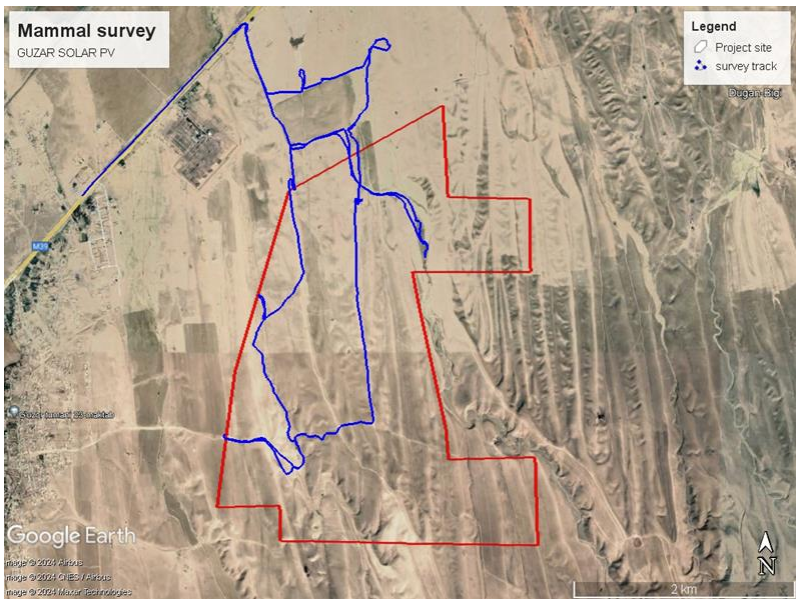
The mammal baseline characterization was developed using a combination of desk-based review of secondary information sources and primary data gathering through a field survey effort conducted within the Project area. Desktop research included review of available technical literature on the mammals of Uzbekistan, publicly available databases (e. g. IUCN Red List of Threatened Species) and analysis of detailed topographic maps of the area (scale: 1:100 000, 1:200 000) and satellite images of

Google Earth. The maps were used to determine locations (GPS coordinates) of observations of the area and for walking transects. The data were then transferred to the LocusPro smartphone program for further use in the field.

The baseline survey effort was designed and conducted by Uzbek theriologist Mariya Gritsina. The length of the route was 15,6 km (Figure 68). The length of the transect was determined using LocusPro. Start and end time of the transect, the biotope, the presence/absence and the type of anthropogenic impact were recorded. During the transect surveys, the data obtained was entered into a field journal. In addition, animals and traces of their life activities were photographed (if possible). Binocular was used to survey the area during the transect walkover and at all points where stops were made.

A full description of the mammal baseline survey methods, and sampling effort is presented in Volume III, Technical Appendix.

Figure 68: Survey transects



5.5.7.2 Sensitive Mammal Species

Mammal habitats are represented by the following biotopes: clay slopes and foothills, agricultural fields, ravines overgrown with vegetation or completely devoid of vegetation. Water collects in ravines during precipitation, which provides a watering place for animals. The territory is strongly transformed as a result of anthropogenic activity - livestock grazing, cultivation of agricultural fields (barley, wheat, flax, peas), automobile roads and a power station are located nearby. Such a range of impacts makes the area suitable for a rather small number of mammals able to survive anthropogenic pressure of various aspects. These species are common and, in some places, abundant in Uzbekistan, but are present in the project area in rather limited numbers.

Below is a list of mammals that have been reported in the literature to occur in the vicinity of the project site (Table 53). The list includes 20 mammal species historically known to occur in the project area, with references to the source of the information.

Table 53: Potential Checklist of mammal species potentially occurring in the Project region based on literature review

№	Species	IUCN Red List [1]	Uzbekistan RDB [2]	Probability of occurrence
1	Long-eared hedgehog Hemiechinus auritus Gmelin, 1770	LC	-	High
2	Bokhara horseshoe bat Rhinolophus bocharicus	LC	-	Low
3	Common Pipistrelle Pipistrellus pipistrellus	LC	-	High
4	Serotine Eptesicus serotinus	LC	-	High
5	Tolai hare Lepus tolaii Pallas, 1778	LC	-	High
6	Yellow ground squirrel Spermophilus fulvus Lichtenstein, 1823	LC	-	High
7	Small five-toed jerboa Allactaga elater Lichtenstein, 1825	LC	-	High
8	Severtzov's jerboa Allactaga severtzovi Vinogradov, 1925	LC	-	High
9	Grey dwarf hamster Cricetulus migratorius Pallas, 1773	LC	-	High
10	Mus musculus Linnaeus, 1758	LC	-	High
11	Mid-day Gerbil Meriones meridianus Pallas, 1773	LC	-	High
12	Great gerbil Phombomys opimus Lichtenstein	LC	-	Low
13	Zaisan Mole Vole Ellobius tancrei Blasius, 1884	LC	-	High
14	Indian Crested Porcupine Hystrix indica Kerr, 1792	LC	-	Low
15	Corsac Fox Vulpes corsac Linnaeus, 1768	LC	VU:D	High
16	Red fox Vulpes vulpes Linnaeus, 1758	LC	-	High

№	Species	IUCN Red List [1]	Uzbekistan RDB [2]	Probability of occurrence
17	Golden Jackal Canis aureus Linnaeus, 1758	LC	-	Low
18	Grey wolf Canis lupus Linnaeus, 1758	LC	-	Low
19	Steppe Polecat Mustela eversmanii Lesson, 1827	LC	VU:D	Low
20	Marbled Polecat Vormela peregusna Güldenstädt, 1770	VU	VU:D	Low
21	Asiatic wildcat Felis sylvestris ornate Gray, 1830	LC	-	High
22	Wild boar Sus scrofa Linnaeus, 1758	LC	-	None
23	Goitered Gazelle Gazella subgutturosa Güldenstädt, 1780	VU	VU:D	None

[1] International Union for Conservation of Nature (IUCN). 2022. The IUCN Red List of Threatened Species. Version 2022-2. https://www.iucnredlist.org. Accessed on 05.11.2023.

[2] Uzbekistan Red Data Book (RDB). Vol.II. Animal. Tashkent. 2019

A previous survey of the site showed the presence of four species (observations attributed to "secondary data" in Table 54). During the baseline surveys for the Project, four species of mammals were documented at the site, including three species not previously documented (Table 54). In total, seven mammal species have been documented at the site (Table 54). Of these, only Corsac Fox has elevated conservation status on either the national or IUCN global redlists, (Uzbekistan VU:D; IUCN LC).

Table 54: Checklist of mammal species recorded on the Project site during baseline survey and per secondary data

No	Species	Baseline Survey Observations	Notes
1	Zaisan Mole Vole	6 burrows	
2	Severtzov's jerboa	1 burrow	
3	Corsac Fox	1 burrow	
4	Red Fox	1 indiv	Secondary data
5	Yellow Ground Squirrel		Secondary data
6	Small Five-toed Jerboa		Secondary data
7	Asiatic Wild Cat		Secondary data

The territory is strongly transformed as a result of anthropogenic activity - livestock grazing, cultivation of agricultural fields (barley, wheat, flax, peas), automobile roads and a power station are located nearby. Such a range of impacts makes the area suitable for a rather small number of mammals able to survive anthropogenic pressure of various aspects. These species are common and, in some places, abundant in Uzbekistan, but are present in the Project Site in rather limited numbers.

With regard to the CHA for mammals, only a single mammal species was identified as a PBF for the Project, the Marbled Polecat. Though this species was not observed during the baseline surveys, it is considered possible that this species could occur, due to its wide ranging behaviour and use of a wide range of habitats. The Project has no likelihood of causing this species to be uplisted to globally EN/CR, hence this species does not trigger CH under IFC criterion 1b.

6 Stakeholder Engagement

6.1 Introduction

A SEP has been prepared in support of the ESIA that outlines legal and lender obligations, provides detailed stakeholder mapping, sets out an overview of SE performed to date (also summarised below), defines the SE principles, and proposes the SE requirements for the ESIA phase and beyond. The SEP also includes the Project Grievance Mechanism (GM).

6.2 Summary of SE during ESIA

A summary of meetings with stakeholders is provided in Table 55 below. During the meetings participants were provided with leaflets with the key information about the planned project as well as contact details of the ESIA Consultant. A sample of the leaflet is provided in SEP, Annex A. A full list of all of the stakeholder engagement activities undertaken to date can be found in the Volume V SEP.

6.3 Grievance mechanism

The Project established a grievance mechanism during the scoping phase of the Project and stakeholder were first informed of the mechanism during scoping phase consultations. Stakeholders have been continuously informed about the grievance mechanism in subsequent consultations. Contact details to access the grievance mechanism have been included in the scoping stage and ESIA stage project leaflets (included as annexes to the SEP). The full grievance mechanism is outlined in Volume V SEP. The table below presents the details of the ESIA Public disclosures conducted in the Project affected district municipalities and AoI communities.

Table 55: Summary of the stakeholder disclosure

Name of receptor	Date and place of meeting	The number of participants	Type of meeting	Summary of discussion	Concerns raised	Responses provided	How concerns were addressed in the ESIA	Information disclosed
Guzar district municipality	5 September of 2024	4	Key informant interview	Additional information about land use, socio economic information of local communities was collected from different departments of the municipality	No concerns raised	n/a	No concerns raised	Project location and project leaflet
Kamshi district municipality	6 September of 2024	4	Key informant interview	Additional information about land use, socio economic information of local communities was collected from different departments of the municipality	No concerns raised	n/a	No concerns raised	Project location and project leaflet
Cadastral department of Guzar district	22 August of 2024 Cadastral department office	5	Key informant interview	Land use information was collected	No concerns raised	n/a	No concerns raised	Project location and project leaflet
Cadastral department of Kamshi district	22 August of 2024 Cadastral department office	5	Key informant interview	Land use information was collected.	No concerns raised	n/a	No concerns raised	Project location and project leaflet`
Guzar municipality	30 July 2024 Municipality building	16 (2 are women,3 are elderly)	Face to face meeting	Juru with the participation of Masdar's representative conducted a meeting with the main district organizations/	No concerns raised	n/a	No concerns raised	Project presentation and project leaflet

Name of receptor	Date and place of meeting	The number of participants	Type of meeting	Summary of discussion	Concerns raised	Responses provided	How concerns were addressed in the ESIA	Information disclosed
				departments to discuss the positive and negative impacts of the project in the framework of ESIA.				
Kamashi municipality	30 July 2024 Municipality building	13 (1 is woman, 5 are elderly)	Face to face meeting	Juru's social and environmental specialists conducted a meeting with the main district organizations/ departments to discuss the positive and negative impacts of the project in the framework of ESIA.	No concerns raised	n/a	No concerns raised	Project presentation and project leaflet
Batosh community	31 July 2024 Community building	10 (4 of them are women, 7 are elderly)	Face to face meeting	Juru's social and environmental specialists conducted a meeting with the community members to discuss the positive and negative impacts of the project in the framework of ESIA.	Community members asked the project to consider local people when recruiting staff for the construction phase.	The representatives of the project company informed them that they would consider this request as soon as the construction is about to start.	ESIA report will mention the requests from the local community	Project presentation and project leaflet
Khalkabad community	31 July 2024 Community building	14 (2 of them are women,6 are elderly)	Focus group discussion	Juru's social and environmental specialists conducted a meeting with the community	Community members were concerned about the impact of the project on air quality, as it could	Project company representative informed them that air monitoring is being undertaken by the Juru team to	ESIA report will mention the air quality monitoring	Project presentation and project leaflet

Name of receptor	Date and place of meeting	The number of participants	Type of meeting	Summary of discussion	Concerns raised	Responses provided	How concerns were addressed in the ESIA	Information disclosed
				members to discuss the positive and negative impacts of the project in the framework of ESIA.	result in huge amounts of dust.	mitigate the negative impacts		
Yangiobod community	31 July 2024 Community building	14 (12 of them are women, 8 are elderly, 1 is youth)	Focus group discussion	Juru's social and environmental specialists conducted a meeting with the community members to discuss the positive and negative impacts of the project in the framework of ESIA.	Members of the community asked the project to take people from the village into consideration when recruiting staff for the construction phase.	The representatives of the project company informed them that they would consider this request as soon as the construction is about to start.	ESIA report will mention the requests from the local community	Project presentation and project leaflet
Aynakul community	31 July 2024 Community building	11 (7 of them are women, 4 are elderly, 3 are youth)	Focus group discussion	Juru's social and environmental specialists conducted a meeting with the community members to discuss the positive and negative impacts of the project in the framework of ESIA.	No concerns raised	n/a	No concerns raised	Project presentation and project leaflet
Batosh community	1 November 2023 Community building	6 (all are women)	Focus group discussion	Juru's social and environmental specialists disclosed applicable preliminary E&S impacts Preliminary Project development	No concerns raised	n/a	No concerns raised	Project information and project leaflet

Name of receptor	Date and place of meeting	The number of participants	Type of meeting	Summary of discussion	Concerns raised	Responses provided	How concerns were addressed in the ESIA	Information disclosed
				schedule as well as details of GRM				
Khalkabod community	1 November 2023 Community building	8 (6 of them are women, 2 are elderly, 1 is youth)	Focus group discussion	Juru's social and environmental specialists disclosed applicable preliminary E&S impacts Preliminary Project development schedule as well as details of GRM	No concerns raised	n/a	No concerns raised	Project information and project leaflet
Aynakul community	1 November 2023 Community building	11 (7 are women, 4 are elderly, 1 is youth)	Focus group discussion	Juru's social and environmental specialists disclosed applicable preliminary E&S impacts Preliminary Project development schedule as well as details of GRM	No concerns raised	n/a	No concerns raised	Project information and project leaflet
Yangiobod community	1 November 2023 Community building	6 (5 are women, 1 is elderly)	Focus group discussion	Juru's social and environmental specialists disclosed applicable preliminary E&S impacts Preliminary Project development schedule as well as details of GRM	No concerns raised	n/a	No concerns raised	Project information and project leaflet

7 ESIA Assessment Methodology

7.1 ESIA terms of reference

A scoping assessment for this ESIA was performed during March 2023. The scoping process identified the issues and impacts to be addressed in the ESIA as summarised in Table 56. Where no impact was predicted between the project and the receiving environment, the topics were scoped out for further assessment. The explanation of this can be found in the scoping report and detailed terms of reference (TOR) (Volume III – Technical Appendix, Scoping Report).

Table 56: ESIA terms of reference (TOR)[82]

Environment and Health	Social	Labour
• Air quality (C/D). • Noise and vibration (C/D) • Waste (including hazardous waste) (C/O/D) • Climate resilience • Soil and geology (C/D) • Water resources (C/D). • Hydrogeology (C/D) • Biodiversity (habitat loss, impact on critical habitat and PBF) • Cumulative impacts (C) •	• Community health and safety (C/O/D) • Traffic and Transportation (C/D) • Security (C/D) • Emergency preparedness and response (C/O/D) • Livelihood and land use (C) • Cultural heritage (C)	• Occupational Health and Safety (C/O/D) • Emergency preparedness and response (C/O/D) • Labour rights (C/O/D) • Employment (positive) (C/D) • Gender Based Violence and Harassment (GBVH) (C/D) • Human rights (C/O/D) • Procurement/supply chain (C/O/D)
Scoped out: • Air quality (operations) • Noise • Soils (operations) • Landscape and visual impact (C/D) (including glint and glare) • Radio and TV interference (all phases) • Traffic and transportation (operations) • Greenhouse gases • Cultural heritage (operations) • Cumulative impacts (operation)		

[82] Note: C = Construction, O = Operations, D = Decommissioning

- Indigenous Peoples
- Transboundary impacts
- Security (O)
- EMF/EMC (O)

7.2 ESIA methodology

For a robust and transparent impact assessment process, each topic will consider the **magnitude** of the impact, and the **sensitivity** of the receiving environment to evaluate the overall **significance of the impact**. A framework for assigning magnitude, sensitivity and impact significance is described below and will be defined for each impact assessment topic. For each E&S topic the potential mitigation and management measures are considered to give an overall residual impact significance conclusion. Data limitations and any uncertainties are also described.

The magnitude of the potential impact is determined based on the professional judgement of the specialist undertaking the assessment considering the five criteria provided in Table 57. Where impacts can also be quantified and compared against national or international standards these are also considered.

Table 57: Determination of magnitude – example criteria for allocation

Magnitude	Intensity Compliance	Duration	Spatial extent	Reversibility	Likelihood/Frequency
High	High intensity / non-compliant / large numbers of people affected/ very disruptive	Beyond the construction phase or permanent change	Direct AOI & Indirect AOI	Permanent impact	Continuous
Medium	Medium intensity/ actions need to be taken to become fully compliant / medium disruption or disruption to vulnerable groups or sectors of the community or workforce / Quality of life diminished due to change in character	> 3 months up to completion of the construction phase	Indirect AOI	Reversable, but requires mitigation and/or compensation.	Intermittent
Low	Low intensity /compliant / small numbers of people / non-intrusive or does not	One off event or occurs for 3 months or less	Direct AOI	Reversible following end of phase under consideration	Infrequent / one-off event

Magnitude	Intensity Compliance	Duration	Spatial extent	Reversibility	Likelihood/Frequency
	cause changes in quality of life				

Sensitivity criteria for receptors are categorised into high, medium, or low. Generic criteria used to determine the receptor sensitivity are provided in Table 58. Each topic specific section of the ESIA will define the relevant receptors and assigned a receptor sensitivity based on topic specific criteria.

Table 58*: Generic criteria for the allocation of Receptor sensitivity*

Sensitivity	Physical Receptor	Human Receptor	Biodiversity Receptor	Climate resilience
High	Little or no capacity to absorb proposed changes and has national or international value e.g., receptors where people or operations are particularly susceptible to noise or air quality changes)	Receptors with high vulnerability and permanent presence within the direct or indirect AOI (e.g., school, poor or vulnerable household, hospital). No capacity to absorb project changes or no opportunity for mitigation.	Substantial loss of ecological functionality. All species/features classed as Critical Habitat.	Climate variability will threaten the sustainability of the project (e.g., work may be precluded from taking place during certain months of the year).
Medium	Moderate capacity to absorb proposed changes e.g., where it may cause some discomfort or distraction or disturbance.	Receptors with moderate to high vulnerability and or somewhat affected by project impacts. Limited capacity to absorb changes. Potential opportunities for mitigation	Moderate but sustainable change which stabilises under constant presence of impact source, with ecological functionality maintained. All species/features classed as Priority Biodiversity Species (PBFs)/Natural habitat (NH).	Potential impacts that can be addressed through management actions (e.g., design, implementation management).
Low	Good capacity to absorb proposed changes and	Receptors with low to moderate vulnerability or are located in the AOI	Species or community unaffected or marginally affected.	Potential impact does not affect the sustainability of the Project.

Sensitivity	Physical Receptor	Human Receptor	Biodiversity Receptor	Climate resilience
	not protected or has low value e.g., receptors where the disturbance is minimal.	infrequently. Good capacity to absorb changes with no lasting effects, or good access to mitigation measures.	All species not classed as PBFs/NH or CH	

Based on impact magnitude and receptor sensitivity as defined above the significance of the impact is classed as neutral, minor, moderate, major or critical as presented in Table 59.

- **Critical**: These effects represent key factors in the decision-making process. They are generally, but not exclusively, associated with impacts where mitigation is not practical or would be ineffective.
- Major: These effects are likely to be important considerations but where mitigation may be effectively employed such that resultant adverse effects are likely to have a Moderate or Slight significance.
- Moderate: These effects, if adverse, while important, are not likely to be key decision-making issues.
- Minor: These effects may be raised but are unlikely to be of importance in the decision-making process.
- Neutral: No effect, not significant, need not be considered as a determining factor in the decision-making process

The significance of impacts will be discussed pre-mitigation and post mitigation (i.e., residual impact) for each aspect. Based on the above approach, impacts identified as having major or moderate significance will be classified as significant impacts. Impacts are typically considered to be adverse, but it is also possible for positive impacts to be realised. Where positive impacts are identified in the sections below, these are assigned a degree of positive impact based on the sustainability (duration) and scale (number of receptors) of the positive outcomes.

Table 59*: Significance evaluation*

Significance		Magnitude					
		Negative			Positive		
		Low	Medium	High	Low	Medium	High
Receptor Sensitivity	Low	Neutral	Minor	Moderate	Neutral	Minor	Moderate
	Medium	Minor	Moderate	Major	Minor	Moderate	Major
	High	Moderate	Major	Critical	Moderate	Major	Critical

The temporal influence of the Project has been assessed by comparing the existing baseline conditions (environmental, socio-economic and biological) over the expected duration of the Project activities as defined in section 2.5.

Residual impacts deemed moderate, major or critical are considered the main focus of the management and implementation framework going forward based on the following consideration:

- Avoidance and reduce through design (embedded mitigation)
- Abate impacts at source or receptor
- Repair, restore or reinstate to address temporary construction effects.
- Compensation for loss or damage, such as replacement planting elsewhere
- Once the application of mitigation and management measures has been defined, the residual significance will be determined.

Residual impacts are those significant impacts that remain after the application of mitigation and enhancement measures.

Any uncertainties associated with impact prediction or the sensitivity of receptors due to the absence of data or other limitation have been considered and articulated in the relevant section.

Decommissioning impacts would be subject to a separate detailed assessment and (if required, permitting process) when decommissioning is planned, as the plant will be in operation for at least 25 years following which there will likely be a continuation or refurbishment. Generic expected decommissioning impacts are assessed in this ESIA for completeness.

8 Impact Assessment

8.1 Air quality

8.1.1 Potential impacts

Increases in dust or fugitive emissions can have a negative impact on the local air quality (AQ) as well as the health of workers or local residents. The health effects include dust getting into eyes and mouth (workers, residents), increased particles in the atmosphere, nuisance through surface soiling affecting local ecology (terrestrial only).

A description of the potential impacts and magnitude is provided below and summarised in Table 60.

8.1.2 Construction phase

Activities during site construction phase which are likely cause AQ impacts include:

- Construction dust from the removal of vegetation leading to exposure of bare soil[83] to the wind and increased dust emissions generated from internal unpaved roads within the site during construction.
- Operation of construction vehicles, excavation of foundations and cement production for foundations during site preparation and clearance works, groundworks leading to fugitive dust emissions specifically PM10 and PM2.5.
- Vehicle movements on site, the short OHTL ROW and along delivery routes and use of temporary generators leading to an increase in visible exhaust smoke, fugitive emission of oxides of nitrogen (NOx), volatile organic compounds (VOCs) and other fumes and gases.

The soil quality assessment did not identify any high levels of contamination in the soil and therefore risks to workers from contaminated soils are not considered further.

Construction dust - All temporary work areas are expected to be within the site or the grid connection ROW. Air quality impacts are expected to be contained to the direct AOI defined as 250 m from the boundary of the site or ROW. There are no other planned developments identified to occur in the AOI during the construction period. The soil assessment indicated that the soil is fixed and weekly fixed sands with a vegetation cover that is less than 50% of the ground cover. This type of soil can have a high dust generating potential contributing to the potential for dust impacts on site.

Fugitive emissions - Vehicle emissions are expected to be low magnitude based on the relatively low number of vehicles on site. The magnitude may be slightly elevated for the receptors along the delivery route where delivery vehicles may pass close to the communities.

[83] discussed in section 9.2

8.1.3 Operation phase

Impacts during the operation phase have been scoped out. No direct operational emissions are anticipated from the Project's operation (PV/BESS/OHTL). O&M related fugitive emissions (maintenance vehicles, dust) will be negligible.

8.1.4 Decommissioning phase

Key activities that could give rise to AQ impacts (dust and fugitive emissions) are:

- Demolition of plant, towers and electrical systems, removal of plant and electrical system materials from site, structural foundation removal; and decommissioning plant item movements.
- Decommissioning traffic movements (removal of equipment and transfer of personnel to and from the worksites).
- Decommissioning AQ impacts will be similar to those generated during the construction phase.

8.1.5 Cumulative impacts

No cumulative AQ impacts have been identified.

8.1.6 Summary of impact magnitude

Table 60 details the impact magnitude for the impacts identified above.

Table 60*: Summary of magnitude - air quality*

Activity	Intensity/ compliance	Duration	Spatial Extent	Reversibility	Likelihood	Magnitude (pre-mitigation)
Construction Dust (site establishment, vehicles movements)	Medium	3 to 6 months	Within 250m of the Site boundary	Temporary during works only	High	Medium
Construction Fugitive exhaust emissions	Low	3 to 9 months	Within 250m of the Site boundary	Temporary during works only	High	Low
Decommissioning dust (site establishment, vehicles movements, cement batching)	Medium	3 to 9 months	Within 250m of the Site boundary	Temporary during works only	High	Medium

Activity	Intensity/ compliance	Duration	Spatial Extent	Reversibility	Likelihood	Magnitude (pre-mitigation)
Decommissioning fugitive exhaust emissions	Low	3 to 6 months	Within 250m of the Site boundary	Temporary during works only	High	Low

8.1.7 Receptor sensitivity

The AOI for potential AQ impacts identified for the construction works is defined as 250m[84] from the boundary of the works or the road used for delivery of materials and personnel to the site. The sensitivity of nearby receptors within this AOI is summarised in Table 61.

Table 61*: Summary of Project AQ receptor sensitivity*

Receptors	Distance from the site	Sensitivity
Workers (at site and along the grid connection ROW)	within 250m of the works	Medium
Road users (surfaced roads)	Outside 250m buffer zone	Low
Herders	Outside 250m buffer zone	Low
Nearby houses and communities	Low (outside 250m buffer zone, but may be impacted by vehicles travelling along the M39)	Low

8.1.8 Mitigation, management and monitoring measures

Table 62 outlines the project specific mitigation and GIIP to prevent or minimise air quality impacts for each project phase and monitoring and enhancement requirements where relevant.

Table 62: AQ mitigation and management

Project Phase	Requirements
Design/ Contract/Procurement	- Require all contractors to have an area on site for shelter during dust events.
Construction – Project specific	- Construct new sections of road in accordance with site clearance and stockpile management requirements including ensuring any stockpiles are covered to minimise dust events.

[84] 250m is typically accepted as the distance from the source of impact where air quality impacts have dissipated to acceptable levels [insert reference for this.

Project Phase	Requirements
	- Excavation, handling and transport of erodible materials shall be avoided under high wind conditions where practicable. - Use water (from sustainable source) or other control measures such as chemical bonding agent or aggregate to control dust. - Demarcate delivery road and access tracks at site and ensure all workers stick to demarcated areas. - Plant and equipment to be stored at least 250m from the Guzar substation and nearby receptors (north of the site). - Erect worker shelter on site for protection in the event of a major dust event.
Construction – GIIP	- All workers to wear personal protective equipment (PPE). - Keep vehicle movements to a minimum. - Enforce speed limits and reduce vehicle movements (maximum of 10 km/h) for project vehicles on unsurfaced roads). - Ensure all mobile site generators or temporary generators are sized accurately for the required load and checked before first use to confirm maintenance checks are up to date. - Consider the use of a battery energy storage system for peak construction loads. Consider using battery light towers, electric pumps where possible. - No bonfires or open burning of materials at the site. - Minimise amounts of material handling and avoid double handling to avoid transportation movements. - Ensure all vehicles carrying loose or potentially dusty material to or from the site are fully sheeted. - Ensure that vehicle engines and equipment on site are not left running unnecessarily. - Minimise movement of construction traffic around the site. - Do not run equipment unnecessarily. - Following the SEP, inform nearby residents and road users on the timing and duration of works and key delivery periods.
Operation	Scoped out
Decommissioning	Same as construction (project specific and GIIP)
Monitoring	- Daily visual monitoring of dust episodes, soiling of vegetation, dust resuspension on the roads and dust clouds at site and OHTL and access road workfronts. - Maintain logbook: record any exceptional incidents that cause dust, either on- or off-site, and the action taken to resolve the situation in the logbook. - Monitor implementation of GIIP for concrete batching at offsite batching plant locations (if needed) (e.g., covered stockpiles, sealed hoppers)
Compensation / Enhancement	- None identified

8.1.9 Residual significance

The magnitude of the impact is expected to reduce for all receptors and in particular those that may fall within 250m of temporary works sites (e.g., herders, site workers).

Table 63*: AQ residual significance*

Adverse impacts	Magnitude (pre-mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
Construction Dust (site establishment, vehicles movements, cement batching)	Medium	Medium (workers); Low (all other receptors)	Low	Minor (Neutral all other receptors)
Fugitive exhaust emissions	Low	Medium	Low	Minor (Neutral all other receptors)
Decommissioning dust (site establishment, vehicles movements, cement batching)	Medium	Medium (workers); Low (all other receptors)	Low	Minor (Neutral all other receptors)
Decommissioning fugitive exhaust emissions	Low	Medium	Low	Minor (Neutral all other receptors)

8.1.10 Data limitations and uncertainty

None identified.

8.2 Environmental Noise

8.2.1 Potential impacts

Increases in noise emissions can have adverse impact on the health of any nearby residents. The health effects include hearing impairment, sleep disturbance, interference with speech communication, mental-health and performance effects, effects on residential behaviour and annoyance; and interference with intended activities.[85]

Occupational noise effects on workers (site and substation) are addressed under occupational health and safety below.

A description of the potential impacts and magnitude is provided below and summarised in Table 64.

8.2.2 Construction phase

The main noise generating activities during construction are:

Site preparation works including piling and excavation works, assembly of Project components, access road works, on-site traffic movements; and

Delivery of materials and plant to the site and the arrival and departure of workers from each Workfront.

Site preparation works – The baseline environment does not have any significant noise source (except for road vehicles) impacts are expected to be mildly disruptive meaning the noise can be heard for receptors within the AOI (250 m) and in the wider area, and may cause small changes in behaviour and/or attitude, but not to the extent that it will result in a change in the quality of life.

Delivery of materials – as above, due to the low noise background, increased vehicle deliveries are likely to result in a noticeable change in noise level but unlikely to cause any change in behaviour or attitude.

8.2.3 Operation phase

No noise is expected to be generated during the operations phase. This has been scoped out.

8.2.4 Decommissioning phase

Decommissioning noise impacts will be similar to those generated during the construction phase. Key activities that could give rise to noise impacts are:

Demolition of plant, removal of PV and BESS systems, removal of plant and electrical system materials from site, structural foundation removal; and decommissioning plant item movements.

[85] WHO Guidelines for community noise

Decommissioning traffic movements (removal of equipment and transfer of personnel to and from the worksites).

The magnitude of impact from construction works and traffic movements are classed as the same as for the construction phase.

8.2.5 Cumulative impacts

Noise impacts are expected to be contained to the direct AOI (250m from the proposed works). There are no other planned developments in the AOI during the construction period. Cumulative impacts are not considered relevant.

8.2.6 Summary of impact magnitude

Table 64 summarises the impact magnitude for the impacts identified above.

Table 64*: Summary of magnitude – noise*

Activity	Intensity	Duration	Extent	Reversibility	Likelihood	Magnitude
Site preparation works	order of 60 to 65 dB(A) 200m from the noise source during daylight only	3 to 6 months	Within 250m of the work activity	Temporary during works only	High	Medium
Delivery of materials	order of 60 to 65 dB(A) 200m from the noise source during daylight only	1 to 3 months	Within 250m of the work activity and along the main road	Temporary during deliveries only	High	Low

8.2.7 Receptor sensitivity

The AOI for noise impacts during construction and decommissioning phases is defined as 250m from the boundary of the site, either side of the OHTL centre line, and 250m from the road used for delivery of vehicles.

The current noise baseline is low and strongly influenced by wind and traffic noise. Spot check monitoring at key receptor location indicate baseline noise levels of between 37 and 41 dB(A) in the daytime.

Locations NA 2 and NA 5, directly on the highway, measure noise levels (L_{Aeq}) at these points between 49.90 and 59.38 dBA during the day and 50.54 and 52.30 dBA at night, respectively

The baseline study did not indicate any high sensitivity receptors in the AOI i.e., receptors where people or operations are particularly susceptible to noise e.g., residential areas, places of worship, hospitals, or schools. No permanent noise sensitive receptors are located within 250m of the site. It

is possible that Workers at the Guzar substation may have a greater susceptibility to increased noise generating activity from activity along the access roads and at site.

8.2.8 Receptors

Table 65*: Project noise receptors*

	Distance from the site	**Sensitivity**
Workers (at Guzar substation)	within 250m of the works	Medium
Road users (surfaced roads)	Outside 250m buffer zone	Low
Herders	Outside 250m buffer zone	Low
Nearby houses and communities	Low (outside 250m buffer zone, but may be impacted by vehicles travelling along the M39)	Low

8.2.9 Mitigation, management measures

Table 66 outlines the project specific mitigation and GIIP to prevent or minimise noise impacts for each project phase and monitoring and enhancement requirements where relevant.

Table 66*: Noise mitigation and management*

Project phase	Mitigation and management measures
Design / Contract/Procurement	- All stationary equipment to ensure less than 85d(B) A 1m the from the equipment.
Construction – Project specific	- No high noise generating activities to be undertaken outside of normal working hours (7 am to 6 pm) without prior approval of the Project Company. - Locate all equipment and laydown area at least 250m from any sensitive receptors (around Guzar substation). - No blasting or night-time working without prior approval of the Project Company. If blasting is required, the request for approval must be accompanied by a detailed assessment of need, detailed description of the process, locations and mitigation measures relating to noise (and also dust, security, biodiversity, community health and safety) must be provided). - Brief site operatives to keep noise minimal as part of the induction process.
Construction – GIIP	- Position plant items as far as practically possible from site boundary to the west. - Use quietest work methods and plant items where practicable. - Equipment to be properly maintained and fitted with appropriate noise control at all times. - Avoid unnecessary revving of engines. - Vehicles are not permitted to idle with engines on. - Switch all equipment off when not in use. - Locate static plant (e.g., generators) to take advantage of any screening to break the line of sight from receptors. - Brief site operatives to keep noise to a minimum. - Following the SEP inform receptors when work will commence and any particular noisy foundation work. - Wear PPE for noisy activities as per the activity risk assessment
Operation	- Confirm through monitoring the legal limits on noise exposure are not exceeded in the event there is a complaint.
Decommissioning	- Same as construction (project specific and GIIP)
Monitoring	- Spot check monitoring may be performed at sensitive sites when grievance arises. - Monitor grievance log for noise related complaints.
Enhancement	- None identified

8.2.10 Residual significance

Following the application of the mitigation measures outlined in Table 66, the magnitude of the impact is expected to reduce for all receptors and in particular those that may fall within 250m of temporary works sites (e.g., herders, site workers) (Table 67).

Table 67 *Noise residual significance*

Adverse impacts	Magnitude (pre-mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
Construction site works (clearance, ground works, erection) (all locations)	Medium	Medium	Low	Minor
Construction traffic movements (all locations)	Low	Low	Low	Neutral
Decommissioning site works	Medium	Medium	Low	Minor
Decommissioning traffic movements (all locations)	Low	Low	Low	Neutral

8.2.11 Data limitations and uncertainty

None identified.

8.3 Solid Waste

8.3.1 Potential impacts

Solid waste will be generated during the construction of the PV site, substation, grid connection, and construction of access roads. Typical waste streams (hazardous and non-hazardous) expected to be generated during the construction, operation and decommissioning phase of the work are summarised in Table 68 below. Hazardous waste shares the properties of a hazardous material (such as ignitability, corrosivity, reactivity, or toxicity), or other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed.

Table 68*: Typical waste streams expected to be generated during the construction, operation and decommissioning phase of the Project*

Waste type (*hazardous)	**Hazard Class (I, II, III, IV) 86**	**Site (PV and BESS)**	**Overhead line/ Cable**	**Access road**	**Hazardous/ non-hazardous status pursuant to Directive 2008/98/EC**
Existing Cabling (may contain oil)	II	N/A	N/A	N/A	Hazardous
Waste Electrical and Electronic Equipment (PV Panels and batteries) *	I, II	✓	✓	N/A	Hazardous
Contaminated Soils*	N/A	N/A	N/A	N/A	Hazardous
Brickwork	III, V	✓	N/A	N/A	Non-hazardous
Concrete	III, V	✓	✓	✓	Non-hazardous
Asbestos* 87	I, II	N/A	N/A	N/A	Hazardous
Steel	V	✓	✓	N/A	Non-hazardous
Copper	IV	✓	✓	N/A	Non-hazardous

[86] Hazards class is defined based on national classification standards as set out in the Resolution of Cabinet of Ministers of The Republic of Uzbekistan "On Approval of The Regulations on the Order of Development and Approval of Draft Environmental Standards" dated January 21, 2014. Class I – extremely hazardous waste, Class II – highly hazardous waste, Class III – moderately hazardous waste, Class IV – low-hazardous waste, Class V – inert waste

[87] In accordance with EBRD PR3 and relevant international conventions on waste, asbestos is not permitted to be used and will be prohibited explicitly in relevant project contracts. It's use is not considered further.

Waste type (*hazardous)	Hazard Class (I, II, III, IV) 86	Site (PV and BESS)	Overhead line/ Cable	Access road	Hazardous/ non-hazardous status pursuant to Directive 2008/98/EC
Mercury*	I	N/A	N/A	N/A	Hazardous
General waste	N/A	✓	✓	✓	Non-hazardous
Timber	V	✓	✓	✓	Non-hazardous
Soils and stones, topsoil	V	✓	✓	✓	Non-hazardous
Temporary fencing, gates	N/A	✓	✓	✓	Non-hazardous
Topsoil, timber, brash, fence posts, wire etc.	N/A	✓	✓	✓	Non-hazardous
Tarmac/made ground (rubble/hardcore/piling mats)	V	N/A	N/A	N/A	Non-hazardous
Batteries*	II, III	✓	✓	✓	Hazardous
Fluorescent tubes*	N/A	N/A	N/A	N/A	Hazardous
Printer cartridges*	N/A	N/A	N/A	N/A	Hazardous
Concrete washout	III, V	✓	✓	✓	Non-hazardous
Waste oils/ sludges*	I, II, III, IV	✓	✓	✓	
Mastic Tubes	N/A	✓	✓	✓	Non-hazardous
Solvents*	I, III	✓	✓	✓	Hazardous
Paints*	N/A	✓	✓	✓	Hazardous
Aerosols*	N/A	✓	✓	✓	Hazardous
Used spill kits*	N/A	✓	✓	✓	Hazardous

Waste type (*hazardous)	Hazard Class (I, II, III, IV) 86	Site (PV and BESS)	Overhead line/ Cable	Access road	Hazardous/ non-hazardous status pursuant to Directive 2008/98/EC
Canteen waste, safety equipment	V	✓	N/A	N/A	Non-hazardous
Mixed metals	N/A	✓	✓	N/A	Non-hazardous
Packaging waste	V	✓	✓	N/A	Non-hazardous
Sanitary waste*	N/A	✓	✓	✓	Hazardous
Septic tank waste*	N/A	✓	✓	✓	Hazardous
Plastics	IV	✓	✓	N/A	Non-hazardous
Ceramics	III, V	✓	✓	N/A	Non-hazardous
Paper/ cardboard	II, IV, V	✓	✓	N/A	Non-hazardous
Glass	II	✓	✓	N/A	Non-hazardous

8.3.2 Construction phase

Masdar will require the EPC Contractor to deal with waste in accordance with GIIP duty of care principles and the waste hierarchy - Avoidance, reduction, recycling re=use, disposal. The EPC contract will place a requirement on contractors to segregate waste on site to maximise opportunities for recycling as far as possible. Waste disposal facilities will be identified through consultation with relevant municipalities and following EPC contractor audits of the waste disposal facilities for alignment with GIIP as outlined in the Hazardous Materials and Waste Management Plan (HMWMP) by default as described in section 3.5.8.

During construction the expected volumes of all wastes (as identified in Table 68) generated at the Site is overall expected to be low.

The amount of solid waste generated from the life activity of working personnel is calculated based on the norm of 50 kg per 1 person/year (SanPiN No. 0297-11[88]). There will be approximately 270

[88] SanPiN Ruz N 0297-11 Sanitary Rules And Standards: Cleaning of territories of populated areas from solid household waste in the conditions of Republic of Uzbekistan https://nrm.uz/contentf?doc=265059_sanitarnye_pravila_i_normy_ochistki_territoriy_naselennyh_mest_ot_tverdyh_bytovyh_othodov_v_usloviyah_respubliki_uzbekistan_(sanpin_ruz_n_0297-

personnel at the construction sites. Based on this, the amount of solid waste will be: 50 * 270 = 13,500 kg/year or 13.5 tons. Or, taking into account the duration of the construction period of 19 months: 50 * 270/12 * 19 = 21,375 kg or 21.375 tons for the construction period.

The standard for waste generation during construction work is calculated on the basis of "Specific quantities of waste generation and irretrievable losses during construction" and a collection of standards for losses of material resources in construction (addition to RSD 82-202-96)[89] M, 1998 according to the formula:

- Moth = G×n/100, (t), where:
- G – amount of material used, t
- n – standard for waste formation based on the mass of the material used, %

The specific amounts of waste generation (standard) and irretrievable losses during construction are:

- Construction crushed stone – 1% of the amount used;
- Construction sand – 3% of the amount used;
- Reinforced concrete, concrete – 1.5% of the amount used;
- Wooden elements from formwork - 1.5% of the amount used;
- Paint – 3% of the amount used;
- Brick – 1% of the amount used;
- Cement mortar – 2% of the amount used;
- Reinforcement – 1% of the amount used.

At the PV plant during construction work will be generated approximately at the year:

- construction waste – 2.0 t
- electrode cinders – 0.17 t
- wooden elements from formwork – 0.2 t
- paint – 0.025 t
- plastic containers for paint – 0.05 t
- cleaning material (rags) - 0.1 t
- construction waste – 0.5 t
- Solid waste – 13.5 t
- Total: 16,545 t

Standards for waste generation during construction are determined on an actual basis.

Waste generated will be segregated and stored on site in temporary storage locations for onward transportation and ultimately disposal at a facility within Uzbekistan that is licenced with national requirements and aligns with GIIP. Available facilities are provided in baseline section.

11)_(utverjdeny_glavnym_gosudarstvennym_sanitarnym_vrachom_27_08_2011_g_)&products=1_vse_zakonodatelstvo_uzbekistana

[89] RDS 82-202-96 Guidelines Document: Rules for the development and application of standards for difficult-to-eliminate losses and waste of materials in construction https://docs.cntd.ru/document/871001051

General waste (including non-hazardous construction waste) will be disposed to a municipal landfill designated for general or construction waste or both following national standards for labelling, segregation, transportation and disposal. This landfill can be used to dispose of construction waste and some types of industrial waste rated at Hazard Class III and IV however this requires a special approval from a respective Centre for Sanitary and Epidemiological Supervision (CSES).

Hazardous wastes including oils, can be treated in-country in accordance with GIIP principles for waste.

During construction, activities with the potential to generate impacts relating to waste include:

- Inadequate handling, transfer and disposal of general waste leads to uncontrolled releases to land, air, groundwater leading to degradation and pollution of the receiving environment and potential fines and/or penalties under national regulations.
- Inadequate handling, transfer and disposal of hazardous waste leads to uncontrolled releases to land, air, groundwater leading to degradation and pollution of the receiving environment and potential fines and/or penalties under national regulations.
- Poor handling and storage of wastes can lead to health impacts on workers and local community (instruction of pests etc.).

Based on the anticipated waste streams, the waste volumes predicted to be generated and the short-term nature of the works the magnitude of the impact for general waste is deemed to be LOW. For hazardous wastes, the absence of hazardous waste disposal facilities results in a MEDIUM magnitude.

8.3.3 Operation phase

During operation the key wastes to be generated will be waste from obsolete or damaged PV panels, batteries as well as general low level hazardous waste and general waste. PV modules are generally considered specialist or hazardous waste.

PV panels and modules often contain small amounts of environmentally toxic metals and elements (e.g., Lead, Selenium, Cadmium) which, if not carefully disposed of, can create environmental hazards. With regard to the PV panels, most parts of a solar module can be recycled, including glass, semiconductor materials, ferrous and non-ferrous metals. Recycling can recover up to 90% of the photovoltaic glass and also up to 95% of the semiconductor material necessary for further production[90]. PV panel recycling is not available in Uzbekistan.

During maintenance works, it is expected that some electronic (in addition to PV panel) waste will be generated including low risk hazardous and non-hazardous wastes (see under decommissioning below). Closed bins will be used for non-hazardous waste, and sealed contained for hazardous waste to prevent contamination. Hazardous waste will be labelled. Wastes will be dealt with in accordance with Masdar standard operating procedure for waste management and national regulations.

[90] https://www.recyclesolar.co.uk/

8.3.4 Decommissioning phase

Waste generated during the decommissioning phase will be as per the construction phase except with the addition of additional waste streams arising from the decommissioning of the main structural and electrical components of the Project.

The minimum proper treatment for the end-of-life equipment as the removal of all fluids and the selective treatment of specific components separation and removal of some key components, such as frames, glass, polymers, plastics and metals, including cables where possible and recycling or disposal.

The modules proposed for this project are silicon based. For silicon-based modules, aluminium frames and junction boxes are dismantled manually at the beginning of the process. The module is subsequently crushed, and its several components are separated, allowing recovering up to 80% of the panel. Since a large quantity of these modules is composed of glass, it is not unusual for glass recyclers to be able to intervene in the recycling process.

It is typical to return PV panels and batteries to the manufacturer for disposal. Following removal of the project infrastructure, the site may be restored to the surrounding land use. This process often includes filling in foundations with gravel, clean fill and topsoil, replacing topsoil and restoring the contours of the landscape.

8.3.5 Cumulative impacts

No cumulative noise impacts have been identified

8.3.6 Summary of impact magnitude

Table 69*: Summary of impact magnitude – waste*

Activity	Duration	Intensity	Likelihood	Extent	Magnitude
General waste management (construction)	Medium	Medium	High	Direct AOI	Low
Hazardous waste management (construction)	Medium	Medium	High	Direct AOI	Medium
Health impacts workers and community	Medium	Medium	High	Direct AOI	Low
General waste management (decommissioning)	Medium	Medium	High	Direct AOI	Low
Disposal and recycling facilities for main structural and electrical components of the PV Plant (PV panels), OHTL and substation	Medium	Medium	High	Direct AOI	Medium
Operational waste	Long (more than 25 years)	Low	High	Direct AOI	Medium

Decommissioning waste	Medium		High	Direct AOI	Medium

8.3.7 Receptor sensitivity

The availability of suitable waste facilities for general waste is generally good, however disposal of hazardous waste in accordance with GIIP may be problematic. Regulated waste transportation and disposal providers for hazardous waste do exist within Uzbekistan at the provincial level, however there is limited capacity to manage this at the local level.

Recycling of PV panels in Uzbekistan is not possible at this time, in particular at high volumes. It is assumed that the availability of options for PV panel recycling within Uzbekistan will not be foreseen during the operational lifetime of the Project.

Table 70*: Project waste receptors*

Receptor	Sensitivity
General waste providers (transportation and disposal)	Low (available locally)
Hazardous waste providers (transportation and disposal)	Medium (available regionally)
PV Specialist waste recycling companies (transportation and disposal)	High (not available in country)
Workers and community	Medium

8.3.8 Mitigation, management measures

Table 71 outlines the project specific mitigation and GIIP to prevent or minimise solid waste impacts for each project phase and monitoring and enhancement requirements where relevant.

Table 71*: Waste mitigation and management*

Project phase	Mitigation and management measures
Design / Contract	Select PV panel producers and battery supplier that offer take-back and recycling of PV panels during the construction, operation phase and end of life decommissioning. Ensure selected PV modules and battery supplier contract includes all costs for returning and decommissioning of PV panels (intermittently during operation and end of life). Prohibit the following materials in EPC Contract: /Procurement Policy • Asbestos • PCB containing materials • lead based paints • pesticide, herbicides as defined under Stockholm convention. Consider offsite manufacture and design for disassembly to minimize resource use.

Project phase	Mitigation and management measures
Construction - Project Specific	• Develop EPC construction site Hazardous Material and Waste Management Plan. • Liaise with local municipality to identify the available list of waste contractors. • EPC contract to state that waste must be segregated at site and where possible options for recycling adopted. • EPC to sign contract with waste management providers. • EPC to perform duty of care audit of the proposed general waste, recycling, construction waste and hazardous waste disposal facilities in Uzbekistan to confirm compliance with GIP. • Disposal of solid waste will be at the closest sanitary landfill to the project site that aligns with GIP. The key and minimum criteria that define a sanitary landfill are identified in the HMWMP. If any of the requirements are not met, the disposal facility will not be used for the purpose of disposal of solid waste for the project and the next closest sanitary landfill will be identified.Endpoint disposal facilities must be approved by Masdar for use at least 1 month prior to commencement of construction • Where any deviations arise, consultation with the municipality must be performed to understand options available for alignment with GIIP. • EPC Contractor E&S Manager will be required to undertake an inspection on the final waste disposal facilities that the authorized contractors will utilize for disposal of waste streams. The inspection will aim to ensure that the disposal facilities are management and operated in line with Good International Industry Practice (GIIP). • A waste manifest (or Chain of Custody Form) will be used as per which details the type/ amount of waste that is generated by EPC Contractor, transferred by the licensed waste collector from the site and disposed at final location.
Construction - GIIP	Employ the waste hierarchy - avoid, minimise the generation of hazardous and non-hazardous waste materials as far as is practicable Define and demarcate dedicated temporary waste collection site at the worksite. Remove all waste on a regular basis to offsite disposal facilities. Where waste is hazardous explore reasonable alternatives for its environmentally sound disposal considering the limitation applicable to its transboundary movements Apply GIIP for the handling, segregation, transportation and disposal of waste of offsite disposal including: Use third party waste transfer and waste disposal contractors that are reputable and legitimate enterprises requiring licences by relevant regulatory authorities In Uzbekistan Explore options for recycling based on the availability of handling facilities in the region.

Project phase	Mitigation and management measures
	Train workers on their rights regarding working with hazardous wastes (e.g., PPE) and the correct way to handle and dispose of waste.
Operation & Maintenance	Develop operational hazardous materials and waste management plan Recycle PV and battery waste streams (buyback / take back scheme)
Decommissioning	Develop decommissioning Hazardous Material and Waste Management Plan Recycle PV and battery waste streams (buyback / take back scheme)
Enhancement	None identified.
Monitoring	Weekly and monthly waste generation volumes for construction wastes (segregated by waste stream) Operational waste streams Waste contracts with authorised waste disposal facilities Monthly volume of waste generated (per type)

8.3.9 Residual significance

Following the application of the mitigation measures outlined in Table 71 the magnitude of the impact is expected to reduce for all receptors. The residual significance post mitigation is summarised in Table 72. The assessment has indicated that waste impacts due to the construction and decommissioning phase of each Project would not be significant.

Table 72*: Waste residual significance*

Impact and Effect	Magnitude (Pre-mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
General waste management (construction)	Low	Low	Low	Neutral
Hazardous waste management (construction)	Medium	Medium	Low	Minor
Health impacts workers and community	Low	Low	Low	Minor
General waste management (decommissioning)	Low	Low	Low	Neutral
Disposal and recycling facilities for main structural	Medium	High	Low	Moderate

Impact and Effect	Magnitude (Pre-mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
and electrical components of PV and batteries				
Operational waste (general)	Medium	Low	Low	Neutral
Decommissioning waste (general)	Medium	Low	Low	Neutral

8.3.10 Data limitations and uncertainty

None identified.

8.4 Climate resilience

8.4.1 Potential impacts

The Task Force for Climate Resilience categorised climate related risks are typically categorised as:

- market and technology shifts
- policy and legal
- reputation
- physical risks

8.4.2 Construction and operation phase

Of particular relevance to the Project are physical risks to project infrastructure and health risks. Market and technology shifts, reputation and policy risks are not considered relevant for assessment in this ESIA. It is worth noting however, that the Project can be considered to have a positive impact on the market and technology shifts required to improve climate resilience as described in the needs case assessment in section 3.1 which highlights the Project contribution to supporting the transition of the Uzbekistan energy sector to low carbon through the deployment of renewables and the need to improve the resilience power network.

Considering the climate risk projections outlined in the baseline section (5.3.2) the Project will be susceptible to climate related risks during the construction and operational lifetime of the asset (expected to be 30 to 40 years (2025 - 2065).

Climate risk screening has identified the following potential events that are relevant to the Project in Uzbekistan with the potential to result in an impact to the workforce and physical infrastructure. Risk projections potentially relevant to the construction, operation and decommissioning phase works are:

- more frequent dust storms
- extreme rain events / landslides /mudflows
- potential for prolonged periods of extreme heat during the summer months

The climate change risk assessment has determined that these risk are medium magnitude. This is provided in Technical Appendix – Volume III.

8.4.3 Receptor sensitivity

The main receptors for climate change risks at the project level are the project infrastructure itself and workers. Based on the climate change projections and the duration of the operations phase, all infrastructure is considered to have a medium sensitivity to change. Workers are assigned a high-risk sensitivity based on there being little to no capacity to avoid climate related events during the construction phase and their susceptibility increases into the operation phase, refer to Table 73.

Table 73*: Project climate resilience receptors*

Receptor	Sensitivity

Physical Infrastructure	Low
Workers	Medium

8.4.4 Mitigation, management measures

Table 74 outlines the project specific mitigation and GIIP to prevent or minimise climate impacts for each project phase and monitoring and enhancement requirements where relevant.

Table 74*: Climate resilience mitigation and management*

Project phase	Mitigation and management measures
Design	Design for climate projections up to 2085 Consider need to reinforce the structures or higher design standards (stronger winds, higher temperatures) Design the access road to consider short-term, extreme weather events/ mudflows. Design site drainage to account for increased or short-term extreme precipitation patterns (in particular in relation to the waterflow regime in the ravines on site) Design for increased and extreme dust storms Specify more effective cooling for substations and transformers, including retrofitting measures, improved shading, and choice of cooler locations / shading where possible around the substation and the BESS site.
Construction - Project specific	Identify shelter locations for workers in the event of a dust storm. Prohibit elevated work in wind conditions more than 15 km/hr. Ensure sufficient supply of potable water at the Work fronts (<3.5 L per worker per day) Ensure sufficient shelter/shade during summer months across the Project site. Provide extra rest periods for workers when temperatures exceed 35 oC. Ensure workers are not penalised for taking extra rest breaks during periods of extreme heat
Construction – GIIP	Consider climate risks in all setting to work risk assessments. Address climate risk in worker induction Address climate risks (dust/extreme heat) in emergency preparedness and response planning (EPRP)
Operation	As per construction phase.
Decommissioning	As per construction phase
Enhancement / opportunities	Planting for shade around the site

Project phase	Mitigation and management measures
Monitoring	Establish an early warning system for wind and extreme heart events through continuous weather monitoring.

8.4.5 Residual significance

Residual significance is presented in Table 75.

Table 75*: Climate resilience residual significance*

Adverse	Magnitude (pre-mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
Increased wind speeds	Medium	Low	Low	Neutral
Increasing temperature	Medium	Low	Low	Neutral
Extreme rain events leading to mudflows / landslides	Medium	Low	Low	Neutral
Climate related events that impact worker health	Medium	Low	Low	Minor

8.4.6 Data limitations and uncertainty

None identified.

8.5 Water resource use, wastewater and water quality

8.5.1 Potential impacts

Water use, in general, can have a negative impact on water availability and water quality (surface and groundwater). The construction of the Project infrastructure has the potential to compete for water resources with existing users which for this project is confirmed will be from the district water supply and delivered to site.

In addition, unplanned wastewater discharge at site can lead to contamination of existing water resources (groundwater or surface water).

A description of the potential impacts and magnitude is provided below and summarised in Table 76.

8.5.2 Construction phase

Project activities during site construction and commissioning which are likely to impact the availability of water resources for competing water users or lead to contamination of sensitive water receptors include[91]:

- Additional water use during construction works leads to increased pressure of water availability and supply via the municipal water system.
- General construction works lead to direct contamination of groundwater from sanitary waste, construction wastewater and contaminated run-off leading to pollution of groundwater (in particular during extreme precipitation events) or nearby surface water courses.[92]

8.5.2.1 Water use

The Project will require water for construction works and domestic use operations, as described in Table 77. Potable water, and construction water will be sourced from the Guzar Municipality water supply and tankered to site or accessed via neighbouring pipeline that crosses near the site.

During construction, the main water use is connected with cement manufacture. This will be undertaken by a third-party offsite cement provider. No concrete batching will occur in the direct AOI and therefore minimal construction water will be required. The overall water needs are considered to be moderate. On-site construction water needs are estimated between 3000L and 4000L per day. Considering one small to medium sized water tanker on site may hold between 8000 and 10,000L, the daily water needs are considered to be low magnitude.

Water for cement manufacturer will be the responsibility of existing offsite facility (the nearest existing concrete batching plant is ~2km from the project site, but the final supplier is still to be determined).

[91] Changes to surface water run-off which may lead to increased erosion or increased sedimentation of surface water features in the indirect AOI (as a result of increased dust storms) are addressed in section 8.6 of this report.

[92] Leaks and spill and general contamination of soils is addressed in section 8.6 of this report.

Table 76*: Project water requirements for construction phase*

No.	Total Water Requirement	Magnitude	Unit	Assumptions
1	Water Quantity for concreting & Compaction (M25)	4,459,808	Litre	8.8 MVA block RCC Inverter station on 0.9m high plinth from N. G. L Inverter Supporting Structure one for -4 inverters and ICOG-1
2	Water for curing	8,919,615	Litre	Transformer foundation 1 (8.8MVA)
3	Water Quantity for PCC 1:3:6	16,593	Litre	Burnt Oil Pit-1
4	Water Requirement for Labours during construction	7,200,000	Litre	Considered construction period of 12 months and 200 labours to be at site per day on an average. Water requirement per labour to be 100 litres.
5	Water requirement for road	1,947,360	Litre	Road widths as per RFP, road lengths as per layout. Assumed 15 litres of water per m2 road surface area.
Total		22,543,376	Litre	

Source: Sgurr Energy, Water Usage Assessment Report

For the construction phase a consumption of 22,543,376 L/Year is estimated during the overall construction phase, including commissioning.

8.5.2.2 Wastewater discharges (to surface water and ground water)

The AOI for the construction works considers the direct site plus 250m buffer around the site. The baseline assessment identified ephemeral channels as in the AOI and groundwater is expected to be around 15m in depth. Considering the frequency of extreme rain events, the short-term nature of the construction works, the volumes of liquids used during the construction process on site (mainly fuel, oils., greases etc.) and the localised extent of the potentially contaminated run off, it is possible that there will be a detectable impact to the groundwater resource. However, the impact is deemed unlikely to permanently change the groundwater quality or lead to exceedances in current groundwater quality levels. Even in the worst-case scenario of wet season construction, the effects are still highly localised and temporary. The overall impact magnitude is therefore considered to be LOW.

Septic tanks of 2,500 litres will treat sewage water during construction and operation will be used for onsite temporary storage prior to collection by the registered waste treatment company for disposal and treatment offsite. offsite disposal following the requirements of the Hazardous Materials and Waste Management Plan. Volumes of sanitary wastewater are considered to be low.

8.5.3 Operation phase

8.5.3.1 Water use

Water use during the operations phase is very low primarily associated with use at the control centre and module cleaning (less for the planned dry cleaning) (Table 77). Based on the projected water consumption volumes, the Project does not require long-term significant water storage or a dedicated water borehole only one small storage tank to supply the main offices or connection to the local water network if available. The overall magnitude for water use is considered to be Low.

Table 77*: Project water requirements for operation phase*

Requirement	Liters	Notes
PV Module Cleaning	NA	Dry Cleaning
Yearly water requirement assuming 20 people in O&M and 10 litres of requirement per day	730,000	I litres

Source: Sgurr Energy, Water Usage Assessment Report

8.5.3.2 Wastewater discharges

The potential for untreated run-off of contaminated or potentially contaminated water during maintenance works with impact on groundwater or ephemeral channels has been scoped out, noting that most maintenance works will be short-term, self-contained and operational procedures require maintenance works to remove all wastes (including liquid wastes) off-site for disposal in accordance with the operational waste management system. No water is required for PV cell clearing and therefore no run-off is anticipated.

8.5.3.3 Changes to drainage regime

During operation, the drainage system is proposed to be designed to ensure no untreated wastewater can be routed to existing surface water features or discharge to groundwater.

8.5.4 Decommissioning phase

Decommissioning impacts are assumed to be the same a construction phase impact.

8.5.5 Cumulative impacts

Water use is relatively low and minimal discharges will be generated from the construction works and these are proposed to be managed locally using GIIP. Combined effects as a result of other related project activities in the vicinity are not expected to result in any pressures on local water resources that will result in an adverse environmental impact. No cumulative water impacts have been identified

8.5.6 Summary of impact magnitude

Table 78 details the impact magnitude for the impacts identified above.

Table 78*: Summary of magnitude – water use and wastewater*

Activity	Intensity/ compliance	Duration	Spatial Extent	Reversibility	Likelihood	Magnitude (pre-mitigation)
Water use	Medium	3 to 6 months	Indirect AOI (municipal water supply)	Temporary during works only	Intermittent (during works only)	Medium
Wastewater discharges (construction)	Medium	3 to 9 months	Within 250m of the Site boundary	Temporary during works only	Intermittent (during works only)	Medium
Wastewater discharges (sanitary wastewater)	Medium	12 to 16 months	Indirect AOI	Temporary during works only	Intermittent (during works only)	Medium

8.5.7 Receptor sensitivity

The likelihood that groundwater will be affected by construction works is low. Furthermore, groundwater is generally not used for drinking water (potable water boreholes) with most people connected to the mains supply.

Despite the general scarceness of water in this region, considering the recent upgrades and capacity expansion to the Guzar district water supply system, the municipal water supply is considered to have adequate capacity to meet the needs of the Project.

Table 79*: Project water resource and water quality sensitivity*

Receptor	Sensitivity
Groundwater (more than 15m in depth)	Low
Guzar Municipal water supply	Low (water use)

8.5.8 Mitigation, management measures

Table 80 outlines the project specific mitigation and GIIP to prevent or minimise water use and wastewater impacts for each project phase and monitoring and enhancement requirements where relevant.

Table 80*: Water use and water quality mitigation and management*

Project phase	Mitigation and management measures
Design/ Procurement	EPC contractor to confirm the PV site layout and provide the project Company with a drainage and site plan for avoiding/managing existing gullies/ravines and intermittent waterflows. Avoid construction in existing ravines and gullies Prohibit groundwater for potable or construction related purposes (confirmed). Sanitary waste to be collected in portable latrines or septic tank and wastewater to be collected for disposal off site in municipal wastewater treatment facility (under licence). Drinking/potable water and construction water to be sourced from municipal supply and bright to site by tanker (under permit). Undertake groundwork to ensure appropriate site drainage (avoiding risk of contaminated run off). Develop a project Water Management Plan to elaborate on the mitigation outlined below.
Construction - Project Specific	Drinking water at the construction work front to be provided by bottled water (equating to at least 3 Litres per day per worker). All cement to be delivered to site pre-mixed or pre-cast from third parties with approved water use licences. No water can be extracted from any surface water sources; e.g. Water pond near the site No storage or laydown areas within 50 m of the ephemeral channels or man-made pond. Herders to be directed to alternative nearby ponds for watering animals to avoid any impact on cattle from water quality issues. No direct discharge of contaminated water or potentially contaminated water to the ground without prior treatment. Bunded facility for all chemicals and oils.
Construction – GIIP	Adopt GIIP to minimize the risk of pollution during construction.

Project phase	Mitigation and management measures
	Conduct hazardous risk assessment for all hazardous materials on site and ensure the MSDS is stored adjacent to the chemical. Include spill scenarios in the EPRP including identification of locations of hazardous materials and associated activities on an emergency plan site map. Use barriers (e.g., drip trays) between works and ground to minimise impacts from spills or other issues. All chemicals, fuels, and oils are stored at the construction camps and laydown area to be in designated areas in a secure and bunded facility that is capable of capturing 110 percent of the largest tank or 25% percent of the combined tank volumes in areas with above-ground tanks with a total storage volume equal or greater than 1,000 liters and will be made of impervious, chemically resistant material. No herbicide use. Do not refuel on site, except at dedicated refuelling area. All concrete washout to take place at designated concrete washout area at the site. All cement trucks must return to the batching facility or a dedicated wash-out facility to perform cement washout. Works with hazardous liquids must be performed over an area of hardstanding or temporary gravel to avoid seepage to groundwater in the event of a spill.
Operation	General operational management requirements concerning good housekeeping during maintenance works and waste management and spill management provisions must be implemented. All chemicals, fuels, and oils permanently stored on site to be in designated areas in a secure and bunded facility that is capable of capturing 110 percent of the largest tank or 25% percent of the combined tank volumes in areas with above-ground tanks with a total storage volume equal or greater than 1,000 liters and will be made of impervious, chemically resistant material.
Decommissioning	As per construction phase
Enhancement	If any water supplies are developed to support the Project (new borehole), these may be made available to the local community.
Monitoring (KPIs)	Volume of construction water use tankered to site Volume of potable water delivered to site. Number of reported spills (zero or downward trend to be maintained) Number of reported incidents of concrete washout in undesignated area No unauthorised release of contaminated or potentially contaminated water to ephemeral channels or ground

Project phase	Mitigation and management measures
	No monitoring required for the operation phase.

8.5.9 Residual significance

Following the application of the embedded design mitigation measures as outlined in Table 80, (including use of dry-cleaning PV technology, and construction setbacks from the edge of ephemeral channels and on-site drainage system) the Project has avoided many significant impacts on water quality, excessive pressure on the municipal supply system and potential for significant contamination and of the Guzar municipal system. The residual significance post-mitigation is summarised in Table 81. The assessment has indicated that the significance of impacts on water resources availability and groundwater quality would be minor to neutral. Impacts on water resources is overall considered insignificant.

Table 81*: Water use and water quality residual significance*

Activity	Magnitude (pre mitigation)	Sensitivity	Magnitude (post mitigation)	Significance
Water quality (ephemeral streams) - construction	Medium	Medium	Low	Minor
Water quality (groundwater) - construction	Medium	Low	Low	Neutral
Water resource use (construction)	Medium	Low	Low	Neutral
Water quality (ephemeral streams) decommissioning	Medium	Medium	Low	Minor
Water quality (groundwater) - construction	Medium	Low	Low	Neutral
Water resource use - decommissioning	Medium	Low	Low	Neutral

8.5.10 Data limitations and uncertainty

None identified.

8.6 Soils

8.6.1 Potential impacts

Locations for developing solar PV projects in Uzbekistan are typically desert regions and communal grazing pastures already experiencing high levels of land degradation, soil erosion and dust events. These locations are already under increased stress due to climate change, but even at the local level, minor land clearance (legal and illegal) can significantly impact the soil structure and erosion potential, leading to increasingly frequent dust events and significantly affecting grazing potential.

8.6.2 Construction phase

During construction of the PV foundations, tower foundations, access tracks and the temporary laydown area and accommodation facility, impacts may include:

- Increased soil erosion (desertification) due to permanent removal of vegetation and topsoil and compaction of soils from increased use of heavy machinery, off-road vehicle movements and storage of construction materials.
- Contamination of soils from construction activities at all locations including storage of hazardous materials, spills of oils, refuelling activities, use of chemicals, poor waste management.

8.6.2.1 Increased soil erosion

The soil in this area is characterised by natural sandy desert habitat consisting predominantly of fixed and semi-fixed sands predominantly, with pockets of saline land and low organic matter and nutrient content. The vegetation characteristic of this type of habitat is principally slow-growing shrubs and trees. The shrubs and trees play an important role in the stabilisation of the sandy desert as evidence in areas where there is less vegetation cover. The shrubs and trees are essential for retaining the fixed structure of the sandy soils that dominate the majority of the Project site. Removal or compaction of this topsoil layer can have permanent consequences for habitat in the temporary disturbed area leading to unfixed sands and increasing potential for erosion and the phenomenon known as “moving sands”. The ROW and site preparation works, and installation of the different components will require the removal of all vegetation in the direct impact area leading to increased erosion potential. The likelihood of the disturbed area naturally returning to its original state is low with intervention.

8.6.2.2 Contamination of soils

Storage of hazardous materials and general construction woks at the site have the potential to result in spills, leaks that may contaminate the soil. Examples include:

- hydraulic oil leaks from heavy plant machinery
- Small spills when undertaken mobile refuelling on the site
- Spills of hazardous materials during transit.

The spills will be short-term and contained do the direct impact area, but depending on the source the spill, the volume could be significant.

8.6.3 Operation phase

No impacts during normal operations and maintenance works are anticipated, this has been scoped out.

During abnormal operating practices there is a potential for:

- Risk of leaks from the batteries during abnormal operating conditions. A
- Ris of firewater routing not ground in emergency event.
- Risk of leakage from emergency generators and fuel storage and refilling transformers oil.

These risks will have a low likelihood but if realised could result in a moderate magnitude impact.

8.6.4 Decommissioning phase

Decommissioning impacts are assumed to be the same a construction phase impact.

8.6.5 Cumulative impacts

No cumulative soil impacts have been identified.

8.6.6 Summary of impact magnitude

Table 82 details the impact magnitude for the impacts identified above.

Table 82*: Summary of magnitude – water use and wastewater*

Activity	Intensity/ compliance	Duration	Spatial Extent	Reversibility	Likelihood	Magnitude (pre-mitigation)
Increased soil erosion	Medium	Long-term	Direct AOI	Permanent	High	Medium
Contamination of soils (including leakage from batteries)	Medium	Long-term	Direct AOI	Permanent	High	High

8.6.7 Receptor sensitivity

The vegetation has essential importance for sand fixation and combat desertification. Where removed the semi-fixed and fixed sands can be under severe pressure from desertification.

Table 83: *Project soil receptors*

Receptor	Sensitivity
Sandy Soils	High

8.6.8 Mitigation, management measures

Table 84 outlines the project specific mitigation and GIIP to prevent or minimise soil impacts for each project phase and monitoring and enhancement requirements where relevant.

Table 84*: Soils mitigation and management*

Project phase	Mitigation and management measures
Design	Avoid total removal of vegetation (see biodiversity section) of whole site where possible e., g around the edges of the site and around the substation and BESS site. Grade temporary access roads so that their slope is not too large to avoid the build-up of fast-running run-off water during extreme precipitation events. Adopt tension stringing technique to avoid impact on habitat between the towers and stringing points. Ensure containment for battery leakages and firewater collection.
Construction - Project Specific	Confine traffic movement to designated routes. Immediately restore the topsoil and vegetative cover using natural or seeded restoration techniques for all temporarily disturbed areas. For any area impacted by compaction, rehabilitate the compacted area to support the return of the impacted area to the original state as quickly as possible following completion of the works.
Construction – GIIP	Cross reference with Biodiversity Management Plan Reflect natural gradient and relief when reinstating soils. When stripping, stockpiling or placing soil, do so in the driest condition possible and use tracked equipment where possible to reduce compaction. Keep soil storage periods as short as possible. Clearly define topsoil and sub-soil stockpiles of different soil materials for reuse of topsoil. Use earthmoving plant that is appropriate to the size of the site, the volume of soil to be stripped and haul distances. Topsoil will normally be stripped to a thickness defined by depth below the surface and a distinct colour change. Define a designated area of storage of hazardous materials and ensure secondary containment (bunding) to contain any spills and adequate security. Restrict access to hazardous materials Adopt GIIP for management for pollution prevention from using machines and equipment, refuelling, storage and handling of hazardous materials and management of wastes.

Project phase	Mitigation and management measures
	Designate a central maintenance and refuelling area on site located on hardstanding. For mobile refuelling or maintenance ensure a drip tray is used at all times. Ensure emergency procedures in place for accidental spills of hazardous materials are outlined in the Emergency preparedness and Response Plan. Spill kits to be located on Site at all work fronts and a spill kit in all heavy plant machinery. Train workers on spills management and hazardous materials management in induction and via tool box talks. Washing of equipment and concrete washout shall be carried out in a designated impermeable area with dedicated drainage and settlement tank. Secondary Containment should be 110% the capacity of the stored material.
Operation	Ensure GIIP measures for handling hazardous materials are included in the operational EMS. Address spills from hazardous material use in the operational EPRP.. Secondary containment for fuel and oil storage, Spill kits, refuelling and oil refilling drip tray in key areas around site where oils/chemicals/fuels is stored or used. All batteries to be located within a bunded container where any leakage can be siphoned off and collected for offsite treatment and disposal. All firewater to be routed to a collection pit for offsite treatment and disposal. GIIP mitigation for use of hazardous materials during operation and maintenance works are outlined in ESMP. Spills to soils during abnormal operating procedure are addressed in the ESMP
Decommissioning	Develop vegetation rehabilitation and restoration plan for whole site. As for construction
Enhancement	Where possible, seek to return low level shrubs to areas around the panels to help fix the sands
Monitoring	Five-year aftercare and monitoring program to ensure soil and associated vegetation cover is returned to its original state. Visual inspections of leaks and spills Record keeping or any incidents

8.6.9 Residual significance

The sensitivity of soils to erosion is considered to be high based on the final balanced relationship between the habitats and soil structure and subsequent capacity to absorb any changes (Table 85).

Table 85: Soil residual significance

Adverse	Magnitude (pre-mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
Soil erosion	Medium	High	Low	Moderate
Soil contamination (construction)	High	Medium	Low	Minor
Soil contamination (operation)	High	Medium	Low	Minor

8.6.10 Data limitations and uncertainty

None identified.

8.7 Traffic and transportation

8.7.1 Potential impacts

Increases in traffic movements and the transportation of equipment and workers can have a negative effect on the local transportation network as well as the health and safety of workers and local residents. The health effects include dust getting into eyes and mouth (workers, residents), increased dust particles in the atmosphere, nuisance through surface soiling affecting local ecology and where relevant cultural features.

8.7.2 Construction phase

Activities during site construction phase which may lead to traffic related impacts for the Project include:

- Additional traffic on road M39 (including heavy goods vehicles) to the Project site leading to impact on road users and traffic flow.
- Increased vehicle movements on all roads leading to deterioration of road infrastructure.

Dust and noise impacts on receptors from traffic movements are addressed in section 8.1 air quality and section 8.2 noise.

Occupational health and safety impacts related to traffic/delivery of materials and equipment to site and impacts related to existing infrastructure from vehicles (e.g. gas pipelines) are addressed in section 8.10.

8.7.2.1 Impact upon Road Users and Traffic Flow

Based on baseline data about the traffic flow along the M39 to the new access to the Project site, the traffic volumes and flow in the areas are low. Based on the assumption that there would be up to 15 vehicles per day to and from the site during the equipment delivery period (months 3 to 6), the project could add up to 30 vehicle movements (predominantly HGV and vans) per day during the early stages of equipment delivery and cement works. This would taper off during the PV module installation works and taper off even further during commissioning works. There may also be up to 40 (80 two way) vehicle movements connected with the delivery of the BESS containers, two vehicle movements connected with the delivery of the transformers and necessary cranes. The use of non-concrete piling techniques will significantly reduce the number of concrete batching vehicles that will need to come to the site. The increase in traffic will be for the duration of the earthworks, piling, and concrete works (approximately 7 months duration), although movements will be intermittent (in relation to large delivery vehicles) and short-term (considering the duration of the delivery phase).

Figure 69: Example of vehicle delivery solar panels

Figure 70: Example of vehicle delivering transformer

Deterioration of Route Infrastructure – There may be some deterioration of road surfacing on the M39 due to the increase in vehicle movements, in particular along the section between the batching plant and the site where the most vehicle movement will be experienced.

8.7.3 Operation phase

During the operations phase only very low levels of traffic would be generated by the Project with trips relating to maintenance and upkeep of PV modules, batteries, OHLT and substation. Operational impact scoped out from further assessment.

8.7.4 Decommissioning phase

The impacts of Project decommissioning are expected to be less than or equal to those resultants from project construction.

8.7.5 Cumulative impacts

No cumulative transportation impacts have been identified.

8.7.6 Summary of impact magnitude

Table 86 details the impact magnitude for the impacts identified above.

Table 86*: Summary of magnitude – water use and wastewater*

Activity	Intensity/ compliance	Duration	Spatial Extent	Reversibility	Likelihood	Magnitude (pre-mitigation)
Impact upon Road Users and Traffic Flow	Medium	0 - 7 months (infrequent)	Indirect AOI (M39)	Temporary during works only	High	Medium
Impact upon Route Infrastructure	Medium	12 months	M39	Permanent	High	Medium

8.7.7 Receptor sensitivity

Receptors along the M39 are likely to experience the greatest impact from the intermittent (large delivery vehicles) and short-term (considering the duration of the delivery phase) from traffic and transportation activities. Other PAPs are not considered to be within the direct AOI. Sensitive receptors in the AOI are summarised in Table 87 below.

Table 87*: Project traffic receptors*

Receptor	Sensitivity
Road (M39) infrastructure (unsurfaced roads)	Medium
Road users (M39)	Medium

8.7.8 Mitigation, management and monitoring measures

Table 88 outlines the project specific mitigation and GIIP to prevent or minimise traffic and transportation impacts for each project phase and monitoring and enhancement requirements where relevant.

Table 88*: Traffic and transportation mitigation and management*

Project phase	Mitigation and management measures
Design / Contract	Design laydown area and delivery approach to minimise vehicle stopping outside the site access. Perform a road condition assessment / comprehensive traffic and transportation study to assess load requirements and the capacity of the road, as well as identify necessary upgrades or enhancements prior to and following the 'core construction period' to assess damage to road infrastructure that can be attributed to project construction. Include clause in the EPC contract that that any damage to road (wear and tear over the construction period) must be repaired and 'made good' (or indemnify the Project Company against any required road rehabilitation work) EPC to confirm delivery route and conduct condition survey of route within 10 km of the Project site.
Construction - Project Specific	Prepare a detailed traffic and transportation management plan and implemented in close collaboration with local traffic authorities to ensure the safety of surrounding communities. Protocols addressing the following shall be included in the TMP: No alcohol and drug use while driving. Demarcate delivery road and access tracks across the site and ensure all workers stick to demarcated areas. CLO to engage local community to inform of start of construction works and timings for large vehicle deliveries (e.g., BESS containers, cranes, transformers) Install appropriate signage to inform local communities and road users of site access points. Establish waiting and overtaking areas around the site. No night-time driving along unsurfaced roads. All refuelling of delivery vehicles to be undertaken in nearest refuelling site (not at site). Require all drivers to undergo a driver's induction and sign the drivers code of conduct. Maximum of 40 km/h on M39 approaching the Site. Road safety training must be provided to all drivers.
Construction – GIIP 93	Enforce speed limits and reduce vehicle movements (maximum of 20 km/h) for project vehicles on unsurfaced roads within the site.

93 GIIP for air managing air quality impacts can be referred to in https://www.rbkc.gov.uk/pdf/Document%2012%20-%20BRE%20-%20Control%20of%20Dust%20from%20Construction%20and%20Demolition%20Activities.pdf ii) IFC EHS Guidelines General

Project phase	Mitigation and management measures
	Minimise amounts of material handling and avoid double handling to avoid transportation movements. Comply with weight limit restrictions on all roads. Ensure escorts, flag persons and other safety measures are employed where necessary (e.g., entering and exiting the site / offsite batching plant) Coordinate with all necessary authorities Include measures to respond to traffic incidents in the EPRP. Evidence that all drivers can demonstrate required competencies for the vehicle they are driving and have signed a driver's code of conduct.
Operation	GIIP as per construction GIIP above.
Decommissioning	As per construction and project specific and construction GIIP
Compensation/ Enhancement	None identified
Monitoring	Regular (daily) monitoring of dust episodes, soiling of vegetation, dust resuspension on the roads and dust clouds at Project site. Maintain logbook: record any traffic incidents. Stakeholder grievance related to traffic and road condition

8.7.9 Residual Significance

Following the application of the mitigation measures outlined in Table 88, the magnitude of the impact is expected to reduce for all receptors. The residual significance post mitigation is summarised in Table 89. The assessment has indicated that traffic and transportation impact due to the construction and decommissioning phase would not be significant.

Table 89*: Traffic and transportation residual significance*

Adverse impacts	Magnitude pre mitigation	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
Road infrastructure (unsurfaced roads)	Moderate	Medium	Low	Minor
Road users) (mainly local community)	Moderate	Medium	Low	Minor

8.7.10 Data limitations and uncertainty

None identified.

8.8 Biodiversity

8.8.1 Potential impacts

The construction, operation, and decommissioning of the Project may generate a number of impacts on various sensitive biodiversity receptors, including ten species classified as Priority Biodiversity Features (PBFs), per EBRD PR6.

The Project has potential to generate the following types of impacts to sensitive biodiversity receptors:

- Introduction of invasive species
- Habitat/vegetation loss and degradation (terrestrial)
- Disturbance to, and persecution of animals
- Injury/death of terrestrial (non-flying) animals
- Bird collisions with powerlines
- Bird electrocutions on powerlines

The Project does not overlap, nor does it have the potential to generate significant adverse impacts to any national or international protected area. The nearest protected area is:

- The Pachkamar (or Chimkurgan) Reservoir IBA[94], located ca. 14 km to the north of the Project

No impacts from construction, operation, or decommissioning will occur on any protected areas. Impacts to these areas are not considered further.

8.8.2 Construction phase

8.8.2.1 Habitats and Flora

Habitat/vegetation loss and degradation. The Project will permanently replace approximately 733 ha of Modified Habitats (per IFC PS6 definition) with PV solar panels, BESS and substation. These habitats consist of mostly bare fields with clayey soils, currently used primarily for low-intensity, rain-fed crop production, with some fallow areas, and some gullies formed by soil erosion, containing weedy forb growth. The pre-mitigation magnitude of impact on vegetation communities is considered LOW.

Accidental introduction of invasive species. The presence of humans, vehicles, and heavy machinery within the Project area may result in the accidental introduction of invasive species. This impact could occur throughout the Project's life cycle, as a function of the level of human and vehicular traffic, thus concentrated within the construction and decommissioning phases. Several invasive plant species were identified in the baseline floral survey, reflecting the area's current state as an agricultural area, from which native vegetation has been removed. The impact magnitude is deemed to be LOW given the pre-existence of invasive species at the site, and the lack of intact, Natural Habitat or native plant communities.

94 BirdLife International (2024) Important Bird Area factsheet: Chimkurgan Reservoir. Downloaded from https://datazone.birdlife.org/site/factsheet/chimkurgan-reservoir-iba-uzbekistan on 25/07/2024.

8.8.2.2 Terrestrial and Aerial Fauna

Two species of non-flying terrestrial animals, Marbled Polecat and Central Asian Tortoise, were identified as PBF in the baseline characterization. These, plus ground-foraging Macqueen's or Great Bustards, may experience either *Habitat loss/degradation* Impacts or *Disturbance/persecution* impacts during the Project's construction and/or decommissioning phases. The former is considered to be a function of the areal extent of an animal's habitat/vegetation that is removed either permanently (within the footprint of solar panels or other Project infrastructure that will persist throughout the operations phase) or temporarily (within construction laydown areas, or other temporarily disturbed areas), while the latter may extend to a broader area, depending on the sensitivity of each animal to disturbance from construction activities, which may cause certain animals to experience disruption of normal activity patterns (disturbance), or to be directly persecuted by construction workers even outside of the Project's soil disturbance footprint. In addition, six bird sensitive species (Sociable Lapwing, Steppe Eagle, Greater Spotted Eagle, Imperial Eagle, Egyptian Vulture, Saker Falcon) identified as PBF for the Project, and expected to occur at the Project site only on a very limited basis either for overflights during migration (all six species) or during the breeding season (Egyptian Vulture) or brief migratory stopovers could also experience *Disturbance/Persecution* Impacts during Project construction.

Considering the absence of sensitive terrestrial animal species from the footprint of the Project area in the baseline survey results, as well as the general unsuitability of the habitat within the Project area for four species mentioned above, the pre-mitigation magnitude of *Habitat loss/degradation* and *Disturbance/Persecution* impacts during Project construction is considered to be LOW.

Injury or death of terrestrial animals. The Project may cause the injury or death of terrestrial animals during the Project's construction phase primarily through the activities of heavy machinery, as well as vehicular traffic within the area. The Central Asian Tortoise, Marbled Polecat, and small terrestrial vertebrate species are particularly at risk of this, as they dwell on, or underneath the soil/substrate, and as soil disturbing activities of heavy machinery may result in the death or injury of such animals. Reptiles and amphibians are particularly vulnerable to injury during the hibernation period where they are less active (or inactive) and unlikely to naturally leave the area nor can they be relocated prior to works commencing. The pre-mitigation magnitude of the impact of injury or death to the Central Asian Tortoise is assessed as MEDIUM, due to the confirmed presence of this species at the site, and the fact that it is very difficult to protect during construction, as this species spends up to 10 months of the year (all seasons except for spring) in a state of hibernation or aestivation in underground burrows, though we note that baseline surveys indicate that this species is rare at the site. For Marbled Polecat and other terrestrial species, the pre-mitigation magnitude of the impact of injury or death is assessed as LOW, as Marbled Polecat may be absent from, or very rare at the site, and there are no other sensitive species of terrestrial animals present.

8.8.3 Operations phase

8.8.3.1 Avifauna

Bird collision with powerlines. Certain types of birds may experience injury or death from collisions with powerlines during the Project's operations phase. This type of impact is believed to occur because

certain birds have difficulty seeing the cables of the OHTL while in flight, thus colliding with them if they are on the birds' flight path. For this reason, the overhead, or static wire of OHTL is generally the most hazardous for bird collisions, as it is generally the narrowest cable, and hence the least visible to a flying bird. Bird collisions may occur anywhere along the spans (line segments between pylons or towers) of the OHTL, and are generally concentrated where OHTLs pass directly through, or in close proximity to water bodies, wetlands, or other habitats that are known to concentrate collision-prone bird species.

Birds' susceptibility to collisions with OHTLs varies substantially across species, with highest collision susceptibility generally associated with large-bodied bird species that possess relatively high wing-loading (the proportion of body weight to the size of the wings), as this type of flight morphology renders these species less buoyant and manoeuvrable in flight. Bird collisions with OHTLs are also associated with visual capacity and flight behaviour of various bird taxa, as well as lighting and weather conditions that may affect the visibility of the cables. Sensitive collision-susceptible bird taxa potentially affected by the Project include Macqueen's Bustard, Great Bustard, Sociable Lapwing, all of which are classified as PBFs for the Project, as well as certain other migratory birds, especially migratory water birds.

The Project will entail the construction of only 658 meters of new overhead, high-voltage transmission line, and the area in which this new line will be constructed consists of 100% upland habitats that are heavily degraded, hence no bustards, large-bodied waterbirds, or other species of collision susceptible birds are likely to occur regularly there. Furthermore, this area already has numerous OHTL present, further limiting the extent of this potential impact. Based on this evidence, the pre-mitigation magnitude of this impact is assessed as LOW.

Bird electrocutions on powerlines. Certain types of birds may experience fatality due to being electrocuted on powerlines during the Project's operations phase. This type of impact occurs when birds make simultaneous contact either with two different electrified parts, or with an electrified and a grounded part of the OHTL infrastructure. Bird electrocutions occur almost exclusively on, or near the support structures (poles/pylons).

Birds' susceptibility to electrocutions on OHTLs varies substantially across species, with highest electrocution susceptibility generally associated with large-bodied bird species that exhibit a behavioural tendency to perch on powerlines and their support structures, either for roosting, hunting, or nesting. Sensitive electrocution-prone bird taxa potentially affected by the Project include Saker Falcon, Egyptian Vulture, Steppe Eagle, Imperial Eagle, and Greater Spotted Eagle, all of which are classified as PBFs for the Project, as well as any other large-bodied bird that tends to perch on powerlines (e.g., storks, raptors, owls).

The Project will entail the construction of only 658 meters of new overhead, high-voltage transmission line, and the area in which this new line will be constructed consists of 100% upland habitats that are heavily degraded, hence the area is not expected to attract a concentration of electrocution-prone birds. Furthermore, this area already has numerous OHL present, further limiting the extent of this potential impact. Based on this evidence, the pre-mitigation magnitude of this impact is assessed as LOW.

8.8.4 Decommissioning

Decommissioning impacts are expected to be the same as for the construction phase.

8.8.5 Cumulative

No cumulative biodiversity impacts have been identified

8.8.6 Summary of impact magnitude

Table 90 details the impact magnitude for the impacts identified above.

Table 90: Summary of magnitude – biodiversity

Activity	Intensity/ compliance	Duration	Spatial Extent	Reversibility	Likelihood	Magnitude (pre-mitigation)
Habitat loss/degradation –pre-existing vegetation	Low	Permanent	Direct AOI	Reversible	High	Low
Habitat loss/degradation – PBF terrestrial animals (Marbled Polecat, Central Asian Tortoise,	Low	Permanent	Direct AOI	Reversible	Low	Low
Habitat loss/degradation – Macqueen's Bustard, Great Bustard)	Low	Permanent	Direct AOI	Reversible	Low	Low
Accidental introduction of invasive species	Low	Permanent	Direct AOI	Reversible	Low	Low
Disturbance/Persecution – Macqueen's Bustard, Great Bustard, Central Asian Tortoise, Marbled Polecat, Saker Falcon, Sociable Lapwing, Steppe Eagle, Imperial Eagle, Greater Spotted Eagle, Egyptian Vulture	Low	3-6 months	Direct AOI	Reversible	Low	Low
Injury/death – Central Asian Tortoise	Medium	3-6 months	Indirect AOI	Irreversible	Low	High

Activity	Intensity/ compliance	Duration	Spatial Extent	Reversibility	Likelihood	Magnitude (pre-mitigation)
Injury/death – Marbled Polecat	Low	3-6 months	Indirect AOI	Reversible	Low	Low
Collision with powerlines – Sociable Lapwing, MacQueen's Bustard, Great Bustard	Low	Permanent	Direct AOI	Permanent	Low	Low
Electrocution on powerlines – Egyptian Vulture, Steppe Eagle, Imperial Eagle, Greater Spotted Eagle, Saker Falcon	Low	Permanent	Direct AOI	Permanent	Low	Low

8.8.7 Receptor sensitivity

Ten distinct biodiversity features have been identified as Priority Biodiversity Features, potentially sensitive to impacts from the Project, based on the definitions and criteria of IFC PS6 and EBRD PR6. No features were identified as Critical Habitat or Natural Habitat triggers for the Project. For the purpose of this impact assessment, these ten biodiversity features that may experience impacts from the Project, are termed "receptors," and their sensitivity is scored and presented in Table 91.

Table 91*: Biodiversity receptors included within the Impact Assessment for the Nur Kashkadarya Solar Project*

	Receptor	Taxon	Sensitivity	PBF/NH
	Central Asian Tortoise	Reptile	Medium	PBF
	Marbled Polecat	Mammal	Medium	PBF
	Macqueen's Bustard	Bird	Medium	PBF
	Great Bustard	Bird	Medium	PBF
	Sociable Lapwing	Bird	Medium	PBF
	Egyptian Vulture	Bird	Medium	PBF
	Steppe Eagle	Bird	Medium	PBF
	Imperial Eagle	Bird	Medium	PBF
	Greater Spotted Eagle	Bird	Medium	PBF
	Saker Falcon	Bird	Medium	PBF

8.8.8 Mitigation and management measures

Table 92outlines the project specific mitigation and GIIP to prevent or minimise biodiversity impacts for each project phase and monitoring and enhancement requirements where relevant.

Table 92*: Biodiversity mitigation and management*

Project phase	Mitigation and management measures
Design (to be included in the Contactor RFP design specification)	OHTL Design Specification in Contract to include requirement to undertake the following for approval of the final design by a qualified project ecologist. Use "raptor friendly" designs including, at minimum, the following specifications: • Minimum 2m insulators used at attachment points of conductors to support structures • Jumper cables suspended below, rather than above support structures • Conductors suspended below, rather than above support structures • Minimum 2m spacing between conductors, including static wire Install bird flight diverters on OHTL (proactive design mitigation) using a current state-of-the art model that has proven effective, and following model-specific guidance on installation methods and intervals. Where OHTL is collocated with existing OHTL the heights of the cables would be matched to the heights of the existing cables to the extent practicable to minimise avian collision risk. Perimeter fencing should have a small gap under the fence to let mammals/reptiles pass through site and ensure ecological continuity (operational) phase. NOTE: during construction a fixed barrier to ensure reptile off site (or translocated off site) does not return must be temporarily in place.
Construction - Project Specific	Prepare BMP outlining the key requirement of this ESIA including: • Demarcation of areas of avoid specifically ravines • Spring CAT survey (2025) to confirm presence or absence of CAT on site and undertake relocation of any remaining CAT. • Identification of CAT relocation area and confirm CAT rescue / relocation protocol (in the Project BMP) • A qualified resource (e.g., Project Ecologist) to be present on-site during site preparation works to assure compliance with construction phase mitigation measures, and to conduct daily searches and animal rescue, as needed, with a focus on CAT during appropriate and relevant times of the year. • CAT awareness training • Signage and training to prevent construction workers from poaching or harassing sensitive wildlife.

Project phase	Mitigation and management measures
	• Mitigation measures in BMP to ensure no spread of AIS around the site or introduction to new areas.
Construction - GIIP	• Minimize soil/vegetation disturbance during construction and where required use sustainable soil / vegetation techniques as described in 8.6. • Use only demarcated area for laydown and access (construction and operation) • Minimise use of trenches or other steep-walled excavations. • Backfill open excavations as soon as possible after construction activity. • Rehabilitate temporarily disturbed areas as soon as possible after construction activity is finished to minimise risk of soil erosion. • Worker/contractor training/awareness, supervision regarding impacts to animals and protection of species. • Establishment, posting, and enforcement of vehicular speed limits, and other traffic management measures. • Implement good housekeeping measures for materials handling, waste management, dust mitigation, and stormwater runoff management. • Prepare decommissioning management plan (including management of biodiversity impacts) prior to decommissioning. • Prohibit poaching (CITES species) and interactions with fauna and flora in the worker code of conduct. • Where construction illumination is needed during construction hooded or downward facing lights shielded, low UV intensity lights which are on motion sensors.
Operation	• Prohibit poaching and interactions with fauna and flora in the worker code of conduct. • Worker/contractor training/awareness, supervision regarding impacts to animals and protection of species. • Establishment, posting, and enforcement of vehicular speed limits, and other traffic management measures. • Implement good housekeeping measures for materials handling, waste management, dust mitigation, and stormwater runoff management
Decommissioning	As per construction phase.
Enhancements	Select fencing that allows the free movement of small fauna onto and across the site (through a gap of circa 20 cm under the fence) to support habitat (and soil) restoration goals and limit biodiversity impacts.
Monitoring	Visual monitoring for spread of AIS A low intensity, semi-systematic survey effort, consisting of monthly walking surveys below the 658m of Project-associated new OHTL to be installed, supplemented by a “chance find” procedure to be implemented by facility

Project phase	Mitigation and management measures
	manager, for at least two years from the erection of the conductor. CAT Monthly monitoring.

8.8.9 Residual significance

Table 93 presents the residual significance assessed for each adverse biodiversity impact anticipated for the Project, where the set of individual impacts is defined as all of the distinct types of impacts described earlier, broken out separately for different receptors of that impact, grouped by sensitivity level. Impact magnitude and residual significance are considered in a post-mitigation (residual) context, assuming implementation of the mitigation measures described in the previous section. Receptor sensitivity and impact magnitude and residual significance are scored according to the impact assessment methodological rubric presented in Table 59.

Table 93*: Biodiversity residual significance*

Adverse Impact	Magnitude (pre-mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
Construction				
Habitat loss/degradation –pre-existing vegetation	Low	Low	Low	Neutral
Habitat loss/degradation – PBF terrestrial animals (Marbled Polecat, Central Asian Tortoise, Macqueen's Bustard, Great Bustard)	Low	Medium	Low	Minor
Accidental introduction of invasive species	Low	Low	Low	Neutral
Disturbance/Persecution – Macqueen's Bustard, Great Bustard, Central Asian Tortoise, Marbled Polecat, Saker Falcon, Sociable Lapwing, Steppe Eagle, Imperial Eagle, Greater Spotted Eagle, Egyptian Vulture	Low	Medium	Low	Minor
Injury/death – Central Asian Tortoise	High	Medium	Low	Minor
Operation				

Adverse Impact	Magnitude (pre-mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
Collision with powerlines – Sociable Lapwing, MacQueen's Bustard, Great Bustard	Low	Medium	Low	Minor
Electrocution on powerlines – Egyptian Vulture, Steppe Eagle, Imperial Eagle, Greater Spotted Eagle, Saker Falcon	Low	Medium	Low	Minor

8.8.10 Data limitations and uncertainty

The robustness and certainty of the critical habitat / priority biodiversity features assessment and biodiversity impact assessment conclusions presented within this section are limited by heterogeneity in the extent of existing scientific knowledge regarding sensitive species' distributions, ecology, and susceptibility to impacts from PV solar projects and powerlines within Uzbekistan.

8.9 Labour (employment, procurement, worker welfare)

8.9.1 Potential impacts

Labour impacts can be felt by workers working on the project and by community members considered 'local' (in this case the communities of Yangiabad, Khalkabad, Batosh and Aynakul). Potential labour impacts during the construction, operation and decommissioning period include:

- Job creation and priority procurement from local communities, (positive).
- Increased local spending in the local economy resulting from local jobs and procurement (positive).
- Poor working terms and conditions affect worker wellbeing (including forced and child labour) (on site and in the supply chain).
- Inadequate worker accommodation.
- Gender-based violence and harassment (GBVH) in the workplace affecting worker wellbeing[95].

8.9.2 Construction phase

The total workforce is expected to be around 600 workers at the peak of the construction phase. During the early stages of the Project the worker numbers will be low (under 100). The peak workforce is likely to comprise a mix of highly qualified specialists, technicians and low-skilled personnel. These numbers will be confirmed by the Main Contractor.

[95] GBVH impacts in the community are addressed in Community Health, Safety and Security section 8.11.

8.9.2.1 Supply chain

Masdar has a supply chain policy for its panels and batteries and requires all suppliers to comply with the Masdar Business Partner Code of Conduct (CoC). The CoC specifically addresses – among others – the supplier's compliance with international labor organization conventions and jurisdictional laws and restricts any engagement in any form of modern slavery or any use of child labor. Prior to signing any contracts, the supplier must pass the due diligence checks and verification run by an external entity appointed by Masdar's Ethics & Compliance team. As a SPV, Source Trading follows the principles of competitive, transparent and fair tendering principles as stipulated in both the Corporate policy and procedures documents and the SPV procurement policy and procedures document. The process of contractual negotiations includes all required references, mitigation measures and contractual entitlements to ensure compliance with sanctions, ILO, Lenders specific requirements, export controls. In all cases, Masdar has zero tolerance for labour violations.

8.9.2.2 Job creation

Given the rural location of the Project site, it is unlikely that people skilled in solar PV and OHTL construction will be able to be identified in the local communities. Therefore, the majority of construction workers are likely to be sourced from further afield via the Main Contractor.

There is potential for a small amount of unskilled or semi-skilled temporary employment generation during the construction phase that will result from the ground clearance, construction of the foundations and building structure, drivers and security work. This type of work may be sourced from the local communities. As mentioned, much of this work is temporary and will not provide long-term job security. There is also a possibility that the Project may source some of its procurement contracts from local communities as well (such as food or raw materials).

Given the relatively small number of workers, it is unlikely that private employment agencies will be used. However, if they are used there is a risk that workers may be forced to pay recruitment fees, which would reduce the benefit the individual receives from gaining employment and may put the worker in a vulnerable position.

Community members have requested that they be hired as a priority for construction jobs and there may be some community unrest if no, or insufficient, employment opportunities are provided in the Project and all employment opportunities are given to migrant workers.

8.9.2.3 Increased local spending in the local economy

Although local construction jobs and local procurement contracts will be temporary, they will be a positive impact for local communities and could contribute to livelihood security. In addition, earnings from Project jobs will likely be spent on local goods and services, at least to some extent, which will have induced socio-economic benefits on local communities. Skills and experience gained through this small amount of temporary work experience will benefit the workers' future job prospects. There are high numbers of unemployed people in the local communities that could benefit from employment.

8.9.2.4 Labor rights and working conditions

Some possible risks to labour and working conditions of all workers as identified in other similar projects include:

- Insufficient provision of the equipment/facilities to safely undertake their Project tasks – such as lack of, or insufficient personal protective equipment (PPE) or having to pay for their own PPE, no rest areas, no smoking areas, insufficient numbers of toilets for workers or no toilets located close to their work site, no dedicated canteen or other clean place to eat lunch, no potable water provided at the work site (see section 8.10 for further OHS risks related to PPE and equipment)
- Insufficient provision of facilities for women – no female rest rooms or changing areas. No segregated accommodation, when accommodation is provided.
- Lack of provision of information on their rights as workers – such as no provision of a work contract or other relevant documentation, insufficient training on HR and payroll practices and no access to management personnel to raise queries to.
- Lack of payment or insufficient payment, particularly relevant to payment of overtime hours, delayed payment or inclusion of deductions to payments without sufficient explanation.
- Unsuitable accommodation, which can include issues with cleanliness (rooms, communal areas, washing facilities or canteens), overcrowding of the accommodation, insufficient heating and/or cooling, insufficient furniture provided, insufficient washing and toilet facilities per person, lack of leisure activities (discussed further in section 8.9.2.5 below).

The abovementioned risks can impact a workers' health, wellbeing or their livelihood during the employment period.

8.9.2.5 Vulnerable workers

Uzbekistan has ratified the eight fundamental ILO conventions and has protections in place for salaried workers (e.g., those hired by Masdar or the Main Contractor), therefore, salaried workers are less at risk than short-term contract workers. Local and migrant workers can be the most vulnerable to risks related to working conditions. In addition, workers that are new to construction work may be unaware of their rights in the workplace. Security guards and day labourers are often overlooked when monitoring and maintaining suitable conditions on the work site.

Incidences of forced and child labour have been identified in Uzbekistan (particularly in the cotton industry, and not specific to construction work). However, the country has been working to reduce the incidence of forced and child labor, including ratifying the ILO conventions on forced labour, minimum age and worst forms of child labour, which has allowed the incidence to reduced significantly in recent years. In addition, this type of project will likely use more skilled labour (particularly in the operations phase) and given that workers are more likely to be salaried and informed of their rights, child and forced labor is not considered a high risk for this Project.

Workers in the Project's supply chain may not receive the same working conditions as those on the Project site. Supply chain workers could be located in Uzbekistan or in other countries and they may be more vulnerable to unsafe work sites, and without direct monitoring from Project personnel, forced and child labour may be used, particular concern is related to the supply of polysilicon for the solar PV

panels and the battery storage. The screening and procurement of suppliers follow the Masdar corporate supply chain management system which is designed to screen, and manage risks on supply chain workers.

8.9.2.6 Worker accommodation

Temporary construction worker accommodation camps could expose workers to the risks of illness. Contractors will be required to implement a Worker Accommodation Management plan (which is part of the HSSE MS) those addresses: sleeping areas; sanitary and toilet facilities; canteen, cooking and laundry facilities, standards for nutrition and food safety, medical facilities, and leisure, social and telecommunication facilities. The accommodation plan needs to ensure there is a manager responsible for the hygiene, safety and security of accommodation in line with the requirements of the Workers accommodation: process and standards; A guidance note by IFC and the EBRD (April 2009). Workers will not be charged for accommodation and related services.

8.9.2.7 GBVH

There is a minor risk of human rights abuses and harassment as a result of the Project. There is no current evidence that the Project will increased the rate of gender-based violence and harassment (GBVH), or that the Project is in a location where GBVH is prevalent. However, the impact assessment has determined that there is potential for Project-related GBVH risks to the community from Project workers and also between Project workers engaged on site. Specific sources of GBVH risk identified include interactions between:

- Workers of different genders perceived social status and financial capital, or with significant power differentials potentially exist between national and international staff or managers and the people reporting to them.
- Female workers and their families or community members may disapprove of their employment in a project.
- Workers and local community members or in-migrants, with workers often in a position of relative financial wealth or perceived to be in a position to access project benefits on behalf of a local community member.
- Local community members and in-migrants who have moved into a project area hope to provide goods and services to the project or its employees or otherwise benefit from the project's presence.
- Public or private security forces deployed in a project area because of a project's presence (whether paid by the project or deployed by the state) and either local community members or the project's workers.
- People and individuals who traffic women and children against their will into a project area to provide goods and services to the project or its employees or otherwise garner benefits from a project's presence for their traffickers.
- People and the individuals that force them to work in a project's supply chain against their will at an age younger than the minimum employment age in a country (or for potentially hazardous work younger than 18 years of age.

- These risks are compounded by a large new workforce and/or an influx of workers (predominantly male) and/or where temporary, informal and/or migrant workers are needed, and people who follow the incoming workforce to sell them goods and services or in pursuit of job or business opportunities. Many of these interactions will happen outside work hours or between two people not employed by the Project. In this context, the Project is not in a position to prohibit many of these interactions or in a position to remain informed of all the interactions that do take place.

8.9.3 Operation phase

The operational phase is not expected to create a significant number of employment opportunities, and the majority of those will be for skilled workers hired by Masdar or its O&M contractors. The total workforce is not expected to exceed 25 workers. Employment for local community members could be provided in security, vegetation clearance, and maintenance works. There is a minor risk related to working conditions and GBVH during the operations phase (see the construction phase impacts for more details). Unskilled workers and security guards would be the most at-risk of poor, or insufficient working conditions.

There is a minor risk of child and forced labour during the operations phase, the most at risk professions would be the unskilled and temporary workers, such as cleaners, and vegetation clearance. Recruitment agencies are not expected to be needed during the operations phase, which also reduces the risk of forced labour.

8.9.4 Decommissioning phase

Labour requirements for the decommissioning phase will be similar to the construction phase.

8.9.5 Cumulative impacts

No cumulative labour impacts have been identified.

8.9.6 Summary of impact magnitude

Table 94 details the impact magnitude for the impacts identified above.

Table 94*: Summary of magnitude – Labour*

Activity	Intensity/ compliance	Duration	Spatial Extent	Reversibility	Likelihood	Magnitude (pre-mitigation)
Construction						
Supply chain	Medium	1 to 16 months	Indirect AOI	Reversible	Intermittent/ Medium	Medium

Activity	Intensity/ compliance	Duration	Spatial Extent	Reversibility	Likelihood	Magnitude (pre-mitigation)
Job creation	Medium	1 to 16 months	Indirect AOI	Reversible	Intermittent/ Medium	Medium
Increased local spending	Medium	1 to 16 months	Indirect AOI	Reversible	Intermittent/ Medium	Medium
Working conditions and wellbeing – Masdar and Main Contractor workers	Low	1 to 16 months	Indirect AOI	Reversible	Low	Minor
Working conditions and wellbeing skilled contract workers	Medium	1 to 16 months	Indirect AOI	Reversible	Low	Medium
Working conditions and wellbeing unskilled/migrant contract workers	Medium	1 to 16 months	Indirect AOI	Reversible	Intermittent/ Medium	High
Unsatisfactory/non-compliant worker accommodation	Medium	1 to 16 months	Indirect AOI	Reversible	Intermittent/ Medium	Medium
GBVH in the workplace	Medium	1 to 16 months	Indirect AOI	Reversible	Intermittent/ Medium	Minor
Operation						
Poor working terms and conditions (including child and forced labour)	Low	Project duration	Indirect AOI	Reversible	Low	Minor
GBVH in the workplace	Low	Project duration	Indirect AOI	Reversible	Low	Minor

8.9.7 Receptor sensitivity

The primary receptors for Project are considered to be the local communities of Yangiabad, Khalkabad, Batosh and Aynakul (where the local workforce will be sourced), the Project workers, and the supply chain workers. Sensitive labour receptors are summarised in Table 95.

Table 95*: Project labour receptors*

Receptor	Sensitivity	Description
Masdar and Main Contractor (salaried) workers	Low	Will be impacted during the construction and operation phases.
Contract workers	Medium	Only impacted during construction, but less likely to have protections and knowledge of rights.
Local community members	High	These communities have potential for employment or procurement impacts during the construction or operations phases but may not have knowledge of their rights.
Supply chain workers	High	Impacts would be more likely during construction. Workers are at a higher risk as they are not under the continued scrutiny of the Project.

8.9.8 Mitigation, management and monitoring measures

Table 96 outlines the project specific mitigation and GIIP to prevent or minimise labour impacts for each project phase and monitoring and enhancement requirements where relevant. The Project Company will ensure Contractor compliance in these areas outlined in the table below.

Table 96: *Labour mitigation and management*

Project phase	Mitigation and management measures
Design/Contracts	Require contractor (via EPC Contract) to conform to Masdar Human Resources (HR) Policy, Code of Ethics, Policy Against Bribery and Corruption, Recruiting Policy, Supply Chain (Procurement) Policy, and Communication Policy Requirements for the Main Contractor and Tier 2 sub-contractors to demonstrate functioning HR policies aligned with Lender requirements, ILO core conventions and Uzbek law, in contractor contracts. Unbundle procurement contracts so that local community members have a greater chance of supplying the Project and advertise procurement contracts locally and in local languages. Define manpower requirements for the construction and operation phase for Masdar the Main Contractor and subcontractors, including the number of E&S personnel and their qualifications. Contractor HSSE-MS and C-ESMP prepared and accepted by Masdar, the Lender and/or the Main Contractor. Perform a supply chain due diligence or obtain third-party supply chain due diligence reports to verity potential suppliers' credentials regarding the occurrence of forced labour, child labour or occupational health and safety failures. The supply chain will be

Project phase	Mitigation and management measures
	mapped (to the polysilicon level) and verified by an independent consultant for point of origin. Suppliers shall have a system to identify and manage risks associated with child labor, forced labor, occupational health and safety and pollution prevention for their activities and their core supply chain Ensure that all employees of the EPC and its subcontractors have an employment contract that was explained to the worker prior to signing, and that the employee be given a copy of this contract. Ensure provision of wage slips with information on wages, OT hours and pay, deductions, etc.
Construction - Project Specific	Develop Labor and Working Conditions Management Plan. Adopt Masdar E&S Policy (refer to Volume IV ESMP) which includes inter alia: Commitment to adherence to core labor standard Prohibition and zero tolerance to child and forced labor. Screening of contractors, subcontractors and supply chain on child and forced labor will be taken into account. Screen supply chain to minimize labor risks. EPC Contractor to hire a site HR Manager and EPC Contractor accommodation HSE Officer as part of the EPC Contractor team. EPC Contractor to Prepare a Labor and Working Conditions Management Plan (Volume IV, ESMP) All EPC Contractor staff to be trained (as part of the induction) on labour terms and conditions (aligned with IFC PS2) Confirm the villages that will be considered 'local' for the purpose of local hiring (suggested Yangiabad, Khalkabad, Batosh and Aynakul communities, but this may need to be widened). Discuss with Guzar and Kamashi district khokimiyats and local communities the employment and procurement contracts available, in order to manage expectations of the number of local jobs that will be available. Prioritize employment of local community members where possible. Prioritize procurement of goods from local communities where possible. Prioritize employment of women and people from vulnerable groups (including impacted herders) where possible.
Construction – GIIP	EPC to prepare HR policy for the Project that meets Lender and ILO requirements and specifically prohibits the use of child and forced labour and encourages non-discrimination.

Project phase	Mitigation and management measures
	All Contractor to submit for review their own HR Policies or to adhere to the Project's HR policy. Prepare a policy on prioritising local employment. Refrain from hiring day labourers or undertaking hiring "at the gate". Require all workers to sign a "code of conduct". Check IDs of all workers prior to contract, and not sign contracts with workers under 18 years. Undertake labour monitoring and labour audits. During labour audits. question worker on their age, working conditions, whether they have been a victim of GBVH, and whether they have been employed by a recruitment company or in any way have been victims of forced labour. As relevant, provide mitigation measures and make changes to Project implementation based on the findings. Prepare and require all contractors and their subcontractors to adhere to a "Labor and Working Conditions Management Plan" which sets out requirements for contractors, including disciplinary actions, and the use of reputable and licensed employment/recruitment agencies if used. Provide worker accommodation in line with the EBRD and IFC Guidance on worker accommodation[96]. The Labour Management Departments at Guzar and Kamashi Municipalities will be consulted before any workers accommodations are established. Prepare a Worker Accommodation Management Plan (Volume IV, ESMP). Set up E&S Training Management Plan (Volume IV, ESMP) for all workers, including inductions and regular refresher training. Prepare disseminate and train workers in the worker grievance mechanism that is compliant with ADB, EBRD and IFC requirements (it should also include separate requirements for GBVH grievances). Prepare a GBVH policy Perform a tier 1 supply chain due diligence / obtain the third-party supply chain due diligence reports to verity potential suppliers' credentials regarding the occurrence of forced labour child labour or occupational health and safety failure. Monitor private employment agencies (if used) for recruitment fees and ensure they are paid by employers rather than prospective job applicants. Ensure provision on site for female workers (segregated toilets and accommodation (if required)
Operation	Establish Operational HR Policy in line with Masdar HR Policy

[96] Workers' Accommodation: Processes and Standards (ifc.org)

Project phase	Mitigation and management measures
	Implement Worker code of conduct and GBVH code of conduct (including grievance mechanism) Audit workers to check for any instances of child labour, poor working conditions, GBVH, or victims of forced labour.
Decommissioning	As per Construction-GIIP above
Enhancement	Prepare a Local Hiring and Gender Management Plan to encourage employment of workers from local communities and women.
Monitoring	Weekly reporting of statistics for local workers, including gender-disaggregated workforce numbers in construction and operations monitoring reports. Periodic focus groups with community members local communities to identify any unrest between local communities and workers. Weekly reporting against KPIs (as defined in the ESMP, Volume IV) Undertake labour audit for EPC Contractor compliance against Labor Management and Working Conditions Management Plan once every two months (construction), and annually (operations) to identify any gaps in payment, provision of personal protective equipment and/or any other concerns regarding human resources to include review of working conditions, paysheets and payslips, leave allocation, and interview with workers to verify findings. Undertake audit for EPC Contractor compliance against EPC Worker Accommodation Management Plan monthly. Review labour and working conditions management and worker accommodation management every three months (part of internal or external E&S audit) Monitor the project's impact on GBVH.

8.9.9 Residual Significance

Following the application of the mitigation measures outlined in Table 96. The residual significance post mitigation is summarised in Table 97. The assessment has indicated that labour impacts will not be significant.

Table 97: *Labour residual significance*

Impacts	Magnitude (pre mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
Construction/Decommissioning				
Supply chain (supply chain workers)	Medium	High	Low	Moderate

Impacts	Magnitude (pre mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
Local job creation and spending (local community members)	Medium	Medium	Medium	Moderate (positive)
Local Procurement (local community members)	Minor	Medium	Medium	Moderate (positive)
Working conditions and wellbeing – (Masdar and Main Contractor workers	Minor	Low	Low	Neutral
Working conditions and wellbeing (skilled contract workers)	Medium	Medium	Low	Minor
Working conditions and wellbeing (unskilled/migrant contract workers)	High	Medium	Low	Minor
Unsatisfactory/non-compliant worker accommodation (accommodated workers)	Medium	Medium	Low	Minor
GBVH (all workers)	Minor	Low	Low	Neutral
Operations				
Poor working terms and conditions (all workers)	Minor	Low	Low	Neutral
GBVH in the workplace (all workers)	Minor	Low	Low	Neutral

8.9.10 Data limitations and uncertainty

Total workforce numbers have not been fully determined at the time of writing this report and could change. The numbers used have been estimated from similar Projects.

8.10 Occupational health and safety

8.10.1 Potential impacts

Occupational health and safety (OHS) hazardous during construction, operations and decommissioning of the PV, BESS and OHTL works include a range of physical, chemical, biological and radiological hazards.

8.10.2 Construction phase

OHS is generally considered a risk rather than an impact, as accidents and incidents relating to OHS cannot be predicted and could occur at any time. Generally speaking, in Uzbekistan it is often observed that low priority is given to OHS measures (such as contractors' workers not wearing personal protection equipment (PPE), open tranches without safety fencing).

In addition to the general construction site risks including exposure to physical hazards from use of heavy equipment and cranes; trip and fall hazards; exposure to dust and noise; falling objects; work in confined spaces; exposure to hazardous materials; and exposure to electrical hazards from the use of tools and machinery, working with batteries can also present an increased OHS risks.

Specific procedures to be developed for adequately handling and installing batteries. Care should always be taken to prevent arcing at or near battery terminals, and proper protection must be considered to avoid fire or thermal runaway.

The main construction related OHS risks include the following.

- Rupture of existing gas pipeline and water pipeline
- Fire, thermal runaway (batteries)
- Electrocution (electric arc-flash hazard while adding or removing a series of solar PV panels)
- Induced voltage at worksite
- Lifting operations
- Working at heights
- Exposure to chemicals and hazardous materials
- Emergency and abnormal situations
- Working in remote areas
- Extreme temperatures
- Dust storms and other climate related events
- Traffic (including occupational health and safety risks)97
- Working in areas where there are wild animals, grazing animals.

This ESIA has also identified that the soil in the Project area has naturally elevated levels of heavy metals and lead that may also pose and risk to the health of workers, particular during site preparation and excavation works.

[97] Community health and safety risk from traffic are addressed in section 8.11.

The majority of the workforce will be skilled workers, experienced in similar projects, or unskilled people from the local community. However occupational health and safety (OHS) risks remain, particularly in relation to working from heights, working with electricity and working in a desert environment (heat and dust). The Project site is also isolated, and should an accident occur on the site, the injured party may need to be transported a long way to receive treatment.

Temporary construction worker accommodation camps could expose workers to the risks of illness. Contractors will be required to produce a Workers' Accommodation Plan that addresses: sleeping areas; sanitary and toilet facilities; canteen, cooking and laundry facilities, standards for nutrition and food safety, medical facilities, and leisure, social and telecommunication facilities. The accommodation management plan needs to ensure there is a manager responsible for the hygiene, safety and security of accommodation. Workers will not be charged for accommodation and related services.

Uzbekistan is also prone to natural hazards, including droughts, floods, and earthquakes. Potential emergency conditions can arise as a result of the following activities:

- Dust storms
- Extreme heat
- Lightning strikes

8.10.3 Operation phase

OHS risks will be reduced during operations due to the reduced number of workers, and the types of work that will be undertaken, maintenance, vegetation control, cleaning, security, and desk-based operations. The majority of the construction phase risks will all be present during the operations phase, but to a lesser extent. O&M teams will be required to implement a robust health and safety management system aligned to ISO 45001 including requirements for risk assessments and method statements for all works and permit to work and lockout tag out procedures for tag out for major maintenance activities. The risk of an incident and subsequent rupture of the gas pipeline remains during the operational phase.

8.10.4 Decommissioning phase

OHS risks for the decommissioning phase will be similar to the construction phase.

8.10.5 Cumulative impacts

No cumulative OHS impacts have been identified.

8.10.6 Receptor sensitivity

All workers during the construction and operations phases of the Project will be receptors for OHS risks. Sensitivity of OHS receptors are summarised in Table 98.

Table 98*: Project OHS receptors*

Receptor	Sensitivity	Description

Construction workers (all)	Medium	Workers with no construction experience will be more vulnerable, but the risk will be there for all workers during construction. In addition, the prioritisation of OHS management can be expected to be low without strong leadership.
Operations workers (all)	Low	Workers will be mainly skilled and contracted for extended periods of time, making them less vulnerable to OHS risks.

8.10.7 Mitigation, management and monitoring measures

Table 99 outlines the project specific mitigation and GIIP to prevent or minimise OHS impacts for each project phase and monitoring and enhancement requirements where relevant.

Table 99*: OHS mitigation and management*

Project phase	Mitigation and management measures
Design/Contract	Incorporate GIIP engineering controls in Project design. Incorporate measures to reduce the risk of these hazards impacting the project as per national codes and norms and international standard specifications. Employ an inspector to oversee the construction process (not full-time, but possibly as an auditor) and gas pipeline to prevent emergencies, manage them, or take measures to eliminate risks). Require Main Contractor to be certified to ISO45001 (or equivalent) Require Main Contractor to set up adequate communication services (cellular, satellite) to ensure coverage across whole Project site during construction. Specify safety signage throughout the Project site, following GIIP specifications and codes of practice. Fence the site during construction to avoid ingress of unauthorized persons, or wild/grazing animals.
Project Specific	Establish a comprehensive Construction, Operations and Decommissioning HSMS and OHS Plans (at relevant times throughout the Project lifecycle). EPC contractor to employ at one (1) Senior HSE Manager and EPC Contractor HSE Officer for every 50 workers. Subcontractors with more than 20 workers shall deploy a dedicated HSE Officer and an additional HSE Officer for each additional 50 workers deployed onsite. Employment officer to oversee E&S obligations for the site (may be based elsewhere) Ensure all workers receive worker induction and regular ongoing training (e.g., tool box talks, setting to work briefings) on environment, H&S. labour and working conditions, worker code of conduct, GBVH, and other requirements

Project phase	Mitigation and management measures
	Define GBVH focal points in HR management team on site and ensure appropriate trainings to workers (for occupational and Community H&S) Include GBVH grievance protocol and specific survivor referral process into internal worker grievance mechanism. Conduct Project specific risk assessment identifying physical chemical, biological and other hazards and prioritising hazard elimination, hazard control and hazard minimisation. Develop a project specific Emergency Preparedness and Response Plan (EPRP) (Volume IV, ESMP (incorporating risk management protocols for climate related risks, exposure to contamination risks, traffic risks etc). Install visible above ground marking along the gas pipeline adjacent to the main access road and site boundary before any below ground works commences on site (e.g. fence building) Include in the EPRP and post around the site contact information for any incidents involving a breach to the main gas pipeline. Include in the EPRP a medical evacuation procedure to enable injured workers to access appropriate emergency facilities. Ensure medical preparedness includes permanent on-site paramedic, first aid facilities and first aiders (ratio of 1:50 first aiders/workers) on site. Provide worker shelter, toilets and provisions (including drinking water) at work fronts across the site (not just at the main site camp). Modify hours of work as needed to reduce working in the hottest periods of the day and train workers on how to identify and what to do in the case of heat stroke (induction).
Good International Practice	Workers to receive correct PPE, free of charge and to be replaced when needed. Workers must receive appropriate training, prior to commencement of work and on an ongoing basis through toolbox talks, oriented by training plans. Mock drills (including OHS, spills, and emergency drills) should be undertaken regularly. First aid facilities to be available at all work fronts. Establish an accident and incident reporting procedure. Including providing incentives for reporting near misses and corrective actions.
Operational	Establish an operational HSMS Define workplace protocols for maintenance activities Employ EHS officer to oversee Project Company obligations (may be based off site) Define operations auditing, inspection, and reporting schedule

Project phase	Mitigation and management measures
	Update the emergency preparedness policy and emergency preparedness and response plan for the operations phase Maintain visible above ground marking along the gas pipeline adjacent to the main access road and site boundary Include in the EPRP and post around the site contact information for any incidents involving a breach to the main gas pipeline Disclose updated emergency preparedness and response plan to local emergency services and other relevant external stakeholders (e.g., nearby communities) Perform continuous monitoring of storm events: e.g., site lock-down securing all equipment and materials
Decommissioning	The same as the construction phase
Enhancement	None identified
Monitoring	Numbers of fatalities, accidents and injuries. Daily H&S inspections by qualified personnel Construction and operations auditing, inspection and reporting schedule Reviews of incident and accident reporting, drill reporting and any corrective actions identified, where relevant.

8.10.8 Residual Significance

As OHS is a risk, rather than an impact, it is not possible to identify the significance. For general measures to address these risks, it is possible to refer to the WBG General EHS Guidelines.

8.10.9 Data limitations and uncertainty

None identified.

8.11 Community health and safety and security

8.11.1 Potential impacts

Project activities with the potential to have community, health, safety and security (CHSS) impacts include:

Project activities pose a hazard to local community through spreading communicable diseases, or nuisance such as dust, noise, or traffic impacts etc.

Temporary labour influx causing strain on local services.

- Poor worker conduct impacting local communities and in particular vulnerable groups such as women.
- Unauthorized community members accessing the site and causing accidents.
- Conflict between community members and security personnel that could impact either or both parties.
- Traffic and transportation of Project workers and Project components could impact people living along the roadways.

8.11.2 Construction phase

The distance from the nearest communities to the Project and the rural nature of the location, makes it unlikely that there will be significant issues with community members entering the Project site. However, farmers and local herders do use the Project area and its surroundings, so there is the possibility that Project construction and increased vehicle movements may pose a hazard to farmers and herders or their animals. It is envisaged that access to the site will be restricted during construction.

Temporary labour influx of people (either for work, or with the hope to obtain work) can cause strains on local infrastructure, such as hospitals, markets and schools, making it difficult for community members to use the services or eroding the quality of the services due to overuse. Hospitals/health clinics in particular in the AOI are not well equipped, to deal with incidents that may arise during the construction and operation of the Project. Pressure on housing markets and rental prices due to the Project, may mean that landlords would prefer to rent to the Project than locals. All of these aspects could result in a reduction in the quality of life of local community members, related to their health, livelihood, and/or education. It can also put community members at risk of conflict with workers or at greater risk of contracting communicable diseases.

The location of worker accommodation is currently unknown however considering all options as presented in section 3.6, there is the potential that workers may be housed in local communities.

Security guards are often the first point of contact between community members and the Project; therefore, they are the most vulnerable to conflict or harassment. It is unlikely that workers will bring their families given the short duration of the construction period. The likelihood of induced development as a result of the Project is low.

The introduction of workers in the vicinity of local communities has the possibility of increasing GBVH between workers and community members. (see section 8.9.2.7 for a description of the possible GBVH impacts as a result of the Project). Many of these interactions will happen outside work hours or between two people not employed by the Project. In this context, the Project is not in a position to prohibit many of these interactions or in a position to remain informed of all the interactions that do take place. There is no current evidence that the Project will increase the rate of GBVH, or that the Project is in a location where GBVH is prevalent.

There will be some groups within the local communities that will be more vulnerable to risks than others, or they may have difficulties in receiving Project benefits. These include women, people living with disabilities, elderly, illiterate people and youths.

The community members at Yangiabad, Khalkabad, Batosh and Aynakul communities may be vulnerable to safety risks from increased construction traffic and other safety issues or construction nuisance (such as dust and noise – are discussed in sections above). Other communities along the transportation routes for Project components may also be identified as at risk for transportation impacts (discussed in section above).

8.11.3 Operation phase

There are no activities that will occur during the operations phase that will specifically impact community members, unless they attempt to access the Project infrastructure. This is unlikely due to the distance local communities located from the Project, but could occur should community members be involved in security risks, such the theft or vandalism of the Project infrastructure.

The presence of security guards and workers, creates a small risk of GBVH, although it is less likely during operations due to the more permanent nature of the work and the small number of workers.

8.11.4 Decommissioning phase

CHSS impacts for the decommissioning phase will be similar to the construction phase.

8.11.5 Cumulative impacts

There is a small chance there may be some community unrest if more migrant workers arrive in the area, with no visible project benefits (employment opportunities were specifically requested), for the local communities.

8.11.6 Summary of impact magnitude

Table 100 details the impact magnitude for the impacts identified above.

Table 100*: Summary of magnitude – community health and safety and security*

Activity	Intensity/ compliance	Duration	Spatial Extent	Reversibility	Likelihood	Magnitude (pre-mitigation)
Construction						
Safety risks for members of Yangiabad, Khalkabad, Batosh and Aynakul community members, farmers and herders	Medium	12 months	Direct AOI	Temporary during works only	Low	Low
Labour influx	Medium	12 months	Direct AOI	Temporary during works only	Low	Low
CHSS impacts from communities to workers	Medium	12 months	Direct AOI	Temporary during works only	Low	Low
Poor worker conduct (inc. GBVH)	Medium	12 months	Direct AOI	Temporary during works only	Low	Low
Operation						
Safety risks for members of Yangiabad, Khalkabad, Batosh and Aynakul community members, farmers and herders	Low	Lifetime of project	Direct AOI	Permanent	Low	Low
Poor worker conduct (inc. GBVH)	Low	Lifetime of project	Direct AOI	Permanent	Low	Low

8.11.7 Receptor sensitivity

The primary receptors for the Project in relation to CHSS can be considered to be Yangiabad, Khalkabad, Batosh and Aynakul communities. The socio-economic baseline provides a detailed overview of the characteristics of the communities in the direct and indirect AOI. Sensitive receptors in the AOI and their vulnerability to CHSS impacts are summarised in Table 101.

Table 101*: Project CHSS receptors*

Receptor	Sensitivity	Description
Members of Yangiabad, Khalkabad, Batosh and Aynakul communities	Medium	They are located closest to the site, and could be impacted by influx, transportation of goods or construction nuisance.
Farmers and herders	Medium	Farmers and herders currently farm and graze their livestock on or near the Project site. They are likely to be the closest people to the site.
Project workforce	Medium	There will be interaction between the workers and the community (particularly those that are housed within the community), community ill-health or safety concerns could result in impacts to workers (with security guards as the first point of contact).
Vulnerable groups (e.g., women, disabled, elderly, illiterate and youth)	Medium-High	May be more severely impacted and may not be able to recover as well from any impact.

8.11.8 Mitigation, management and monitoring measures

Table 102 outlines the project specific mitigation and GIIP to prevent or minimise CHSS impacts for each project phase and monitoring and enhancement requirements where relevant.

Table 102*: CHSS mitigation and management*

Project phase	Mitigation and management measures
Design/Contract	Incorporate safety requirements into the Project design. Fence boundary of the site, erect safety signage (in locally used languages) in any location where the community may interface with project activity, and other relevant features to deter community members from entering the Project site.
Construction - Project Specific	House workers from outside the Project area or municipality in accommodation away from the immediate communities at Yangiabad, Khalkabad, Batosh and Aynakul as much as possible, thereby reducing potential social tensions (note, it is not prohibited for workers to be housed in these communities subject to satisfactory demonstration that the living condition meet IFC/EBRD Guidance on accommodation standards and the relevant consultation is performed with the social departments at the Guzar and Kamashi municipalities and community leaders in advance.) Prepare a plan/strategy to guard workers and community members against contracting communicable diseases. Include in the traffic and transportation management plan (Volume IV, ESMP) measures to transport Project components as well as transportation of workers and designated routes for vehicles. Include in the TTMP a disclosure plan for community members, to inform as to start of construction works and timing and Project impacts along the transportation route. Establish a GBVH grievance redress mechanism (as outlined in the SEP). Temporary medical facilities on site (medical clinic with first aid facilities and defibrillator) and means of transporting patients to nearby hospital if required. If monitoring (discussed below) identifies impacts related to an influx of workers develop influx management plan, to alleviate strain on local infrastructure, the risk of communicable diseases and risks to vulnerable groups and risk of GBVH. Employ local security guards and female guards where possible. Ensure all security personnel are trained in human rights principles and use of force. Secure project boundary with a secure fence, and clear signage (in languages spoken by locals and herders).
Construction - GIIP	Undertake a comprehensive SE campaign to inform community members of the possible risks and impacts of the construction of the Project (refer to SEP) including the project schedules, traffic, grievance mechanism, worker code of conduct, GBVH referral services etc. Require all workers to sign a “code of conduct – workers”. Require all security personnel to sign a “code of conduct – security personnel”.

Project phase	Mitigation and management measures
	Undertake cultural awareness training for migrant workers, should it be deemed necessary. Prepare a Security Management Plan (Volume IV ESMP) that outlines the security requirements for construction and operations (including numbers of guards, whether they will be armed, use of video technology, training and background checks for guards etc). Disclose the EPRP, to community members that may be impacted in an emergency or will be required to assist (emergency services) during and emergency. Implement and disclose details of a community grievance mechanism. which should include GBVH requirements. Nominate a CLO for the construction and operations phases. Determine whether training for community members on migrant workers, or communicative diseases is necessary, and implement if needed (to be determined by the CLO). Prepare a corporate social responsibility (CSR) plan
Operation	Ongoing implementation of the SEP and grievance mechanism . which should include GBVH requirements. Require all workers to sign a “code of conduct – workers”. Require all security personnel to sign a “code of conduct – security personnel”. Re-disclose the EPRP for the operations phase, to community members that may be impacted in an emergency or will be required to assist (emergency services) during and emergency. (see construction phase actions above that are for both construction and operations)
Decommissioning	As per construction phase
Enhancement	Community Development Plan (to be prepared) with focus on health, education, water.
Monitoring	Stakeholder engagement completed (stakeholder log) Number of community grievances received (grievance log). Responses and follow up actions. To be monitored monthly during construction and quarterly during operations. Periodic focus groups with community members to identify any impacts related to influx of people and put together mitigation measures, if identified. Security incidence Undertake OHS and emergency drills throughout construction and operations phases

Project phase	Mitigation and management measures
	Monitor influx of people (number of new people in the community and their demographics if possible) if a significant influx of temporary workers or followers is observed (not anticipated), develop influx management plan.

8.11.9 Residual Significance

The residual significance post mitigation is summarised in Table 103. The assessment has indicated that CHSS impacts will not be significant.

Table 103*: CHSS residual significance*

Impacts	Magnitude (pre mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
Construction/Decommissioning				
Safety risks for members of Yangiabad, Khalkabad, Batosh and Aynakul community members, farmers and herders	Low	Medium	Low	Minor
Labour influx	Low	Medium	Low	Minor
CHSS impacts from communities to workers	Low	Medium	Low	Minor
Poor worker conduct (inc. GBVH)	Low	Medium-high	Low	Minor
Operations				
Safety risks for members of Yangiabad, Khalkabad, Batosh and Aynakul community members, farmers and herders	Low	Low	Low	Negligible
Poor worker conduct (inc. GBVH)	Low	Medium	Low	Minor

8.11.10 Data limitations and uncertainty

None identified.

8.12 Land

8.12.1 Potential impacts

The 733 ha of land required for the construction of the Project belongs to the Committee for Sericulture and Wool Industry Development (SWID), the Kamashi District Municipality, and Guzar District Municipality. The breakdown per component includes:

- Project site: 731 ha
- Access road: 1.7 ha (1700m in length and 10m in width)
- Area for permanent use of OHTL: 0.028 ha
- Area for permanent use of underground cable: 0,362 ha
- There will be temporary impacts in relation to the construction of the OHTL during the construction phase of 1.67ha of land.

There will not be any physical displacement impacts as a result of the Project

There are two land management companies that are managing land leases on the Project site, called Guzar Korakul Cluster LLC and Bobur Murodaliyevich Private Enterprise (PE). All of these entities are government run entities, and as such they will not be impacted by the Project and will not lose livelihoods.

There are seven farms, one large farm that is considered a PE and one large farm that is considered an LLC (F01-F09) that lease land from Kamashi District, Guzar District and the land management companies. The owners of the farms, the PE and the LLC use the land for farming activities and also graze livestock. They have a total of 22 workers (W01-W20 and W22-W23)[98] that help to farm the land and graze livestock. These people are all at risk of losing at least some of their livelihoods as a result of the Project land acquisition. There is one farm F04 that will lose all of its land, and they have two workers one permanent (W07) and one seasonal (W18) that will likely lose their employment.

There are four herders (H01-H04) from local communities that use the Project site unofficially (without written agreement from SWID, the municipality or any of the farm owners) to graze livestock. They use the land for the spring, summer and autumn months. As a result of fencing off the Project site, these herders will have less area to graze their animals or will have to travel further to graze their animals.

There are a group of PAPs that graze animals on behalf of a livestock owner (or livestock rental household – LRH) on an ad-hoc basis which may vary from year to year. There is no money exchanged, but the LRH provides the herder/worker with a certain number of animals to graze on their behalf in exchange for being able to keep a proportion of the herd. Twenty two LRHs (LRH01-LRH22), have been

[98] Note: Worker W21 is no longer considered affected. W21's name was provided to Juru by F06, but upon attempting to contact them, F06 stated that they had never had such a worker. In order to confirm the information received, Juru contacted the local municipality and the Ministry of Agriculture, which also confirmed that they are not a worker on the Project site.

identified as renting animals to other PAPs, all of those PAPs were herders[99]. No impact has been identified on LRH that "rent" to herders (or the herders who receive the animals) as herders will either retain grazing land or have been provided alternative grazing land.

On the Project site there is herder camp (one room structure) and a stable for livestock which belong to farmer F01 and a movable trailer that belongs to farmer F05. The farmers and their workers will lose access to these structures and will need to be compensated for them. In addition, farmer F01 has two maple trees on their land, which will need to be removed and compensated.

In summary the Project activities with the potential to impact on the land use and involuntary resettlement include:

- Acquisition of the Project footprint and access road by Masdar, resulting in:
- Loss of land for SWID, Kamashi District Municipality, Guzar District Municipality and Guzar Korakul Cluster LLC and Bobur Murodaliyevich Private Enterprise (PE) (no livelihood impacts – and therefore no compensation required).
- Cancellation of the land lease the farmers (F01-F09).
- Loss of income for the farmers (F01-F09), and their employees (W01-W20 and W22-W23).
- Loss of grazing land for the herders (H01-H04) and the LRH (LRH01-LRH22).
- Loss of structures (herder cabin, stable for livestock movable trailer) (F01 and F05).
- Removal of vegetation for the ROW of the OHTL and underground cabling impacting grazing (F05).
- Overall, 165 people from 28 households are going to be impacted by the Project.

At this time, an offsite temporary accommodation camp, and additional offsite temporary land use removing access to grazing land other than along the OHTL ROW, access road ROW or main site are not envisaged but are considered as options described above). If this is required in the future e.g. for a laydown and customs area, the land will be temporarily rented from the relevant landowner/user for the duration of the construction phase and then returned to the landowner/user in the same state as it was obtained. The LRP addresses this temporary land take if needed.

A vulnerability analysis has been carried out to identify context-specific groups of vulnerable people affected by the Project. The categories of PAPs identified include, chronically ill or disabled, elderly, informal land users, female headed households, poor households and significantly impacted households[100]. The findings are summarised below:

- Chronic illnesses/disabled: PAH that are farmers include PAPs with osteoporosis (bone decay), heart thrombosis, osteoporosis, and a physical disability (she cannot walk) (both in 1 PAH).

[99] Note, some workers were not willing to disclose who they rent animals from. Therefore, should additional LRH be identified during monitoring activities as having rented animals to workers, then they will also be compensated.

[100] Under ADB requirements, the vulnerability of households that lose more than 10% of their landholdings need to be assessed. There are five farmers that will lose more than 10% of their land (F01, F04, F05, F07 and F09). However, assessment has shown that PAPs F01, F05, F07 and F09 have remaining land, income and tomorka land that will help the PAH to adapt to changes, or survive shocks that may occur during the Project construction. Therefore, only farmer F04 has been considered vulnerable as a significantly impacted PAH.

Family members of the workers PAPs have chronic back and leg pain, an oncological disease (1st stage), and diabetes and asthma (both in 1 PAH).

- Elderly: There are 12 family members aged over 60 (from 7 households).
- Informal land users: There are four informal land users: all of them are herders grazing their livestock within the project area. The illegal land users and their land use rights are not recognized under Uzbek law.
- The female headed households: 1 out of 28 households is female-headed.
- Poor households: Three households stated that they were not able to pay for basic needs, and their stated expenditures exceeded their incomes.
- Significantly impacted PAH: there are three PAH that will be significantly impacted. Farmer F04 that will lose 100% of their land, and the two workers W07 and W18 that work for farmer F04 that will lose their income. The remaining workers are not expected to lose their livelihoods as a result of the Project.

There is some double counting in the above list, as some PAHs have more than one vulnerability. Therefore, within the total list of PAJ, there are a total of 15 PAH identified as vulnerable, four farmer households, seven worker households and all of the four herder households are considered vulnerable.

8.12.2 Construction phase

The owners of the land rights of the Project footprint are the government owned Committee for Sericulture and Wool Industry Development (SWID), Kamashi District Municipality, and Guzar District Municipality. The land is currently used for farming and grazing animals, some of the land is being unofficially grazed by local community members (i.e., without a formal agreement). As the landowners are government entities they will not have livelihood impacts as a result of the Project. A presidential decree the Resolution of the President of the Republic of Uzbekistan dated March 14, 2024, № 125 "On measures to implement the project "Construction and management of a 300 MW solar photovoltaic power plant and a 75 MW electricity storage system in the Kashkadarya region under a public-private partnership": has been signed to manage the handover of the land to the Ministry of Energy, which will lease the land to Masdar.

The formal leaseholders (farmers F01-F09) will have differing impacts due to the amount of land required to be acquired. Farmer F04 will lose all of their land. For the remaining farms, the farmers have stated they wish to retain their employees and farm workers (W01-W20 and W22-W23). However, the workers of F04 (W07 and W18) will lose some or all of their livelihood. Workers will also be temporarily impacted during the construction phase either from loss of wages or from loss of land for grazing their own animals or animals rented to them by third parties (livestock rental households or “LRHs”).

The herders H01-H04 that graze animals on or near the Project footprint will experience some impacts as their grazing land overlaps the Project footprint; this will result in a reduced area to graze animals or having to travel further to graze animals, which could ultimately result in a reduction of livelihood (due to the herders having to pay additional money to reach alternative grazing lands, not being able to graze as many animals, or if the animal are not as healthy as prior to the Project, due to reduced grazing areas, dust etc.). Kamashi District Municipality has identified 80ha of land that can be used as

alternative grazing land. This will continue to be on an informal basis (without formal title to the land), and it is within an equivalent distance to the existing land used by herders.

Additionally, the Project will need to get servitude rights over the land for the OTHL and the underground cable (farmers F01 and F05 will be impacted by the OHTL, but all of the land required for the underground cable belongs to SWID and is not leased). The footprint of the OHTL towers will cause permanent impact for the lifetime of the Project (however it will be a small impact and agriculture and grazing will be able to continue under the OHTL – no structures or tall trees can be located within the OTHL right of way, but there are none that are currently in that location). Farmer F05 will have temporary impacts to crops during the construction of the OHTL.

There are households that use the land for collecting herbs, recreation, farming and collecting manure, however consultations with community leaders and community members have confirmed that these practices are solely for personal consumption (not livelihoods), and not exclusively undertaken in the Project site (in addition the use of the land for the collection of herbs and recreation etc, was provided during the scoping phase, with the previous Project layout that was closer to the M39 road). According to the community leaders and community members, there are sufficient herbs and manure outside of the Project site to meet local demand. However, this will be monitored during Project construction.

8.12.3 Operation phase

Access to grazing lands will remain restricted for the operations phase. However, no additional land acquisition will be required. Therefore, it is not expected that there will be any further land impacts during operations. During the operations phase livelihood restoration activities related to controlled grazing and other measures as defined in Table 105 will occur on the Project site, thus working to restore, or improve the livelihoods of PAPs.

8.12.4 Decommissioning phase

Once all infrastructure has been decommissioned and removed from the site, the areas of permanent land take will be restored to their original state and returned to general grazing land, resulting in herders regaining the original amount of available land for grazing.

8.12.5 Cumulative impacts

No cumulative land impacts have been identified.

8.12.6 Receptor sensitivity

The primary receptors for the Project are considered to be the herders that come from the settlement near the Project site, the farmers and the LLC that own the land and their workers. Within each group there may also be vulnerable sub-groups who will receive specific attention deemed as PAHs (i) headed by women; (ii) with low income; (iii) with elderly or disabled household members and this is provisioned for with additional compensation in the LRP.

Table 104 discusses the Project receptors for land impacts.

Table 104*: Project land receptors*

Receptor	Sensitivity	Description
Committee for Sericulture and Wool Industry Development (SWID) and Kamashi District Municipality and Guzar District Municipality	Low	These are the official owners and administrators of the land. However, as it is a government entity that owns all the grazing land in Uzbekistan, it is not likely to be sensitive to losing the Project land.
Guzor Korakul Cluster LLC and Bobur Murodaliyevich Private Enterprise (PE)	Low	These are the government owned management companies for the land. As they are government run, there will be no livelihoods impacted by the loss of land.
Farm owners (leaseholders) (Nine)	High	These owners will have an impact to their livelihood from one or more of the following: loss of some or all of their land, loss of crops, loss of trees); which could be difficult for them to recover from (for detail refer to LRP, Volume V). Some farmers may also require permanent and temporary structures to be moved (3 farms)
Farm workers (employed by leaseholders) (22)	High	These workers are likely to be low income and vulnerable to changes. They may lose their livelihoods as a result of the acquisition. These workers may also lose available land for grazing their own animals or animal rented out to them on their employers land.
Herders (4)	High	These people are low income and informally use the land for their livelihood. Therefore, any impact to grazing land could be difficult for them to recover from.
LRHs	Medium	These livestock owners may need to find alternative persons to rent out their animals, or altenraive locations to feed their animals, or feed them out of pocket.
Collectors of medicinal herbs and manure (may be the same as herders)	High	These people are low income and use the items they collect to supplement their livelihood. Therefore, loss of ability to collect plants/manure etc, could cause an impact to their livelihoods.

8.12.7 Mitigation, management and monitoring measures

Table 105 outlines the project specific mitigation and GIIP to prevent or minimise land take impacts for each project phase and monitoring and enhancement requirements where relevant.

Table 105*: Land acquisition mitigation and management*

Project phase	Mitigation and management measures
Design/Contract	- As far as possible/practical undertake Project design to avoid all structures, crops and trees during the design phase of the Project. - Prepare a Livelihood Restoration Plan (LRP) (Volume IV, ESMP) that defines the specific responsibilities of the Project in relation to land acquisition and resettlement as required below. - Complete all land acquisition and resettlement requirements per the LRP prior to the commencement of construction including (*inter alia)*: • Increasing the land productivity of remaining land and training PAPs in improved agricultural practices (Only farmer PAH) • Agricultural and business based training, such as financial awareness, business management, overgrazing, land auction, veterinary health and training in trades related to project works (such as welding) with the aim to employ a certain percentage of training graduates. (All PAPs) • Provision of seeds and saplings for PAH to improve the productivity in their remaining land, or "tomorka" land (in the case of workers and herders) (All PAPs) • Assistance with provision of hand tools for use on "tomorka" land or use in animal husbandry (to be determined in consultation with the PAH) –(All PAPs) • Administrative assistance to use the land auction portal. (Only farmer PAH) • Assistance for farmer F04 and F07 (if relevant) to receive a loan from a reputable financial institution to receive a loan to set up a small business. • "Controlled grazing" of smaller animals within the Project site. (All PAPs) • Priority employment in Project jobs, if PAPs have the requisite skills (All PAPs)
Project Specific	- Confirm with herders if there is sufficient area to graze their animals away from the Project construction works. - Provide alternative land for herders and workers who rent animals for grazing from the Kamashi District Municipality. - Compensate farmers F01-F09 for loss of income from land leases lost as a result of the construction of the Project, access road and OHTL footprints (refer to the LRP) - Compensate farmer F05 for temporary impacts from the construction of the OHTL. - Compensate farm workers (W01-W20 and W22-W23) for any permanent or temporary livelihood impacts. (refer to the LRP) - Compensate herders for any livelihood impacts (refer to the LRP). - Compensate farmers F01 and F05 for loss or movement of assets (trees, crops) and structures (refer to the LRP) - Compensate workers who graze their own animals on farmers land (refer to LRP) - Compensate farmer F01 for loss of trees. (refer to the LRP) - Provide additional compensation to PAHS (i) headed by women; (ii) with low income; (iii) with elderly or disabled household members (refer to LRP for detail).

Project phase	Mitigation and management measures
	- Identify unforeseen temporary land requirements (e.g. temporary laydown areas) and compensate affected farmer/worker/herder/LRH as applicable. - Pay any penalties for taxes, loads or harvest agreements as a result of partial or noncompletion of farmers harvest agreements or any defaults on loads as a result of the Project - Provide all affected households with training (including financial awareness, monetary management, business management, veterinary health, livestock breeding and management, animal husbandry, agricultural production enhancement, management of overgrazing, using the land auction process, and training in particular trades). - Provide all affected households with access to livelihood restoration activities (including provision of seeds, assistance with provision of hand tools, administrative assistance to use the land auction process, loan assistance) to retain, if not improve their livelihoods. - Hire an agrivoltaics expert to determine the optimal productivity, number of head of sheep that may graze the land (during construction phase) - Agrivoltaics expert to develop a controlled grazing protocol for operational phase for sheep addressing access periods, eligibility, legal, insurance and occupational health and safety considerations. - Provide all affected households with priority access to employment opportunities.
Good International Practice	- Include farmers, herders and employees in all relevant consultations and information disclosures as per the Project SEP. - Design grievance mechanism to be implemented and disseminate in a culturally appropriate way to all project affected people. - Prepare a livelihood restoration execution report to prove that required activities have been completed within the timeline of the LRP (see monitoring below).
Enhancement	- Implement community social responsibly activities in the construction phase to benefit all community members, not just PAPs.
Monitoring	- Internal monitoring (quarterly monitoring and evaluation reports) up to three years following the start of implementation. Full list of KPI's (LRP 01 to LRP25) is listed in the LRP (Volume V). - Compliance report confirming that all compensation has been paid per the LRP, prior to the actual displacement occurring - External third party audit by EMA (external monitoring agent) (full scope defined in the LRP) • Mid-term audit (expected Q1 2026) • Completion audit (expected Q4 2027) • Review of grievances (ongoing)

8.12.8 Residual Significance

The residual significance post mitigation is summarised in Table 106. The assessment has indicated that land acquisition impacts will not be significant.

Table 106*: Land acquisition residual significance*

Impacts	Magnitude (pre mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
Loss of profit due to land take (SWID) , Kamashi District Municipality, Guzar District Municipality, Guzor Korakul Cluster LLC and Bobur Murodaliyevich PE	Low	Low	Low	Neutral
Loss of livelihood due to land take (farm leasholders)	High	High	Low	Minor
Loss of livelihood due to land take (farm workers)	High	High	Low	Moderate
Loss of livelihood due to restrictions on herding - herders LRH's	High	High	Low	Moderate
Loss of feed for animals due to restrictions on herding - LRH	Medium	Medium	Low	Minor
Loss of ecosystem services (herbs, manure etc)	Low	Medium	Low	Neutral

8.12.9 Data limitations and uncertainty

None identified.

8.13 Cultural heritage

8.13.1 Potential impacts

While Uzbekistan is known for its UNESCO World Heritage Sites, no items of tangible cultural heritage as listed in the UNESCO World Heritage List are located within the Project site. Consultation with the Academy of Sciences of the Republic of Uzbekistan, National Archaeological Center provided information on the general area surrounding the Project and the Project site and suggested that while there were no items of cultural significance on the site, there are two areas of potential archaeological significance just outside the Project site, close to the Guzar substation namely L-shaped polygon and rectangular polygon as shown in section 5.4.14. The distance from "L" shaped polygon to the access road is approximately 40m, and to the Project site is approximately 870m. The distance from rectangular polygon to Project site is approximately 660m,

During the initial walkover, many stone artefacts belonging to the historical period from the Middle Palaeolithic to the Neolithic period, as well as a number of findings from the late Middle Ages and Modern Era were collected on the ground level of the Project site and in the polygons noted off site. These were removed and it was determined that these items were transferred to the site from another location, and not an indication of any areas of significance on the site itself. However, it is possible, but not likely that further items of cultural heritage will be identified during Project excavation works.

8.13.2 Construction phase

Impact on the archaeological fragments found in the L-shaped polygon (and elsewhere) is possible during construction of the access road with the road passing within 40m from the feature at its closest point. The likelihood of access road works encroaching into this area is low. the cultural heritage authority has given permission for works to go ahead in this area, under archaeological supervision and with the establishment of a chance finds procedure.

Unexpected items of cultural heritage or paleontological significance are most likely to be identified during site preparation and excavation or other earth works, if at all. Site preparation and excavation work is only expected during the construction phase and will take place in the construction of office buildings, for the erection of the PV panels, for the erection of the OHTL towers, the placement of the underground cabling and the digging of trenches for drainage etc.

Given Uzbekistan's cultural past, and the fact that many previous cultures were nomadic, there is a possibility that further items, not previously identified (referred to as "chance finds"), may be identified during the excavation works.

8.13.3 Operation phase

During the operations phase no below ground works are anticipated. Maintenance works for the Project are not expected to impact items of known or unidentified cultural heritage. All vehicles (including HGVs) will use the defined access road from the M39 to the Project site and this activity is not deemed to be an ongoing risk to potential unidentified archaeological artefacts (above or below ground) e.g. pottery shards.

8.13.4 Decommissioning phase

During decommissioning no below ground excavation works in areas not previously surveyed is expected. As per the construction phase, any works outside the previously disturbed area may result in archaeological finds and therefore the work must be undertaken under the supervision of an Archaeological expert from the local cultural heritage authority and in accordance with the Project Chance find procedure.

8.13.5 Cumulative impacts

No cumulative cultural heritage impacts have been identified.

8.13.6 Receptor sensitivity

Receptors in relation to cultural heritage are summarised below.

Table 107*: Project cultural heritage receptors*

Receptor	Sensitivity	Description
Unidentified cultural heritage in the Project footprint	Medium	Only possible during excavations, which will only occur during construction. Some items have already been found on the site, meaning that other items could still exist. However, based on current findings, the significance of these finds is expected to be low.
Known cultural heritage just outside the Project footprint	Low Medium (L-Shaped wall)	Two items or archaeological significance were identified near the Guzar substation, but the Project design has been changed sufficiently to avoid these objects. At the closest point the access road construction will be within 40m of the L-shaped feature and therefore therefore it is considered a potentially at a medium risk of damage from encroachment. The memorial feature is sufficiently distant from all construction works (access road, grid connection and PV site)

8.13.7 Mitigation, management and monitoring measures

Table 108 outlines the project specific mitigation and GIIP to prevent or minimise cultural heritage impacts for each project phase and monitoring and enhancement requirements where relevant.

Table 108 *Cultural heritage mitigation and management*

Project phase	Mitigation and management measures
Design/Contract	- Prepare Project design to avoid all known areas of cultural heritage and archaeological significance. - Include requirement for a chance finds procedure in the Project contract.

Project phase	Mitigation and management measures
	- EPC Contractor to hire an archaeologist to supervise excavations works (per the requirements of the institute of Archaeology)
Project Specific	- Maintain communication with the Institute of Archaeology on the requirement to contract the archaeologist. - Require the Main Contractor to hire the archaeologist from the Institute of Archaeology under the Academy of Sciences of Uzbekistan[101] to monitor Project construction works. - Prepare a map and disclose to all contractors and subcontractors the location of cultural heritage sites outside the Project site and include buffer zones of the closest locations of where works can be undertaken near these locations. - Erect barrier around the L-shaped polygon to protect any further fragments as found during the initial survey work. - Access road RAMS to include requirement to train/inform all workers on the sensitivity of the area to potential unknown archaeology and the need to work under the supervision of an Archaeological watching brief and chance finds procedure.
GIIP	- Establish a chance find procedure (that includes national and Lender requirements as well as following GIIP) for the construction phase, or any phase that requires excavation works. - Should items of cultural heritage be identified they should be managed in line with the chance find procedure and the Institute of Archaeology should be notified. - Carry out ongoing discussion with local community members in relation to the cultural significance of the site.
Enhancement	- Train workers in the identification of items of cultural heritage or archaeological significance.
Monitoring	- Log and report all chance finds identified. - Should items of cultural heritage be found on or near the Project site, these should be regularly monitored to ensure they are properly signposted, their buffer zones are maintained and that no harm has come to the items. - Training should be provided to workers on the location of such items (including those items located near to the Guzar substation) and the proper behaviour around the items of cultural heritage.

8.13.8 Residual Significance

The residual significance post mitigation is summarised in Table 109. The assessment has indicated that cultural heritage impacts will not be significant.

[101] According to local laws, only one archaeologist (or one team of archaeologists) is allowed to investigate an area at a time, and the permit is valid for one year. During the period of the permit, other archaeologists cannot carry out research work on the same territory. Therefore, the archaeologists who conducted the survey in 2023 will need to be hired (the archaeologist from Institute of Archaeology under Academy of Sciences of Uzbekistan).

Table 109*: Cultural heritage residual significance*

Impacts	Magnitude (pre mitigation)	Sensitivity	Magnitude (post mitigation)	Residual significance (post mitigation)
Impact on unidentified cultural heritage in the Project footprint	Medium	Medium	Low	Low
Impact on identified items of cultural heritage	Medium	Medium	Low	Low

8.13.9 Data limitations and uncertainty

None identified.

9 Environmental and Social Management and Monitoring

1.1 Overview

An ESMP (Volume IV) is prepared as part of the ESIA to support the ongoing implementation of E&S requirements for the Project. The objectives of the ESMP are to:

- Clearly describe the required components of the Masdar/Project Company and EPC Contactor and subcontractor environmental and social management systems (HSSE-MS) for the construction and operation phase.
- Provide overview of the Masdar/Project Company structure and roles and responsibilities for implementing projects.
- Define the supporting management plans require for implementing the requirements of the ESIA.
- Confirm compliance obligations.
- Establish objectives of the ESMP (construction and operation).
- Define roles and responsibilities for implementation of the requirements of the ESMP.
- Set minimum requirements for meetings inspection, audits and reporting.
- Define key performance indicators (KPIs)

A summary of the key commitments outlined in this ESIA is provided in the ESMP. These will be elaborated in the subsequent supporting management plans to provide further information on:

- Outcomes or targets
- Timeframes
- Responsibilities
- Resources required
- Monitoring activities

The Project Company will adopt a Project E&S Policy (provided in Volume IV ESMP) and work under the Masdar construction Health Safety Social Environmental Management System (HSSE-MS) (for health and safety). The Project Company will adopt a robust human resource policy, local hiring policy and supply chain policy.

The E&S provisions and obligations in the main contract between the Project Company and EPC contractor / O&M contractor must be applied back-to-back down the contracting chain.

The ESMP requires an emergency preparedness and response plan to be prepared that considers natural hazard risks (e.g., flood risk, seismic risk, weather risk) in project design), climate related risk, the proximity and availability of adequate medical services and risk management and training protocols.

10 Conclusions

10.1 Key conclusions

The Project is considered to be suitable for development and able to comply with national regulatory framework and the requirements of IFC PSs, EBDR PRs, ADB SRs and GIIP.

The project can be developed in accordance with:

- IFC PS1 – Assessment and Management of Environmental and Social Impacts and Issues
- IFC PS2 – Labour and Working Conditions
- IFC PS3 – Resource Efficiency and Pollution Prevention and Control
- IFC PS4 – Health, Safety and Security (community/workers)
- IFC PS5 – Land Acquisition, Involuntary Resettlement; and Economic Displacement;
- IFC PS6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources.
- IFC PS8 – Cultural Heritage
- EBRD PR1 - Environmental and Social Appraisal and Management
- EBRD PR2 – Labour and Working Conditions
- EBRD PR3 - Resource Efficiency and Pollution Prevention and Control
- EBRD PR4 - Health, Safety and Security
- EBRD PR5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
- EBRD PR6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources
- EBRD PR8 - Cultural Heritage
- EBRD
- ADB SR1- Environment; and
- ADB SR2 – Involuntary Resettlement

PS 7, PR7, PR9 and SR3 are not considered to be triggered. This ESIA has identified and evaluated potential environmental and social impacts that the Project may have on the environment and communities within its AOI (positive and negative) and reached the following conclusions.

The measures outlined in this ESIA enable the Project to avoid, or where avoidance is not possible, minimise, mitigate or compensate adverse environmental or social impacts and issues to workers, affected communities and persons, and the environment from Project activities, including biodiversity impacts to acceptable levels.

Overall, the ESIA concludes that the Project represents a priority infrastructure for Uzbekistan. The Project is an effective and viable energy infrastructure project for the country.

1.2 Stakeholder engagement

- A systematic approach to SE has been employed that has sought to build a constructive relationship with stakeholders, particularly the directly affected communities.
- Stakeholder engagement and consultation has been performed throughout the ESIA process as defined in the SEP (Volume V) and summarised in section 6.

- The public meetings held to disclose the draft ESIA, have demonstrated the communities have few concerns regarding the Project and consider possible employment opportunities to be the biggest direct benefit to the community (community members were informed that the number of possible job positions for local communities was low). To date stakeholder perception of the Project is broadly positive.
- A program for effective engagement going forward is set out in the Project Stakeholder Engagement Plan (SEP) alongside a project community and GBVH grievance mechanism.
- A mechanism for addressing project related GBVH grievances has been established alongside the main community and worker grievance mechanism.

1.3 Environmental

- The Project is susceptible to climate related risks on physical infrastructure and worker health which can be managed through climate resilient design choices and appropriate emergency response planning.
- Sustainable land clearance practices and ecological rehabilitation and restoration actions are required to ensure disturbed areas of land are not degraded with the potential for erosion and loss of habitat.
- The Project may generate negative environmental impacts from the use of hazardous materials, or poor waste management, however these can be mitigated or managed to acceptable levels.
- The Project will have a negligible impact on AQ, noise, groundwater, and water availability, cultural heritage and transportation infrastructure in the local region.Good practice measures for management and mitigation of these aspects have been outlined in the Project ESMP.

1.4 Biodiversity

- The construction, operation, and decommissioning of the Project may generate a number of impacts on various sensitive biodiversity receptors, including ten species classified as Priority Biodiversity Features (PBFs), per EBRD PR6.
- The Project does not overlap, nor does it have the potential to generate significant adverse impacts to any national or international protected area. The nearest protected area is the Pachkamar (or Chimkurgan) Reservoir IBA102, located ca. 14 km to the north of the Project.
- No features were identified as Critical Habitat triggers for the Project.
- All habitats within the Project site are under significant anthropogenic pressure, manifested by land cultivation and overgrazing which is reflected in the relatively low botanical species richness and relatively high proportional representation of weedy or adventitious species
- Based on the low botanical species richness recorded in the botanical sampling plots located within and near the Project site, as well as the relatively high proportion of adventitious, weedy species among the species recorded, leads to a determination of Modified Habitat, per IFC PS6, for all habitats within the Project site (733ha).

102 BirdLife International (2024) Important Bird Area factsheet: Chimkurgan Reservoir. Downloaded from https://datazone.birdlife.org/site/factsheet/chimkurgan-reservoir-iba-uzbekistan on 25/07/2024.

- Several invasive plant species were identified in the baseline floral survey, reflecting the area's current state as an agricultural area, from which native vegetation has been removed. Management measures to reduce the spread of these species will be employed.
- Potential impacts include ten priority biodiversity species per EBRD PR6 with post mitigation impacts predicted to be insignificant (minor significance or less) with greatest potential impact identified for two species of non-flying terrestrial animals namely the Marbled Polecat and Central Asian Tortoise.
- The Project Company will install BFDs as a proactive mitigation measure for the project affiliated OHTL interconnection route, The measure is designed to reduce risks to bird species identified as Priority Biodiversity Feature in the CHA, as well as other bird species which may overfly the area.

1.5 Labour and social

- Occupational health and safety risks will require a comprehensive Construction HSE Plan and OHS Plan for the Project works.
- Labour matters and supply chain matters which are crucial to the successful development of the Project will be managed by setting out key obligations on suppliers and contractors in contractual documentation.
- Local employment and procurement will be prioritised where possible. However, awareness raising will be necessary in the local communities to manage expectations of the exact number of opportunities available.
- Cumulative impacts of community unrest (or lack of support for the project) could occur if expatriate workers are selected to work on the project and communities consider that employment opportunities for local community members are insufficient.
- Temporary worker accommodation requirements will be managed by ensuring housing standards are aligned with GIIP as defined by the EBRD and IFC Guidance on worker accommodation and any additional standards required by other Lenders or the local municipality.
- Community health and safety risk are deemed to be low however the Project will implement awareness raising activities to inform local community members of the outcomes of the findings of the ESIA.
- All workers (including security personnel) will be required to sign a workers' code of conduct that includes obligations for recognising the potential for GBVH risks exacerbated by the Project.

1.6 Land

- The Project will not result in any physical displacement impacts.
- There will be some permanent and temporary land take for the Project that may result in adverse impacts on livelihoods for farmers, their employees, local herders and households who rent animals to persons who graze on the affected land.
- Three structures, a herder shelter, a stable for livestock and a mobile trailer will be removed.
- Compensation will be required for the land acquisition impacts, particularly for farmers, and livelihood restoration measures are outlined in the Project LRP to address loss of employment

by farm workers, loss of access to land by workers to rent animals for grazing, and of access to land by herders.