Gijduvon 300 MW Wind Farm
Uzbekistan

Environmental & Social Impact Assessment (ESIA)

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ABBREVIATIONS

ABBREVIATION	MEANING
5 Capitals	5 Capitals Environmental & Management Consultancy
ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
ATG	Asia Trans Gas
CC	Civil Code
CCRA	Climate Change Risk Assessment
CESMP	Construction Environmental and Social Management Plan
CRM	Collision Risk Modelling
E&S	Environmental and Social
EAAA	Ecologically Appropriate Area of Analysis
EBRD	European Bank for Reconstruction and Development
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EP	Equator Principles
EPC	Engineering, Procurement and Construction
EPFIs	Equator Principles Financial Institutions
ESIA	Environmental & Social Impact Assessment
ESMS	Environmental and Social Management Systems
EU	European Union's
GBVH	Gender Based Violence and Harassment
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
GOU	Government of Uzbekistan
GRM	Grievance Mechanism
HGV	Heavy Goods Vehicles
HPZ	Health Protection Zones
HSSE	Health, Safety Security and Environment
IBA	Important Bird Area
IFC	International Finance Corporation
ILO	International Labour Organisation
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
LAO	Land Allotment Order
LC	Land Code
LILO	Line in Line out
LLA	Land Lease Agreement
MAWR	Ministry of Agriculture and Water Resources

Abbreviation	Meaning
MDAs	Ministries, Departments, and Agencies
MEEPCC	Ministry of Ecology, Environmental Protection and Climate Change
MOE	Ministry of Energy
MPC	Maximum Permissible Concentrations
NCC	National Climate Contributions
NEGU	National Electric Grid of Uzbekistan
NGOs	Non-Governmental Organizations
NTS	Non-Technical Summary
O&M	Operation and Maintenance
OESMP	Operational Environmental and Social Management Plan
OHTL	Overhead Transmission Line
OVOS	National Uzbekistan acronym for EIA assessment process
PPA	Power Purchase Agreement
PPP	Public-Private Partnership
PR	Performance Requirement
PS	Performance Standard
ROW	Right of Way
SEA/SH	Sexual Exploitation and Abuse and Sexual Harassment
ToR	Terms of Reference
UNESCO	United Nations Educational, Scientific, and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UZRDB	Red Data Book of Uzbekistan
VPs	Vantage points
WDA	Wind Development Area
WTG	Wind Turbine Generator
ZTV	Zone of Theoretical Visibility

1 INTRODUCTION

In 2018, Uzbekistan ratified the Paris Agreement and committed to reducing its greenhouse gas emissions per unit of Gross Domestic Product (GDP) by 10% of the 2010 level by 2030. The country's "Green Economy" strategy for 2019-2030 outlines ambitious goals, including increasing the share of renewable energy sources in total electricity generation to over 25% by 2030. Additionally, Uzbekistan aims to double its energy efficiency, decrease the carbon intensity of its GDP, and ensure universal access to modern, affordable, and reliable energy across all sectors (IEA, ND)[1].

Uzbekistan possesses significant renewable energy sources potential, which could drive the growth of a green, sustainable economy. The country's total renewable energy sources potential is estimated at 117,984 Mtoe, with a technical potential of 179.3 Mtoe. The largest portion of this potential comes from solar energy, with a total potential of 51 Gtoe and a technical potential of 177 Mtoe while the wind energy potential stands at 2.2 Mtoe, with a 19% potential for technical development (IEA, ND).

The Uzbekistan 2030 Energy Strategy defines the mid-term and long-term objectives and directions for the development in the power sector for ensuring electricity supply in Uzbekistan between 2020-2030. One of the objectives of the Energy Strategy include the development and expansion of renewables use and their integration into the unified power system. In order to fulfil this objective, the government of Uzbekistan intends to ensure diversification in power and heat energy sectors through increased share of renewable energy sources and creation of renewable energy investment project mechanism utilising PPP approaches, enhancement of government policies related to development of renewable energy sources, demonstration of renewable projects.

In regard to the development of wind farms the Energy Strategy states the following as priority:

"Creation of large-scale wind farms with single site capacities ranging from 100MW to 500MW mostly concentrated in North-Western region (Republic of Karakalpakstan and Navoi region) shall be the main priority of wind power development".

[1] IEA, ND. Uzbekistan energy profile, Sustainable development, Renewable energy. Retrieved from: https://www.iea.org/reports/uzbekistan-energy-profile/sustainable-development

Targets indicators for annual capacity introduction in 2020-2030 have been approved in order to achieve renewable energy goals envisaging construction of 3GW wind capacities by 2030 as shown in Figure 1-1 below.

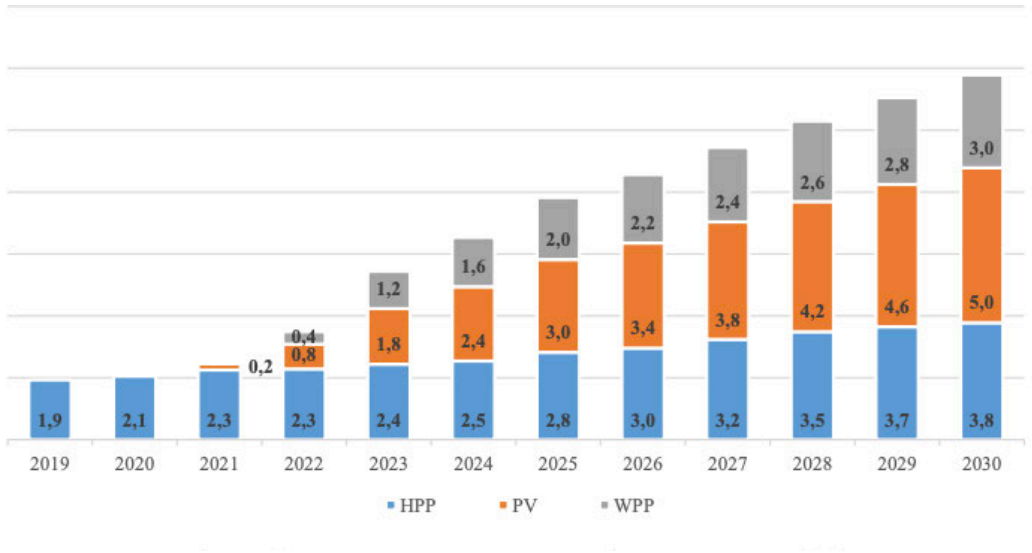


Figure 1-1 Uzbekistan Renewables-Based Generation Targets by 2030

Source: Uzbekistan 2030 Energy Strategy Concept Note, 2020[2]

1.1 The Project

As part of the Uzbekistan 2030 Energy Strategy, ACWA Power has signed an implementation agreement with the Ministry of Energy in Uzbekistan for developing, building and operating 300MW wind farm in Gijduvon. ACWA Power has since established a Project Company 'ACWA Power Gijduvon Wind FE LLC'. The Project Company has entered into a 25-year Power Purchase Agreement (PPA) with JSC 'National Electric Grids of Uzbekistan', which is based on the ultimate operations of the Project.

The Project includes the development, financing, construction, operation and maintenance of the Wind Farm including the Wind Farm electrical substation. In addition, it will also include development, financing, construction and transfer of Purchase Electrical Facilities for the Overhead Transmission Line (OHTL) Line in Line out (LILO) connection with Bash-Karakul OHTL.

JSC National Electric Networks of Uzbekistan will be responsible for the operations and maintenance of the PEF following transfer from ACWA Power and the development, financing, construction, operation and maintenance of the OHTL upstream from the PEF.

[2] Retrieved from: https://minenergy.uz/uploads/01261b5c-9c52-2846-9fcf-e252a67917e6_media_.pdf

1.2 Background & Scope of the ESIA Report

5 Capitals Environmental and Management Consulting (5 Capitals) has been engaged by ACWA Power to undertake the independent Environmental Impact Assessment (EIA) and Environmental and Social Impact Assessment (ESIA) processes, as well as certain other environmental & social related scope, the main volume of which is this document herein.

At this stage, it is understood that ACWA Power is seeking an amount of project finance from banks and financial Institutions (together "lenders"). At this stage, it is understood that Asian Development Bank (ADB) and the Asian Infrastructure Investment Bank (AIIB) are involved in discussions relating to provisions of finance. Other lenders may also be part of the lending group. Lenders such as those outlined above may have their own internal environmental & social investment policies/standards which the Project must align with, which are further outlined in Section 3.3.

Based on the requirements of the lenders, a process for undertaking ESIA to assess potential impacts and determine suitable mitigation measures and monitoring plans is necessary as a process to reach financial close.

An Environmental and Social Scoping report for the Project was prepared by 5 Capitals on April 2024 prior to the EIA/ESIA. This was submitted to the ACWA Power for review. The comments were reviewed by 5 Capitals and have been taken into account in the preparation of this ESIA.

1.2.1 National EIA (OVOS)

A key stage in the development of the Project, requires Environmental Impact Assessment (EIA) in compliance with Uzbekistan national EIA requirements (OVOS). 5 Capitals has sub-contracted Juru (Tashkent, Uzbekistan) to undertake certain elements of the scope that require local focus, studies (environmental & social) and regulatory submissions. This includes baseline surveys, consultations, and preparation of the project specific Stage I EIA Preliminary Statement of the Environmental Impact.

The Stage I EIA was submitted to the Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan on the 1st of July 2024 by Juru. This was reviewed by the State Environmental Expertise Center and the positive conclusion was received on the 24th of July allowing for project construction works to commence. As such, the Project is not required to prepare a Stage II "Statement for Environmental Impact". However, a Stage III 'Statement on Environmental Consequence' is required to be submitted, and approved, prior to commencement of project operations.

Refer to **Appendix A** for the positive conclusions on the National EIA.

1.2.2 Lenders ESIA

The ESIA has been informed by the aforementioned Scoping Report (**Appendix B**) prepared by 5 Capitals and has been prepared with relevance to the national environmental regulations for Stage I EIA and the expected environmental & social requirements of the aforementioned prospective Lenders.

1.3 Objectives of the ESIA Report

The objectives of this ESIA in relation to this project include the following:

- Provide an overview of the Project design, identification of sensitive receptors in the Project's area of influence and assessment of Project alternatives.
- Assessment of baseline conditions prior to the development of the Project through review of available data and conducting surveys.
- Assessment of the project's environmental & social impacts for the construction and operational phases;
- Review of compliance obligations, including applicable Uzbekistan regulations and international regulations & standards as well as international lender requirements.
- To engage with key stakeholders and project affected people to disclose Project information, study outcomes, gain lay knowledge about the local environmental & social context, seek feedback on proposal and to understand & map any resettlement requirements.
- Determination of applicable mitigation and management measures including monitoring requirements to be implemented in order to avoid or minimise potential impacts and maximise potential environmental and social gains.
- Consideration of alternatives that can be used for the project leading to reduced impacts and/or greater social and environmental gains.
- Prepare a framework from which the construction phase and operational phase respective environmental & social management systems and plans can be developed and implemented.

1.4 Structure of the ESIA

To align the ESIA with the requirements for environmental and social assessment established by the various lenders and good practice, the ESIA report is proposed to be presented in the following format developed by 5 Capitals:

- **Volume 1** is a Non-Technical Summary (NTS) of the ESIA, including the main outcomes, and conclusions.
- **Volume 2** is the main text of the ESIA and full impact assessment, with mitigation, management and monitoring measures identified.
- **Volume 3** is the Environmental and Social Management Plan linking together the outputs for mitigation and E&S management as determined from the ESIA Volume 2.
- **Volume 4** includes the technical appendices relevant to the studies and this ESIA.

2 PROJECT INFORMATION

2.1 Key Project Information

Table 2-1 Key Project Information

PROJECT TITLE	Gijduvon 300 MW Wind Farm
PROJECT DEVELOPER	ACWA Power
PROJECT COMPANY	ACWA Power Gijduvon Wind FE LLC
OFF TAKER	JSC National Electric Grid of Uzbekistan
EPC CONTRACTOR	To be Confirmed
O&M COMPANY	NOMAC
ENVIRONMENTAL CONSULTANT	5 Capitals Environmental and Management Consulting (5 Capitals) PO Box 119899, Dubai, UAE Tel: +971 (0) 4 343 5955, Fax: +971 (0) 4 343 9366 www.5capitals.com
	Juru Ltd Chust Str. 10, 100077, Tashkent, Uzbekistan Tel: +998 71 202 0440, Fax: +998 71 2020440
POINT OF CONTACT	Ken Wade (Director), Ken.wade@5capitals.com

2.2 Project Location

The Project is a 300 MW wind farm located in the Gijduvon and Shofirkon districts in the Bukhara region of Uzbekistan. The Project includes the establishment of a collector sub-station, a 1.5km Overhead Transmission Line (OHTL) with a capacity of 500 kV and internal access road. The wind farm will include a total of 39 Wind Turbine Generators (WTG), which will be sited within an investigation area measuring approximately 12,626 ha.

The proposed Project components' locations and the Wind Turbine Generators (WTGs) coordinates are provided in the following table and figure.

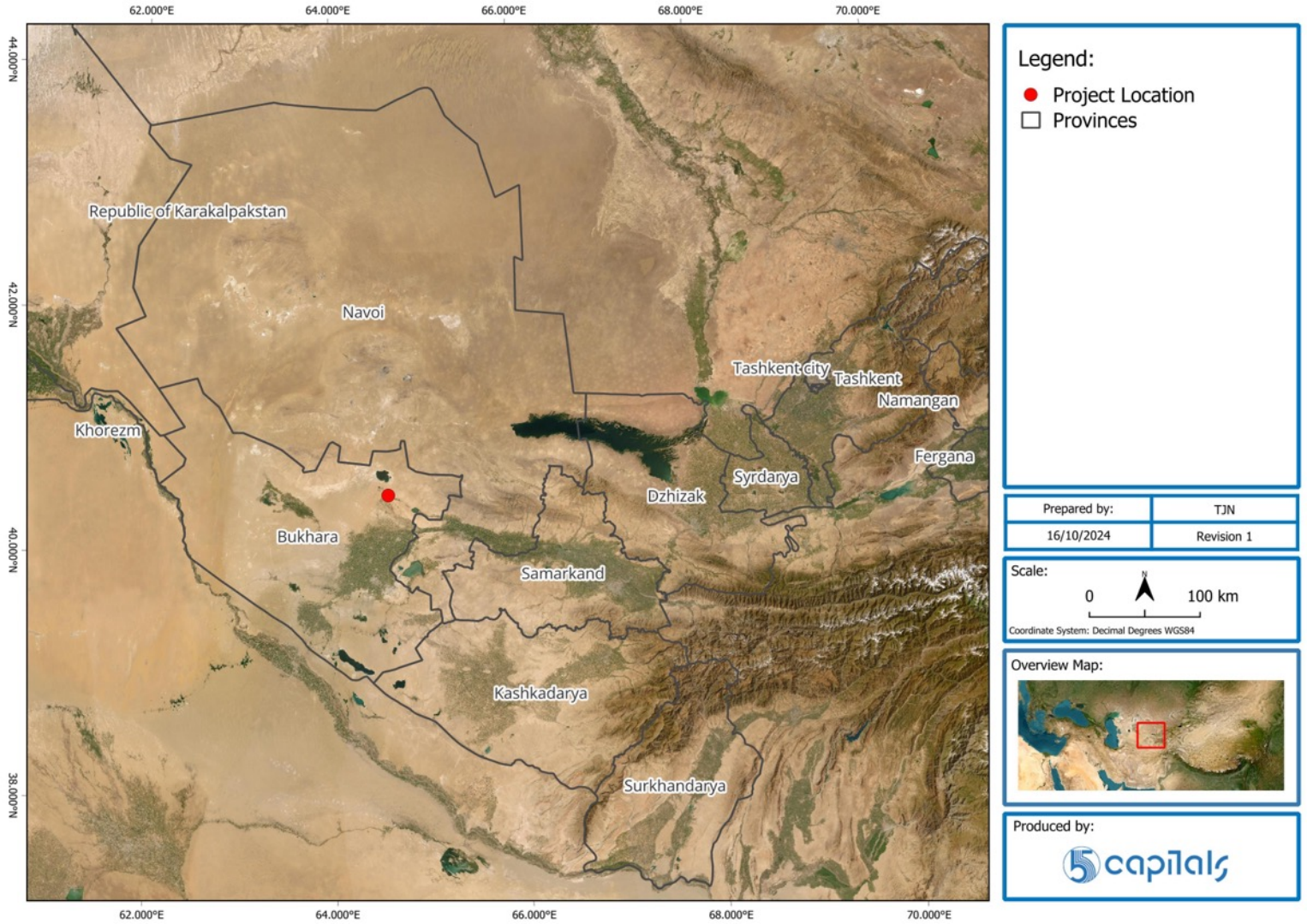


Figure 2-1 Project Location – National Context

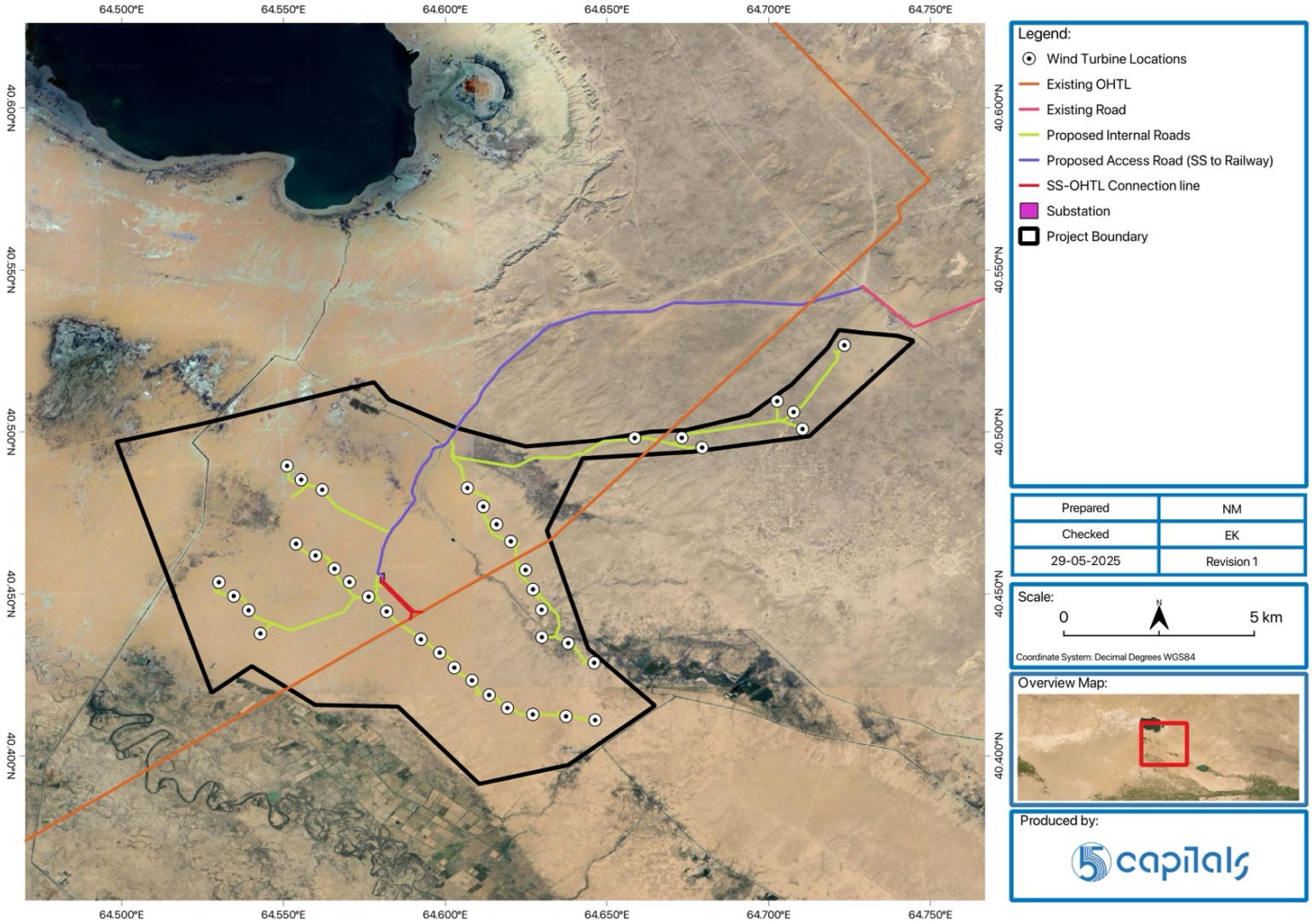


Figure 2-2 Project Location – Local Context

Table 2-2 WTGs Coordinates[3]

ID	Longitude	Latitude
BSH2-01	645973.4	4487651
BSH2-02	644933.9	4484756
BSH2-03	644687.8	4485334
BSH2-04	644251.9	4485700
BSH2-05	642314.8	4484071
BSH2-06	641777.2	4484396
BSH2-07	640544	4484365
BSH2-09	636191.7	4482570
BSH2-10	636618.4	4481942
BSH2-11	636978.8	4481338
BSH2-12	637363	4480761
BSH2-13	637769.7	4479790
BSH2-14	637974.3	4479129
BSH2-15	638213.7	4478437
BSH2-16	638237.3	4477493
BSH2-17	638932	4477302
BSH2-18	639624.1	4476641
BSH2-19	631453.7	4483244
BSH2-20	631832.3	4482778
BSH2-21	632390.2	4482442
BSH2-22	631736.8	4480577
BSH2-23	632256.1	4480186
BSH2-24	632759.7	4479740
BSH2-25	633158.4	4479294
BSH2-26	633669	4478796
BSH2-27	634151.9	4478300
BSH2-28	635067.3	4477362
BSH2-29	635569.3	4476913
BSH2-30	635961.7	4476406
BSH2-31	636433.1	4475977
BSH2-32	636892	4475486
BSH2-33	637379.1	4475049
BSH2-34	638049.7	4474840

[3] The total number of WTGs is 39. BSH2-08 was removed and replaced with BSH-40 to avoid impacts to one of the herders. Please refer to the Alternatives Section 2.10 of this report.

ID	Longitude	Latitude
BSH2-35	638921.7	4474793
BSH2-36	639686.6	4474678
BSH2-37	629737.3	4479224
BSH2-38	630135.8	4478760
BSH2-39	630532.3	4478277
BSH2-40	630855.2	447748

2.3 Land Use and Site Condition

2.3.1 Land Ownership

According to the 1998 Land Code of the Republic of Uzbekistan, all land in Uzbekistan is state property and permits for use of land are granted and monitored by the State through the regional and district administrations. In 2021, the GoU reformed the land allocation process by introducing an e-auction system. As a result, local authorities are no longer authorized to allocate land plots directly to individuals or legal entities. Currently, both land leases and land purchases are conducted exclusively through the e-auction platform.

The Project falls within Gijduvon and Shofrikon districts. Consultations undertaken with the Committee for the Development of Sericulture and Wool Industry (SWID) indicated that the majority of the Project plot that falls within the Gijduvon district was leased by SWID to Kokcha LLC cluster for 49 years with the agreement No. 02-1 dated October 21, 2020. Consultations with the Shofirkon Cadastral Department identified an area used by Galaba LLC. Consultations have revealed that they have been allocated grazing land respectively under their management which includes the land within the Project site and in the wider Project area.

Presidential Decree No.116 dated 05 March 2024 was signed and disclosed on the national legislation website[4]. Section 7 of the Presidential Decree states that the Khokimiyat of Bukhara region together with the relevant ministries to issue the Land Allotment Orders and allow the Project Company to execute the Land Lease Agreement (LLA) at a later stage.

The overall size of land allocated for the development of the wind farm is approximately 12,626, however the land allocation for the footprint of the different Project components is as provided in the table below. These are estimated based on ACWA's understanding of the project needs, however, these will be further confirmed when the EPC Contractor is appointed, and the design is finalised.

[4] https://lex.uz/docs/-6829146

Table 2-3 Land Allocated to the Project

Project Facilities	No./Total KM	Footprint Area in Ha	Type of Ownership
WTG Base (including foundation & hardstand & WTG transformer)	39	24.93	Land lease for project lifetime
Access roads	-	40.76	
Wind Farm substation	-	3.46	
220kV OHTL	1.5 km, with 10 Towers	0.02*	
Sub-total for Permanent Land Take	**n/a**		**n/a**
Temporary Construction Site Facilities area (WTG base 30m buffer, temporary site facilities, laydown yard, offices, other storage, accommodation camps, temp access)	-	60.73	Temporary, for use during the construction phase
Note: *The land required is based on the footprint and it does not include the restrictions on land use that will be established as part of the HPZ for the WTGs, OHTL and substation.*			

2.3.2 Land Use and Site Condition

2.3.2.1 Wind Farm

The wind farm plot is 12,626 ha in area. The nearest inhabited community to the Project area is Kuklam situated approximately 1.8 km north-east the nearest WTG, followed by Kokcha community located approximately 20 km east the Project area. The Project is located approximately 6.5 km south of Lake Ayakagitma and is bordered by farmlands expanding to the south the Project site.

Reviews of satellite imagery and the scoping site visit indicated that the Project area is predominantly flat with slight slope variations. The site is largely composed of sandy desert substrate, which is sparsely vegetated by low-growing trees and bushes as shown in the following figure.





Figure 2-3 General Site Photos

The main industrial facilities identified in the Project area are shown in the following figure and described in Table 2-3.

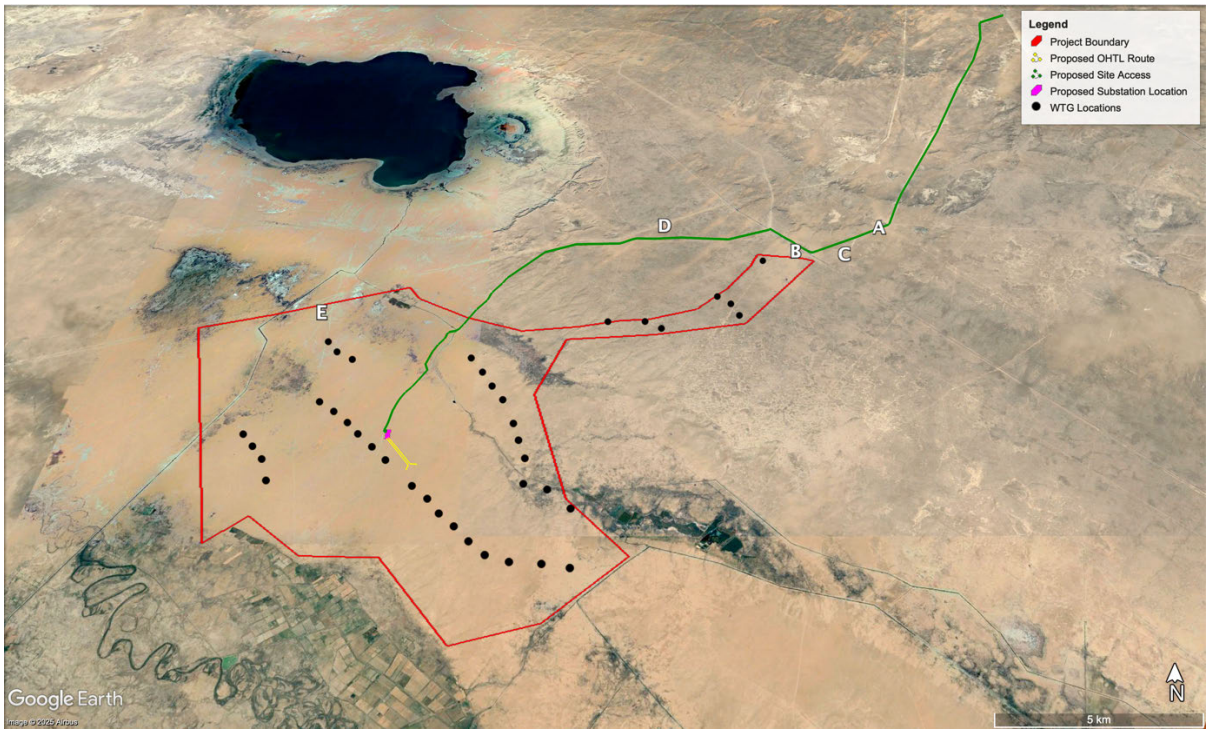


Figure 2-4 Infrastructure Facilities in the Project

Table 2-3 Infrastructure Facilities in the Project Area

ID	Description	Photo
A	**Transformer Substation** located around 5 km from the closest WTG.	
B	**Navoiyuran Chemical Warehouse** located around 2.8 km from the closest WTG.	
C	**Zafarobod Hydrocarbons Storage** located around 1.3 km from the closest WTG.	

ID	Description	Photo
D	**Post of Asia Trans Gas (ATG)** Pipeline located around 4 km from the closest WTG.	
E	**Vahta Post** within Pipes Storage, 1.7 km from the closest WTG.	

During the site visit two pipeline corridors were observed, these were further confirmed during the initial stakeholder engagement for the Project. These are the Asia Trans Gas (ATG) pipelines and the Uztransgas pipelines, depicted in green and purple respectively on the figure below. The ATG pipeline corridor lies approximately 2.3 km north the closest WTG. On the other hand, the Uztransgas pipeline corridor traverses the site north to south and extends around 450 m to the nearest WTG.

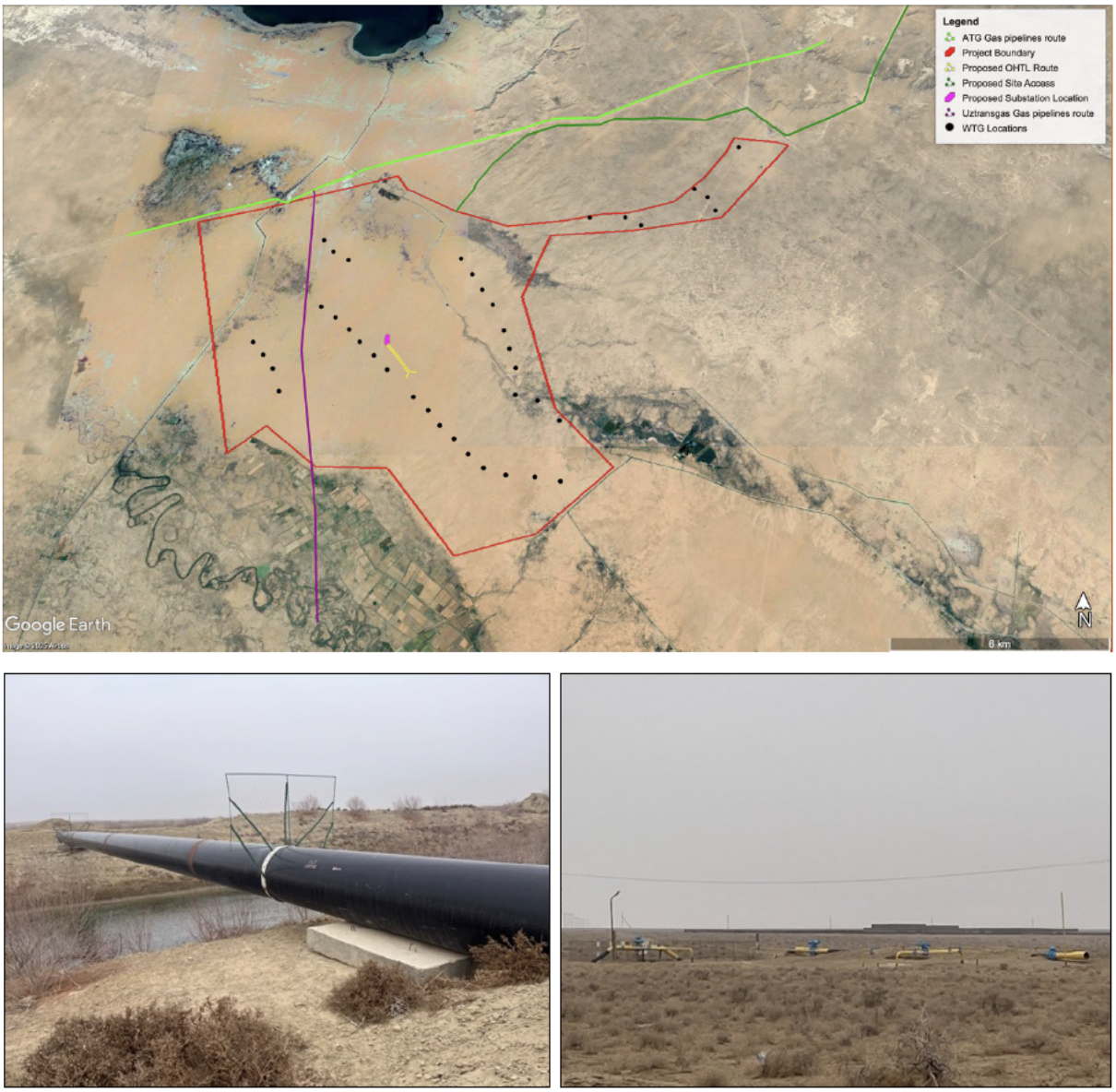


Figure 2-5 Routing and Examples of the Gas Pipeline in the Project Area

As shown in Figure 2-5, a power line extends to the north of the Project site, approximately 2.3 km from the closest WTG. Another power line crosses the site, extending around 10 km from the north to the south approximately 450 m from the closest WTG. Phone consultations with the National Electric Grid of Uzbekistan (NEGU) indicated that these power lines are not under their jurisdiction. Accordingly, a consultation letter was sent to the Bukhara Regional Electricity Grids confirmed that these are 35-110 kV power lines with a 15-20 m Health Protection Zone (HPZ). In addition, the Bash 500 OHTL that is currently being constructed crosses the site east to west.

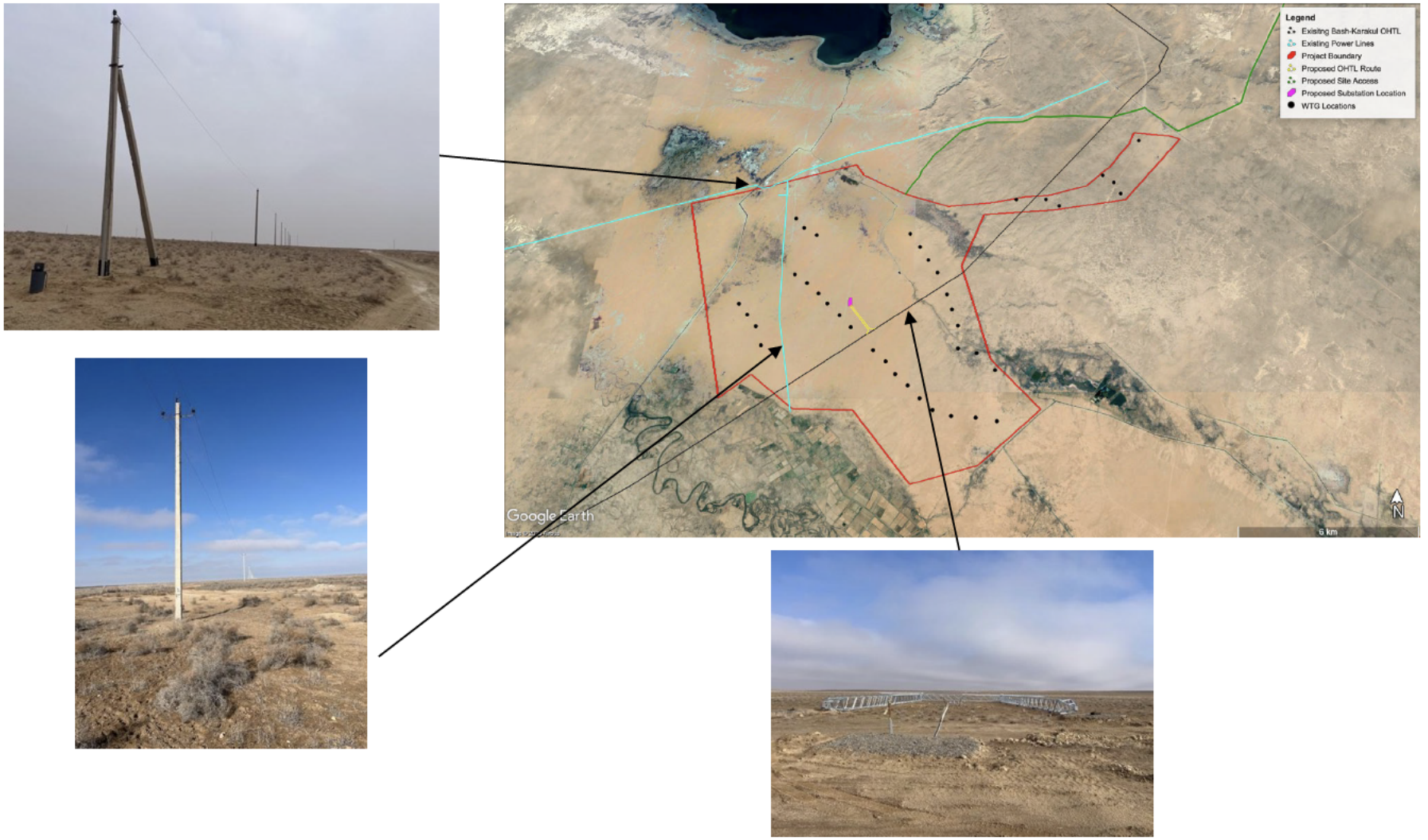


Figure 2-6 Power Lines in the Project Area

Water channels, water/fishing ponds and water wells were observed within the Project site and the surrounding area; these are further discussed in Section 8.2.1.38.2.1.4. Additionally, dirt tracks and bridges were observed across the proposed site (refer to Section 12.2.1), with evidence of anthropogenic activity including several herders' houses and animal stables as presented in detail in Section 2.4 below.

2.3.2.2 Overhead Transmission Line

The Project OHTL is a LILO connection with Bash-Karakul OHTL, each of 1.5 km length. The Sanitary-Epidemiological Peace and Public Health Committee requires a 30 m health protection zone (HPZ) from the power line. No receptors (structures, houses, stables) are located within the OHTL route or the 30m HPZ.

ACWA Power will transfer the operation of the OHTL to NEGU after completion of the construction phase. As such and in accordance with the Presidential Decree, ACWA Power will be granted with land usage rights and the required land will be allocated to NEGU on a permanent basis by the MoE. The land allocated to the OHTL tower footprint based on the Presidential Decree will be included in the next iteration of the ESIA.

2.3.2.3 Substation

The substation is located within the wind farm boundaries and all receptors (structures, houses, stables) are located more than 1.5 km away from the substation location.

2.4 Receptor Identification

The receptors identified within the Project area are presented in the following sections.

2.4.1 Receptors Outside the Project Boundary

Kuklam Community located roughly 1.8 km north-east the nearest WTG, comprises residential houses on the east side of the railway. Details regarding this community are included in Section 14.2 of this report.

Agricultural lands are located outside the Project area to the south. Several farmers' houses are within this agricultural area, located approximately 3 km from the closest WTG. It is understood that these farmers utilise the farmlands outside the Project area for agricultural and farming purposes. Fish ponds and a fish farm area is also located to the south-east of the Project site, with the closest house located approximately 1.5 km away from the closest WTG.

The locations of these receptors are provided on the following figure.

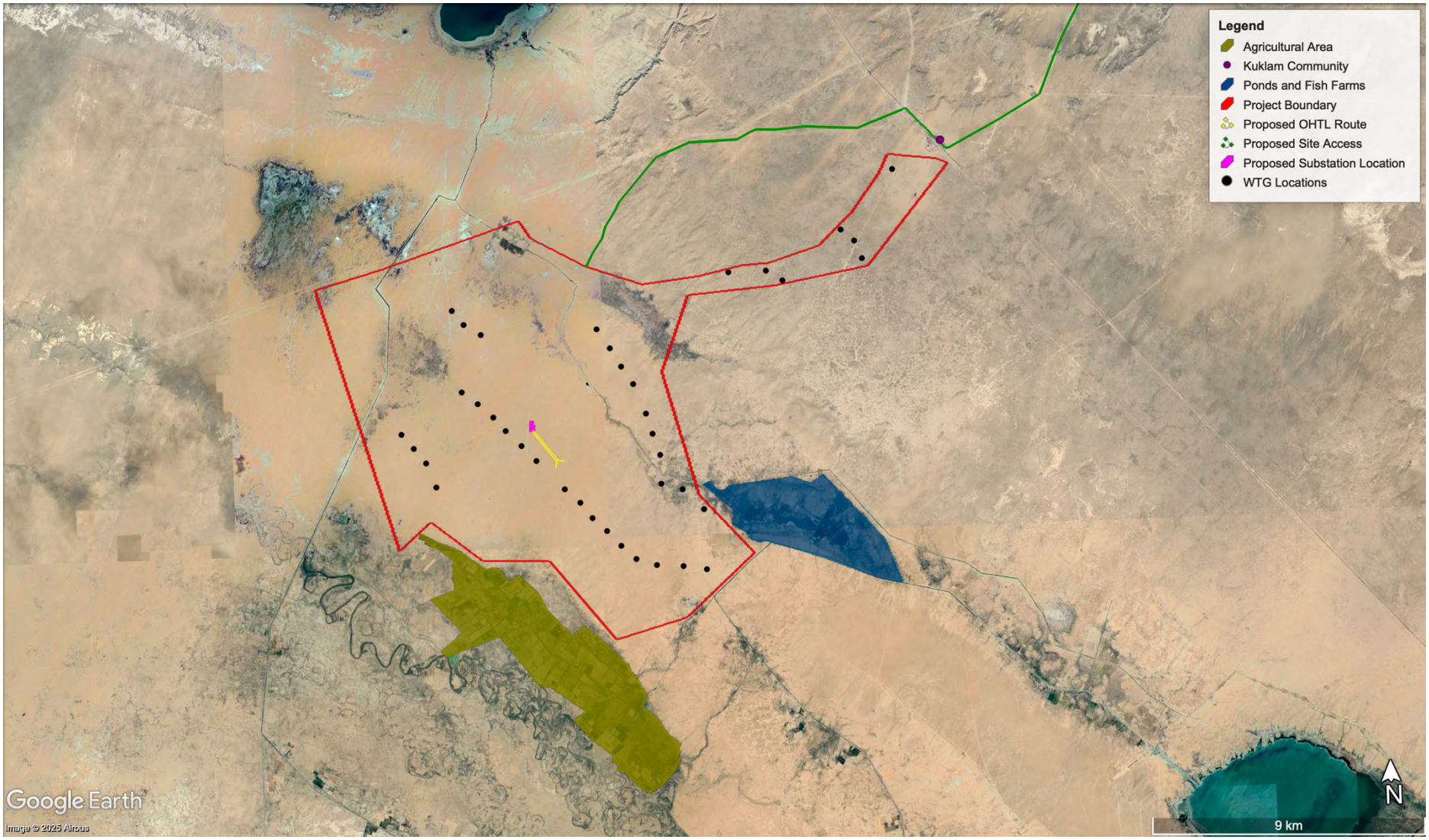


Figure 2-7 Farmlands and Kuklam Community in the Vicinity of the Project Area

2.4.2 Herders within the Project Boundary

A total of 23 herders have structures (house, stable etc.) in multiple locations within the project area. Two of these herders have fish farms within the Project area (F1 and F2). These herders use these houses throughout the year, although it is noted that they have primary residences elsewhere outside the project area. The herders utilise the Project site and the surrounding areas as pasture lands for grazing and herding purposes only. No agricultural or faming activities are carried out within the Project footprint. These structures are shown on the following figure and presented in the following table.

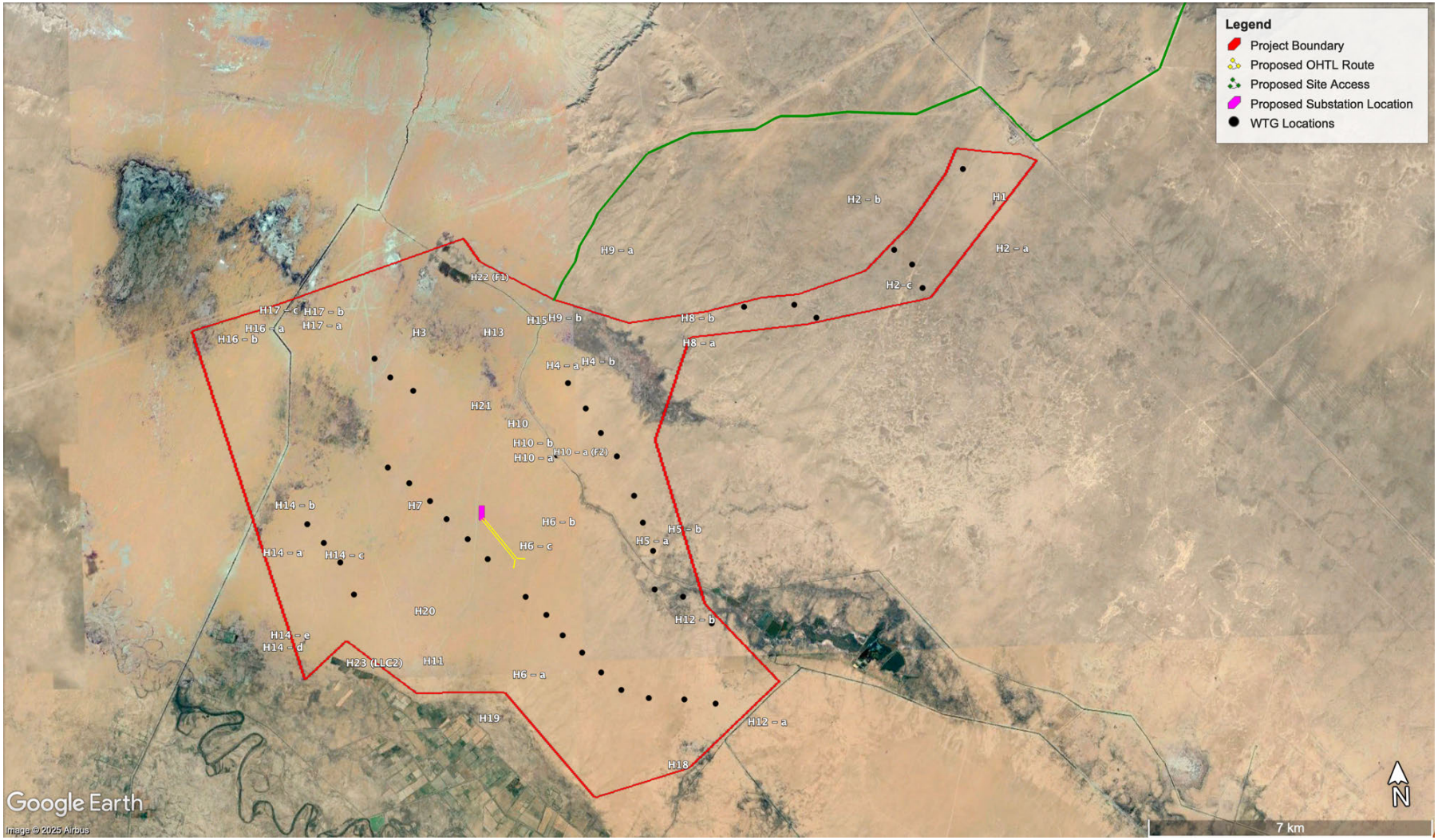


Figure 2-8 Structures in the Project Area

Table 2-4 Identified Herders' Structures within Project Area

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H1	Herder's house located 1.1 km from the closest WTG (BSH2-01).	
H2-a	Herder's house located 1.99 km from the closest WTG (BSH2-02).	
H2-b	Herder's house located 1.14 km from the closest WTG (BSH2-04).	

[5] When a herder owns structures in different locations, these are shown separately in the table an referred to in alphabetical order; for example H2 has structures in 2 locations, H2-a and H2-b.

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H2-c	Stable located 890 m from the closest WTG (BSH2-02).	
H-3	Herder's house located 1.06 km from the closest WTG (BSH2-19).	
H4-a	Herder's house located 537 m from the closest WTG (BSH2-09).	

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H4-b	Herder's house located 522 m from the closest WTG (BSH2-09).	 
H5-a	Herder's house located 583 m from the closest WTG (BSH2-15).	

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H5-b	Herder's house located 547 m from the closest WTG (BSH2-15).	
H6-a	Stable and trailer located 1.24 km from the closest WTG (BSH2-30).	
H6-b	Herder's house located 1.89 km from the closest WTG (BSH2-28).	

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H6-c	Stable located 1.26 km from the closest WTG (BSH2-27).	
H7	Stable and a trailer located 368 m from the closest WTG (BSH2-24).	 

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H8-a	Herder's house located 1.63 km from the closest WTG (BSH2-07).	
H8-b	Remains of an unused stable located 1.59 km from the closest WTG (BSH2-07).	
H9-a	Stable located 3.4 km from the closest WTG (BSH2-07).	

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H9-b	Stable located 1.2 km from the closest WTG (BSH2-09).	
H10-a (F2)	Herder's house and fish farm located 1.29 km from the closest WTG (BSH2-11).	 

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H10-b	Stable and an abandoned structure located 1.22 km from the closest WTG (BSH2-09).	 

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H11	Stable located 2.5 km from the closest WTG (BSH2-40).	
H12-a	Herder's house (trailer covered with mud) located 1.59 km from the closest WTG (BSH2-07).	
H12-b	Herder's house located 420 m from the closest WTG (BSH2-18).	

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H12-c	Stable located 429 m from the closest WTG (BSH2-18).	
H13	Stable located 2.69 km from the closest WTG (BSH2-21).	
H14-a	Herder's house located 558 m from the closest WTG (BSH2-38).	

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H14-b	Herder's house located 570 m from the closest WTG (BSH2-37).	
H14-c	Trailer located 232 m from the closest WTG (BSH2-39).	
H14-d	Herder's house located 1.64 km from the closest WTG (BSH2-40).	

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H14-e	Herder's house located 1.57 km from the closest WTG (BSH2-40).	
H-15	Stable located 1.57 km from the closest WTG (BSH2-09).	
H16-a	Trailer located 2.79 km from the closest WTG (BSH2-19).	

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H16-b	Herder's house located 2.93 km from the closest WTG (BSH2-19).	
H17-a	Herder's house located 2.02 km from the closest WTG (BSH2-19).	
H17-b	Stable located 2.01 km from the closest WTG (BSH2-19).	
H17-c	Stable located 2.14 km from the closest WTG (BSH2-19).	

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H-18	Herder's house located 1.58 km from the closest WTG (BSH2-35).	
H-19	Herder's house located 2.52 km from the closest WTG (BSH2-30).	
H-20	Stable located 1.79 km from the closest WTG (BSH2-40).	

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H-21	Stable located 1.99 km from the closest WTG (BSH2-09).	
H22 (F1)	Herder's house and a Fish Farm located 2.01 km from the closest WTG (BSH2-08).	 

Herders' (H) ID[5]	Brief Description	Photographic Documentation
H23 (LLC2)	Stable located 2.16 km from the closest WTG (BSH2-40).	

2.4.3 Existing Wind Farm Projects

The Project is located in the vicinity of two other Wind Farm Projects that are expected to be operational at the time of constructing the Project. These are Bash 500 MW and Bash 52 MW Wind Farms. In addition, the Bash 500 MW OHTL crosses the Wind Farm Project site.

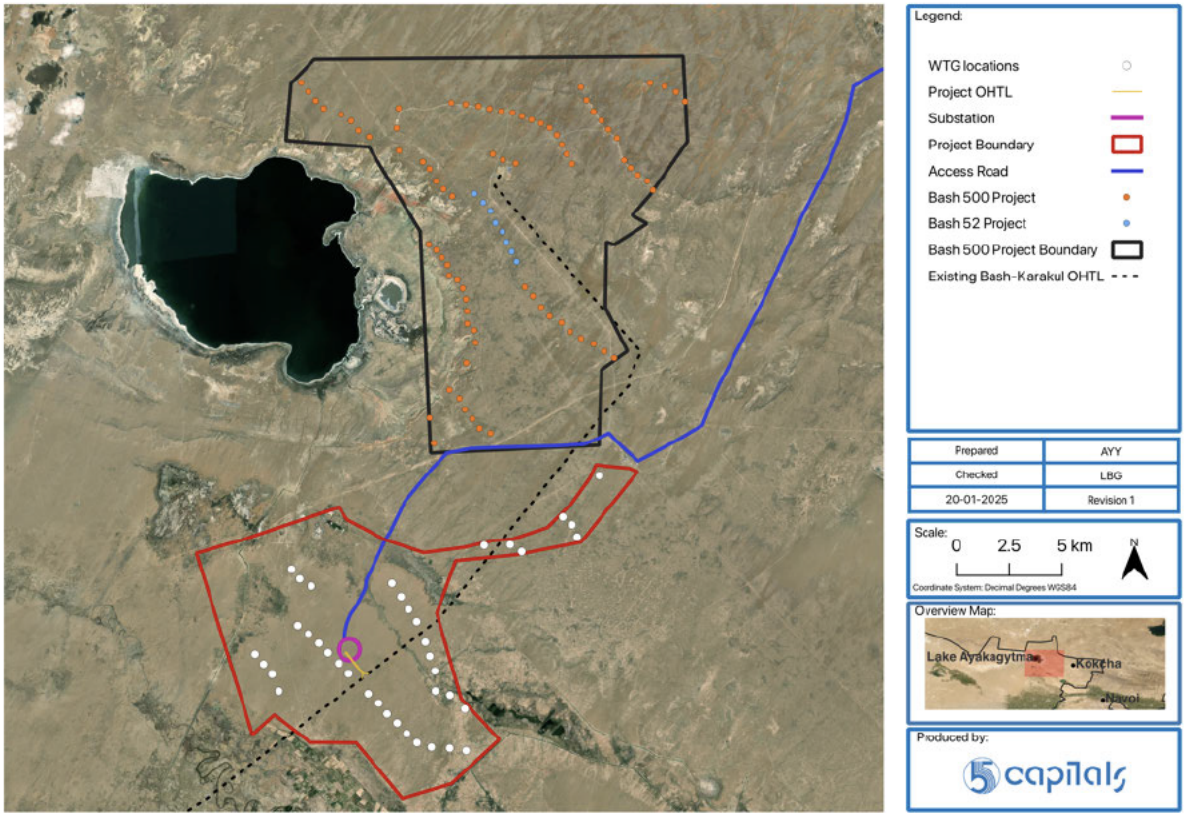


Figure 2-9 Existing Wind Farms in the Projects Vicinity

2.5 Project Description

Wind turbines have been used to produce electricity on a commercial scale since the 1990s and are well established as a developed renewable energy technology.

Wind turbines harness the energy in the wind and convert it to electricity. The amount of energy produced by wind turbines increases with increased wind speed and modern turbines are able to adapt efficiently extract energy from the entire range of wind speeds.

Wind speeds typically increase with height above ground as turbulence (due to topography and ground features) intensity decreases at the same time. This typically allows turbines with higher hub-heights to produce more energy than a turbine with a lower height at the same location. In addition, longer blades (the rotor radius from the turbine) significantly increase the swept area from which wind energy can be extracted.

The wind farm will consist of 39 WTGs which will utilize SI-19580 8 MW wind turbines. This turbine features horizontal axis, three blades, upwind rotor, variable speed and pitch control.

The proposed locations of the WTGs within the Project site are presented in the following figure.

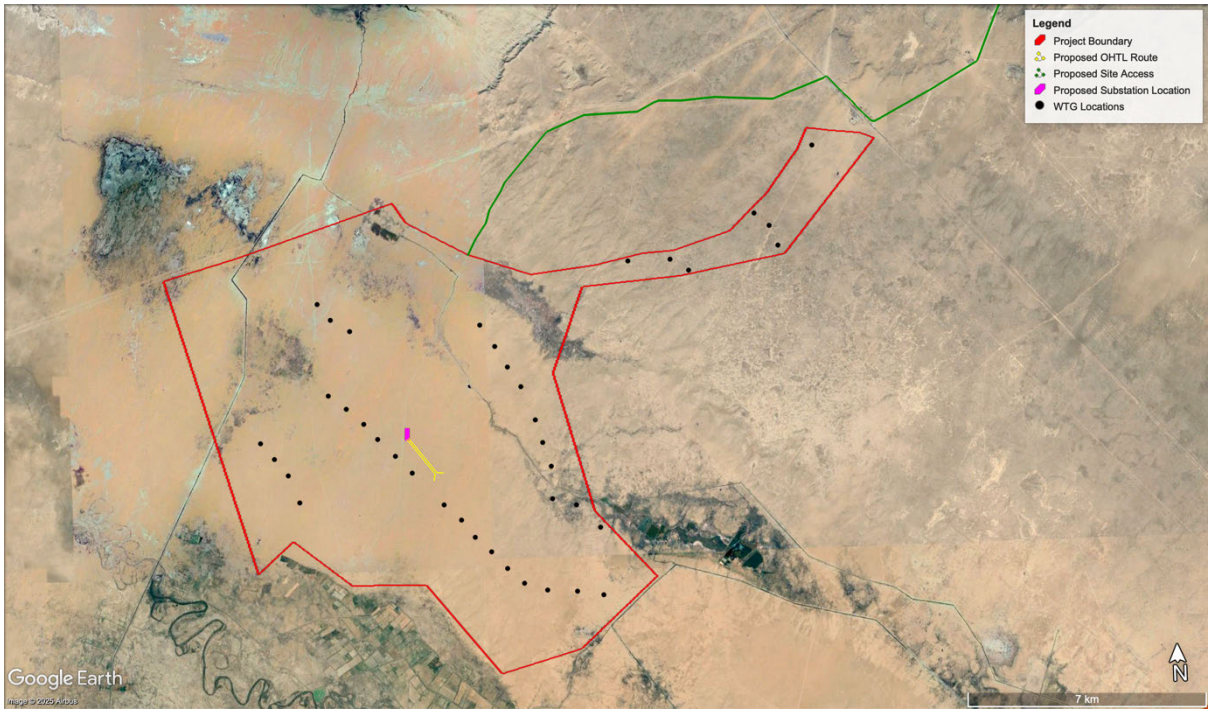


Figure 2-10 Proposed WTG Locations within the Project Site (December 2024)

2.5.1 Wind Farm

2.5.1.1 Wind Turbines Components

The wind turbines manufacturer is Sany and the model is Sany SI-19580. A brief description of the main components of the WTGs is as provided below.

Blades

Each blade has an independent pitch system that actively regulates the pitch angle of the blade. The blade is made of glass fibre reinforced polymer (GFRP) and it is equipped with a lightning protection system. The discharger can direct the lightning current on the blade into the ground through the tower.

Pitch System

The pitch bearings are used between its hub and blades to transfer loads from blades to the hub. The blades are connected to the inner race of a bearing with root bolts, and the outer race of pitch bearing, and blade pitch bearing is connected to the hub body with bolts. The pitch gears are integrated on the inner race of the bearing and blade pitch control is realised by the engagement with gears between pitch & gearbox.

The pitch system consists of two parts; the electrical and mechanical parts. The electrical assembly consists of a control cabinet, a motor and a backup power supply while the mechanical assembly consists of a pitch gearbox, pitch bearings and its connecting parts. The pitch control cabinet of the electrical assembly integrates controller, backup capacitor charging and monitoring and pitch motor brake holding control functions. It also effectively reduces system fault points. In the backup power supply, a supercapacitor module is used and this consists of fast charging, high power density features and it is less susceptible to ambient temperature. A supercapacitor can be fully charged within 10 minutes and its stored energy allows feathering at least once even in the worst case.

Hub

The hub is a cast construction with a combination of star type and ball type. The nacelle elevation angle, cone angle and blade preflex are used to ensure that the minimum distance between blade tips and the tower meets safety requirements.

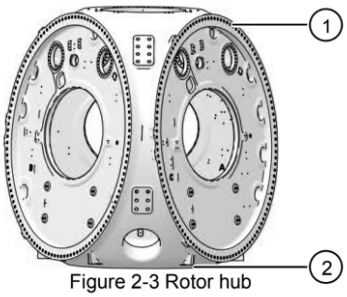


Figure 2-3 Rotor hub

1. Flange for connecting rotor blade
2. Flange for connecting main shaft

Figure 2-11 Outline of Hub

Nacelle

The nacelle houses the generator and gearbox. The nacelle is equipped with control cabinet, hoist, yawing system, drive chain system etc.

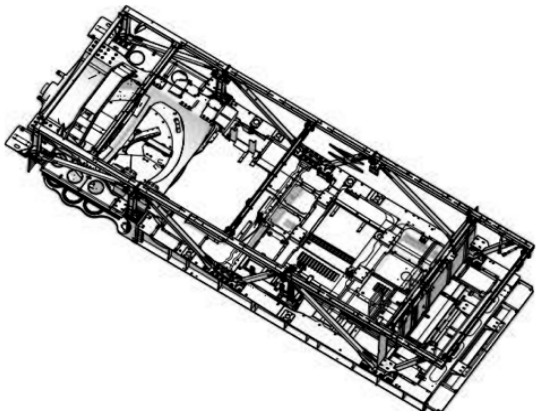


Figure 2-12 Outline of Nacelle

Brake System

The primary braking method for the WTG is aerodynamic braking which is realised by three-blade pitch control. This braking system will work under various operating conditions such as normal shutdown, overspeed shutdown, emergency shutdown, etc. During aerodynamic braking, the pitch control keeps the wind roto in a safe operating speed range. Supercapacitors supply power to three pitch systems individually and independently thus enabling individual and independent pitch control. In addition, a high-speed caliper is installed at the gearbox high speed shaft (HSS) end as an auxiliary brake for the whole machine.

After aerodynamic braking realised by pitch control reduces the speed of wind rotor to a certain range, the high-speed brake caliper at the gearbox HSS end acts to lock the drive

chain. Based on EHS requirements, an all-round protective cover for HSS end is designed to ensure personal safety.

Yaw System

The yaw system actively yaws the nacelle to orient the rotor to the wind. When the wind direction changes, the wind vane sends a signal to the control system. The control system sends a signal to the yaw drives, and the yaw drives drive the pinions to rotate on the gear ring, thereby driving the nacelle to rotate and orienting the rotor to the wind. The nacelle can rotate in two directions and the direction of rotation is detected by a proximity switch. When the angle of rotation in one direction reaches the cable untwisting angle, the control system controls the wind turbine to untwist the cables.

Electrical System

The electrical system mainly comprises of generator, convertor, transformer, electrical cabinet, power cable, pitch control, etc. Optimal matching between the doubly fed induction generator (DFIG) and its convertor enables the best power capture and good power grid quality. The generator's wind speed range allows the wind turbine to cut into a power grid under extremely low wind speed. Coupled with a high overspeed tolerance, it is suitable for extremely wide wind conditions and disturbance range.

Generator

The generator converts mechanical energy into electricity. The generator will be a doubly fed induction generator (DFIG) with simple structure, high efficiency, rated power: 8200 kW and rated voltage 1140V. The generator has two (2) pairs of poles and is for horizontal installation. It will adopt air cooling system where cooled air in nacelle will enter the generator through the air inlets at the drive end and non-drive end, with one flow of cool air through the radial air ducts of rotor, the air gap, and the radial air ducts of stator to take away the heat in the cores and windings, and the other through the end of the stator to take away the heat at the end of the stator winding directly. The hot air is then discharged through the air outlet of the generator cooler.

Temperature sensors are installed in positions such as stators and bearings to keep the generator under continuous monitoring. The generator can work normally under environmental temperature -40 to +50 °C. Damping devices are used to ensure stable operation. Short-circuit and overload protection devices are installed.

Generator Stator

The generator stator connects to the box transformer directly and consists of stator support, core, windings, and other accessories. The stator employs a fractional slot winding arrangement to further eliminate the influence of harmonics. The unique arrangement of rotor poles reduces vibration and noise.

The generator stator includes base, stator core, and coil.

Generator Rotor

The rotor of the wind turbine converts the kinetic energy in the air into mechanical energy of rotation. The rotor system consists of rotor blades, spinner, rotor hub, and pitch systems. Each rotor blade is equipped with an independent pitch system, which automatically adjusts the pitch angle of the rotor blade according to the wind speed and power output. Its rotation results from the lift created by the airflow over blades. It is connected to the converter

Convertor System

The main function of the converter is to control the torque of the generator and feed the electrical energy to the grid, achieving variable-speed constant-frequency control of the generator. With a certain reactive power compensation capacity, the converter is one of the key components of the wind turbine. The converter communicates with the main controller of the wind turbine, receives control commands from the main controller, and uploads the status information of the converter to the main controller or the remote monitoring system.

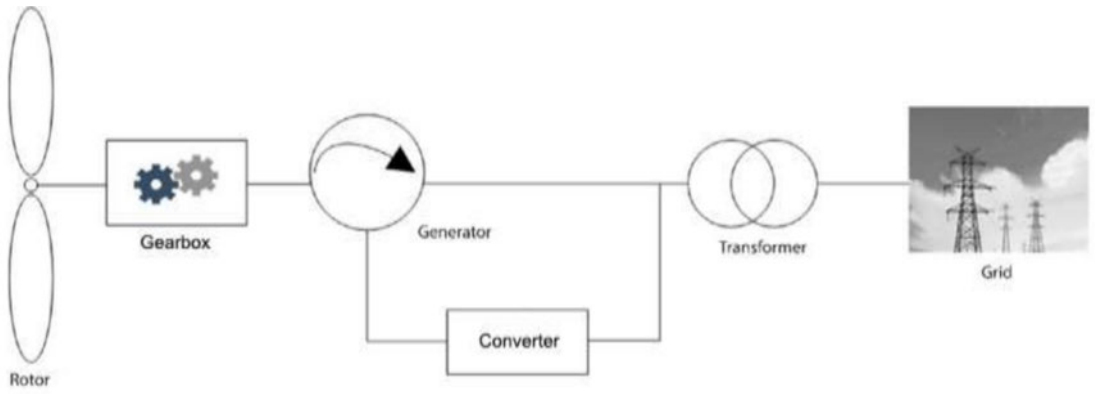


Figure 2-13 Schematic of the Electrical System – Electrical Drive Chain for DFAG

Source: Sany SI 19580 Wind Turbine Specifications

Tower

The main function of the tower is to support the nacelle, rotor, and other components of the wind turbine and bear all the loads from various components of the wind turbine. The tower is a conical tubular steel tower composed of multiple sections. Refer to Figure 2-15. The upper

end of the tower is connected to the yaw bearing of the nacelle, and the lower end of the tower is connected to the anchor bolt foundation. The tower sections have flanges at both ends and they are connected with bolts. The tower has multiple platforms, which are used for the installation and maintenance of the tower connecting bolts, cable twisting system, and other components and for the personnel to have a rest. The center of the tower top platform is designed with a square ladder to access to the nacelle. The tower can be equipped with auxiliary lifting equipment such as climb auto system or service lift as required, and it is also equipped with fall protection equipment.

Grid Connection

The power production system consisting of the generator, converter, and transformer makes sure that the wind turbine can always feed energy to the grid stably. The transformer is installed inside the nacelle. Its function is to connect the wind turbine to the power collection network of the wind farm and feed the electrical energy to the grid after stepping up the voltage.

LIGHTNING PROTECTION AND GROUNDING

The wind turbine employs an integrated lightning protection system, which consists of internal and external lightning protection systems. It is required that all components of the lightning protection system (excluding the electrical control components and wear parts) operate normally within the 20-year service life. The external lightning protection system is composed of air-termination system, down - conductor system, and earth-termination of foundation. It is mainly used to withstand direct lightning strike and conduct the lightning current to the ground.

The internal lightning protection system and protection measures of the wind turbine can effectively prevent the wind turbine from being damaged by lightning electromagnetic impulse. They are mainly comprised of equipotential bonding device, Faraday cage, surge protective device, and other devices.

ELECTRICAL CONTROL SYSTEM

The electrical control system will be designed to ensure the normal control and emergency shutdown.

AUTOMATIC FIRE PROTECTION SYSTEM

Automatic fire protection systems are in place for nacelle, nacelle transformer rooms, nacelle control cabinet, and converter cabinet

A brief technical information of the selected turbine is provided in the table below.

Table 2-5 Brief Technical Information of Selected Turbine

Parameter Value/description	Parameter Value/description
Manufacturer/model	Sany SI-19580
Rated Power	8000 kW
Rotor Diameter	194.17 m
Hub Height	130
Cut-in Wind Speed	3 m/s
Rated Wind Speed	14.2 m/s
Cut-out Wind Speed	25 m/s
Maximum Wind Speed (3 s average wind speed)	59.5 m/s
Operating ambient temperature	-30 °C to +40 °C
Survival ambient temperature	-40 °C to +50 °C
Design Service Life	20
Number of blades	3
Blade length	95.5 m
Blade Material	Fiber reinforced plastic
Pitch angle	0°to 90°
Type of backup power supply for pitch control	Supercapacitor
Rated speed of pitch motor	2000 rpm
Type of pitch motor	AC permanent magnet synchronous
Pitch lubrication	Centralized lubrication
Type	Doubly fed asynchronous generator
Number of pole pairs	2
Rated Power	8200 kW
Rated Voltage	1140 V
Rated Speed	1760 rpm
Mechanical efficiency	≥ 97%
Rated frequency of generator	50 Hz
Generator protection class	IP54
Lubrication Method	Lubricated with grease
Cooling Method	Water cooling
Rated Voltage	1140
Degree of protection of control cabinet	IP54
Primary Brake System	Aerodynamic braking system
Type of Yaw Brake	Friction brake

2.5.1.2 Internal Access Roads Between Turbines

Internal access roads, of 6m width, will be developed between the turbines to enable easy access within the Project site. The preliminary indicative layout is show below.

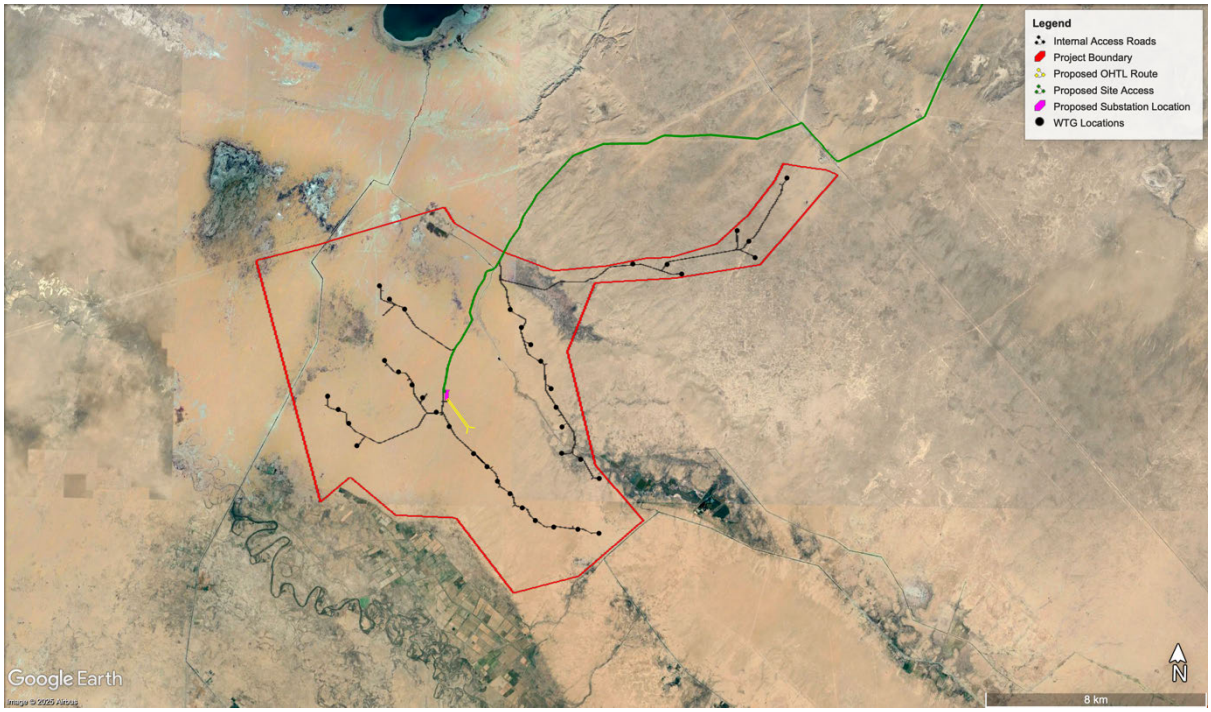


Figure 2-14 Indicative Layout of the Internal Access Roads

2.5.2 Substation

An AIS 33/500kV sub-station will be located in the centre of the Wind Farm area. The proposed location is 1.17 km from the existing Bash-Karakul OHTL.

2.5.3 OHTL Components

On the 13th of June, 2024 NEGU approved the LILO option by letter No 01-02-18/3053. In the LILO option, the part of the 500 kV Bash-Karakul OHTL coming from Bash Substation will be connected to the Project. Then Line 2 from the Project will connect to the Bash-Karakul OHTL going to Karakul Substation.

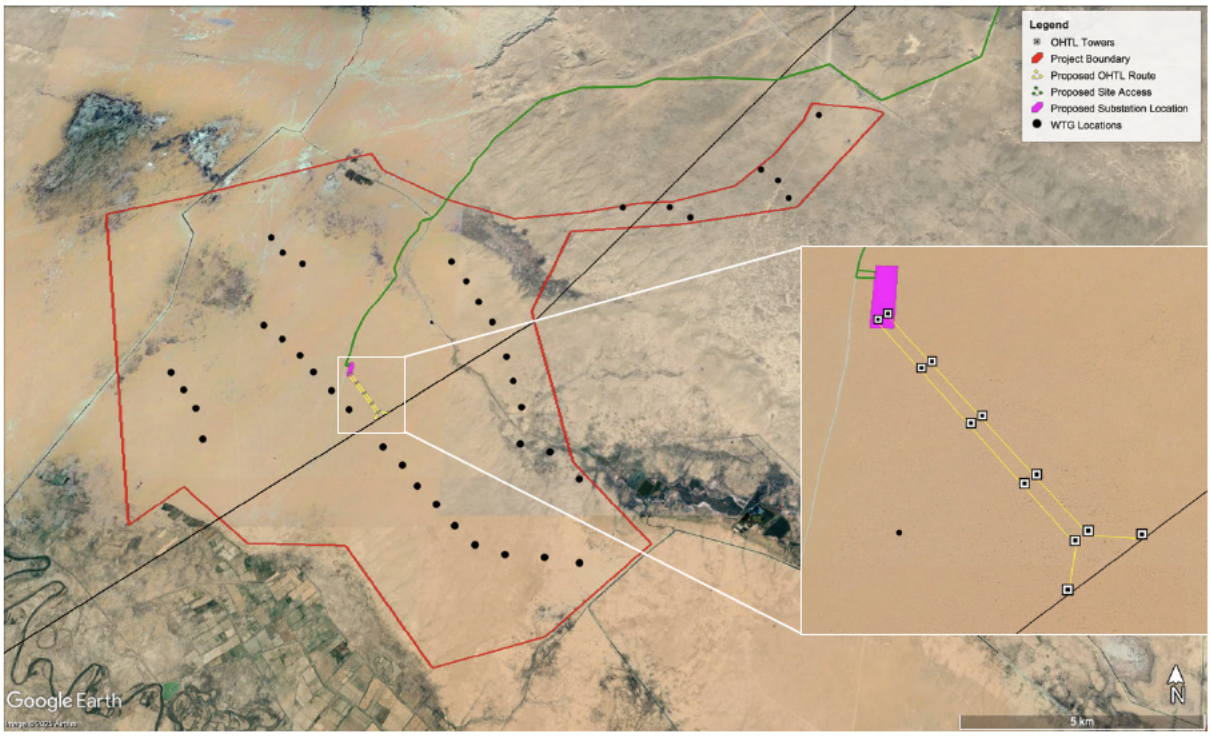


Figure 2-15 Project OHTL connecting to the existing Bash-Karakul OHTL Route

Towers/Pylons

The exact type of tower structures that will be used for this Project has not been selected at the time of writing the ESIA. However preliminary details are described below.

It is anticipated that the transmission line will consist of 10 towers/pylons that will be self-supporting and grounded to ensure low resistance.

The selected tower types will be designed to meet the applicable Uzbekistan standards & regulations and will consider bird safety from electrocution & collision. All metal structures will be galvanized. Given an overall buffer corridor of 30m, safety distance from the centre line of the transmission line will be 30m in accordance with Uzbekistan requirements.

Foundations

The foundation for the towers will be constructed using concrete and reinforcement. The concrete used will be suitable to the specific carrying capacity of the different terrain along the OHTL route. The type and size of the foundation will be dependent on the outcome of the geotechnical investigations undertaken along the OHTL route.

Conductors & Wires

Conductors are the wires used to carry electrical power. These wires/conductors are made of aluminium core steel reinforced, and they are in large drums.

The earthing wires also called Optical Ground Wires (OPGW) combines the function of grounding and communications. These wires will be connected to an isolator so in the event of a lightning strike, the electric shock effect will go through the closest isolator to the ground ensuring safety and protection. It is often run between the tops of high voltage electricity pylons with the conductive part bonding adjacent towers to the ground and shielding the high voltage conductors from lightning strikes.

Insulators are OHTL components installed between live conductors and earthed parts and subjected to mechanical and electrical stress. They are used to isolate the towers from the live wires that carry the electricity and are typically made of glass, ceramic or some form of composite materials. The insulators for the OHTL will be designed to ensure effectiveness during adverse climatic conditions during OHTL operation.

All OHTL component will be designed and constructed to ensure safe operations in all climatic conditions that exists in the area where the OHTL will run through.

2.5.4 External Access Road

The 17.7 km existing dirt access road from the main road near the railway to the Project site will be used by the Project for the transportation of construction materials and workers. The road is an unpaved dirt road and was observed to have low traffic during the site visits. The EPC Contractor will assess the need to upgrade this access road, and further details will be provided when made available.

2.5.5 Project Ancillary/Support Facilities

The following ancillary facilities will be included in the Project design:

- Site entrance and security building
- Administration building, offices and amenities
- Central Control Room
- Warehouse and stores
- Security
- Lighting
- Access roads between turbines
- Other mobile plant and vehicles

2.5.6 Associated Facilities

Associated facilities are those which are not funded as part of the Project, but without which (or without their expansion) the Project would not be viable. The Project will have a dedicated substation and a short LILO OHTL will be developed for the purpose of the Project and these for the Project will not include any associated facilities.

2.6 Project Construction Requirements

2.6.1 Construction Activities

The principal construction activities and associated requirements in relation to civil works are anticipated to include the following;

- Detailed project planning, design and consideration of wind farm components by the EPC Contractor;
- Transportation of components to the project site;
- Delivery of machinery & equipment to the site;
- Site preparation (comprising excavation, grading, levelling, and land clearing at WTG platforms) to create flat land area for preparation of turbine pads, installation of wind turbine towers and various project components;
- Additional facilities to facilitate construction work (comprising excavation and levelling etc.) for access road, internal road network, construction of any building infrastructure (if required);
- Construction of temporary laydown facilities and building site equipment (e.g. containers at the Project site);
- Installation of permanent meteorological towers (as necessary);
- Provision of electricity supply, generation and distribution system as required for installation, erection;
- Commissioning tests of electrical infrastructure (including wind turbine generators) and inspection of civil engineering quality records.

OHTL

- Site preparation (comprising excavation, grading, levelling, and land clearing at tower footprint & access roads from nearby road to OHTL corridor or Right of Way (ROW));
- Transportation and delivery of equipment/machinery and OHTL components;
- Construction of platforms for pylons/towers and delivery of materials along OHTL route;
- Construction of temporary laydown areas (if to be located along OHTL corridor);

- Assembly of OHTL towers/pylons;
- Constructing electrical substations, Installation & erection of OHTL towers/pylons, installation and laying of wires & transmission cables on pylons, connecting wires and cables, stringing of conductors, tensioning and sagging of conductors, etc.
- Provision of electricity supply, generation and distribution system as required for installation, erection, etc.

2.6.2 Temporary Construction Facilities

Temporary construction laydown area(s) will be established within the Project site. These areas will be required during the construction phase of the Project for the Wind Farm, the substation, the OHTL and the access road and for the storage of materials by the Engineering Procurement and Construction (EPC) contractor as well as sub-contractors. After completion of construction, the construction laydown areas will be disassembled, and the area will be returned to its original condition. The laydown area will include:

- Office containers;
- Storage areas for equipment;
- Parking areas;
- Bathroom and waste collection facilities;
- Equipment for power generation;
- Communications equipment; and
- Other miscellaneous small items as required.

These facilities will be located within a 62,810 m^2 laydown and storage area. This is shown indicatively on the following figure and will be confirmed following the appointment of the EPC Contractor.

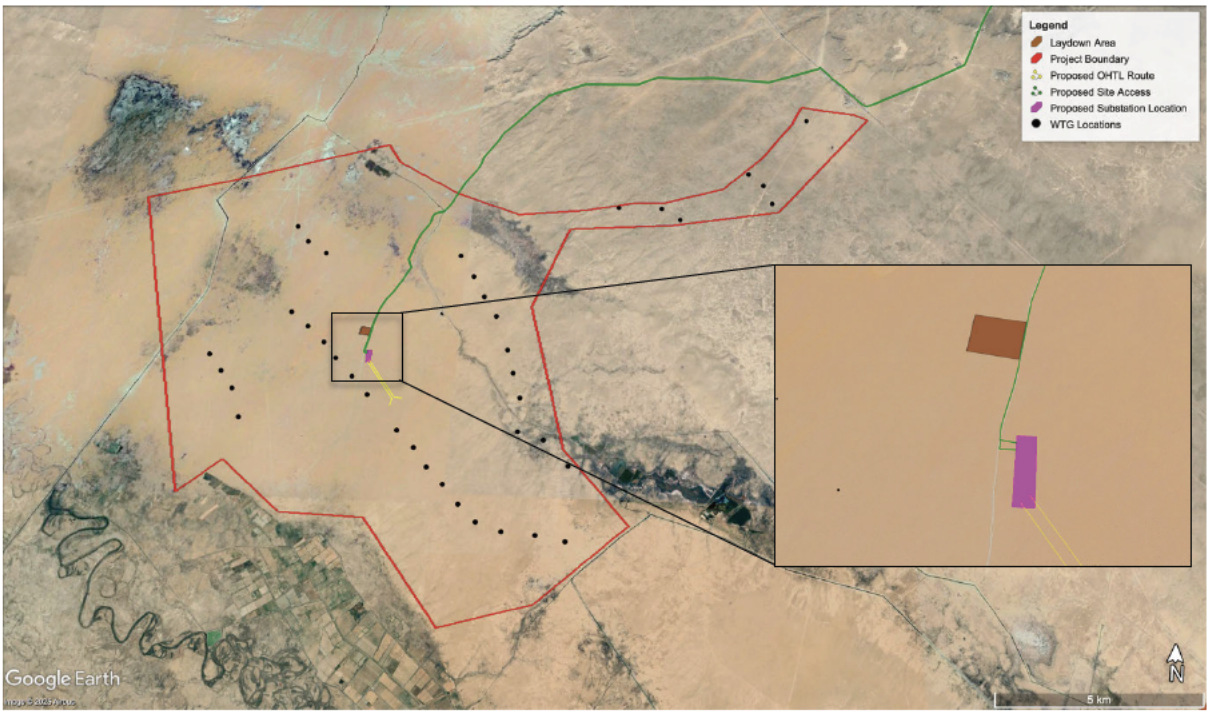


Figure 2-16 Indicative Location of the Laydown Area

2.6.3 Utility Requirements

The Engineering, Procurement and Construction (EPC) contractor will be solely responsible for all construction utilities required for the Wind Farm and OHTL including power supply, potable water, firefighting supplies and systems, erosion and sedimentation control, waste management and temporary medical and welfare facilities. Where possible, the EPC contractor will connect to existing utilities, where this is not possible utilities will be provided by water tankers and generators.

2.6.3.1 Electrical Supply & Fuel

It is anticipated that diesel electric power generators will be used as the source of electricity during construction and as backup, however, this will be confirmed by the EPC Contractor, when appointed. Currently, it is estimated that the total electricity consumption during the construction phase will be approximately 6,605,515.20 kw/h. It is estimated that about 10,500 litres of diesel will be used per month.

2.6.3.2 Water Supply

DOMESTIC WATER

During the entire construction phase of the Project, the EPC Contractor estimates approximately 35,000m³ of potable water for 1,000 workers based on 120L/day/per person. This is in line with the IFC & EBRD's Guidance on Worker's accommodation which states that 80 to

180L of water per person per day should be made available (depending on the weather and accommodation standards).

A licensed potable water supply company will supply the water required to cover the potable water demand of the Project (for use by project personnel) to the site via water tanker trunks.

CONCRETE WORKS

It is anticipated that water for concrete works will be supplied to the site via water tankers with recycling and reusing of water allowed if possible. However, it is also understood from ACWA Power that the EPC Contractor will potentially abstract ground water on site for construction purposes. Given the scarcity of water in the Project area, a water supply assessment will be undertaken to assess the availability of water for the Project and if there will be significant impacts to local community users. This assessment will also include cumulative impacts of other proposed development projects that may also depend on similar water sources and the potential impacts of climate change. In addition, the EPC Contractor will be required to obtain water abstraction permits from the relevant authorities before drilling of any wells can commence.

The table below presents the water consumption estimates during the entire construction phase.

Table 2-6 Estimated Water Consumption for Concrete Works

ACTIVITY	APPROXIMATED WATER REQUIREMENT (M^3)
WTG Foundation construction	30,000
Road & hardstand construction	50,000
Sub-station construction	2,700
Auxiliary building construction	7,300
Total	**90,000**

Sanitary Facilities

The site will require on site sanitation facilities for the construction workers (expected to be toilets and washrooms with collection septic tanks). Sanitary wastewater will be stored in bunded septic tanks on-site, prior to removal by a licensed contractor for treatment at licensed facilities off-site.

2.6.4 Workforce

Requirements for construction workforce are yet to be finalised. At this stage it is understood that about 700-1000 personnel will be involved during peak construction periods. these, about 60% will be employed from within Uzbekistan while the remaining 40% will be recruited from

China, Turkey, India and Europe. This will comprise a combination of Project Company, EPC Contractor and sub-contractor staff.

2.6.5 Worker Accommodation

The workers accommodation will be developed within a 12,690 m² area within the Project site as shown indicatively on the following figure. The location and size of the accommodation area will be confirmed following the appointment of the EPC Contractor.

It is expected that the necessary facilities and standards of facilities for all worker accommodation/camp will be specified by the Project Company and will be in accordance with the IFC/EBRD Worker Accommodation Processes and Standards and recent COVID-19 requirements including:

- Interim Advice for IFC Client on Supporting Workers in the Context of COVID-19 (April 2020)
- Interim Advice for IFC and EBRD Clients on Migrant Workers and COVID-19 (July 2020)
- ADB Interim Advisory Note: Protecting the Safety and Well Being of Workers and Communities from COVID-19 (2020).

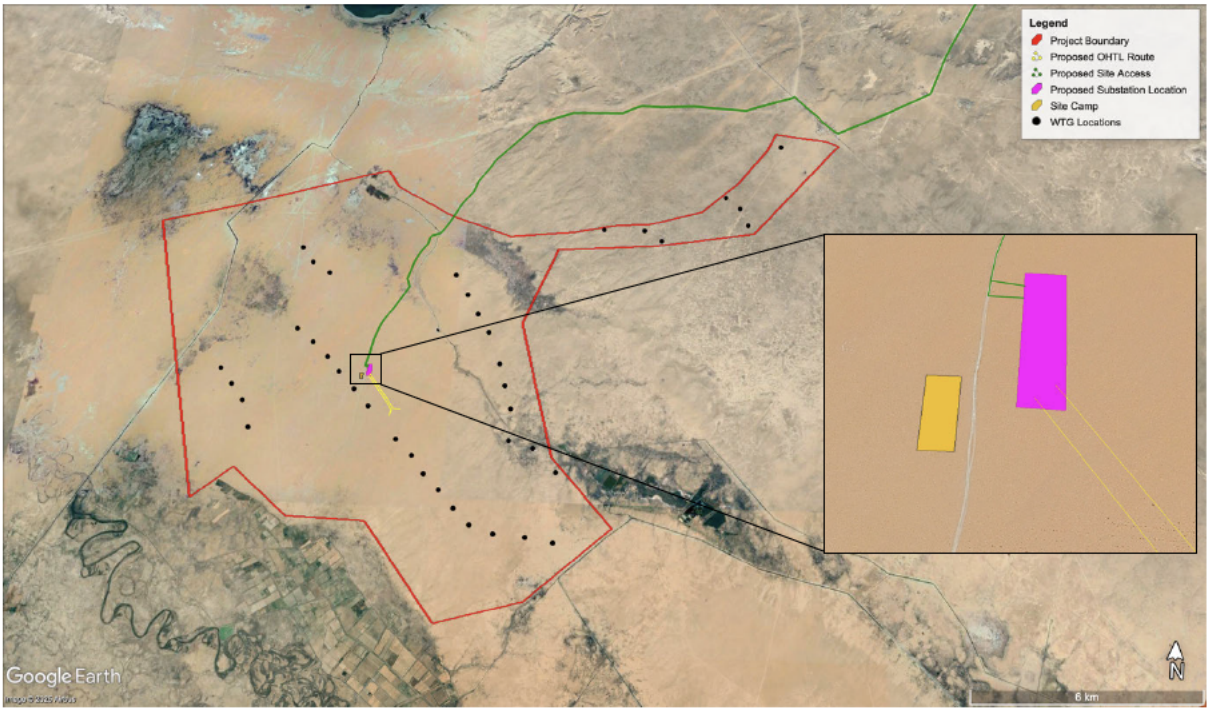


Figure 2-17 Indicative Location of the Workers Accommodation

2.6.6 Vehicles, Equipment and Heavy Machinery Requirements

EPC Contractors/sub-contractors responsible for different construction activities within the site will make use of various kinds of vehicles, equipment and heavy machinery during the construction phase of the wind farm. The anticipated vehicles, equipment and machinery to be used on site during the site preparation and construction activities include but not limited to:

Table 2-7 Vehicles & Construction Equipment During the Construction Phase

NAME	QUANTITY	TYPE OF FUEL
750t crawling crane	1	Diesel
150t crawling crane	1	Diesel
Hydraulic lifting device and lifting frame	1	Electrical
250t crawling crane	1	Diesel
50t crawling crane	1	Diesel
50t truck crane	1	Diesel
Gantry crane	2	Electrical
Truck	3	Diesel
Forklift	2	Diesel
Diesel generator	1	Diesel
Tower crane	2	Electrical
Vehicle crane	2	Diesel
Wheel loader	1	Diesel
Backhoe excavator	7	Diesel
Crawler bulldozer	1	Diesel
Road roller	2	Diesel
Dump truck	10	Diesel
Platform lorry	1	Diesel
Batch plant	2	Electrical
Concrete pump truck	3	Electrical
Concrete delivery truck	6	Electrical
Piling machine	4	Diesel

Note: The equipment/machinery listed above is anticipated to be used by the EPC Contractor only. The sub-contractors are expected to have additional equipment/machinery depending on their area of work. The final selection of equipment/machinery might slightly differ from those proposed in the table above.

2.7 Project Operation & Maintenance Requirements

Wind Farm

The duration of the PPA is 25 years from the Project Commercial Operation Date and operations and maintenance activities will be undertaken by The First National Operations and Maintenance Company (NOMAC), a wholly owned subsidiary of ACWA Power.

The operation of the wind farm will require limited operational activities such as the following:

- Operation and maintenance to include normal daily operation of equipment including maintenance (electromechanical and housekeeping) to optimise energy yield and life of the system;
- Remotely activated turbine shutdown during excessive wind speeds;
- Management of operations in relation to resident bird and bat species and migration periods during Spring and Autumn.

Workforce

The operation of the wind farm is likely to be monitored and controlled from a remote location, as such, only a limited number of operational workforce are likely to be required. At this stage, it is understood that about 35-40 workforce will be engaged to carry out operation and maintenance activities of the wind farm.

Overhead Transmission Line

The OHTL will be operated & maintained by National Electric Grid Uzbekistan (NEGU). Dedicated/full-time personnel are not required for this purpose, however, both preventive & corrective maintenance will be undertaken at the OHTL.

Preventive Maintenance includes works at tower foundation, monitoring of earth resistance values, tree cutting and trimming along the ROW, ground patrolling, thermo-vision scanning on sample basis and attending to defects if any. Corrective Maintenance depends on type of issues.

The OHTL will be designed to facilitate workers for maintenance activities including activities such as tower painting, upgrade in the future, inspections, replacement of insulators, strengthening of tension ropes, etc.

Right of Way (RoW)

A Right of Way is a passive but critical component of transmission line. It provides a safety margin between the high-voltage lines and surrounding structures and vegetation. It also provides a path for ground-based inspections, access to transmission towers and other line

components if repairs are needed. The width of Right of Way for the proposed 500kV OHTL is based on the size of the towers that will be selected which were not available at the time of writing. The RoW will account for the 30m buffer zone on each side of the OHTL as required by law.

2.8 Project Milestones

Based on the details provided by ACWA Power, the project milestones are provided below

Table 2-8 Key Project Milestone/Timeline Dates

MILESTONES	DATE
Signing Project Agreements (PPA; Investment Agreement)	November 2023
Presidential Decrees	March 2024
Land Allotment Orders	Not issued yet
Limited Notice to Proceed (LNTP)	Expected August/September 2025
Full Notice to Proceed (FNTP)	Expected October/November 2025
Obtain Permits for Road Modification Works to Allow for Transportation	July 2025
WTG Installation	Q4 2025
Substation Construction Commencement	Q3 2025
OHTL Design Approval	Q3 2025
OHTL Construction (LILO)	Q4 2025
Commencement of WTG Reliability Tests	Q3 2026
Grid Available for synchronization & full production (Earliest connection date)	Q4 2026
Wind Farm Substation Commissioning Tests Completion	Q3 2026
Interconnection and synchronization at wind farm and grid-level substation are completed (Communication is established & ready for evacuation)	Q3 2026
Early Commercial Operation Date (>10WTG for each site)	Q1 2027
Project Commercial Operation Date	Q2 2027
Project Taking Over	Q3 2027

2.9 Decommissioning of the Project

Potential impacts relating to decommissioning will be similar to those encountered during the construction phase. There are likely to be few decommissioning related risks to wind turbines such as minor quantities of hazardous components. Due to the small footprint of the project WTG, all structures and infrastructure could feasibly be dismantled for material recovery.

Given that the decommissioning phase is not expected for at least 25 years from COD, there are no specific requirements for decommissioning at this time, since future environmental and

social regulations have yet to be developed. As such, it is not considered practical to speculate on future environmental and social conditions including the sensitivity of current or future receptors at this time.

It is proposed that the decommissioning process will be managed via an updated ESIA and ESMS to identify measures for the prevention, avoidance or minimisation of impacts. This will also require a specific Decommissioning Plan. The studies should be undertaken at least 12 months prior to the time of decommissioning to reflect changes in regulations and standards, and requirements for compliance with the expected "circular economy" that is likely to be a condition at that time. This will require maximising the re-use, recovery and recycling of components and materials to provide resource for future use.

2.10 Project Alternatives

In accordance with good practice methodologies for ESIA, the evaluation of various project design and activity alternatives should be considered, in order to ensure that the objectives of the proposed project have accounted for social, environmental, economic and technological options. The following project alternatives were considered at the feasibility stage:

- No Project Option;
- Alternative Project Site;
- Project Technology;
- Wind Farm Project Layout and;
- OHTL Route.

2.10.1 No Project Option

The Government of the Republic of Uzbekistan through the Ministry of Energy aims to increase the electricity production in the country to foster economic growth, develop and expand use of renewables and develop public-private partnership in the country's energy sector. The project forms part of the Ministry of Energy's plan to develop and expand renewable use to 8MW and increase total electricity production in the country to 29.3GW by 2030.

The generating capacity of the Project will be 300MW and this will contribute to the 3MW estimated wind power contribution to the total renewable power generating capacity of 8MW by 2030. Given the national strategy for additional renewable energy contribution to the total power generating capacity, a 'No Project' option has not been considered further as considering this option would delay the Government of Uzbekistan from meeting its renewable

energy target and also continue the reliance of the Country on non-renewable energy sources.

Looking at the anticipated impacts as a result of the development of this project although the construction phase may likely result in potential temporary negative impacts, the operational phase of the project will result in an overall positive impact, particularly due to the development of utilities and socio-economic benefits and the increase in renewable energy being supplied to the Uzbekistan grid.

2.10.2 Alternative Project Site

Ministry of Energy proposed several sites including the Project site. It is also understood that the site was selected over other sites due to the wind potential, wind campaign measurements, geological factors, existing infrastructure, and interconnection to the grid.

Besides the above, the site at was also selected due to presence of existing road infrastructure in the project area.

The selection of a site with less wind potential will not allow for the wind turbines to harness sufficient wind energy required to generate the electricity thereby reducing the wind farm's potential to contribute to the renewable energy target of the country. The presence of existing road will reduce the need for new access roads to the site thereby minimizing environmental & social impacts of the project facilities.

The consideration of an alternative project location may not only be costly to the Project due to a need for construction of new access roads and lengthy power transmission lines, it could also potentially result in additional environmental and social impacts.

2.10.3 Project Technology

The different turbines that were considered for the Project are presented in the table below:

Table 2-9 Different Technologies Considered for the Project

WIND TURBINE MODEL	MANUFACTURER
SI195-8.0	Sany
GW 182-7.5	Goldwind
EN182-8.0	Envision
MySE7.5-182	Mingyang
WD200-7.7	Windey

The Sany SI195-8.0 model was finally selected for the current layout and was based on the following:

- Technology options for flexible use and maximising energy generation during high and low wind conditions;
- Least Cost of Energy which results in highest generation at lowest cost;
- Site Suitability of the chosen WTG Model; and
- Project Schedule.

2.10.4 Wind Farm Project Layout

The siting of the Project site and WTGs was based on the following:

- The wind measurement campaign,
- Location of existing infrastructure and utilities, and
- Social Impacts which included assessment of current land users, distance to existing houses and settlements.

2.10.4.1 Changes to the Project Boundary

To avoid agricultural lands located to the south of the project area, the Project boundary was optimised as indicated on the following figure.

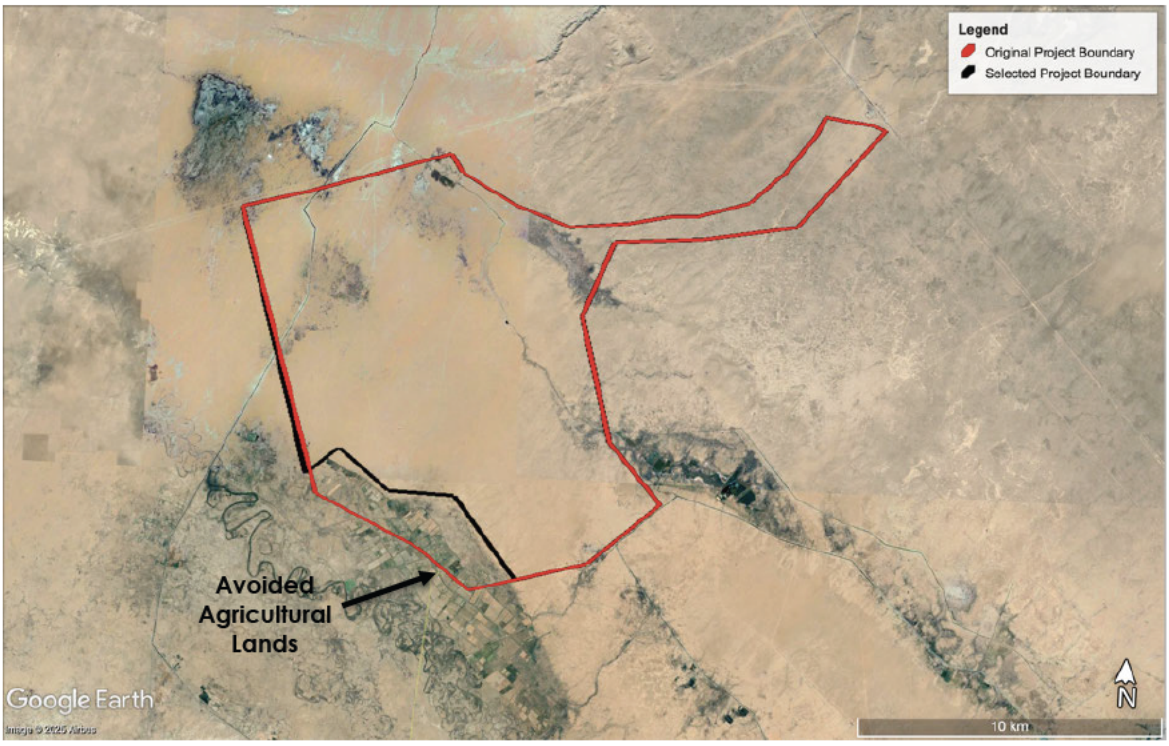


Figure 2-18 Layout showing the Avoided Agricultural Lands

2.10.4.2 Changes to the WTG Locations

In the Original Layout that was provided in January 2024, the Project included 41 WTGs distributed as presented below.

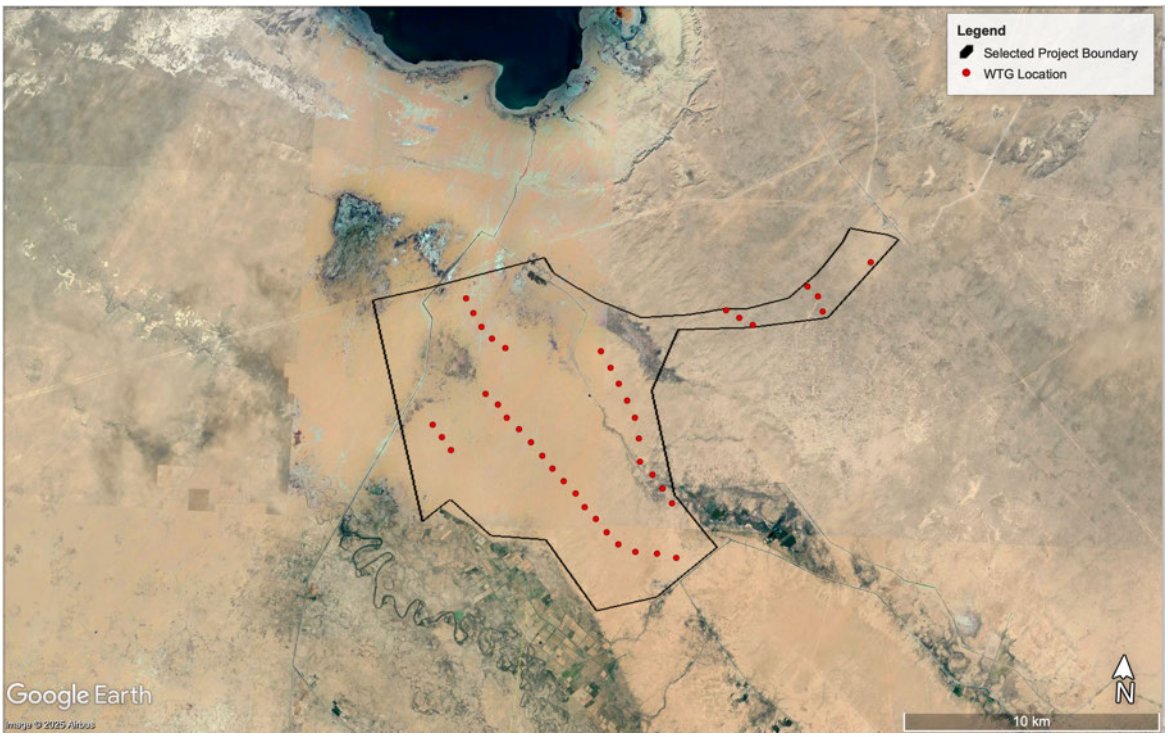


Figure 2-19 Original WTG Distribution

In February 2024, additional buffer WTGs were considered in case any of the WTGs required replacement due to certain environmental, social or technical constraints. The locations of these WTGs are presented in the following figure.

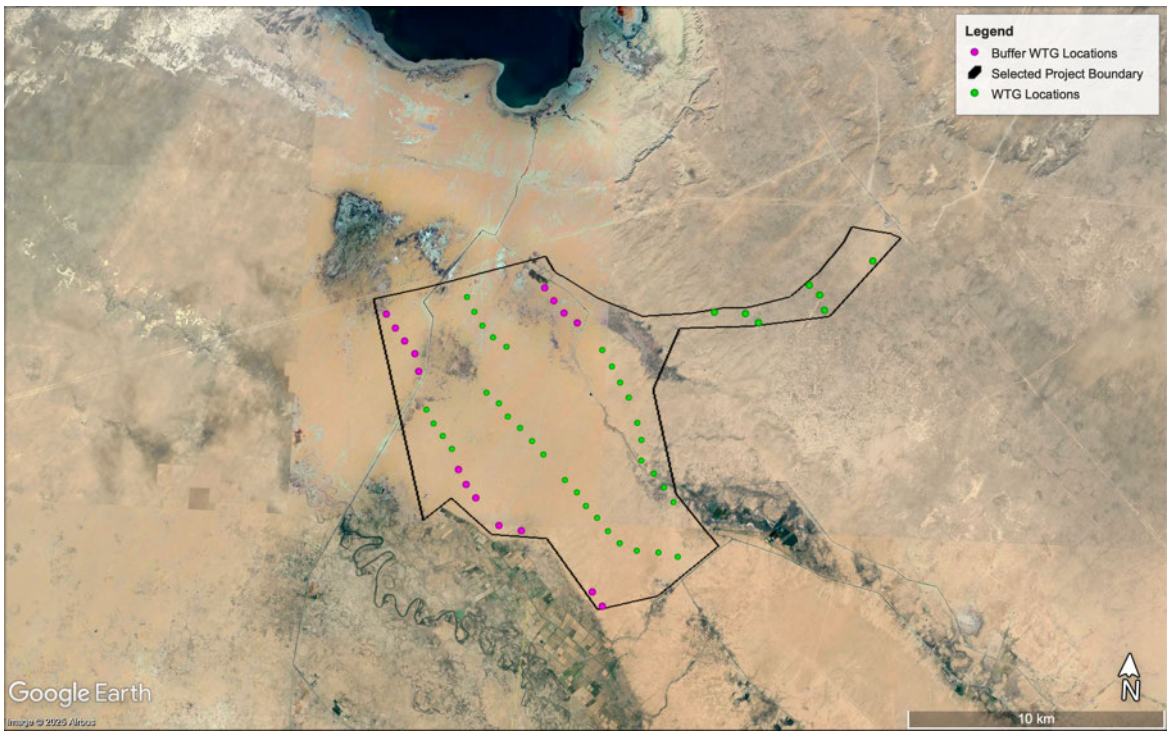


Figure 2-20 February 2024 WTG Distribution

In July 2024, 39 WTGs out of the 41 WTGs were selected. The locations of these WTGs and the main changes to the locations of some of them are presented in the following figure.

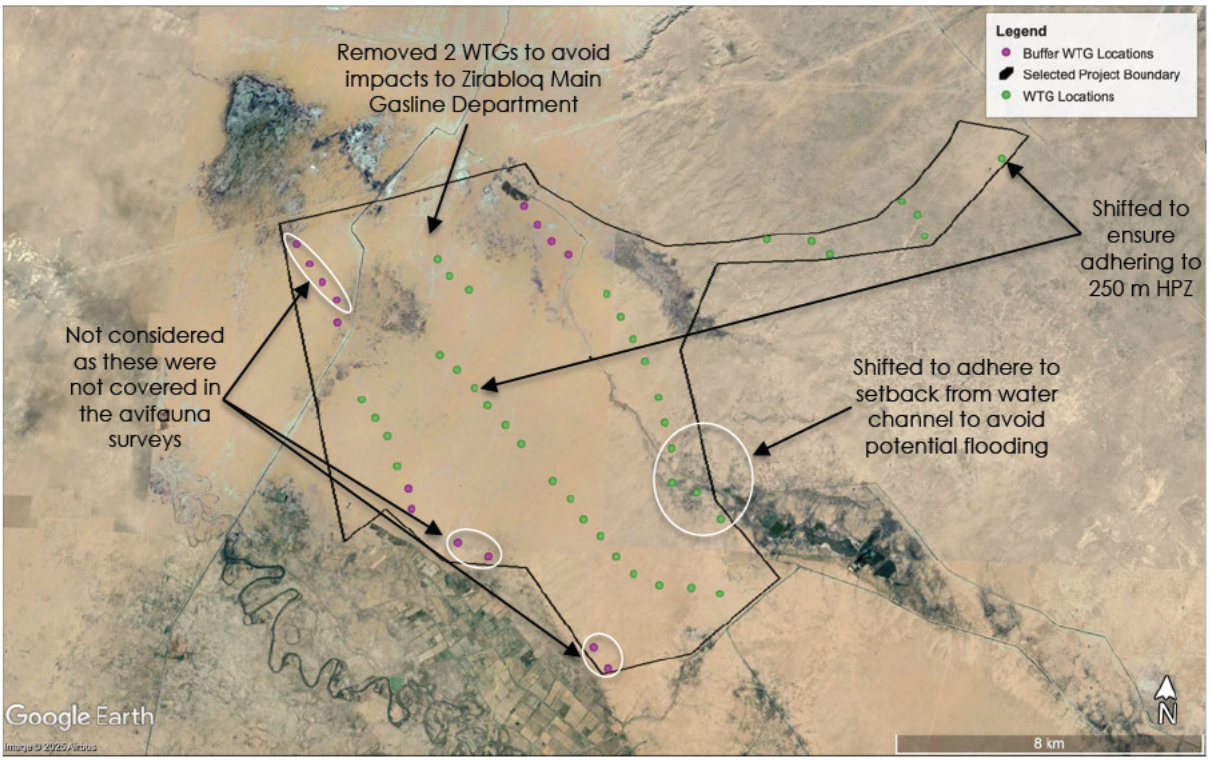


Figure 2-21 July 2024 WTG Distribution

In December 2024. The locations of some of the WTGs were micro-sited to avoid noise and shadow flicker impacts to some of the receptors, where possible, and to take into consideration some flood risk required setbacks. In addition, the buffer WTGs were removed from the layout. The final selected WTG locations are presented in the following figure.

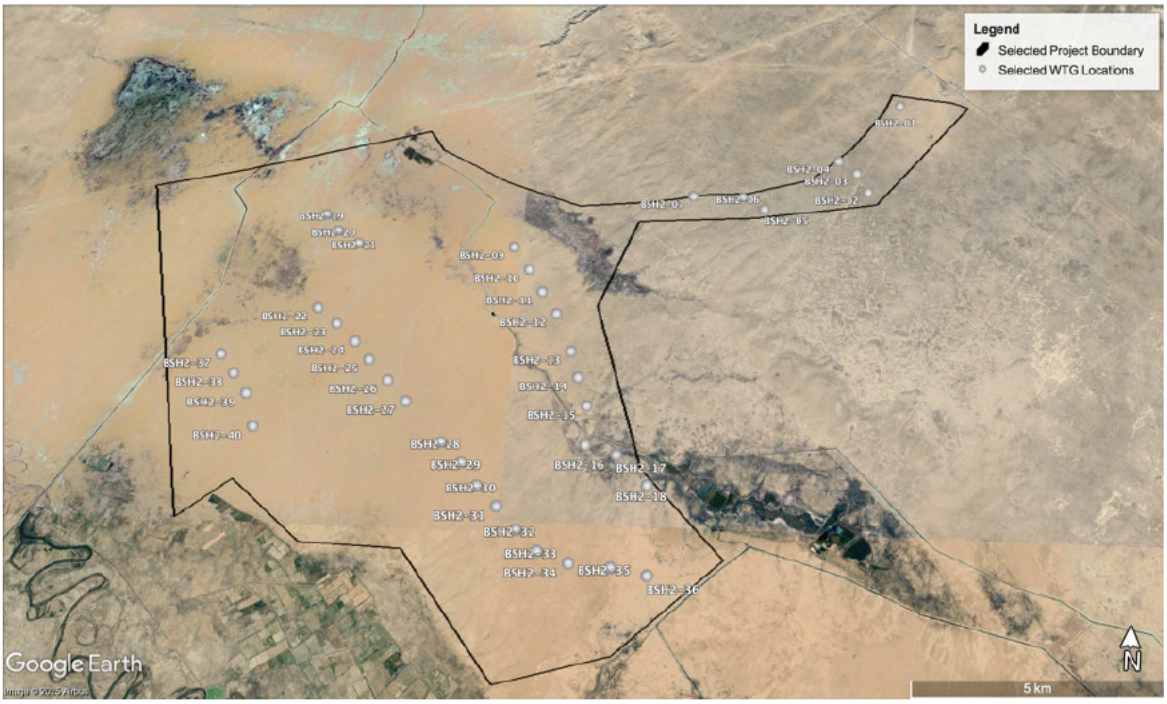


Figure 2-22 December 2024 Selected WTG Distribution

Table 2-10 WTGs that were Moved for Selecting the Final Layout and the Justification

WTG ID	Distance Moved (m)	Justification
BSH2-11	8.52	Shifted for hydrology and flood risk purposes
BSH2-23	3.29	
BSH2-25	14.81	
BSH2-34	41.10	
BSH2-16	50.87	
BSH2-02	24.53	
BSH2-01	1180.68	Shifted to avoid noise and shadow flicker impacts on H1
BSH2-08	-	Replaced with a Buffer WTG (BSH40) to avoid impact on the Fish Farm

2.10.5 OHTL Routing

Two options were considered for the routing of the OHTL:

- **Option A**: 25 km OHTL from the Project site to Bash 500 MW switching station.
- **Option B:** 1.5 km OHTL, LILO connection from the Project's substation to the Bash-Karakul OHTL.

Option B was the preferred and selected option for the following reasons:

- Technically preferred option and utilization of existing OHTL.
- Reduced environmental impacts considering a smaller footprint.
- Reduced avifauna electrocution and collisions risks due to the reduced OHTL alignment.

- Reduced social impacts due to the small footprint of the selected OHTL.

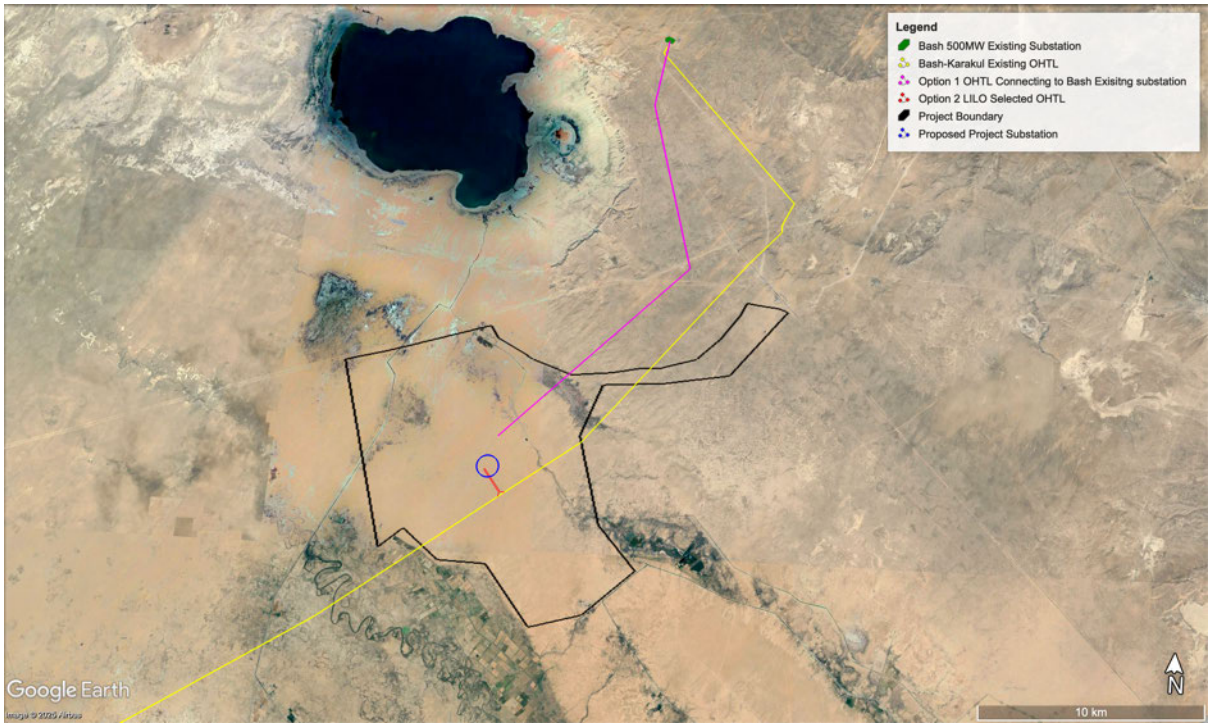


Figure 2-23 OHTL Options Considered and the Selected Route show in Red

2.10.6 Access Road

Two access road options were considered for the Project as shown on the following figure. these include:

Option 1: Access through a dirt road connecting the site to A379 from the northeast.

Option 2: Access through the farmlands in the south connecting the site to Road M37.

Option 1 was selected for the following reasons:

- **Shorter Distance**: Option 1 covers approximately 37 km to reach A379, whereas Option 2 extends around 45 km to connect to M37.
- **Better Road Condition**: Large sections of Option 2 showed significant deterioration, including potholes and cracks, requiring extensive upgrades. In contrast, the road in Option 1, from the railway to A379, was previously used for nearby Bash 500 wind farm construction. As a result, it was assessed in a traffic study and, where necessary, upgraded to accommodate construction traffic.
- **Lower Impact on Communities**: Option 1 primarily passes through open land with minimal receptors, whereas Option 2 traverses farmlands and residential areas, increasing potential disruptions.

By selecting Option 1, the need for extensive road upgrades is minimized, reducing construction activities, associated nuisances, and health and safety risks. Additionally, it avoids potential land acquisition requirements for road improvements, making it a more efficient and less intrusive choice.



Figure 2-24 Access Road Options

The access road was further optimised to align with the 350 m setback requirements of ATG for the gas pipeline as indicated below.

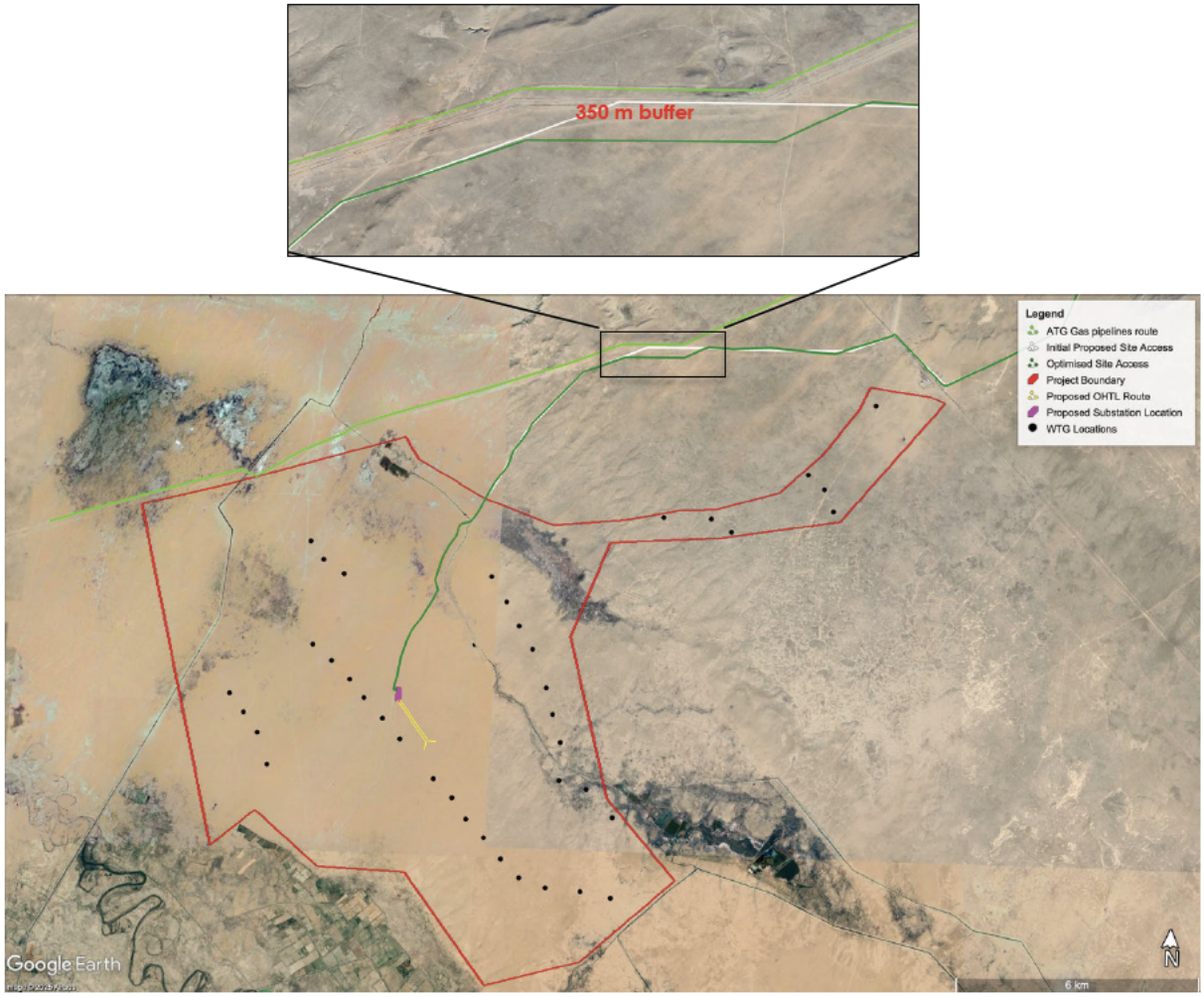


Figure 2-25 Optimised Site Access Road

3 REGULATORY FRAMEWORK

3.1 Institutional Framework

Key organisations with responsibility for environmental management in Uzbekistan are:

- Cabinet of Ministers of the Republic of Uzbekistan (COM).
- Ministry of Ecology, Environmental Protection and Climate Change (MEEPCC).
- The Centre for State Ecological Expertise, which is under the MEEPCC.
- 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.

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 Centre for State Ecological Expertise: The Centre 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 Ministries, Departments and Agencies (MDAs) related to E&S impact management in the context of the Project include (but are not limited to) those presented in the following figure.

Table 3-1 Main National Institutions and Roles

NAME OF INSTITUTION	MAIN ROLE
Ministry of Energy of the Republic of Uzbekistan (MoE)	The Ministry of Energy of the Republic of Uzbekistan is the authorised state body for: (i) implementation of production sharing agreements on issues related to the main areas of its activities; (ii) implementation of a unified state policy in the field of the use of renewable energy sources; (iii) development of a unified state policy and strategic directions in the development and use of nuclear energy; (iv) introduction of modern energy-efficient and energy-saving technologies in state bodies and organizations, as well as monitoring the efficiency of energy consumption.
Ministry of Ecology and Environmental Protection and Climate Change	Ministry is responsible for managing environmental monitoring for industrial facilities. It reviews and issues technical conditions for construction and operation of facilities, both planned and existing.
Ministry of Mining Industry and Geology of the Republic of Uzbekistan	Ministry is responsible for managing and monitoring mining and geological activities. It will dictate technical condition for conducting construction activities near ongoing geological/mining activities and surveys at the Project boundary.
State Committee on Sericulture and Wool development Industry	Committee owns pastural lands across Uzbekistan, including Project site. It will allocate land for permanent acquisition for installation of wind turbines.
Ministry of Transportation	Responsible for development of domestic and international transport corridors, improvement of the logistics system and amelioration of traffic safety. Important for the Project considering the use of public roads during construction and operation.
Sanitary and Epidemiological Welfare and Public Health Service of The Republic of Uzbekistan	Responsible for determining the Health Protection Zone (HPZ) under the Ministry of Health. The HPZ applicable for the Project is determined this government organisation.
JSC National Electric Grid of Uzbekistan (NEGU)	NEGU is entrusted with the following key functions: (a) transmission system operation and development; (b) dispatch management of the power system; (c) transmission of electricity within the country; (d) regional connectivity and electricity trade (export and import); and (e) single purchaser of electricity from generation companies, including IPPs, as well as the sale of electricity to distribution companies.

3.2 National Regulations

3.2.1 Constitution of Uzbekistan

The Constitution of Uzbekistan has been amended following a referendum that took place on 30th of April 2023. Key constitutional reforms in the context of the ESIA are as follows:

- Uzbekistan is a legal, social, and secular state.

- Human rights may be restricted in order to maintain social morality and public order (for instance, homosexualism, considering cultural and religious perceptions of majority of population).
- Land can be private property (it is expected that more cases of owning land will be allowed, compared to the previous years when ownership status was granted in very few case).
- Prohibition of death penalty
- Moreover, the following articles of the Constitution may be applicable for provisions relating to environmental and social aspects:
- Article 30. No one shall be convicted, punished, deprived of property, or any other right on the basis of a law that is not publicly promulgated.
- Article 40. Everyone shall have the right, both individually and collectively, to submit applications, proposals, and to lodge complaints with competent state bodies and organizations, citizens' self-governing bodies, officials and public representatives. Such applications, proposals and complaints shall be considered in accordance with the procedure and within the time-limit specified by law.
- Article 41. Everyone shall have the right to own property. The privacy of bank operations, deposits, and accounts, as well as the right to inheritance shall be guaranteed by law.
- Article 42: Everyone shall have the right to decent work, to free choice of profession and occupation, favourable working conditions that meet the requirements of safety and hygiene, to fair remuneration for work without any discrimination and not below the established minimum wage, as well as the right to unemployment protection in the manner prescribed by law. The minimum wage shall be determined taking into account the need to ensure a decent standard of living for a person. It shall be prohibited to refuse to hire women, dismiss them from work and reduce their wages on the basis of pregnancy or having a child.
- Article 44: Any forced labour shall be prohibited, except as punishment under the court decision, or in some other Instances specified by law. Any form of child labor that poses a threat to the health, safety, morality, mental and physical development of the child, including those that prevent him or her from getting an education, shall be prohibited.
- Article 49: Everyone shall have the right to a favourable environment, reliable information about its condition. The State shall create conditions for the implementation of public control in the field of urban planning activities in order to ensure the environmental rights of citizens and prevention of harmful environmental impact. Draft urban planning documents shall be subject to public discussion in the manner prescribed by law. The State, under the principle of sustainable development, shall implement measures to improve, restore and protect the environment, maintain ecological balance.

- Article 58. Women and men shall have equal rights. The State shall ensure equal rights and opportunities for women and men in the administration of public and state affairs and in other spheres of social and state life.
- Article 61. It is the duty of citizens to protect the historical, spiritual and cultural scientific and natural heritage of the people of Uzbekistan. The historical, spiritual, cultural, scientific, and natural heritage shall be protected by the state.
- Article 62. Citizens shall be obliged to protect the environment.
- Article 65. The basis of the economy of Uzbekistan, evolving to enhance the well-being of citizens, shall be a property in its various forms. The State shall create the conditions for the development of market relations and fair competition, and guarantee the freedom of economic activity, enterprise and labour, taking into account the priority of consumer rights. Equality and legal protection of all forms of property shall be ensured in Uzbekistan. Private property shall be inviolable. An owner may not be deprived of his or her property except in the cases and according to the procedure prescribed by law and on the basis of a court decision.
- Article 66. An owner, at his/her discretion, shall possess, use and dispose of his/her property. The use of any property must not be harmful to the environment or violate the rights and legitimate interests of other persons, society and the state.
- Article 68. The land, its minerals, waters, flora and fauna, other natural resources shall constitute the national wealth and shall be rationally used and protected by the state. Land may be privately owned on the terms and in the manner prescribed by law, which ensure its rational use and protection as national wealth.

3.2.2 Uzbekistan Policy Framework for Wind Projects

The primary legislation for the development of the Wind Energy Projects is the Law of the Republic of Uzbekistan No. 537 "On Public-Private Partnership" dated 10th May 2019 and the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 259 "On Improving the Procedure for Implementing Public, Private Partnership Projects" dated April 26, 2020.

The Law of the Republic of Uzbekistan No. 539 "On the Use of Renewable Energy Sources" (RE Law) dated May 21, 2019; and the Law of the Republic of Uzbekistan No. 412-1 "On the Rational Use of Energy" dated April 25th, 1997 will also be applicable to the Project.

In October 2019, Uzbekistan issued an environmental strategy: Uzbekistan's Environmental Strategy 2030 (approved by the Decree of the President of the Republic of Uzbekistan No. 5863 dated October 30th 2019) which promotes renewable energy development.

The Strategy also contains measures to preserve the environment (air, water, land, soil, biodiversity etc) from anthropogenic impacts and other negative factors, expand protected areas and improve the environmentally safe systems of waste management.

3.2.3 President Decree № PD-4477 on the Strategy for the Transition of the Republic of Uzbekistan to a Green Economy in the period 2019-2030

This decree was adopted to fulfil Uzbekistan's obligations under the Paris Climate Agreement signed on April 19, 2017 and to implement the Action Strategy for five priority areas of development for 2017-2021.

This decree sets out a strategy for the transition of the Republic of Uzbekistan to a green economy for the period 2019-2030, aimed at improving energy efficiency, rational consumption and conservation of natural resources, reducing greenhouse gas emissions, providing access to green energy, creating green jobs and ensuring climate sustainability. It sets several targets for this transition, including the further development of renewable energy sources, covering over 25% of total electricity generation.

3.2.4 Law On Nature Protection (1992, amended in 2021)

The law states legal, economic, and organizational foundations for the conservation of the environment and rational use of natural resources. Its purpose is to ensure balanced relations between humans and nature to protect the environmental system and to guarantee the rights of the population to live in a safe environment.

Article 25 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.

3.2.5 Law on the Rational Use of Energy (1997, as amended in 2020)

This law is fundamental to the development and functioning of the whole energy sector, including renewable energy. It defines a general legal framework to ensure the conservation of national energy resources and the efficient use of the available production capacity, fuel

and energy. The law provisions are applicable to legal entities and individuals whose activities are related to the extraction, production, processing, storage, transportation, distribution and consumption of fuel and energy.

The law is aimed at achieving the following objectives:

- Ensuring efficient and environmentally friendly use of energy in its production and consumption.
- Ensure reliability, uniformity of measurements and metering of quantity and quality of energy production and consumption.
- Governmental control and supervision over efficient energy production and consumption, its quality, the technical condition of energy equipment, energy supply systems and energy consumption.

The law has a particular article that defines the framework conditions for the use of renewable energy sources and aims to stimulate the development of renewable energy in Uzbekistan. The law authorises independent producers of electricity and heat from renewable energy sources to supply energy to the energy networks of energy supply organisations, which are obliged to accept energy from these producers at prices formed according to the established procedure. The prices are formed by an authorised body, currently the Ministry of Finance of the Republic of Uzbekistan.

3.2.6 Law On Environmental Control (2013, amended 2021)

The law generally provides for the protection of the environment and natural (ecosystem) resources in Uzbekistan. 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.

3.2.7 Law On Environmental Audit (2021)

The Environmental Audit Law was adopted to regulate environmental audits in the field of environmental protection and rational use of natural resources, including voluntary or mandatory environmental audits. The Law states that '*an environmental audit can be carried out on a voluntary form by businesses with low or insignificant (local) risk of environmental impact and on a mandatory form on an annual basis for businesses with high and medium risk of environmental impac*t'.

An environmental audit is not a substitute for environmental control; however, in case of a positive conclusion of the audit, a business entity is not subject to an inspection by the State Committee on Ecology and Environmental Protection for one year, except for accidents and emergencies, as well as in connection with the investigation of criminal cases or by order of the President of the Republic of Uzbekistan or the Cabinet of Ministers of the Republic of Uzbekistan. The environmental audit is carried out on the basis of a contract concluded between the environmental auditing organisation and the client of the environmental audit. The Law comes into force in March 2022."

3.2.8 Presidential Decree No. 5863 on Environmental Protection Strategy (30th October 2019)

The Strategy contains measures to preserve the environment (atmospheric air, water, land, soil, subsoil, biodiversity, protected areas) from anthropogenic impact and other negative factors, expand protected areas, and improve the environmentally safe system of waste management.

The Strategy approved 24 target tasks until 2030, which aim to increase the area of forest plantations, restoration and reclamation of disturbed lands, rational use of water resources, reduction of emissions into the air, protection and reproduction of biological resources, and improvement of the waste management system.

Through the implementation of the Strategy, the following are expected to be achieved:

- Increasing the area of forest plantations on the Uzbek part of the dried Aral Seabed from 28% (0.9 million ha) to 60% (2 million ha);
- Reduction of pollutant emissions by 10% (from 2.492 million to 2.243 million tonnes);

- Converting 80% (about 6,500) of public transport to natural gas and electric propulsion;
- Increasing the area covered by forest from 3.2 million to 4.5 million hectares;
- Increasing the area of protected areas from 3.5 percent (1.5 million hectares) to 12 percent (5.4 million)
- Increasing the coverage of solid domestic waste collection and transportation services from 48% (16 million people) to 100%;
- Increasing solid domestic waste processing from 18% (1.3 million tonnes) to 65% (4.6 million tonnes).

3.2.9 Law of the Republic of Uzbekistan on Protection of Women Against Oppression & Violence (as amended 09.12.2021 No. ZRU-736)

The purpose of this law is to provide protection to women against all forms of oppression and violence. The law recognises different forms of violence including: sexual violence, physical abuse, violence, economic violence, workplace violence, psychological violence etc.

In addition, Article 4 details the rights of the victims of oppression and violence which include:

- Right to appeal to the relevant authorized bodies & organisations or court with the statement for making concerning it of oppression and violence or threat of their making;
- Receipt of free legal consultation, economic, public, psychological, medical and other assistance in the special centres and also by means of free phone line;
- The appeal to law-enforcement bodies with the requirement about issues of the security order, and in case of violation, of conditions of the security order informing them about it,
- Appeal to the court with the requirement about compensation of the material damage caused to it and compensation of moral harm owing to committed oppression and violence.
- The victim of oppression and violence in case of appeal to the court with the statement for compensation of the material damage caused to it and compensation of moral harm is exempted from payment of the state fee.

3.2.10 Other relevant legislation

An elaboration on the applicable requirements and standards of these laws in relation to the project is provided in the chapters 5 onwards of this Report.

3.2.10.1 National/local requirements for environmental impact assessment

The national Environmental Impact Assessment (EIA) procedure for various development projects is mandated by the following legislation:

- Law "On Environmental Expertise" No.73-II of 25.05.2000 (as amended on 29.04.2021).
- Regulation on State Environmental Expertise (SEE), approved by Decree No.949 of the Cabinet of Ministers on 22 November 2018 which is replaced by "On the further improvement of the environmental impact assessment mechanism No.541, approved by Resolution of the cabinet of ministers of the Republic of Uzbekistan on 9 July 2020."

3.2.10.2 Public participation in national EIA

Based on changes in the national legislation regarding the national EIA process, public consultation is now a mandatory part of the first EIA stage.

According to the Resolution of the Cabinet of Ministries of the Republic of Uzbekistan on "Further Improvement of the Environmental Impact Assessment Process" No. 541 dated 7th September 2020, the procedure of conducting public consultations is as follows:

- Annex 3 of the Resolution No 541 – Rules and regulations for conducting public consultations states that public consultations should include discussions and decision making regarding planned activities (for construction of any facility) that may have negative impacts on the environment.
- A non-technical summary regarding any planned project activity that is categorized as I & II group (in accordance with national requirements for categorization) shall be prepared. The NTS should include information about the following:
  - Brief description of the project.
  - Technology solutions and alternative options for the project.
  - Current state of the environment at the selected project site.
  - A brief assessment of socio-economic conditions.
  - Brief description of the causes and type of negative impacts on the environment as a result of the project.
  - Forecast and assessment of possible changes in the state of the environment, socio-economic conditions.
  - Forecast and assessment of project and non-project risks.
  - Measures to prevent, minimise and/or compensate for adverse impacts; and
  - Assessment of possible significant adverse cross-border impacts.
- A public consultation shall be based on the review of non-technical summary by providing equal rights to all participants to express their concerns, opinions, and suggestions.

- The following entities shall be considered as part of public consultations:
  - Representatives of local departments of State Committee on Ecology and Environmental Protection who will be considered as observers of public consultations.
  - Local municipalities (considered as the responsible organisation for organising and inviting participants to the meetings).
  - NGOs'.
  - All organisations interested in the project.
  - Local communities.
  - Mass media.
- Expenses, if any, related to the public consultations are to be financed by the Project Developer.

In addition to the above national requirements on conducting public consultations, the Law of the Republic of Uzbekistan 'Regarding Appeals of Individuals and Legal Entities' No 378 dated 3.12.2014 (with amendments on 17th August 2017), regulates the appeals of individuals and legal entities to state bodies as well as to their officials. Appeals can be oral, written, or electronic and regardless of their form and type are of equal importance. A people's 'Reception Office' is tasked with organising a direct dialogue with the population, ensuring the functioning of an effective system of appeals aimed at the full protection of their rights, freedoms and legitimate interests. Any applications are considered within 15 days from date of receipt and any additional consideration is completed within 1 month.

3.2.10.3 Environment

The following laws focused on the protection of specific environmental/ natural resource elements are in effect and applicable to the Project.

- The Law of the Republic of Uzbekistan "On Water and Water Use" (1993) as amended in 2022.
- The Law of the Republic of Uzbekistan "On Ecological Expertise" (2000) as amended in 2021.
- The Law of the Republic of Uzbekistan "On Atmospheric Air Protection" (1996, amended on 21.04.2021).
- The Law of the Republic of Uzbekistan "On Protection and Use of Vegetation" (1997) as amended in 2016.
- The Law of the Republic of Uzbekistan "On Protection and Use of the Wildlife" (1997) as amended in 2016.
- The Law of the Republic of Uzbekistan "On Protected Natural Reserves" (2004) as amended in 2022.

- The Law of the Republic of Uzbekistan "On Wastes" (2002) as amended in 2021;
- The Law "On the sanitary and epidemiological well-being of the population" (2015) as amended in 2021.
- 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 2022.
- 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 2022.
- 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.

3.2.10.4 Land Rights, Acquisition and Resettlement

The following laws govern the process of land tenure, expropriation, and reallocation in Uzbekistan. The specific requirements of these laws in relation to the project are elaborated in Section 14 of this Report.

- 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 No. 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 No. 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 No. 911 of the Cabinet of Ministers (2019) "On the Procedure for withdrawal of land plots and compensation to owners of immovable property located on the land plot.
- Presidential Decree No. DP-6243 dated June 8, 202 "On measures to ensure equality and transparency in land relations, reliable protection of rights to land and their transformation into market assets".
- Law No 781 "On procedures for the withdrawal of land plots for public needs with compensation" October 1st, 2022. The Law 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 procedures of land acquisition, communication with project affected people (PAPs), compensation calculation, and demolition of affected assets. As of October 1st, 2022, all projects that require the acquisition of land for public needs should be managed in accordance with this Law.

With regard to wayleaves and exclusion zones that are mandated for the establishment of certain infrastructure, specific legal provisions for land acquisition are as follows:

- With regards to the acquisition of land for Right of Way, 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 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.

3.2.10.5 Labour and Employment

The following laws pertain to the recruitment and management of labour in Uzbekistan, and the protection of labour rights within the workplace. An elaboration of key relevant provisions is provided in Section 16 of this report.

- Labour Code of the Republic of Uzbekistan 1996 as amended on 18.05.2022.
- Law "On the employment of the population" No. 642 of 20.10.2020.
- Resolution of the Ministry of Labour and Social Protection of the Population, Ministry of Health of the Republic of Uzbekistan, registered on 29.07.2009, reg. number 1990 "About the approval of the list of occupations with unfavourable conditions, in which the use of the labour of persons under 18 years of age is prohibited".
- Decree No. 133 of 11 March 1997 to approve normative acts necessary for the realization of the Labour Code of the Republic of Uzbekistan.
- 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".
- 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".
- 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".

3.2.10.6 Archaeology and Cultural Heritage

The laws pertaining to the exploration, protection and preservation of archaeological resources and cultural heritage sites in Uzbekistan are listed below. Detailed mandatory requirements for different aspects of cultural heritage in relation to the Project will be provided in the detailed ESIA report.

- Constitution of the Republic of Uzbekistan, the Criminal Code of the Republic of Uzbekistan.
- 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). The relevance of these requirements will be determined during the ESIA process.

3.2.10.7 Safety along overhead transmission lines

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). These standard address health protection zones (HPZ), also known as setbacks. According to SanPiN No.0350-17, section 2.23.4, an HPZ must be established to protect the population from the effects of an OHTL's electric field. HPZ's are defined as the land along the route of a high-voltage OHTL in which the electric field strength exceeds 1 kV/m. For newly designed OHTL, buildings and structures must be set back the following distances either side of the OHTL[6]:

- 20 m for OHTL with a voltage of 330 kV;
- 30 m for OHTL with a voltage of 500 kV;
- 40 m for OHTL with a voltage of 750 kV;
- 55 m for OHTL with a voltage of 1150 kV.

Other relevant national laws and regulations pertaining to the installation and operation of transmission and distribution powerlines, in the context of E&S assessment, include the following:

- 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".

6 The HPZ (set back) is defined as the distance from the outermost wires in a direction perpendicular to the OHTL.

- SanPiN & Norms No. 0236-07 "Sanitary norms and rules to ensure safety for people living near high voltage power transmission lines, 2007".

Electrical safety regulations pertaining to ecological receptors include the following:

- Resolution of Cabinet of Ministers of Republic of Uzbekistan No.95 "On approval of general technical regulations of environmental safety" (2020).
    - Requires the implementation of environmental safety measures for the protection of flora and fauna. This includes the prevention of death of wildlife species due to magnetic fields of power transmission lines and sanitary protection zones.
    - Requires transformer substations in power transmission lines, their grids to have equipment (barriers, fences etc.,) to prevent animals from entering the territory of the substation.
- Decree of the Cabinet of Ministers of the Republic of Uzbekistan No.1050 "On approval of Rules for Protection of Power Grid Facilities, 2018". This law established the procedure for establishing protected zones for power grid facilities, as well as special conditions for using land located within the protected zones and ensure the functioning and operation of the said facilities. Construction of power grid facilities with 110, 220 or 500kV in protected areas of state nature reserves, protected areas of nature parks and state biosphere reserves requires prior permission from the Cabinet of Ministers of the Republic of Uzbekistan.

  Grid Security Zones for power grid facilities shall be established on both sides of the power transmission line from the outermost wires and along the perimeter of substations at the following distances for voltages:
    - 110kV – 20 meters from each outer-most conductor
    - 220kV – 25 meters from each outer-most conductor
    - 500kV – 30 meters from each outer-most conductor

The Grid Security Zones (GSZ) applicable to the protection of the Project's 500 kV OHTL is 30 m (from the outermost conductors).

3.2.10.8 Management of Public Grievances

The Resolution No. 728 provides for the resolution of communal and private grievances in relation to various development projects and programs within Uzbekistan.

The law establishes a centralized public Grievance Redress Mechanism (GRM) which employs a publicly accessible online platform for the collection of grievances from residents across the country. The Portal allows any member of the public to submit a grievance, for the attention of various authorities within the various domains of local and central Government. The application for grievance resolution can target any authority within the hierarchy of executive Government.

Upon initial review of the grievance statement by the target authority, the grievance is allocated to the most relevant LGA for further review and remedial action. In the event that resolution cannot be delivered by the most relevant LGA level, the grievance is cascaded higher along the administrative hierarchy, until an appropriate executive decision is provided by a competent authority.

In addition to the above, the Law of the Republic of Uzbekistan 'Regarding Appeals of Individuals and Legal Entities' No 378 dated 3.12.2014 (with amendments on 17th August 2017), regulates the appeals of individuals and legal entities to state bodies as well as to their officials. Appeals can be oral, written, or electronic and regardless of their form and type are of equal importance. A people's 'Reception Office' is tasked with organising a direct dialogue with the population, ensuring the functioning of an effective system of appeals aimed at the full protection of their rights, freedoms and legitimate interests. Any applications are considered within 15 days from date of receipt and any additional consideration is completed within 1 month.

3.3 International Conventions/Protocol

The proposed Project must comply with the environmental requirements of the following protocols and conventions listed in the Table below of which the Uzbekistan is a signatory:

Table 3-2 International Protocols and Conventions

Name of International Protocol /Convention	Signed/ Ratified	Relevance to the Project
UN Framework Convention on Climate Change	Accession: 20 June 1993	The Project will comply contribute to Uzbekistan's GHG emission reduction targets.
Kyoto Protocol to UNFCCC	Ratified: 12th October 1999	
Paris Agreement to UNFCCC	Signed: 19th April 2017	
Montreal Protocol on Substances that Deplete the Ozone Layer (with London, Copenhagen, Montreal amendments)	Accession: 10th June 1998	The Project will support Uzbekistan's contribution towards the protection of the ozone layer by refraining from use of ozone depleting substances.
Vienna Convention on the Protection of Ozone Layer	Accession: 18 May 1993	
UN (Rio) Convention on Biological Diversity	Accession: 19th July 1995	The Project will implement mitigation and management measures to ensure the conservation and protection of terrestrial ecology during the Project lifecycle.

Name of International Protocol /Convention	Signed/ Ratified	Relevance to the Project
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	Accession: 10th July 1997	The Project staff and workers will be strictly forbidden from trading in any wild flora and fauna found in the Project site or outside the Project boundaries.
Convention on Migratory Species of Wild Animals	1 May 1998	The project will implement mitigation and management measures to ensure conservation of terrestrial and avian migratory species especially because the Wind Farm will be located along the Asian bird migration route and IBA site.
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	Accession: 7th February 1996	The Project will be required to adhere to all national and international standards for hazardous waste generation and management.
United Nations Convention to Combat Desertification	Ratified: 31 August 1995	The Project will not result in accelerated desertification through sourcing of its materials and will contribute to sustainable development.
Paris Convention on Protection of the World Cultural and Natural Heritage	Succession: 13th January 1993	The Project will implement mitigation and management measures where items/sites/monuments of cultural or natural heritage are identified within or near the Project boundaries and notify the relevant authorities immediately.
Stockholm Convention on Persistent Organic Pollutants	Accession: 28th June 2019	The Project will implement control measures to eliminate any use of chemicals under Annex A and B and reduce the unintentional release of those under Annex C.

In addition to the national labour requirements, the Republic of Uzbekistan has also ratified the following ILO conventions.

Table 3-3 ILO Conventions Ratified by Uzbekistan

ILO Conventions	Ratified
Convention No 29 on Forced Labour adopted in 1930	13th July 1992
Convention No 87 on Freedom of Association and Protection of the Right to Organise, adopted on 17th of June 1948	12th December 2016
Convention No 98 on the Right to Organise and Collective Bargaining adopted on 8th of June 1949	13th July 1992

ILO Conventions	Ratified
Convention No 100 on Equal Remuneration adopted 6th of June 1951	13th July 1992
Convention 111 on Discrimination (Employment and Occupation) adopted 4th of June 1958	13th July 1992
Convention 138 on Minimum Age adopted 6th of June 1973	6th March 2009
Convention 182 on the Worst Forms of Child Labour adopted 17th June 1999	24th June 2008
Convention C105 on the Abolition of Forced Labour Convention, 1957	15th Dec 1997
C187 Promotional Framework for Occupational Safety & Health Convention, 2006	14th September 2021
C081 Labour Inspection Convention 1947	19th Nov 2019
Protocol 29 – to the Forced Labour Convention	16th September 2019

3.4 Lender Requirements

ACWA Power are pursuing an amount of Project Finance from financial institutions who either:

- Have their own internal E&S investment guidelines;
- Are members of the collective environmental and social agreements such as the Equator Principles; or
- Align their E&S policies and guidelines with other established guidelines (such as the IFC Performance Standards).

At this stage, it is known that ADB and AIIB are interested in providing finance for the Project. The key E&S requirements for these financial institutions, as well as for any other Equator Principles Financial Institutions (EPFIs) that may also be involved are summarised below.

3.4.1 ADB

The E&S policies, principles and objectives adopted by the ADB are enshrined in the Safeguard Policy Statement (SPS 2009). The main focal areas of the Policy are (i) environmental safeguards, (ii) involuntary resettlement, and (iii) Indigenous Peoples (IP) safeguards. The key objectives of the SPS include:

- To avoid adverse impacts of projects on the environment and affected people, where possible.
- To minimise, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is impossible.
- To help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

ADB's SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

- Environmental safeguards;
- Involuntary resettlement safeguards; and
- Indigenous Peoples safeguards.

ADB's Indigenous People's Safeguard is not applicable to this Project. This is because as per the ADB's requirement on Indigenous Peoples, there are no indigenous peoples within the project area of influence.

The Project is required to comply with the following policies and associated 'operations manuals' and guidelines:

- ADB Safeguard Policy Statement (2009);
- ADB Social Protection Strategy (2001) (national laws and key ILO standards);
- ADB Gender and Development Policy (1998); and
- ADB Access to Information Policy (2018).

3.4.2 AIIB

The AIIB Environmental and Social Framework (ESF) is a system that supports AIIB and its clients in achieving environmentally and socially sustainable development outcomes. The 2024 ESF was approved by the Board and entered into force on 26 June 2024, superseding the previous November 2022 version

The Environmental and Social Policy comprises mandatory environmental and social requirements for each Project and is accompanied by three associated mandatory Environmental and Social Standards (ESSs) setting out requirements applicable to Bank Clients on:

- ESS1: Environmental and Social Assessment and Management;
- ESS2: Land Acquisition and Involuntary Resettlement; and
- ESS3: Indigenous Peoples

3.4.3 Equator Principles

The Equator Principles (EP) is a risk assessment framework used by financial institutions to determine, assess and manage the environmental and social risk in Project's financing. Currently, over seventy-five major financial institutions from around the world have adopted the EPs. These financial institutions operate in more than 100 countries worldwide.

The Equator Principles were updated in 2006 (EPII), 2013 (EPIII) and a further update EPIV came into effect in October 2020. The EPs currently include provisions for the following:

- Principle 1: Review and Categorisation;
- Principle 2: Environmental and Social Assessment;
- Principle 3: Applicable Environmental and Social Standards;
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan;
- Principle 5: Stakeholder Engagement;
- Principle 6: Grievance Mechanism;
- Principle 7: Independent Review;
- Principle 8: Covenants;
- Principle 9: Independent Monitoring and Reporting; and
- Principle 10: Reporting and Transparency.

EPIV establishes the minimum E&S standards to be adopted by EP Financial Institution (EPFIs) as those from IFC Performance Standards on Environmental and Social Sustainability (Performance Standards), the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) and/or the relevant host country laws, regulations and permits that pertain to environmental and social issues.

3.4.4 IFC Performance Standards

The IFC Performance Standards are a key component of the IFC's Sustainability Framework and directed towards clients (i.e. party responsible for implementing and operating the project that is being financed), providing guidance on how to identify risks and impacts. The IFC Performance Standards are designed to help avoid, mitigate, and manage risks and impacts throughout the life of a project as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities.

The IFC Performance Standards (2012) are listed below:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
- Performance Standard 2: Labour and Working Conditions
- Including International Labour Organisation (ILO) Conventions
- 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

3.4.5 WBG EHS Guidelines (2007)

The World Bank Group International Finance Corporation (IFC), Environmental, Health and Safety (EHS) General Guidelines of April 2007 superseded the World Bank Handbook issue of 1998.

In terms of specific guidelines to control environmental externalities (e.g. wastewater quality etc.), EHS guidelines have been set out by IFC and the World Bank Group to provide general guidelines for its members when involved in a project or when providing financial support to a project. These guidelines contain general and industry-specific examples of Good International Industry Practice (GIIP). In summary, it should be noted that the following IFC EHS Guidelines are relevant to this project:

- General EHS Guidelines, Environmental:
  - Air Emissions and Ambient Air Quality;
  - Energy Conservation;
  - Wastewater and Ambient Water Quality;
  - Water Conservation;
  - Hazardous Materials Management;
  - Waste Management;
  - Noise; and,
  - Contaminated Land.
- General EHS Guidelines, Occupational Health & Safety:
  - General Facility Design and Operation;
  - Communication and Training;
  - Physical Hazards;
  - Chemical Hazards;
  - Radiological Hazards;
  - Personal Protective Equipment;
  - Special Hazard Environment; and,
  - Monitoring.
- Community Health & Safety:
  - Water Quality and Availability;
  - Structural Safety of Project Infrastructure;

- Life and Fire Safety;
- Traffic Safety;
- Transport of Hazardous Materials;
- Disease prevention; and,
- Emergency Preparedness and Response

- Industry Sector Guidelines, Power:
  - Electric Power Transmission and Distribution (2007)
  - Wind Energy (2015)

PROJECT CATEGORISATION

Under the IFC Performance Standards, the proposed project falls under **Category A**. This is described as below:

'Business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible or unprecedented.'

> ***Note:*** *The Project categorization is subject to confirmation by the Project lenders. However, it is noted that this scoping report has been prepared on the basis of undertaking a full ESIA commensurate with a Category A requirement.*

3.5 Applicable Environmental Standards

Applicable standards required for Project compliance are included to the respective environmental parameter sections of this report. This includes national standards and those expected for the lenders.

3.6 EIA/ESIA Requirements

3.6.1 National Requirements

3.6.1.1 Project Categorisation

As per the Resolution of the Cabinet of Ministries of the Republic of Uzbekistan No. 541 'On measures for the further improvement of environmental impact assessment' dated 7.10.2020, Projects with a total capacity of with a capacity of 100 MW to 300 MW are categorised as Category II.

3.6.1.2 EIA Process

In accordance with the resolution of the Cabinet of Ministries of the Republic of Uzbekistan No. 541 the national EIA process consists of three stages:

- Stage I: "A Preliminary Statement of the Environmental Impact ("PSEI") - this is performed at the planning stage of the proposed Project prior to the allocation of funds for development.
- Stage II: The "Statement of the Environmental Impact" ("SEI") - this is prepared following Stage 1 and where the outcome of Stage 1 identified the need for additional studies or analyses. The SEI shall be submitted to State committee on ecology and environmental protection prior to the Feasibility Study or financing of the Project and, therefore, prior to the beginning of construction.
- Stage III: The "Statement on Environmental Consequences" ("SEC") is the final stage of the SEE process and is performed prior to approval of the Project. The report describes in detail the changes in the project made as a result of the outcomes of Stage 1 and Stage 2, the comments received during public consultations, the environmental standards applicable to the project (as defined by the modelling and assessment process), the environmental monitoring requirements and the main conclusions.

State Ecological Expertise approval: The State Committee on Ecology and Environmental Protection provides their opinion at Stage I and II is a typically a mandatory document for project financing by Uzbek banks, other Lenders and for Project commissioning at Stage III. However, it is possible to obtain approval after Stage I should the submitted EIA be sufficiently detailed and comprehensive with respect to project information and baseline conditions. The conclusion of the State Committee is typically valid for three years from the date of its issuance. If the project is not implemented within three years from the date of issue of the conclusion, the EIA report needs to be revised and re-submitted for approval.

3.6.2 Lenders Requirements

3.6.2.1 ADB

ADB Safeguard Requirements 1 requires an environmental assessment to be developed depending on the significance of the project impacts and risks, the assessment may comprise a full-scale environmental impact assessment (EIA) for category A projects, an initial environmental examination (IEE) or equivalent process for category B projects, or a desk review.

ADB uses a system to assess the potential environmental impacts of projects. The most sensitive environmental aspect determines the project's classification, taking into account all potential direct, indirect, cumulative, and induced effects. A project's category is determined by the

category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Projects are assigned to one of the following four categories:

- "Category A: A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
- Category B: A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.
- Category C: A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.
- Category Financial Intermediary (FI): A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI."

3.6.2.2 **AIIB**

AIIB's ESS1: Environmental and Social Assessment and Management outlines the requirement for environmental assessment if a Project is likely to have adverse environmental risks and impacts or social risks and impacts (or both).

AIIB assigns each proposed Project to one of the following four categories and determines the type of assessment and instrument required, as noted below and further elaborated throughout their ESP:

- **Category A**: A Project is categorized A if it is likely to have significant adverse environmental and social impacts that are irreversible, cumulative, diverse or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works and may be temporary or permanent in nature.
- **Category B**: A Project is categorized B if: (i) it has a limited number of potentially adverse environmental and social impacts; (ii) the impacts are not unprecedented; (iii) few if any of them are irreversible or cumulative; (iv) they are limited to the Project area; and (v) they can be successfully managed using good practice in an operational setting.
- **Category C**: A Project is categorized C if it is likely to have minimal or no adverse environmental and social impacts. The Bank does not require an environmental and social assessment but does require the Client to prepare an analysis of the environmental and social aspects of the Project.

- **Category FI**: A Project is categorized FI if the financing structure involves the provision of funds to or through a financial intermediary (FI) for the Project, whereby the Bank delegates to the FI the decision-making on the use of the Bank funds, including the selection, assessment, approval and monitoring of Bank-supported activities, based on a sound environmental and social management system (ESMS) adopted by the FI.

3.6.2.3 EPFIs

According to EP2, '*The EPFI will require the client to conduct an appropriate Assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and scale of impacts of the proposed Project*'.

3.6.2.4 IFC

Performance Standard 1 outlines the need to "*establish and maintain a process for identifying the environmental and social risks and impacts of the project*". The standard further states that "*The process may comprise a full-scale environmental and social impact assessment, a limited or focused environmental and social assessment, or straightforward application of environmental siting, pollution standards, design criteria, or construction standards*".

As part of the review of environmental and social risks and impacts of a proposed investment, IFC also uses a process of environmental and social categorization to reflect the magnitude of risks and impacts. These categories are:

- Category A: Business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented.
- Category B: 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.
- Category C: Business activities with minimal or no adverse environmental or social risks and/or impacts.
- Category FI: Business activities involving investments in financial institutions (FIs) or through delivery mechanisms involving financial intermediation. This category is further divided into three categories.

4 APPROACH TO ESIA

4.1 Impact Assessment Methodology

4.1.1 Process

The ESIA process is a systematic tool for examining and assessing the potential beneficial and adverse environmental and social impacts of a proposed development. In addition to identifying impacts of the Project, the ESIA has also identified key environmental and social mitigation measures and guidance to avoid, minimise and compensate for any adverse environmental and social impacts associated with the construction and operation of the Project. The ESIA process is summarised in the table below and in the following sections.

Table 4-1 Overview of the ESIA process

STAGE	TASK	OBJECTIVE
Scoping	Gap Analysis	Identify the approach, methodology and data requirements of the ESIA
ESIA 	Consultation	Consult with statutory and non-statutory organisations and individuals with an interest in the development
	Desk Based Literature Review	Use existing secondary information and data sources to obtain information on the environmental and social conditions of the development site and immediate surroundings.
	Primary Data Collection	Characterise the existing physical, ecological and social conditions of the development site and immediate surroundings.
	Specialist Studies	Further investigate those environmental parameters which may be subject to potentially significant impacts.
	Impact Assessment	Evaluate the existing environment and social conditions in terms of sensitivity to predict the magnitude and associated significance of the potential impacts.
	Mitigation Measures	Identify appropriate and practicable mitigation and enhancement measures to avoid, minimise and/or offset any adverse impacts. Monitoring plans are proposed to monitor residual impacts.

To obtain a credible assessment of environmental and social impacts, the assignment of 'significance' to each identified impact needs to be a robust, consistent and transparent process. The methodology to assess 'effect significance' is outlined below and follows a GIIP approach based on the assumption that the significance of an impact on resources or receptors is considered to result from an interaction between two factors:

- The nature and magnitude of the impact (i.e., a change in the environment, social and/or health baseline conditions); and

- The environmental value or sensitivity of those resources or receptors to the change.

A three-step approach has been used to determine the significance of environmental and social impacts, as follows:

- **Step 1** – Evaluation of value/sensitivity/vulnerability of resource or receptor;
- **Step 2** – Assessing the magnitude of the impact on the resource or receptor; a
- **Step 3** – Determining the significance of impacts

4.1.2 Impact Assessment Significance Criteria

4.1.2.1 Determining Receptor Sensitivity

The sensitivity of a receptor is understood as the sensitivity of the environmental or social receptor to change, including its capacity to accommodate changes that the Project may bring about. The sensitivity is assigned at the receptor level and as such details regarding sensitivity are provided within the topic specific chapters of this Report. The table below outlines the definition criteria upon which the receptor sensitivities of this ESIA are based.

Sensitive receptors are defined as:

- Elements of the environment that are of value to the functioning of natural systems (i.e., areas or elements of ecological, landscape or heritage value, species, habitats and ecosystems, soil, air and water bodies or land-use patterns); and
- **Human** receptors, such as stakeholders (i.e., users of dwellings, places of recreation, places of employment, community facilities or household relocation, cultural heritage – tangible & intangible-, community health, livelihoods & economic activities, gender relationships) and human systems (e.g. employment market, population disease susceptibility and disease communicability, public infrastructure and services, exposure to toxicity of chemicals).

Table 4-2 Receptor Sensitivity Criteria

SENSITIVITY	DESCRIPTION OF VALUE
Very High	• High importance and rarity on an international scale (IUCN Endangered or Critically Endangered) and limited or no potential for substitution. • The receptor has already reached its carrying capacity, so any further impact is likely to lead to an excessive damage to the system that it supports (e.g., very limited or non-existent infrastructure and services such as hospitals and schools, available natural, economic or local resources are not sufficient to provide means of livelihoods for all local populations). • Locations or communities that are highly vulnerable to the environmental and social impact under consideration or critical for society (e.g., indigenous peoples, hospitals, schools).

SENSITIVITY	DESCRIPTION OF VALUE
	• Other examples are very high proportion of vulnerable groups (women, elderly, disabled, etc.) in the Project area, very frequent occurrences of gender-based violence, very low probability of female participation in decision making and in the labour market, archaeological items of international importance or designated UNESCO world heritage sites, tangible or intangible cultural assets that contribute to international research objectives, etc.
High	• High importance and rarity on a national scale, and limited potential for substitution. • The receptor is close to reaching its carrying capacity, so a further impact may lead to a significant damage to the system that it supports (e.g., poor or limited public infrastructure and services, with limited access and high pressure on existing natural or economic resources available). • Locations or communities that are particularly vulnerable to the environmental impact under consideration (e.g., residential areas, vulnerable/marginalized groups). • Other examples are high proportion of vulnerable/marginalised groups (women, elderly, disabled, etc.), locations with poor health practices, poor education level, high crime rate, frequent occurrences of gender-based violence, tangible or intangible cultural assets that contribute to national research objectives, etc).
Medium	• High or medium importance and rarity on a regional scale, limited potential for substitution. • The receptor is already significantly impacted, but it is not close to reaching its carrying capacity. Further impacts will get increase the stress of the underlying system, but evidence does not suggest that it is about to reach a critical point (e.g., public infrastructure and services with some capacity, alternative natural or economic resources are available but not sufficient or easily accessible). • Locations or groups that are relatively vulnerable to the environmental impact under consideration (e.g., commercial areas). • Other examples area: average proportion of vulnerable/marginalised groups, occasional occurrences of gender-based violence, tangible or intangible cultural assets that contribute to regional research objectives, etc).
Low	• Low or medium importance and rarity on a local scale. • The receptor is not significantly impacted and shows a large spare carrying capacity. Impacts are not likely to generate any noticeable stress in the underlying system (e.g., reasonable public infrastructures and services, sufficient natural, economic or local resources available but not easily accessible). • Locations or groups that show a low vulnerability to the environmental impact under consideration (e.g., industrial areas). • Other examples are low proportion of vulnerable/marginalised groups, rare occurrences of gender-based violence, tangible or intangible cultural assets that contribute to local research objectives, etc).
Very Low	• Very low importance and rarity on a local scale. • The receptor is not impacted and shows a very large spare carrying capacity. Impacts are very unlikely to generate any noticeable stress in the underlying

SENSITIVITY	DESCRIPTION OF VALUE
	system (e.g., very good public infrastructures and services with some capacity, equivalent natural, economic or local resources available and easily accessibly). • Locations or groups that show a very low vulnerability to the environmental impact under consideration (e.g., industrial areas). • Other examples are very low proportion of vulnerable/marginalised groups, no occurrence of gender-based violence, tangible or intangible cultural assets that are not legally protected and have no significance to local people (i.e. local people no longer use the cultural asset, etc).

4.1.2.2 Identifying Potential Impacts

The following types of impacts have been considered:

- Direct Impacts - Potential impacts that may result from the construction, commissioning, and operations of the Project acting directly on an environmental or social receptor;
- Indirect Impacts – Potential impacts which are not a direct result of a Project activity, that may be realised later in time or at distances further removed from the project footprint, but are normally a result of a complex pathway;
- Cumulative Impacts – Changes to the environment that are caused by an action in combination with other past present and future actions;
- Beneficial Impacts – Those impacts that have a positive, desirable or favourable effect on the sensitive resources or receptors (e.g. landscape providing artificial habitat for a variety of species, jobs opportunities during the construction and/or occupation phases of a project);
- Adverse Impacts – Those impacts that are detrimental and have a negative influence on the environment, social structures, resources or other receptors;
- Secondary Impacts - Potential impacts that may result from the implementation of protection measures applied to mitigate potential direct impacts; and
- Event Related Impacts - Potential unplanned or accidental impacts stemming from an unintentional event such as fire, explosion, oil spill, etc.

4.1.2.3 Determining Impact Magnitude

The magnitude of an impact has numerous components, for example:

- The extent of physical change;
- The level of change in an environmental condition;
- The permanence of impact and the reversibility of the impacted condition;
- Its spatial footprint;
- Its duration and frequency; and

- Its likelihood of occurrence where the impact is not certain to occur.

The magnitude of the impact will be defined wherever possible in quantitative terms and where necessary, the determination of impact magnitude will be assisted through the use of modelling. The general criteria used for identifying the magnitude of impacts is provided within the table below.

Table 4-3 Impact Magnitude Criteria

MAGNITUDE	DESCRIPTION OF MAGNITUDE
Major	**Adverse**: Loss of resource and/or quality and integrity; severe damage to key characteristics, features or elements. A major impact is usually large in extent, permanent and irreversible. **Beneficial**: Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.
Moderate	**Adverse**: Significant impact on the resource, but not adversely affecting the integrity; Partial loss of/damage to key characteristics, features or elements. Moderate impacts usually extend outside the site boundary, and are usually permanent, irreversible or cumulative. **Beneficial**: Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Minor	**Adverse**: Some measurable change in attributes quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. Minor impacts usually are only noticeable within the site and are temporary and reversible. **Beneficial**: Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	**Adverse**: Very minor loss or detrimental alteration to one or more characteristics, features or elements. **Beneficial**: Very minor benefit to or positive addition of one or more characteristics, features or elements.
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

4.1.2.4 Determining Significance

The significance of effects is a combination of the sensitivity of a receptor or resource and the magnitude of the project impact.

The following matrix provides criterion used for determining the significance of environmental effects through consideration of the potential magnitude of impact and sensitivity of the associated receptor.

As is evident from the matrix, in some cases the significance product is a range (i.e., a 'Minor' Magnitude and a 'Very High' Sensitivity results in a 'Moderate or Major' Significance). In these

cases, professional judgement will be used to determine which significance the impact best represents.

Table 4-4 Criteria for Determining Significance of Effects

		Magnitude of Impact (Degree of Change)				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Sensitivity of Receptor	**Very High**	Neutral	Minor	Moderate or Major	Major	Major
	High	Neutral	Minor	Minor or moderate	Moderate or Major	Major
	Medium	Neutral	Negligible or minor	Minor	Moderate	Moderate or Major
	Low	Neutral	Negligible or minor	Negligible or minor	Minor	Minor or moderate
	Very Low	Neutral	Negligible	Negligible or minor	Minor	Minor

The following table outlines general definitions of significance.

Table 4-5 Definition of Significance

Significance Category	Criteria
Major	• The impact is large scale and would cause a large improvement or deterioration in the environment, • Adverse impacts may be considered unacceptable due to exceeded of statutory limits and may require additional studies to ascertain if alternatives (in terms design and location) with the potential for lower impacts should be considered. These impacts represent key factors in the decision-making process. • These impacts are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
Moderate	• The impact gives rise to noticeable improvement or deterioration to the existing environment at a regional or local scale. • If adverse, impacts are potential concerns to the project and may become key factors in the decision-making process. • Whilst the impacts will be experienced, mitigation measures and detailed design work may reduce (or enhance) the effect. Some residual effects will still arise.
Minor	• The impact is small scale and would cause a small improvement or deterioration to the existing environment. • Adverse effects are undesirable but acceptable and within statutory limits and not likely to be key decision-making issues. • Mitigation measures are typically not requited to mitigate such effects. • The cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Negligible	• No discernible improvement or deterioration to the existing environment as a result of the Project will occur. • Local issue unlikely to be of importance in the decision-making process. • Effects do not exceed statutory limits. • They are of relevance in enhancing the subsequent design of the project and consideration of mitigation or compensation measures.
Neutral	• No effect or effect that is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error. • No mitigation is required.

The approach to assigning significance relies on reasoned argument, professional judgement and cognisance to the advice and views of the appropriate regulators and organisation. For some disciplines, it is determined by comparison, wherever possible with locally, nationally or internationally accepted standards.

4.1.3 Mitigation & Management Measures

A key component of the ESIA process is to explore practical ways of avoiding or reducing potentially significant impacts caused by development of the Project. These are commonly referred to as mitigation measures and will be incorporated into this Report and the future CESMP and Operational ESMP (OESMP). Mitigation will be aimed at preventing, minimising or managing significant adverse impacts to as low as reasonably practicable (ALARP) and enhancing and maximising any potential beneficial impacts of the Project.

The approach taken to identifying and incorporating mitigation measures into the Project is based on a typical hierarchy of decisions and measures. This is aimed at ensuring that, wherever possible, potential impacts are mitigated at source rather than mitigated through restoration after the impact has occurred. In ensuring the Project achieves the applicable environmental standards and guidelines, mitigation measures have been adopted within the Project's design. In addition to specific measures included within the design of the Project, the ESIA will outline further mitigation and/or management measures for the construction and the operational phases, upon which the Project can further minimise or avoid negative impacts and enhance positive impacts.

Upon approval of the Project, the stated mitigation and management measures in the approved ESIA will be required for implementation as a condition of the Environmental Permit or as part of the lenders loan agreement.

4.1.4 Residual Impacts

The residual impacts section will consider the overall significance of impacts following the implementation of the mitigation & management measures not already included to the design. The significance of such impacts will be re-evaluated based upon the same criteria used to determine the impact significance stated above.

4.1.5 Cumulative Impact Assessment

IFC Handbook on Cumulative Impact Assessment defines cumulative impacts as "those that 'result from the successive, incremental, and/or combined effects of an action, project, or

activity when added to other existing, planned, and/or reasonably anticipated future ones" (IFC, 2013).

In practice, the assessment of cumulative effects requires consideration of some concepts:

- Assessment of effects over a larger (i.e., "regional") area that may be transboundary/cross-jurisdictional; (including effects due to natural perturbations affecting environmental components and human actions).
- Assessment of effects during a longer period of time into the past and future;
- Assessment of effects on Valued Environmental Components due to interactions with other actions, and not just the effects of the single action under review; and
- Evaluation of significance in consideration of other than just local, direct effects.

5 AIR QUALITY

5.1 Applicable Requirements & Standards

5.1.1 National Regulations

THE LAW OF THE REPUBLIC OF UZBEKISTAN "ON ATMOSPHERIC AIR PROTECTION" (1996, AMENDED ON 13.03.2019)

This regulation specifies standards, quality and harmful effects norms, requirements on fuels, lubricants, production and operation of vehicles and other transport means and equipment, ozone layer protection requirements, obligations of enterprises, institutions and organisations toward atmospheric protection, and compensations of damages from atmospheric pollutions.

SaPiN № 0293-11 "Hygienic regulations. List of Maximum Permissible Concentrations (MPC) of contaminants in the atmospheric air of inhabitant areas in the territory of the Republic of Uzbekistan".

Table 5-1 Ambient Air Quality MPC (mg/m³)

POLLUTANT	MPC MG/M³			
	ONE-TIME	24-HOUR	MONTHLY	ANNUAL
NO_2	0.085	0.06	0.05	0.04
NO	0.6	0.25	0.12	0.06
CO	5	4	3.5	3
SO_2	0.5	0.2	0.1	0.05
NH_3	0.2	0.12	0.06	0.04
Suspended particles up to 10 µm	500	300	100	50
Suspended particles	500	350	200	150

Note: Maximum one-time concentration - the highest concentration detected at 20-30-minute sampling.

- Average daily concentration is the average of the one-time concentrations detected during the day or obtained with continuous 24-hour sampling.
- Monthly average concentration is the average of the average daily concentration detected during the month.
- Average annual concentration is the average of the number of average monthly concentrations revealed during a year in the course of one-time sampling.

5.1.2 Lender Requirements

5.1.2.1 ADB, AIIB and IFC

ADB, AIIB and IFC require adherence to the World Health Organisation (WHO) Ambient Air Quality Guidelines (2021) presented in the following table.

Table 5-2 WHO Ambient Air Quality Standards (µg/m³)

PARAMETER	24 HOUR	ANNUAL
PM_{10}	150 (Interim target 1)	70 (Interim target 1)
	100 (Interim target 2)	50 (Interim target 2)
	75 (Interim target 3)	30 (Interim target 3)
	50 (Interim target 4)	20 (Interim target 4)
	45 (guideline)	15 (guideline)
$PM_{2.5}$	75 (Interim target 1)	35 (Interim target 1)
	50 (Interim target 2)	25 (Interim target 2)
	37.5 (Interim target 3)	15 (Interim target 3)
	25 (Interim target 4)	10 (Interim target 4)
	15 (guideline)	5 (guideline)
NO_2	120 (Interim target 1) 50 (Interim target 2) 25 (guideline	40 (Interim target 1) 30 (Interim target 2) 20 (Interim target 3) 10 (guideline)
SO_2	125 (Interim target 1)	500 (10-minute guideline)
	50 (Interim target 2)	
	40 (guideline)	
O_3	100 (interim target 1) (8-hour daily maximum)	
	70 (interim target 2) (8-hour daily maximum)	
	60 (8-hour daily maximum guideline)	

Source: WHO Global Air Quality Guidelines, 2021

5.2 Observations and Baseline Conditions

Air quality is influenced less by geographical considerations and more by proximity to pollution sources (e.g. cities, highways and industrial facilities). Typically, the air shed closer to a pollution source is of poorer quality than at a greater distance (due to pollutant dispersion), however air quality at a particular location is generally dependant on weather conditions particularly wind direction and wind strength; which has a large effect on the direction and dispersion of pollutant plumes.

The proposed Project area is located in a remote region of Uzbekistan away from major population clusters and away from key anthropogenic emission sources with the nearest population cluster being the agricultural area with the nearest farmhouse located around 3 km from the closest WTG at the southern Project boundary, a fish farm area approximately 1.5 km south-east the closest WTG and Kuklam community approximately 1.8 km north-east the nearest WTG. There are not expected to be regional air quality influences due to these communities.

However, the site is prone to high winds, and it is expected that natural ambient dust concentration may increase due to the sandy soils and limited vegetation.

Besides a railway line passing around 1.5 km north the Project area, there are few point sources of any emissions from main road running parallel to the railway in the project area. Occasional locomotive emissions are expected to be the principal emission source around the Project, but this would only occur at times of railway and road use.

Due to the isolated nature of the Project area, there are a few land users (herding of animals and fisheries) and vehicles that are active within the Project site, which has some visible vehicle tracks, but does not include paved roads. Both the vehicle use and herding/fishery practices are not expected to result in discernible impacts to ambient air quality.

Two facilities, namely Zafarobod Hydrocarbon Storage Tanks and Navoiyuran Chemical Warehouse are located approximately 1.3 km from the closest WTG and 2.8 km to the north-east of the closest WTG. There are not expected to be air quality influences due to these facilities.

Overall, the existing potential emission sources (i.e. mobile vehicular emissions and limited diffuse sources) are not expected to result in discernible impacts to ambient air quality in the area. The air shed in the Project area is expected to be non-degraded.

5.2.1 Survey Methodology

An ambient air quality survey was undertaken at two representative locations. The monitoring was carried out for 24 hours each. The monitoring survey measured ambient air quality for PM10 and PM2.5. The survey was carried out to capture the current ambient air quality at the Project site and enable a representative assessment of the significance of potential impacts. The air quality monitoring was undertaken to identify short-term peaks and troughs in air quality and to identify influences of meteorology on ambient air quality within the Project site.

The locations for the ambient air quality monitoring surveys are outlined below.

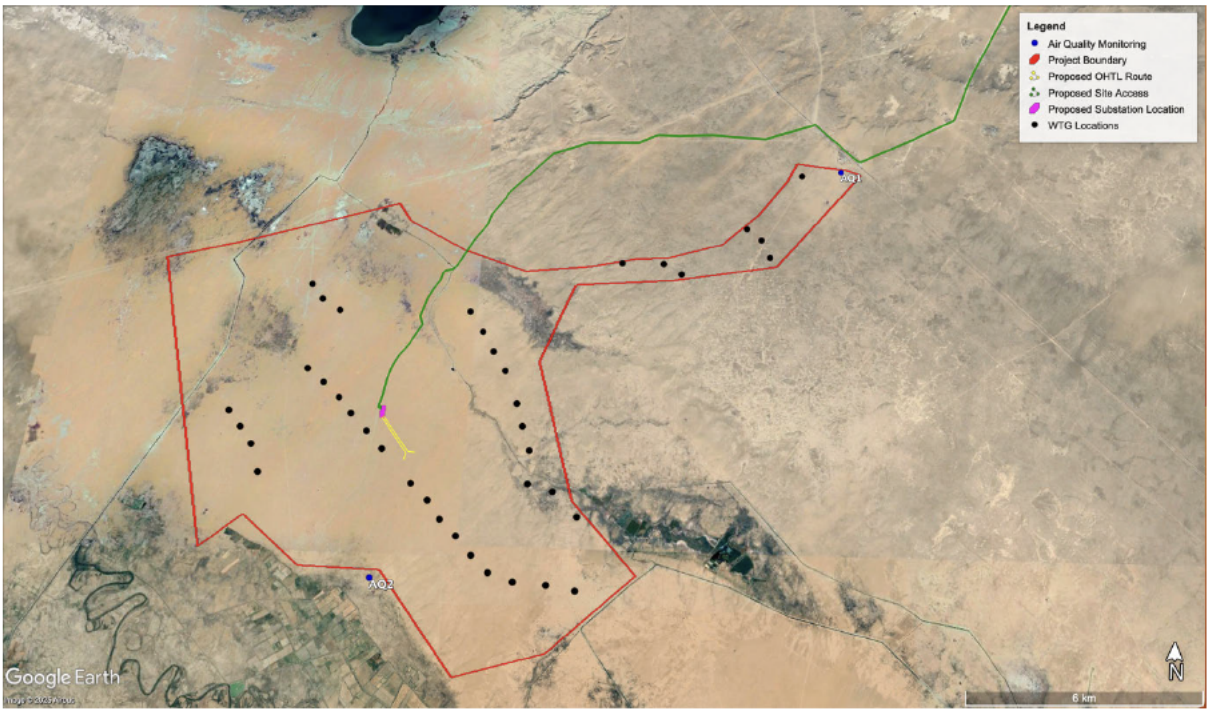


Figure 5-1 Air Quality Monitoring Locations

Table 5-3 Air Quality Monitoring Locations

Location ID	Date of Survey	Location Description	Image
AQ1	From the 5th till the 6th of June 2024	Located to the northeast of the project area, approximately 650 m from the railway, the main road, Zafarobod Hydrocarbon Storage Tanks and Navoiyuran Chemical Warehouse.	

Location ID	Date of Survey	Location Description	Image
AQ2	From the 24th till 25th of May 2024.	Located in the southwest of the project area, approximately 650 m from the agricultural lands.	

The weather conditions at the time of the survey are presented in the following table.

Table 5-4 Weather Conditions at the Time of the Air Quality Monitoring

Location	Weather Conditions	Average T, °C	Wind Speed Average, m/s	Wind Direction, °
AQ1	Clear sky	27.389	3.01	45.83
AQ2	Clear sky	24.651	3.13	3.77

5.2.2 Monitoring Results

The air quality monitoring average concentrations of the surveyed parameters compared to the national air quality standards and the WHO ambient air quality targets and guidelines (WHO, 2021) are provided in Table 5-5. The survey results are provided in **Appendix C**.

Table 5-5 Air Quality Monitoring Results

Parameter	Monitoring Period	Concentration (µg/m³)				WHO Ambient Air Quality Standards (µg/m³)[7]
		AQ1 – Average	AQ1 – Maximum	AQ2 – Average	AQ2 – Maximum	
$PM_{2.5}$	24 hours	0.72	1.68	1.80	5.91	75 (interim target 1) 50 (interim target 2) 15 (Guideline)
PM_{10}	24 hours	0.95	5.47	4.42	41.98	150 (interim target 1) 100 (interim target 2) 45 (Guideline)

The PM2.5 and PM10 levels show a slight difference between the locations during the monitoring period. Both the average and maximum concentrations are higher at AQ-2

[7] Interim targets serve as incremental steps in the progressive reduction of air pollution towards the air quality guideline levels and are intended for use in areas where air pollution is high.

compared to AQ-1, even though AQ-1 is closer to the road and railway. The highest PM10 level recorded at AQ-2 peaked at the end of the survey, reaching 41.98 µg/m³, which is unusual for this area, and may indicate certain anthropogenic activity such as periodic burning of fires in the vicinity.

In the absence of national standards for PM2.5 and PM10, the maximum concentrations were compared to the WHO Ambient Air Quality Standards interim targets and guidelines for 24 hours. The PM2.5 and PM10 are well below the thresholds of the standards with the only result near the WHO guideline is AQ-2 for PM10 maximum, however it does not exceed it. This indicates that the airshed is generally unpolluted, with occasional localized sources that may affect air quality for brief periods.

5.3 Receptors

During construction, pollutants of concern that may impact ambient air quality include Particulate Matter (PM) from site clearance and other typical construction activities, gaseous emissions from vehicles, machinery and equipment, and minor Volatile Organic Compounds (VOCs) and odour emissions.

References for areas of influences for construction dust and gaseous emissions are provided in the following table.

Table 5-6 Air Quality Area of Influence

Phase	Pollutant	Study Area	Reference
Construction	PM (Dust)	An assessment relating to dust generation is normally required where there is: • a 'human receptor': o within 350 m of the boundary of the site. o within 50 m of the route used by construction vehicles on public highway, up to 500 m from the project site entrance. • An 'ecological receptor': o within 50 m of the boundary of the site. o within 50 m of the route used by construction vehicles on public highway, up to 500 m from the project site entrance.	Institute of Air Quality Management (IAQM) for construction dust, 2014
	Gaseous Pollutants (from vehicular and temporary plant emissions)	Receptors within 200 m of the site or access road to be considered (in regard to vehicular emissions, but considered to be appropriate for construction plant)	The Design Manual for Roads and Bridges, Volume 11, Section 3, Air

Phase	Pollutant	Study Area	Reference
			Quality (HA207/07) 2017
	Odour from sanitary wastewater (only if poorly managed)	Only expected a maximum of 100 m from source for distributed and various temporary toilets/septic tanks.	5 Capitals' project experience
	VOC emissions and odour (only if poorly managed)	Only expected a maximum of 100 m from source for small quantity and distributed storage during construction.	5 Capitals' project experience

Potential ambient air quality impacts from the project are expected to occur primarily during the construction phase. These impacts are anticipated to be discernible to nearby receptors, outside the area of influence (AoI) discussed above.

These include residents and visitors of Kuklam village approximately 20m from the access road and the herders' structures and animals' stables located near the site access road, internal access road, substation, OHTL and the WTG construction activities.

Table 5-7 Potential Air Quality Receptors

Receptor	Receptor Type	Sensitivity	Justification
Herders' houses	Residential	**High**	Herders that use this accommodation will be particularly vulnerable to changes in ambient air quality.
Herders' Livestock stables	Commercial	**Medium**	Livestock kept at these stables will be particularly vulnerable to changes in ambient air quality.
Fish Farm (F1 and F2)	Residential /Ecological	**High**	Fish at the ponds and herders that use this accommodation will be particularly vulnerable to changes in ambient air quality.
Wind Farm Site Workers	Construction Workers	**Medium**	Workers will be particularly vulnerable to changes in ambient air quality. However, they will be supplied with PPE to manage potential air impacts arising from the Project.
Kuklam Village	Residential	**High**	Residents and visitors of the village will be vulnerable to changes in ambient air quality resulting from increased traffic along the main access road.

***Note**: The structures that are within 500m from the WTGs will not be at the project site during construction and as such they are not considered receptors to air quality impacts. The relocation of these herders will be in accordance with the Project's Resettlement Action Plan (RAP).*

5.4 Potential Impacts, Mitigation, Management & Residual Impact

5.4.1 Construction Phase

During construction, local ambient air quality may potentially be affected by increased dust (i.e. increased particulate matter), particularly during the site preparation stage (resulting from site clearance and earthworks etc.) and by the exhaust fumes of construction vehicles, equipment and temporary power generators. The typical air emissions resulting from these activities include nitrogen oxides (NOx), sulphur dioxide (SO_2), carbon monoxide (CO), carbon dioxide (CO_2), VOCs, particulates ($PM_{2.5}$ and PM_{10}) and BTEX.

The principal sources of dust, particulate and gaseous emissions during construction will be:

- Excavations and earthworks, such as groundbreaking, cutting, filling and levelling;
- Vehicle movements on unpaved, or compacted surfaces;
- Particulate matter dispersion from uncovered truckloads and from materials and aggregates at the batching plant (if uncovered);
- Vehicle and Construction equipment emissions (e.g. NO_x, SO_x and CO, CO_2, VOCs, $PM_{2.5}$, PM_{10} and BTEX) and particulates from vehicles, generators and other mechanical equipment;
- Stored VOCs and other volatile hazardous materials (if not sealed effectively) and;
- Odour from temporary wastewater facilities, or containment (if not sealed effectively).

5.4.1.1 Dust Generation

Dust Emissions from Site Preparation

Dust resulting from excavations and earthworks typically comprises large diameter particles, which settle rapidly and close to the generation source.

According to the screening guidance of the UK's Institute of Air Quality Management (IAQM) for construction dust, detailed assessment relating to dust generation is required where there is a 'human receptor' within 350m of the boundary of the site. With regards to the wind farm project, this will be 350m from the nearest WTG. With respect to the screening criteria above and considering that the structures that are within 500m from the WTGs will be relocated for H&S purposes, there are no human receptors within 350m of the WTGs. In addition, there are no receptors within 350m from the OHTL or power substation construction zone. As such, potential for impacts relating to dust emissions as a result of WTG, OHTL and power substation preparatory activities upon receptors are not anticipated.

The preparatory work of the internal access roads may result in impact on some receptors; however, this depends on the routing selected which was not available at the time of writing.

Dust & Particulate Emissions from Movement of Vehicles

In addition to vehicle movements on unpaved surfaces, dust generation from truck movements on unpaved surfaces and particulate dispersion from uncovered truckloads would only occur where mitigation measures are not effectively implemented at the site, or by contractors bringing materials torn cement bags, sand to the site.

Uncontained and/or un-sheeted trucks may be subject to losses of material where the containment is not effective (e.g. spills), or where wind or other air turbulence may disturb the contents and result in dispersion of materials. Such impacts have the potential to degrade local air quality in the immediate area of such movements.

In accordance with the UK's IAQM Guidance on the Assessment of Dust from Demolition and Construction, detailed assessment of vehicle movements should only be required where 'human' receptors are located within 50m of the route used by construction vehicles on public roads, up to 500m from the project site entrance.

In the instance of the wind farm, the receptors within 50m of the route to be used by construction vehicles include Kuklam village approximately 20m from the road as well as the herders and their livestock if they happen to be within the AoI. As such, there is the potential for impacts relating to dust generation or particulate emissions as a result of increase vehicle movement on this route.

Dust Emission and Particulate Dispersion from Storage of Batching Plant Materials

Furthermore, the inadequate storage of sand, aggregates and other dust generating materials may lead to dust generation and particulate dispersion with the potential to degrade local air quality in the immediate area of the batching plant. However, such impact would only occur where mitigation measures are not effectively implemented at the batching plant onsite.

In accordance with the UK's Institute of Air Quality Management (IAQM) for dust, detailed assessment relating to dust generation is required where there is a 'human receptor' within 350m of the boundary of the site (in this case within 350m of the batching plant). The location of the batching plant was not provided at the time of writing and will be included in the next iteration of the ESIA.

5.4.1.2 Gaseous Emissions

The main sources of gaseous emissions to air during construction will be the combustion of fossil fuels from the operation of vehicles, construction equipment and plant. Such vehicles and equipment are likely to include, but not be limited excavators, graders, pavers, cranes, vibratory rollers, generators, etc.

Under normal operating conditions, emissions from the construction vehicles and equipment are expected to mix in ambient air close to the point of origin and are unlikely to be discernible at receptors thereby resulting in emissions that are not distinguishable from the background concentrations or emissions that will not result in an exceedance in ambient air quality standards/concentration.

However, where old or poorly maintained equipment is operated, there is potential for noticeable and/or cumulative impacts to occur. Such impacts are not expected to be discernible at receptor locations over 200m from the project boundary and over 50m from the site access road. There are no human receptors within 200m of the WTGs, OHTL or power substation construction zone. As such, potential for gaseous emission impacts are not anticipated.

Details of the overall GHG emissions during construction are provided in the Climate Affairs chapter of this ESIA.

5.4.1.3 Emission of Volatile Organic Compounds (VOCs)

Very small quantity of fuels, paints, solvents and other volatile substances are likely to be required during the construction phase. Where necessary, these will be stored in secure areas within the temporary construction areas. In the event that these are not adequately contained/sealed, such substances have the potential to result in the dispersion of volatile emissions to the immediate air shed. The expected range of impact from Volatile Organic Compounds (VOCs) is likely to be less than 100m from source such as chemical storage areas, hazardous waste storage areas, etc.

Given that the storage of such volatile substances will be in small volumes, any potential impacts will be limited to the immediate surrounding area where the laydown down areas and/or storage yards are located. Impacts to receptors outside the project site is not anticipated given the distance of the proposed laydown areas to receptor location (over 100m away). Any potential impact to receptors will only occur where inappropriate storage or use of substances is in close proximity to the project site boundary.

5.4.1.4 Odour

The construction phase of the project will require a number of toilet facilities (including septic tanks) on site for site staff and construction workers. There is the potential for the release of odour to the immediate surrounding areas from inappropriate containment and coverage associated with wastewater holding/septic tanks. The expected range of impact from odour is likely to be within 100m from source such as temporary toilets/septic tanks. Such impacts may therefore be limited to the immediate surrounding area.

Table 5-8 Air Quality Impact Significance, Mitigation & Management Measures and Residual Impacts – Construction

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
Dust emissions	**Minor Negative**	Herders' houses	High	**Moderate**	• Any land grading, excavations and moving of uncovered waste/materials will be undertaken during periods of low winds (e.g. <15 km/h is recommended as a threshold when a review of works is conducted). • Daily review of weather updates, to give warning of likely strong winds to assist with the management of windblown dust. • Dust generating activities will be reconsidered (or moved away or downwind of receptors) during periods of high winds conditions (≥15km/h). • Where sand, cement and other dusty materials are transported to the site, trucks will not be overloaded and will be appropriately covered / sheeted to avoid loses en-route. • Cement and other fine powders will be sealed or covered after use, stored and transported in enclosed or bunded containers. • Notice will be provided to the sensitive receptors near the site as early as possible (minimum one-week notice) if there will be activities that might generate a lot of dust. • Dusty material stockpiles (i.e., any fine sands and powders) dust generating activities (stone cutting) are to be located away from the site boundaries and be contained or covered with suitable netting to avoid dust dispersion during storage or use. • Vehicle routes will be clearly demarcated and appropriate signage displayed around the site. • Internal roads inside the project site will be compacted as it reduces vehicular power consumption. • Vehicle speed on all site roads and along the access road into the site will be restricted to 20km/h. • Due to water scarcity in the Project area, unpaved site roads and external access roads will be well compacted such that dust will	**Minor**
		Herders' Livestock stables	Medium	**Minor**		**Negligible**
		Fish Farm (F1 and F2)	High	**Moderate**		**Minor**
		Wind Farm Site Workers	Medium	**Minor**		**Negligible**
		Kuklam Village	High	**Moderate**		**Minor**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					not be generated when used and thus eliminate the need for wetting down. • Project workers will be provided with full PPE kit including dust masks, where dust is identified as a risk to workers. • No burning of wastes will be allowed on-site. • It is recommended that vehicles are cleaned when leaving site to avoid dispersion of soil on roads. Due to water scarcity at the Project site, dry cleaning will be employed for all vehicles leaving the site. • Dust suppression of the concrete batching plant to be conducted regularly using recycled/treated concrete washout to minimize dust generation. • Concrete batching plant will be located away from sensitive receptors. • Unloading of sand and other dust generating materials at the batching plant will be avoided) during periods of high winds conditions (≥15km/h). • All dust generating materials at the batching plant will be adequately covered and stored in enclosed or bunded containers • The EPC Contractor will obtain all the necessary permits related to the construction and operation of the batching plant. • Where applicable, the EPC Contractor will obtain all necessary permits required for the operation of HGV and diesel generators within emission standards.	
Gaseous emissions	**Minor Negative**	Herders' houses	High	**Moderate**	• Project workers will be provided with full PPE kit including face masks. • No burning of wastes will be allowed onsite.	**Minor**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
		Herders' Livestock stables	Medium	**Minor**	• Construction roads in the site will be designated and made clear to the drivers with signage for directions and speed limits placed all along the roads. • Unnecessary usage of vehicles, plant and equipment will be minimised – No unnecessary idling. • Deliveries of equipment/plant to the site will be efficiently managed to reduce the number of trips. • Exhaust fumes and particulates emitted from trucks and vehicles will be minimised by ensuring the use of good condition vehicles (e.g. compliant to vehicle emission requirements). • Lorries and trucks engines will be turned off while waiting on site to minimize gaseous emissions. Air-conditioned or heated shelters will be provided for drivers in designated waiting, loading and unloading areas to prevent drivers waiting in vehicles. • There will be pre-requisite requirements of site vehicles to ensure no black smoke before entering site and that any identified machinery or vehicles with black smoke will require maintenance and re-assessment before it is returned.	**Negligible**
		Fish Farm (F1 and F2)	High	**Moderate**		**Minor**
		Wind Farm Site Workers	Medium	**Minor**		**Negligible**
		Kuklam Village	High	**Moderate**		**Minor**
Emissions of VOCs	**Negligible Negative**	Receptors within 100m from source	Medium	**Minor**	• Hazardous materials stored and used on site with potential gas emissions (e.g. Volatile Organic Compounds) will be located in well-ventilated, but secure low-risk areas, away from major transport routes and away from the site boundary and receptors locations (where possible). • Volatile fuels and chemicals (including hazardous wastes) will be stored in sealed containers. On site storage of large quantities of volatile fuels will be avoided, equally prolonged exposure to direct sun and heat will be avoided. • Fires and material burning will not be allowed on the Project site. • Chemical storage areas will be purpose built and well maintained. A data log of all chemicals with MSDSs will be provided at the storage facility within easy access.	**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
Odour from onsite sanitary facilities	**Negligible Negative**	Receptors within 100m from source	Medium	**Minor**	• Adequate and sufficient sanitary facilities for site workers must be provided in accessible locations to working areas. • Effective cleaning and maintenance of toilets is to be undertaken to avoid odour and cleaning records/inspection sheets displayed in the toilets. • All septic tanks must be sealed (with applicable vents) and fully functioning. • Septic tanks must be operated and maintained according to manufacturer recommendations. • Sanitary wastewater will be removed from site by licensed contractors and disposed in waste treatment facilities approved by the local municipality. • Where possible, all sanitary facilities and septic tanks will be sited away from receptor locations.	**Negligible**

5.4.2 Operational Phase

As the operation of the wind farm will not include combustion related activities, there will be no direct emissions to the local air-shed as a result of primary project operations.

The operation and maintenance requirements of the wind farm will necessitate limited use of vehicles and delivery/removal vehicles along access roads. Emissions from these vehicles will be very minor and are unlikely to result in discernible impacts at receptors. Therefore, the impacts are considered insignificant and have been scoped out of the assessment.

The Project OESMP shall include the applicable best practice measure to ensure any impacts during maintenance activities are properly mitigated. This will include:

- Appropriate quality of fuel used – Fuel of an internationally compliant standard to be sourced through a licensed supplier.
- Limit unnecessary usage of vehicles – No unnecessary idling. This may require providing staff, drivers and visitors with access to heated and air-conditioned areas to wait.
- Planned inspection and maintenance of project vehicles and mobile equipment will be undertaken annually to ensure worthiness.
- Emissions from vehicles will be free from significant black smoke - remedial measures will be taken if this is observed.
- Implement regular maintenance program of vehicles and keep documentary evidence.

5.4.3 Cumulative Impacts

Air quality will be potentially impacted by the construction of on-going activities and existing facilities within the Project area.

Project related impacts on ambient air quality are those associated with construction activities, temporary emissions from vehicles, dust from earthworks and dust from vehicle movements within the Project. However, since the construction of the nearby Bash 52 MW WF and Bash 500 MW WF projects will be completed before the commencement of Gijduvon WF construction, cumulative air quality impacts during the construction phase are not anticipated.

During operation, the wind farm will not involve combustion-related activities, resulting in no direct emissions to the local air-shed. Consequently, cumulative air quality impacts from project operations are not expected.

5.4.4 Decommissioning Phase

Potential impacts relating to decommissioning will be similar to those encountered during the construction phase. This will include the generation of dust from demobilisation and break-up of foundations and landscape restoration etc. As such, it is assumed that the risk of dust generation or gaseous emission as a result of vehicle movement associated with the construction phase will be expected for the decommissioning phase. Likewise, the mitigation & management measures outlined for the construction phase in relation to dust generation and gaseous emission will be applicable to the decommissioning phase as well but will be re-assessed at the time to best inform a Decommissioning Management Plan, with specific relevance to working methods and nay regulations that may be applicable at this time.

5.5 Monitoring

The EPC Contractor and the O&M Company will undertake certain monitoring processes related to air quality during both the construction and operational phases of the project respectively and these are outlined in the table below. The final monitoring methodology with specific monitoring details (i.e. locations, frequencies, durations, parameters etc.) will be developed in the specific 'Environmental Monitoring Plan' by these parties.

Table 5-9 Air Quality Monitoring Requirements

Monitoring	Parameter	Frequency & Durations	Monitoring Location	Responsibility
Construction				
Dust Generation & Dispersion	Dust	Visual observation for dust emissions to be undertaken on a daily basis and if dust is visible and/or complaints/grievances are received, dust meter should be used to quantitatively monitor dust.	Access Road to the Project site, Construction site and laydown areas, Batching plant, Dispersion to external receptors from point of generation.	EPC Contractor E&S Manager
Emissions from engines	Vehicle Emissions	Visual observations of emissions to be undertaken on a daily basis while vehicles & equipment are in use and annual inspection of vehicles. This will include an inspection during the initial acceptance criteria of such vehicles to site.	All non-road vehicles and engines	EPC Contractor E&S Manager

Monitoring	Parameter	Frequency & Durations	Monitoring Location	Responsibility
Sanitary Facilities & Hazardous Material stores	Odour & VOCs	Daily olfactory observations for odour – as part of maintenance and inspection checks Daily inspection of hazardous materials storage areas for any leaks or emission of VOCs	All sanitary facilities available within the laydown areas, sub-contractor camps and work fields. All hazardous material, chemical and fuel stores.	EPC Contractor E&S Manager
Operation				
Emissions from engines	Vehicle emissions	General visual observations of emissions to be undertaken on a daily basis. Regular maintenance & servicing of project vehicles and planned annual inspection.	All road and non-road vehicles and engines belonging to the Project.	O&M Contractor E&S Manager

6 NOISE & VIBRATION

6.1 Applicable Requirements & Standards

6.1.1 National Regulations

The SanPin No. 0267-09 relating to rules on acceptable levels for habitable areas in Uzbekistan sets out the acceptable noise levels for habitable areas both inside and outside of buildings in Uzbekistan as shown in the table below.

Table 6-1 Noise Limits under SanPiN No.0267-09

LOCATION	TIME	SANPIN NO. 0267-09
Noise levels in premises of residential, public buildings and on the territory of residential areas	7am to 11pm	55dB(A)
	11pm to 7am	45dB(A)

The SanPin No. No 03225-16 Sanitary standards for permissible noise levels in the workplace aims to protect the health of the staff and workers in the workplace. The law represents noise levels for a variety of internal and external application as shown in the table below:

Table 6-2 Work Environment Noise Limits

TYPE OF WORK, WORKPLACE	REQUIREMENT
Performing all types of work on the permanent workplaces in industrial premises and in the enterprises	80db(A)

6.1.2 Lender Requirements

6.1.2.1 ADB, AIIB and IFC

ADB, AIIB and IFC require adherence to WHO noise standards as detailed in IFC EHS Guidelines (2007), presented in the following table.

Table 6-3 World Bank Ambient Noise Level Guidelines

RECEPTOR	ONE HOUR LAEQ DB(A)	
	DAYTIME (07:00 – 22:00)	NIGHT (22:00 – 07:00)
Residential, Institutional, Educational	55	45
Industrial, Commercial	70	70

These relates to receptors and not the plant boundary. Noise impacts should not exceed the levels presented above or result in a maximum increase in background levels of 3 dB(A) at the nearest sensitive receptor location off-site.

Furthermore, the following requirements have also been specified in the WBG EHS noise guidelines:

- No employee should be exposed to a noise level greater than 85 dB(A) for duration of more than 8 hours per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C).
- The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound level reaches 140 dB(C), or the average maximum sound level reaches 110 dB(A). Hearing protective devices provided should be capable of reducing sound level at the ear to at least 85 dB(A).
- For every 3 dB(A) increase in sound levels, the allowed exposure period or duration should be reduced by 50%.
- Where feasible, use of acoustic insulating materials isolations of the noise source and other engineering controls should be investigated and implemented prior to the issuance of hearing protection devices as the final control mechanism.
- Medical hearing checks on workers exposed to high noise levels should be performed periodically.

Noise Requirements for Wind Projects

The World Bank/IFC EHS Guidelines for Wind Projects include information relevant to the EHS aspects of onshore and offshore wind energy facilities.

For operational phase noise, the IFC Guideline for Wind Energy include principles for the assessment of sound from wind turbines, which include the following (WBG/IFC, 2015):

- Receptors should be chosen according to their environmental sensitivity (human, livestock or wildlife);
- Preliminary modelling should be carried out to determine whether more detailed investigation is warranted. The preliminary modelling can be as simple as assuming hemispherical propagation (i.e., the radiation of sound, in all directions, from a source point). Preliminary modelling should focus on sensitive receptors within 2,000 m of any of the turbines in a wind energy facility;
- If the preliminary model suggests that turbine noise at all sensitive receptors is likely to be below an LA90 to 35 dB(A) at a wind speed of 10 m/s at 10 m height during day and night times, then this preliminary modelling is likely to be sufficient to assess noise impact; otherwise, it is recommended that more detailed modelling be carried out, which may include background ambient noise measurements;
- All modelling should take account of the cumulative noise from all wind energy facilities in the vicinity having the potential to increase noise levels;
- If noise criteria based on ambient noise are to be used, it is necessary to measure the background noise in the absence of any wind turbines. This should be done at

one or more noise-sensitive receptors. Often the critical receptors will be those closest to the wind energy facility, but if the nearest is also close to other significant noise sources, an alternative receptor may need to be chosen; and

- The background noise should be measured over a series of 10-minute intervals using appropriate wind screens. At least five of these 10-minute measurements should be taken for each integer wind speed from cut-in speed to 12 m/s.

The above principles are referenced from the following key guidance documents:

- ETSU, Report ETSU-R-97 "The Assessment & Rating of Noise from Wind Farms" 1997.
- Institute of Acoustics (IOA) "A Good Practice Guide to the Application of ETSU-R-97 for the Assessment & Rating of Wind Turbine Noise" 2013.
- D. McLaughlin "Wind Shear and its Effect on Wind Turbine Noise Assessment" Acoustic Bulletin, July/August 2012, 39-42.

6.2 Observations and Baseline Conditions

6.2.1 Noise

Noise may occur intermittently during periods of transit for locomotives and their trains along the railway line, north the site. There are a few land users and vehicles that are active in the area, which have some visible vehicle tracks and bridges over the existing water canals but does not include paved roads. Small-scale seasonal herding practices are present across the site. Both the vehicle use and herding practices are not expected to result in major noise influences.

Based on observations made during site visits, there is minimal noise throughout the Project area, although this can vary in areas in proximity of the railway at times of transit. Where there is no rail transit, observed noise is consistent with open-field noise levels.

6.2.1.1 Survey Methodology

A continuous environmental baseline noise monitoring was carried out at four locations in order to quantify existing noise levels at the Project site and at receptor location. These locations were selected as they are considered to be representative of the ambient noise levels for the Project site.

The noise surveys were undertaken during periods of relatively calm weather in order to obtain representative noise baseline data at each location. The noise survey was carried out with two sound level meters Class 1 (Type 1) (Calibration certificates provided in **Appendix D**). The noise meter was arranged at a height of 1.7 m above the ground level and was placed at least 5 m

away from any obstructing or reflecting surfaces. Ambient noise levels were monitored for 10-minute intervals for a period of 14 days at each location.

All the surveys were conducted to make sure it was aligned with the Uzbekistan SanPin No.0267-09 timelines (daytime 7am to 11pm and night-time 11pm to 7am) and those of WHO Noise standard (daytime 7am to 10pm and night-time10pm to 7am).

The A-weighted continuous equivalent sound level (LAeq) along with LAmax, LAmin, LA10, LA 50, LA90 and LA95 were logged at each location. The monitoring locations are provided in the following figure. The coordinates of the monitoring locations as well as site observations are presented in the following table.

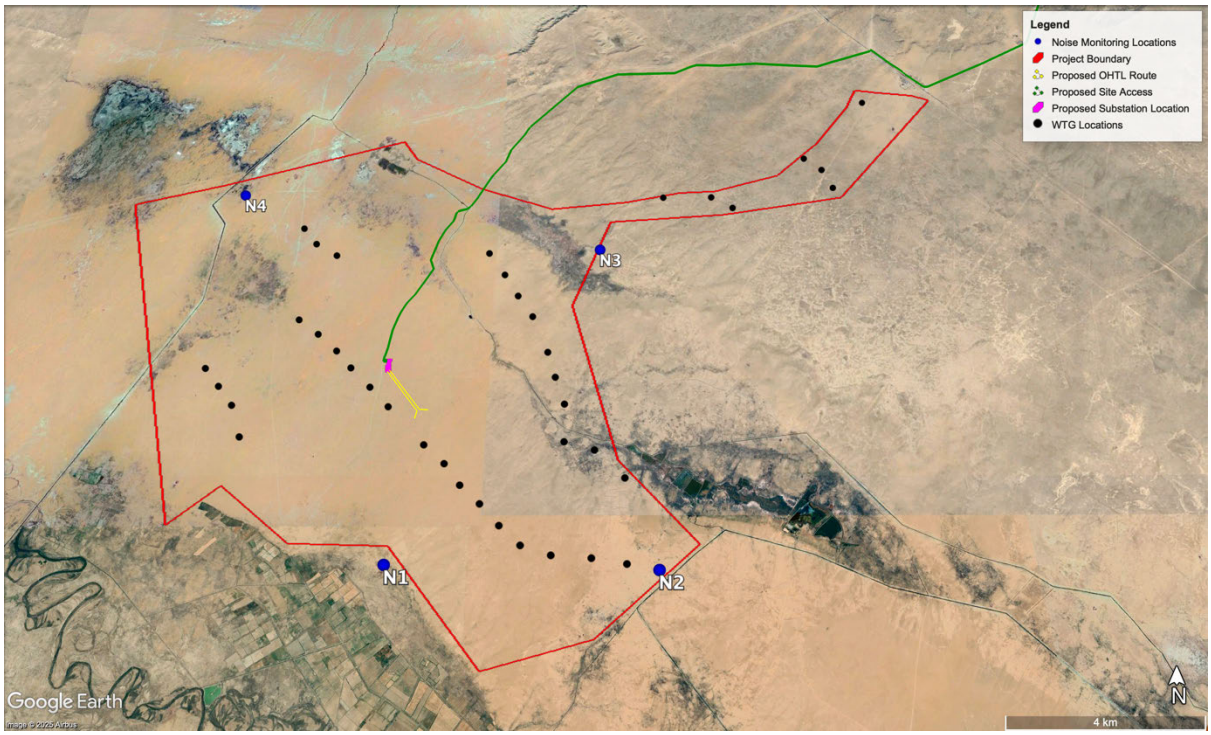


Figure 6-1 Noise Monitoring Locations

Table 6-4 Noise Monitoring Locations

ID	Location	Coordinates		Photos
		Latitude	Longitude	
N1	Near the agricultural area to the southwest of the Project area	40.410407°	64.585127°	
N2	To the south of the Project area, near a herders' house	40.409346°	64.654480°	

ID	Location	Coordinates		Photos
		Latitude	Longitude	
N3	To the northwest of the project site, near a herders' house	40.483051°	64.639430°	
N4	To the northeast of the project site, near a herders' house	40.498304°	64.531683°	

6.2.1.2 Noise Monitoring Results

The noise levels obtained from the survey are presented herein. The A-weighted continuous equivalent sound level (LAeq) along with LAmax, and LA90 have been presented. The results have been compared with the Uzbekistan day and night standard of 55dB(A) and 45dB(A)

respectively. These standards match the World Bank Ambient Noise levels for residential, institutional and educational receptors.

Note: According to BS 5228:2009

- LAeq – This is the equivalent continuous A weighted sound pressure level determined at a distance of 10m from and over the period of a given activity
- LAmax – This is the maximum sound level and provides the highest of the A-weighted sound pressure level with a specified time weighting that occurs during a given event
- LA90 – This is the sound pressure level exceeded for 90% of the monitoring period is often used to describe the background noise level.

A summary of the noise levels recorded during the survey is presented in the following table.

Table 6-5 Summary of Daytime and Night-time Noise Results Monitoring Results

Location	Noise Monitoring Period	Daytime / Night-time	LAeq	LAmax	LA90	National and WHO Standards (dB(A))
N1	25 May – 8 June	07:00-23:00	36.4	54.1	22.4	55
		23:00-07:00	32.0	48.2	19.4	45
N2	26 May – 9 June	07:00-23:00	33.0	48.9	22.8	55
		23:00-07:00	26.3	42.0	18.1	45
N3	8 June – 21 June	07:00-23:00	32.6	48.6	26.9	55
		23:00-07:00	23.1	38.9	18.8	45
N4	9 June – 24 June	07:00-23:00	35.4	52.2	22.4	55
		23:00-07:00	23.3	39.2	19.4	45

The average noise results (Leq) obtained at the four monitoring locations ranged from 32.6 dB(A) to 36.4 dB(A) between the daytime hours of 07:00am to 23:00pm and ranged from 23.3 dB(A) to 32.0 dB(A) between the night-time hours of 23:00pm to 07:00am. Upon comparison of the average Leq results obtained with Uzbekistan day and night-time standard, the average daytime noise level and night-time noise level at the four monitoring locations were well below the limit of 55 dB(A) and 45 dB(A) respectively. These results are consistent with the observations made on site (of a generally quiet location).

6.2.2 Vibration

Although it has not been noticed, it is expected that a limited amount of vibration may be discernible in areas immediately adjacent to the railway line at times of rail transit. Besides this, there are no current facilities/works/processes in the vicinity of the proposed Project site that are likely to result in significant vibrations at or around the Project area.

6.3 Receptors

In relation to noise impacts from the wind farm construction activities, the expected range of impacts are likely to be within a zone of 2km. Human receptors[8] were identified within 2km from each WTG that may be susceptible to changes in noise levels. In addition, considering receptors located less than 500 m from the WTGs will be relocated prior to the commencement of the construction activities, they have been excluded from the assessment. The noise sensitive receptors are included in the following table.

Table 6-6 Potential Noise Receptors

Receptor	Receptor Type	Sensitivity	Justification
Herders' houses	Residential	**High**	Herders that use this accommodation will be particularly vulnerable to increase in ambient noise levels.
Herders' Livestock stables	Commercial	**Medium**	Livestock kept at these stables will be particularly vulnerable to changes in noise levels.
Fish Farm (F1 and F2 and fish farm area outside the Project Boundary)	Residential /Ecological	**High**	Herders that use this accommodation and the fish at the pond will be particularly vulnerable to increase in ambient noise levels.
Wind Farm Site Workers	Construction Workers	**Medium**	Workers will be particularly vulnerable to changes in ambient air quality. However, they will be supplied with PPE to manage potential air impacts arising from the Project.
Kuklam Village	Residential	**High**	Residents of this village will be particularly vulnerable to increase in ambient noise levels resulting from the construction activities of the Wind Farm and increased traffic along the access road.
Vahta Post	Industrial	**Low**	Workers will unlikely be sensitive to project impacts due to the nature of works they are exposed to from their facilities.
Zafarobod Hydrocarbons Storage	Industrial	**Low**	Workers will unlikely be sensitive to project impacts due to the nature of works they are exposed to from their facilities.

[8] Livestock stables were excluded from this assessment

6.4 Potential Impacts, Mitigation, Management & Residual Impact

6.4.1 Construction Phase

6.4.1.1 Construction Noise

Construction activities will likely result in temporary and short duration increases in the noise and vibration levels emanating from the project site, access road, batching plant and the laydown areas; dependant on the type of works being undertaken.

Noise will be generated by construction and propagated to the surrounding areas via a range of processes. Pertinent construction activities at the project site in relation to noise are likely to include

- Site Preparation
- Civil Works
- Construction and Installation
- Internal Road Compacting
- Concrete mixing and other works at the batching plant
- Vehicle movements (on and off-site)

The accumulation of noise from the above sources can introduce potential cumulative impacts when generated in tandem. All of these impacts may have a negative effect on the amenity of receptors within 2km of each wind turbine.

The anticipated construction equipment/machinery to be used at the site for various construction activities together with noise data for this equipment are presented in the following table as obtained from 'British Standards: Code of practice for noise and vibration on construction and open sites'.

Table 6-7 Noise Level of Proposed Construction Equipment

Equipment	BS 5228-1:2009 Reference	SPL dB (A)
Site Prep and Earth and Civil Works		
Wheel loader	Table C.6, 28	76
Backhoe excavator	Table C.2,3	78
Crawler bulldozer	Table C.6,29	88
Road roller	Table C.2, 38	79
Dump truck	Table C.2, 30	79
Diesel Generator	Table C.4, 84	74

Equipment	BS 5228-1:2009 Reference	SPL dB (A)
Truck	Table C.4, 62	66
Forklift	Table D.7 96	77
Building & Foundation Works		
Platform lorry	Table C.2,34	80
Concrete pump truck	Table C.4, 30	79
Concrete delivery truck	Table C.4, 20	80
Piling machine	Table C.3, 1	89
Diesel Generator	Table C.4, 84	74
Truck	Table C.4, 62	66
Forklift	Table D.7 96	77
Mechanical & Installation Works		
750t crawling crane	Table C.4,52	75
150t crawling crane	Table C.4,52	75
Lifting frame	Table C.4,57	67
250t crawling crane	Table C.4,52	75
50t crawling crane	Table C.4,50	71
50t truck crane	Table C. 4, 46	67
Gantry crane	Table C.4,52	75
Tower crane	Table C.4.48	76
Vehicle crane	Table C. 4, 50	71
Diesel Generator	Table C.4, 84	74
Truck	Table C.4, 62	66
Forklift	Table D.7 96	77
Batching Plant Works		
Concrete pump truck	Table C.4, 30	79
Concrete delivery truck	Table C.4, 20	80
Truck	Table C.4, 62	66
Diesel generator	Table C.4, 84	74
Wheel loader	Table C.6, 28	76
Backhoe excavator	Table C.2,3	78
Crawler bulldozer	Table C.6,29	88
Dump truck	Table C.2, 30	79

Predicted noise levels for construction plant impacts at receptors have been calculated using the noise ratings for equipment (as above), in combination with distance attenuation to receptors, assuming no sound barriers are used. The phases of construction have been split (as above) and the noise pressure levels from expected equipment have been combined. The

predictions assume that each piece of equipment will only be operational for 50% of the working day. The predictions also work on the basis that all of the equipment is located at the same location at the boundary of the site and boundary of the batching plant as applicable nearest WTG (a worst-case).

In order to derive representative noise levels for the purpose of calculating the construction noise impacts, baseline daytime and night-time noise levels have been calculated from the logarithmic average of all measurements obtained over a given period of time in order to obtain a single ambient noise level for each location and assessment period.

A basic modelling assessment using equations set out in Annex F of 'BS5228-1:2009 Part 1 Noise' has been used to predict the effects of distance propagation and ground absorbance related to different stages of construction shown in the table below.

The relevant noise monitoring location has been selected by determining the nearest baseline monitoring location to each receptor. The cumulative impact is based on the overall noise and considers the baseline noise and the construction noise levels.

The cumulative noise levels obtained are then compared with applicable established standards to determine the significance level of construction noise impacts.

In respect of potentially more sensitive residential receptors, BS5228 outlines criteria in Annex E.3, which considers impact significance based upon the change in ambient noise associated with construction activities. BS5228 states that this can be considered as, '*an alternative and/or additional method to determine the significance of construction noise levels*'. Paragraph E.3.2 describes Example Method 1 (The ABC Method), which considers the existing ambient noise environment (the LAeq noise level environment) at the neighbouring sensitive receptors and identifies levels that if exceeded would be considered to result in a significant adverse effect and is noted to apply to residential receptors only.

Table E.1 of BS5228 sets out significance effect threshold values at receptors. The process for determining this requires the determination of the ambient noise level at the relevant receptor (rounded to the nearest 5dB), which is then compared to the total noise level, including the predicted construction noise level. If the combined noise level exceeds the appropriate category value, then the impact is deemed to be significant. The relevant statistics from Table E.1 are set out below.

Table 6-8 Construction Phase Noise - ABC Assessment

Assessment Category and Threshold Value Period (L_{Aeq})	Threshold Value, in Decibels - dB(A)		
	Category A	Category B	Category C
Daytime (0700 to 1900 hrs) and Saturdays (0700 to 1300 hrs)	65	70	75
Evenings & Weekends	55	60	65
Night-time (2300 to 0700 hrs)	45	50	55
NOTE 1 *A significant effect has been deemed to occur if the total LAeq noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.*			
NOTE 2 *If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total LAeq noise level for the period increases by more than 3 dB due to construction activity.*			
NOTE 3 *Applied to residential receptors only.* *A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.* *B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.* *C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.*			

Note: *The ABC Method does not provide levels of significance, as such professional judgement has been applied to determine this within following significance tables.*

Various types of equipment will be used for different construction activities. Noise levels were calculated assuming all equipment operates at the nearest WTG for 50% of the working day during each construction stage. The anticipated noise levels at a distance of 10 meters for each stage are as follows:

- Site Preparation, Earth & Civil Works: 90.4 dB(A)
- Building & Foundation Works: 93.3 dB(A)
- Mechanical & Installation Works: 83.3 dB(A)

To streamline the assessment across different construction stages, the worst-case scenario, representing the highest noise levels during the building and foundation works, was used for evaluation at each receptor location.

For the purpose of the quantitative assessment, human receptors[9] were identified within 2km from each WTG that may be susceptible to changes in noise levels. Considering receptors located less than 500 m from the WTGs and those that will be impacted during the operation

[9] Livestock stables were excluded from this assessment

of the project (refer to section 6.4.2.1) will be relocated prior to the commencement of the construction activities, they have been excluded from the assessment.

The tables below provide details of receptors located within 2 km of the nearest WTG (excluding those that will be relocated), including their distance from the noise source and the predicted noise levels at these locations.

Table 6-9 Building & Foundation Works Noise Attenuation by Distance

Receptor	Herders' (H) ID	Nearest WTG	Distance from Source (m)	Predicted Noise Level
Source Noise: 93.3 dB(A) (at 10m)				
Herder's house	H1	BSH2-01	1110	44.1
Herder's house	H2-a	BSH2-02	1990	37.8
Herder's house	H2-b	BSH2-04	1110	44.1
Herder's house	H3	BSH2-19	1080	44.4
Herder's house	H6-a	BSH2-30	1260	42.8
Herder's house	H6-b	BSH2-27	1890	38.4
Herder's house	H8-a	BSH2-07	1660	39.8
Fish Farm (and herder's house)	H10-a (F2)	BSH2-11	1300	42.4
Herder's house	H12-a	BSH2-12	840	47.2
Herder's house	H14-d	BSH2-40	1660	39.8
Herder's house	H14-e	BSH2-40	1570	40.4
Herder's house	H17-a	BSH2-19	2000	37.8
Herder's house	H18	BSH2-36	1740	39.3
Herder's house	H20	BSH2-40	1800	38.9
Fish Farm (and herder's house)	H22 (F1)	BSH2-08	1980	37.9
Vahta Post	-	BSH2-19	1750	39.2
Receptors outside the Project Boundary				
Zafarobod Hydrocarbons Storage	-	BSH2-01	1490	40.9
Kuklam Community	-	BSH2-01	1815	38.8
Fish Farm area	-	BSH2-18	1520	40.4

Daytime cumulative noise levels and predicted change in noise levels were calculated based on the noise baseline data from the nearest monitoring site.

Table 6-10 Summary of Building & Foundation Works Noise Assessment

Receptor	Relevant noise monitoring location	Baseline noise level	Anticipated Construction Noise at Receptor Location Due to Construction Works & distance attenuation (dBA)	Cumulative Noise Level At Receptor Location (dBA)	Change from Baseline
H1	NS-3	32.6	44.1	44.4	11.8
H2-a	NS-3	32.6	37.8	39.0	6.4
H2-b	NS-3	32.6	44.1	44.4	11.8
H3	NS-4	35.4	44.4	45.0	9.6
H6-a	NS-1	36.4	42.8	43.7	7.3
H6-b	NS-3	32.6	38.4	39.4	6.8
H8-a	NS-3	32.6	39.8	40.5	7.9
H10a (F2)	NS-3	32.6	42.4	42.9	10.3
H12-a	NS-2	33	47.2	47.3	14.3
H14-d	NS-1	36.4	39.8	41.4	5.0
H14-e	NS-1	36.4	40.4	41.8	5.4
H17-a	NS-4	35.4	37.8	39.7	4.3
H18	NS-2	33	39.3	40.2	7.2
H20	NS-1	36.4	38.9	40.8	4.4
H22 (F1)	NS-4	35.4	37.9	39.8	4.4
Vahta Post	NS-4	35.4	39.2	40.7	5.3
Zafarobod Hydrocarbons Storage	NS-3	32.6	40.9	41.5	8.9
Kuklam Community	NS-3	32.6	38.8	39.7	7.1
Fish Farm area	NS-2	33	40.4	41.2	8.2

Noise generation during construction is inevitable, and based on the calculations above, noise impacts are expected at all receptors. However, it is important to note that the above calculations do not account for any acoustic barriers between the noise source and the sensitive receptors. Any buildings, acoustic enclosures and fence lines between the Project and the receptors will act as an acoustic barrier and reduce the noise impact on the receptor. In addition, these will largely depend on the location of the activities with respect to these receptors.

In accordance with the ABC method, as the daytime ambient noise level at these residential receptors (excluding the Vahta Post and Zafarobod Hydrocarbons Storage) (when rounded to the nearest 5dB(A)) is less than category A values, hence Category A threshold values are applicable to these residential receptors during daytime. Therefore, the noise impacts at these

receptors are below the threshold value of 65dB(A) for daytime. Therefore, noise impacts these receptors are deemed insignificant.

As Vahta Post and Zafarobod Hydrocarbons Storage are not residential receptors, the ABC assessment is not applicable to these receptors as such, the cumulative noise level at these receptor locations is compared with established Uzbekistan noise limit of 55dB(A) for daytime.

6.4.1.2 Vehicular Noise

The addition of temporary construction vehicles on local roads and within the site will likely result in temporary increases in traffic which will consequently result in an increase to noise levels at off-site receptors within close proximity to the Project area and close to the site access road and along key routes. Impacts due to vehicular noise will vary due to the phasing of works and the timing of vehicular movements, which affect both vehicles flow and the percentage of heavy vehicles.

The flow of vehicles in the local area is not constant, but the road which runs parallel to the railway line at the Project site has a low traffic. The construction phase will result in the presence of larger vehicles (HGV's) and other more specialised equipment. As a major Project in the local area requiring hundreds of construction staff, associated equipment and deliveries, there will be a noticeable increase in vehicles at the site and along key access routes. This will influence noise levels and impacts to users of these roads and the receptors identified along the access road connecting the road which runs parallel to the railway line to the Wind Farm. It is noted that such impacts will be limited to the construction phase only and may be more prevalent during certain period of construction which require more vehicle trips.

Internal site roads will generate a new noise source from the movement of construction vehicles. Such noises will be predominantly experienced by the Project construction worker and herders grazing their livestock in nearby lands. It is noted that much of this movement of vehicles has been captured by the predictions for construction equipment as above.

6.4.1.3 Vibration

Certain construction processes, particularly those involved with site preparation and civil works, e.g. breaking, piling, vibratory rollers etc. have the potential to create vibration within the vicinity of the works. Vibration to a lesser extent is also anticipated to occur around the construction site due to the movement of materials and equipment by vehicles.

Vibration dissipates rapidly as it spreads and loses energy radiating 360 degrees from the source, hence impacts from vibration are not expected to be discernible at receptors located over 500m away from the Project site. Considering no receptor are expected within 500m from

the construction activities, the vibration impacts have not been discussed any further in the assessment.

6.4.1.4 Noise Impacts to Site Workers

Site workers will be exposed to varying levels of noise depending on their specific roles and activities being conducted including noise from site preparatory, building & foundation and mechanical & installation works as described above. This may relate to exposure to noise in areas that are considered 'high' (e.g., above occupational health and safety guidelines), Without mitigation, noise impacts to the workforce could results in health impacts, for example hearing damage.

Table 6-11 Noise Impact Significance, Mitigation & Management Measures and Residual Impacts – Construction

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
Construction Site Noise	**Negligible Negative**	Herders' houses (located outside the 700m buffer)	High	**Minor**	• Where practical, additional noise barriers /attenuation will be employed to ensure that the maximum noise level at 1m distance outside of the plant fence when all equipment is running do not exceed 70dB(A) and maximum noise level at 1m from open air installations do not exceed 85dB(A). • Night-time construction works particularly near the project boundary will be avoided as much as practicable to prevent noise impact at the receptor location. Where unavoidable, night work permits (if applicable) will be obtained from the relevant authorities. • The EPC Contractor will, at all times, carry out all work in such a manner as to keep any disturbance from noise to a minimum (by phasing noisy works). • Acoustic covers on machine engines to remain closed at all times as applicable. • Where practical, electrically powered plant will be preferred to mechanically powered alternatives. • All mechanically powered plant, diesel engine vehicles and compression equipment will be fitted with noise control equipment (exhaust silencers, mufflers) as available from the manufacturer. • Where possible, the highest noise emitting activities will be undertaken in a central site area, or within an enclosed structure. For example, fabrication of materials will be carried out away from the site boundaries and or within structures. • Items of plant on site operating intermittently will be shut down in the intervening periods between use. • Dropping of metallic objects from height will be avoided as far as practicable particularly. • Notice will be provided to the sensitive receptor as early as possible (minimum one-week notice) of periods of noisier works	**Negligible**
		Herders' Livestock stables (located outside the 700m buffer)	Medium	**Minor**		**Negligible**
		Fish Farm (F1 and F2 and fish farm area outside the Project Boundary)	High	**Minor**		**Negligible**
		Kuklam Village	High	**Minor**		**Negligible**
		Vahta Post	Low	**Negligible**		**Negligible**
		Zafarobod Hydrocarbons Storage	Low	**Negligible**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					in regards to certain construction activities and for how long such activities will be likely to last in accordance to the SEP. • The impacted receptors will have access to a grievance mechanism in accordance with the Project SEP in order to make any complaints regarding noise during the construction phase	
Vehicular Noise at receptors near the roads	**Minor Negative**	Herders' houses	High	**Minor**	• Limit unnecessary usage of vehicles/equipment – No idling – Equipment to be shut or throttled down when in intermittent use. • Delivery vehicles will be prohibited from waiting outside the site with their engines running. • Ensure any appropriate permits are in place for deliveries to the site and for any works performed outside normal working hours. • Notify residents in proximity to the access road of noisy activities or special deliveries of large equipment to be conducted nearby their dwellings with a minimum one week in advance. • Review vendor specifications and accept site plant & vehicles, in particular heavy vehicles, based on noise emissions (as far as practical). • The movement of heavy vehicles during the night will be avoided wherever practical. • Where available in country, audible reversing alarms with broadband noise (white noise) will be preferred over tone alarms (beeping), to limit external disturbance to communities. • Where construction vehicles will be operating in close proximity to the accommodation camp, the need for trucks to reverse will be minimized as far as practicable. This is so as to reduce the frequency at which disturbing but necessary reverse warnings sirens will be used.	**Negligible**
		Herders' Livestock stables	Medium	**Minor**		**Negligible**
		Fish Farm (F1 and F2)	High	**Minor**		**Negligible**
		Kuklam Village	High	**Minor**		**Negligible**
		Zafarobod Hydrocarbons Storage	Low	**Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					• Speed limits established in the Traffic Management Plan will be adhered to.	
Impacts to Construction Workers	**Moderate Negative**	Wind Farm Site Workers	Medium	**Moderate**	• Where noise levels exceed 80dB(A) noise protection devices will be provided to personnel on-site and the area marked as a high-noise zone where ear protection is mandatory. Note: 80dB(A) is aligned with Uzbekistan noise standards. • Operators of vibrating hand-held machinery (if any) will be provided with appropriate PPE (e.g., protective gloves and ear muffs/plugs) and be given suitable breaks from using such equipment to reduce the impacts of vibration. • Workers potentially exposed to high noise and vibration will be provided with appropriate PPE with respect to the occupational H&S risk assessment conducted for that activity. • Workers potentially exposed to high noise and vibration will be trained to identify situation when PPE is required to be worn and how to effectively utilize the PPE. • These mitigation measures will be incorporated to the applicable occupational H&S plan being developed by the EPC Contractor and implemented on-site. The OHS plan will be developed in accordance with IFC EHS Guideline in relation to OHS noise and vibration.	**Minor**

6.4.2 Operational Phase

6.4.2.1 Wind Turbine Noise

During the operation of the wind turbines, noise will be generated from mechanical and aerodynamic sources. Both mechanical and aerodynamic noise may result in propagation to areas within 2km of the WTG. Mechanical noise is radiated by the surface of the turbine and by openings in the nacelle housing and will emanate from generator, gearbox, yaw drives etc. These components produce their own characteristic noise. Aerodynamic noise will be produced by the flow of air over the blades. This is the major source of noise during operations and it generally increases as rotor speed increases.

Noise from wind turbines vary with wind speed. The sound power level of wind turbines increases with higher wind speed due to the increase in rotation speed of the turbine blades.

Preliminary Noise Modelling Study

In order to evaluate noise from the operation of the wind turbines, a preliminary noise modelling study was undertaken in accordance with the IFC EHS Guidelines on Wind Energy. This preliminary noise modelling study was undertaken due to the presence of noise sensitive receptors within proximity of the proposed turbine locations. The preliminary noise modelling study considered the wind turbine locations, receptor locations, model of turbine, number of wind turbines and sound power levels based on data supplied by the manufacturer.

The noise study also considered the sound power levels of the turbines in octave bands for the hub height of 100m & wind speed of 10m/s, tonality of 5dB for receptors within 300m of a turbine, topographical conditions of the project area and a light downwind propagation correction to represent worst case was used.

Noise levels at receptor locations were calculated using the noise modelling suite IMMI2024 in accordance with the ISO 9613 prediction methodology. This model considers the noise 'emission' of each turbine and calculates the accumulative noise level at each receptor in accordance with the ISO9613 methodology. Noise levels were calculated at the first-floor height (4m above ground).

The predicted noise emissions from wind turbines at the assessed receptors ranged between approximately 24dB(A) to 51dB(A) at 10m/s. The predicted noise levels at the majority of the receptors were above the 35dB L_{A90} noise limit established by the IFC EHS Guidelines: Wind Energy, indicating that detailed modelling was required for 31 receptors, most of which are located within the Project boundary. For the full list of results of the preliminary modelling, please refer to **Appendix E**.

Detailed Noise Modelling

As per the IFC's, "The Environmental, Health and Safety Guidelines for Wind Energy (2015)",

- Preliminary modelling should be carried out to determine whether a more detailed investigation is warranted.
- If the preliminary model suggests that turbine noise at all sensitive receptors is likely to be below an LA90 of 35 decibels (dB) (A) at a wind speed of 10 meters/second (m/s) at 10 m height during the day and night times, then this preliminary modelling is likely to be sufficient to assess noise impact.
- Otherwise, more detailed modelling should be done, which may include background ambient noise measurements.

Therefore, in line with the IFC's environmental guidance on Wind Energy projects, after the preliminary model identified 12 receptors as non-compliant with the initial IFC 35 dB LA90, T criterion, a more detailed modelling, including background ambient noise measurements were required.

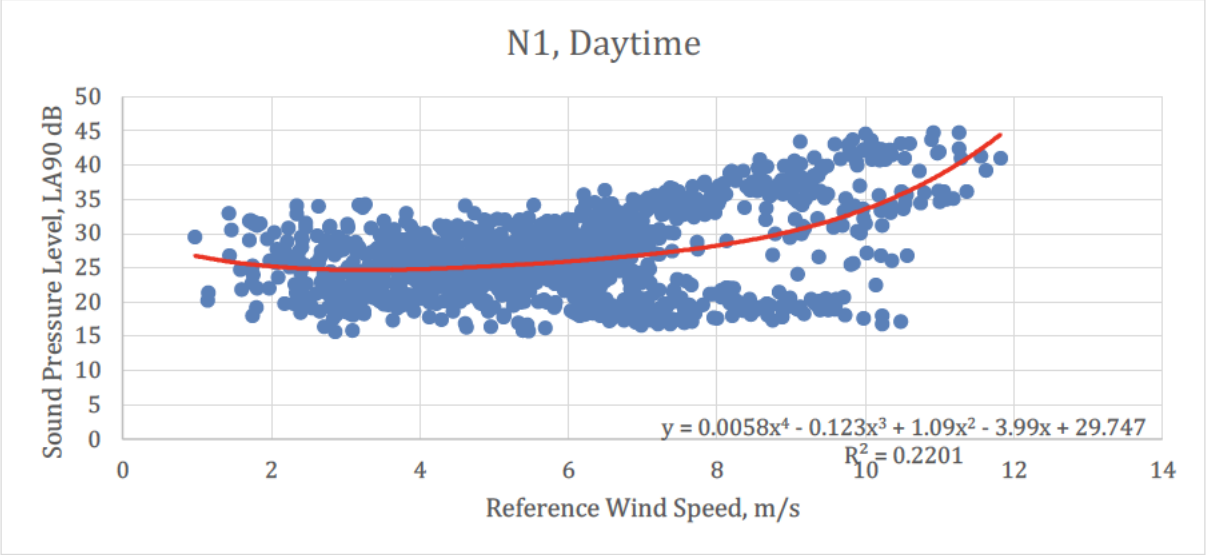
Between the 25th of May and 30th of June 2024, continuous background noise monitoring was conducted at four (4) proxy locations, NM1 to NM4. The four proxy locations, as shown in Figure 6-1 were chosen to represent the overall project area and the receptors identified in the preliminary model.

The wind data collected from the onsite wind masts was corrected to a standardised wind speed at 10m above ground before being used in a regression analysis to determine background noise levels at specific wind speeds. As with the preliminary model, this model also considered the noise 'emission' of each turbine and calculated the accumulative noise level at the identified receptor in accordance with the ISO9613 methodology. Noise levels was calculated at the first-floor height (4m above ground).

By considering the source noise levels, the area of acoustic or non-acoustic enclosures (where available), structures and buildings and the intervening distance to the receptors, a noise model was constructed using the proprietary software IMMI2024, using the methodology outlined in ISO9613 which describes a detailed procedure to calculate sound levels from point/line/area sources.

Results

After an appropriate amount of background noise data had been collected, a regression analysis was conducted, as shown below. The readings show how background noise (L_{A90}) varies with wind speed.



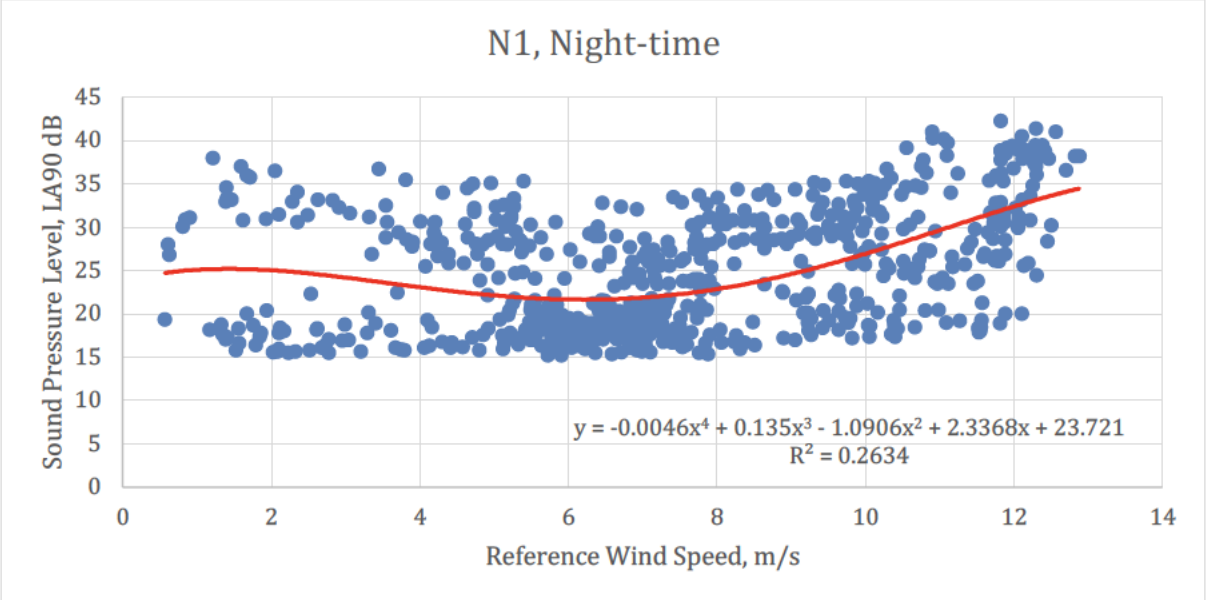
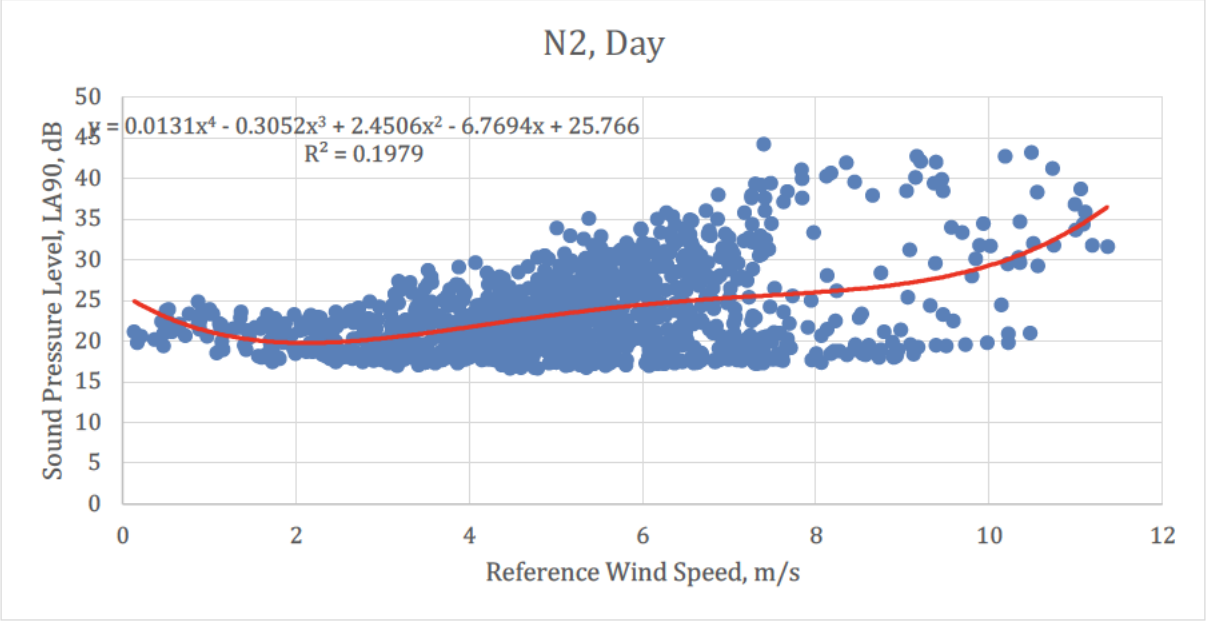


Figure 6-2 Regression Analysis at Survey Location N1



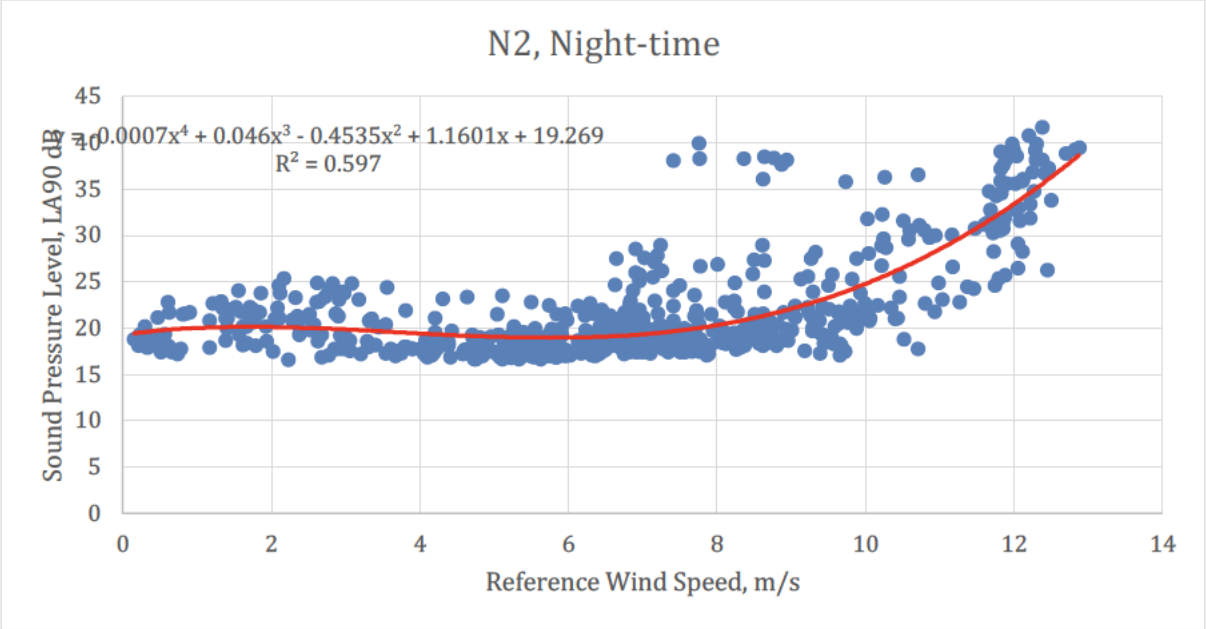
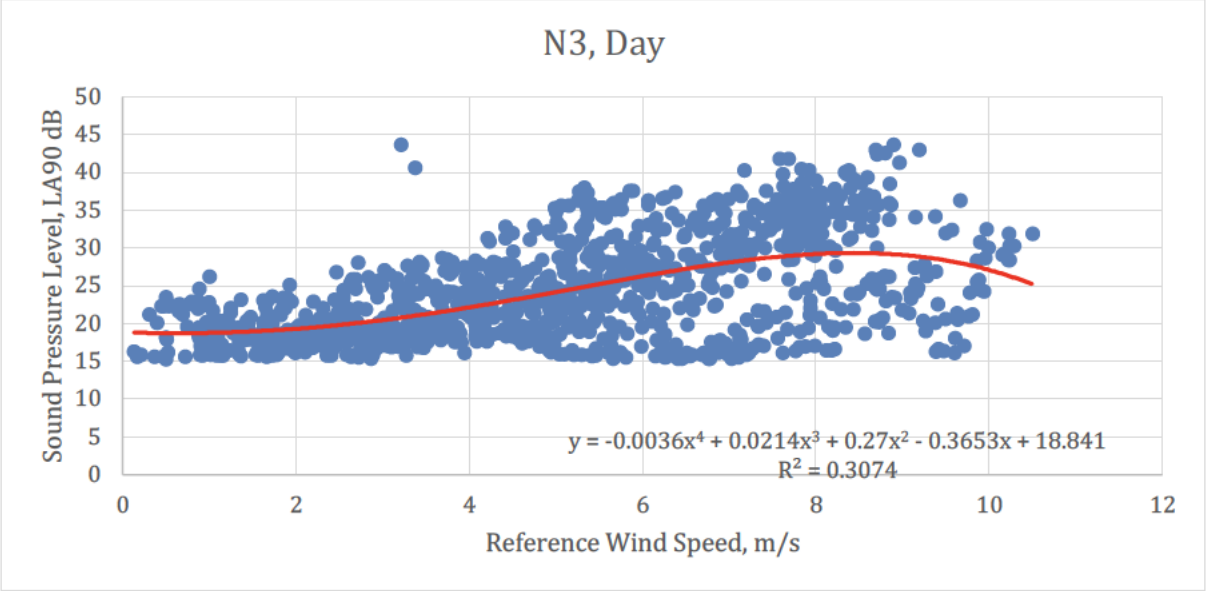


Figure 6-3 Regression Analysis at Survey Location N2



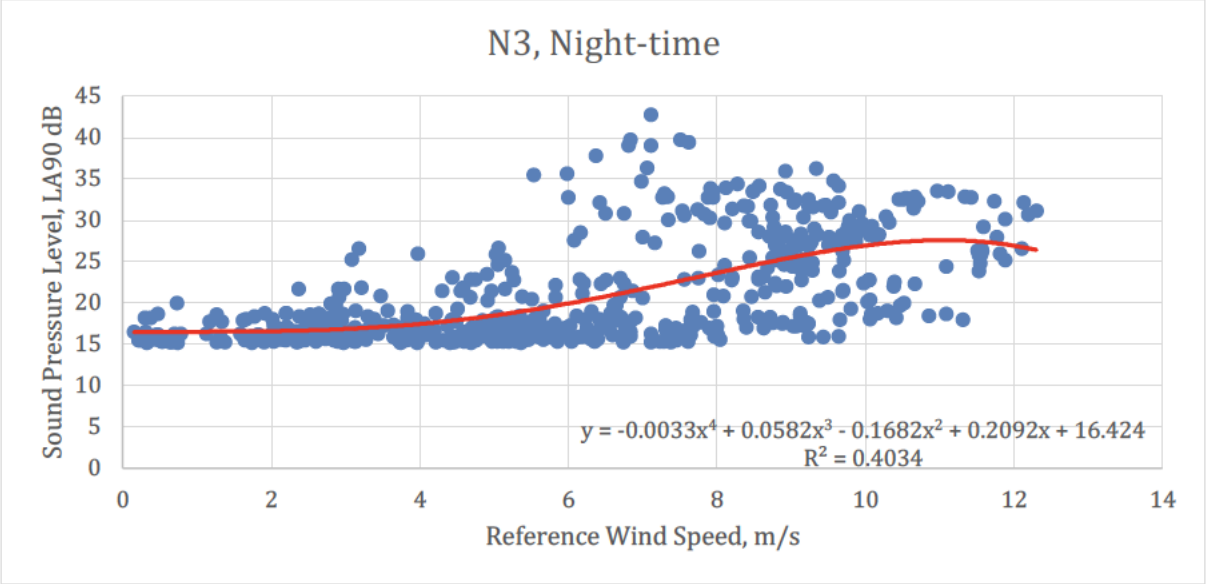
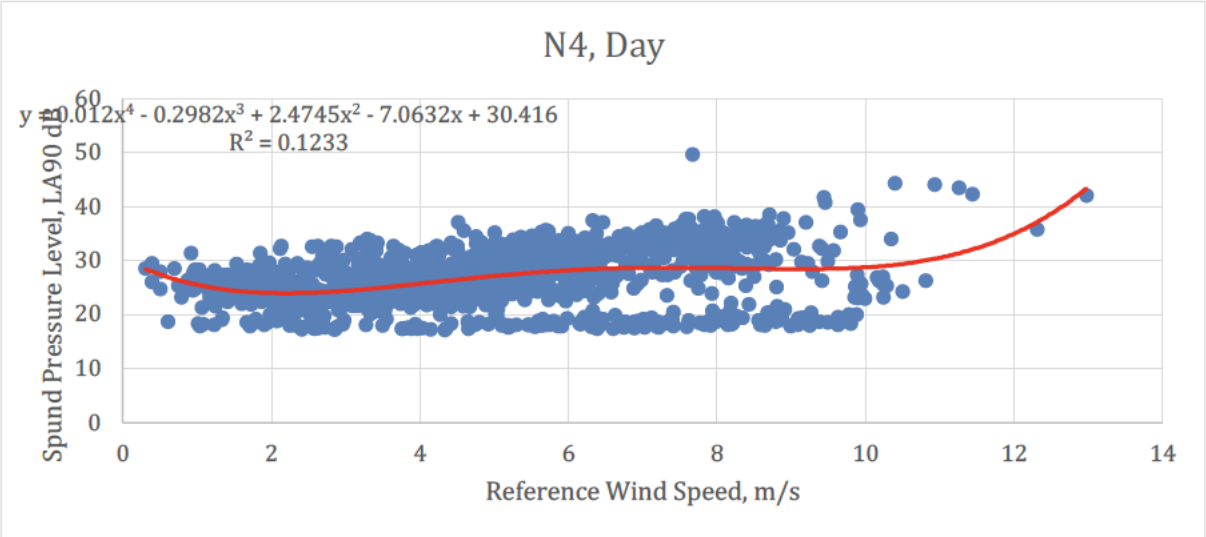


Figure 6-4 Regression Analysis at Survey Location N3



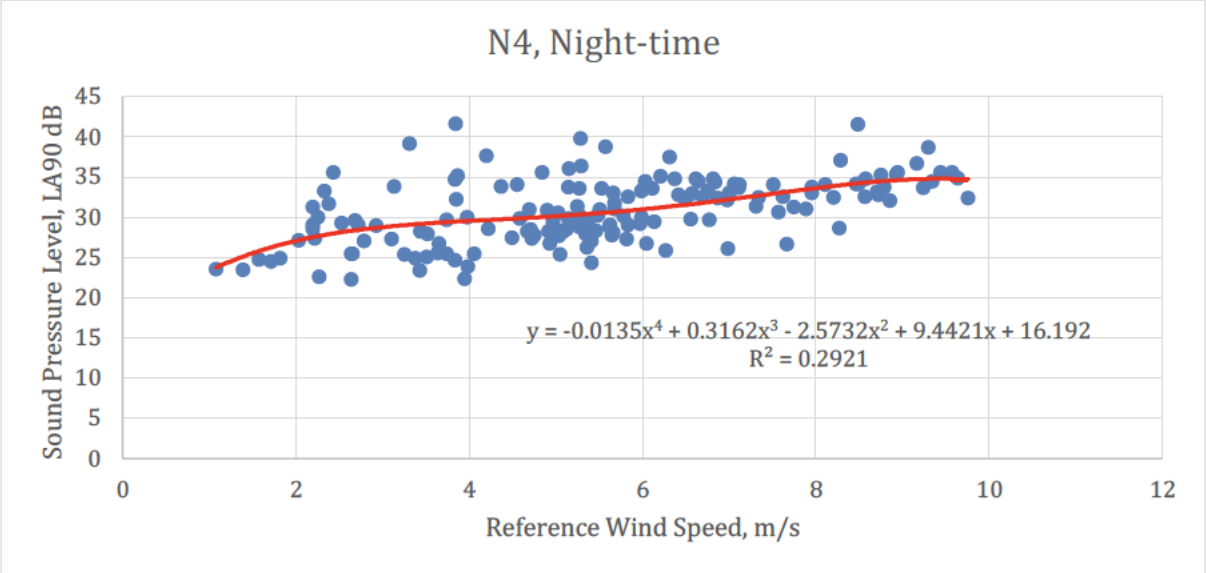


Figure 6-5 Regression Analysis at Survey Location N4

The Institute of Acoustics guideline states that '*for the protection of sleep of occupants within buildings an external free-field level of 43 dB L_{A90} is appropriate when background noise levels are low. When background noise levels are sufficiently high, then the noise limits are set to the prevailing background of +5dB*'. Considering this, the following derived noise levels were calculated and presented in the following table together with the predicted noise levels from wind turbines at 10m/s at the residential receptor locations.

Table 6-12 Compliance Status with IFC/Uzbekistan Assessment Limits

Receptor	Receptor Classification	Nearest WTG	Distance (m)	Compliance Status		Predicted Noise Levels
				IFC General / Uzbekistan Daytime 53 dB Criteria	IFC General / Uzbekistan Night-time 43 dB Criteria	
F1	Fish Farm	BSH2-08	2018	Y	Y	36
F2	Fish Farm	BSH2-11	1295	Y	Y	43
F3	Fish Farm (Outside the Site)	BSH2-18	1585	Y	Y	39
H1	Herder's House	BSH2-01	1100	Y	Y	40
H2-a	Herder's House	BSH2-02	1994	Y	Y	37
H2-b	Herder's House	BSH2-04	1147	Y	Y	41
H3	Herder's House	BSH2-19	1065	Y	Y	43
H4-a	Herder's House	BSH2-09	537	Y	N	47
H4-b	Herder's House	BSH2-09	522	Y	N	47
H5-a	Herder's House	BSH2-15	583	Y	N	48
H5-b	Herder's House	BSH2-15	547	Y	N	48
H6-a	Herder's House (Trailer)	BSH2-30	1239	Y	Y	43
H6-b	Herder's House	BSH2-28	1893	Y	Y	43
H7	Herder's House (Trailer)	BSH2-24	368	Y	N	51
H8-a	Herder's House	BSH2-07	1657	Y	Y	38
H10-a	Herder's House	BSH2-11	1295	Y	Y	43
H10-b	Herders house (partially demolished & not in use)	BSH2-11	1221	Y	N	44
H12-a	Herder's House	BSH2-36	836	Y	Y	43
H12-b	Herder's House	BSH2-18	420	Y	N	50
H14-a	Herder's House	BSH2-38	558	Y	N	48
H14-b	Herder's House	BSH2-37	570	Y	N	46
H 14-c	Herder's House (Trailer)	BSH2-39	232	N	N	58
H14-d	Herder's House	BSH2-40	1664	Y	Y	38
H14-e	Herder's House	BSH2-40	1574	Y	Y	39
H18	Herder's House	BSH2-35	1584	Y	Y	40
H19	Herder's House	BSH2-30	2524	Y	Y	38

Note: Y: Yes Compliant and **N:** Not Compliant

As presented in the table above, noise generated from the operation of the WTGs range between 46 dB(A) and 58 dB(A) at H4-a, H4-b, H5-a, H5-b, H7, H10-b, H12-b, H14-a, H14-b, and H 14-c which are higher than the night-time background noise of 43 dB(A). Noise contributed

from the BSH2-39 at H14-c is 58 dB(A) higher than the daytime background noise (53 dB(A)). However, it should be noted that the noise output of a turbine varies with the wind speed and therefore the noise climate attributable to the wind farm will not always be at a worst-case output at 10 m/s or greater.

All the residential structures (H4-a, H4-b, H5-a, H5-b, H7, H10-b, H12-b, H14-a, H14-b, and H 14-c) are located within the Project site and used by herders therefore, the sensitivity of these receptors is considered to be 'High'. Therefore, these receptors will be required to be relocated.

The noise modelling study is presented in **Appendix E.**

6.4.2.2 Operational Vehicle Noise

Besides maintenance vehicles and potential low magnitude humming from the electrical transformers (which is not expected be discernible at over 50m distance from source), there will be very few specific point noise sources from the project.

Given the minimal requirements for maintenance activity during operation, noise impacts from vehicles are also not expected to be major source of noise as it will only be discernible along access roads and within the wind farm boundary. As such, operational vehicle noise is not expected to be discernible at identified receptor locations. As the magnitude of noise impacts are minimal, further assessment has not been undertaken.

6.4.2.3 Other Operational Noise

During the operation of the OHTL, transmission of electricity through the overhead lines results in the production of noise related to the 'corona discharge' effect. Such noise is in the form of buzzing and humming and reaches high levels during rain, fog, snow and other wet weather conditions. According to the IFC EHS Guideline on Electric Power Transmission and Distribution, these noise emissions from the transmission line do not pose any known health risks.

The noise intensity generated by Corona discharge depends on the number of conductors in the cable bundle and atmospheric humidity. When it's raining, the sound of rain will mask the high noise emission generated during electricity transmission. However, there is a potential for corona effect generated during other wet weather condition (e.g. snow, fog, mist) to result in nuisance to residential receptors as well as fauna species in proximity to the OHTL route.

During conditions of heavy rain, Gerasimov (2003) reports that the maximum permissible noise level outside an OHTL corridor with a width from the line's centre must be lower than 45dB(A). This noise level will decrease with distance and given the design condition of the OHTL for this Project, Corona effect is not anticipated to result in noise levels that will exceed established

noise limits at the centre of the OHTL. The corona effect will not be discernible at the nearest herder's house to the OHTL route which is more than 500m away.

Additionally, the OHTL right of way and health protection zone is expected to provide separation from human receptors to reduce noise impacts. The health protection zone will be in accordance with the protection zone established in San Rules & Norms No. 0236-07 for OHTL up to 500kV.

Potential noise impacts to fauna species are addressed in the Terrestrial Ecology chapter of this ESIA.

Table 6-13 Noise and Vibration- Impact Significance, Mitigation & Management Measures and Residual Impacts – Operation

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
Wind Turbines Operational Noise	**Moderate Negative**	Herders' houses (H4-a, H4-b, H5-a, H5-b, H7, H10-b, H12-b, H14-a, H14-b, and H 14-c)	High	**Moderate**	Relocation will be undertaken in accordance with the Project specific Resettlement Action Plan (RAP).	**n/a**
	Negligible Negative	Herders' houses (H1, H2-a, H2-b, H3, H6-a, H6-b, H8-a, H10-a, H12-a, H14-d, H14-e, H18, and H19)	High	**Minor**	Third parties/herders will have access to a grievance mechanism to raise their concerns and grievances regarding noise during the operation phase.	**Minor**
	Negligible Negative	Fish Farms (F1, F2 and F3 (outside the project site))	High	**Minor**		**Minor**
Operational Vehicle Noise	**Negligible Negative**	Wind Farm Operation Workers Nearby herders/residents	High	**Minor**	• Limit unnecessary usage of vehicles/equipment – No idling – Equipment to be shut or throttled down when in intermittent use. • Delivery vehicles will be prohibited from waiting outside the site with their engines running. • Ensure any appropriate permits are in place for deliveries to the site and for any maintenance works performed outside normal working hours. • Notify residents in proximity to the access road of noisy special deliveries with a minimum one week in advance. • Review vendor specifications and accept site vehicles, in particular heavy vehicles, based on noise emissions (as far as practical). • The movement of heavy vehicles during the night will be avoided wherever practical. • Where available in country, audible reversing alarms with broadband noise (white noise) will be preferred over tone	**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					alarms (beeping), to limit external disturbance to communities. • The impacted receptors will have access to a grievance mechanism in accordance with the Project SEP in order to make any complaints regarding noise during the operational phase	

6.4.3 Cumulative Impacts

Construction noise impacts will primarily result from construction activities, equipment operation, and vehicle movements within the Project site. However, as the construction of the nearby Bash 52 MW WF and Bash 500 MW WF projects will be completed before the start of Gijduvon WF construction, cumulative noise impacts during the construction phase are not expected.

During operation, Bash 52 MW WF, Bash 500 MW WF, and Gijduvon 300 MW WF will run concurrently. Noise modelling was conducted for all three projects, and the results did not indicate any cumulative noise impacts. For the full results, refer to **Appendix E**.

6.4.4 Decommissioning Phase

Potential impacts relating to decommissioning will be similar to those encountered during the construction phase. As such, it is assumed that the risk of increased noise level associated with the construction phase will be expected for the decommissioning phase at permanent receptor locations. Likewise, the mitigation & management measures outlined for the construction phase in relation to noise generation at the site, vehicle movement and vibration impacts will be applicable to the decommissioning phase as well.

6.5 Monitoring

The EPC Contractor and the O&M Company will undertake noise monitoring on a periodic basis during both the construction, commissioning and operational phases of the project respectively. The minimum expected requirements for the noise monitoring are outlined in the table below. The final monitoring methodology with specific monitoring details (i.e. locations, frequencies, durations, parameters etc.) will be developed in the specific 'Environmental Monitoring Plan' as part of the respective construction or operational phases ESMS.

Table 6-14 Noise Monitoring Requirements

Monitoring	Parameter	Frequency	Monitoring Location	Responsibility
Construction				
Day time noise	Leq(A)	1hr periods at each location	Given the nature of the Project, construction activities will progress along with the locations of the WTGs. Monitoring will be conducted monthly at the two nearest receptors to each active	EPC Contractor E&S Manager
Nighttime noise				EPC Contractor E&S Manager

Monitoring	Parameter	Frequency	Monitoring Location	Responsibility
			construction site and along the access road.	
Operation				
Day & night noise from wind farm	Leq(A)	10 days when complaint is received	If complaints are received from receptors regarding wind turbine noise, monitoring will be undertaken at complainant's locations. Mitigation will be implemented as required and monitoring will be carried out afterwards to confirm effectiveness	O&M Contractor E&S Manager

7 SHADOW FLICKER

This chapter assesses the effect of shadow flicker on nearby sensitive receptors during the operation of the Wind Farm.

Shadow flicker is the effect of the sun shining through the rotating blades of a wind turbine and casting a shadow on the window of neighbouring properties under certain wind & light conditions.

The shadow is perceived as a "flicker" due to the rotating blades repeatedly casting an intermittent shadow over neighbouring properties. Shadow flicker occurs only when the wind turbines are operating during sunny conditions and when the sun passes behind the hub of a wind turbine. It is most likely to occur early and late in the day when the sun is at a low angle in the sky. The frequency of shadow flicker is a function of the number of blades making up the wind turbine rotor and rotor speed and the intensity of shadow flicker is influenced by the location/distance of neighbouring properties to the wind turbine.

7.1 Applicable Requirements & Standards

7.1.1 National Regulations

There are no regulations or standards in Uzbekistan that provide requirements for assessing shadow flicker from wind turbines.

7.1.2 Lender Requirements

7.1.2.1 EPFIs - IFC EHS Guidelines for Wind Energy (2015)

The EHS Guidelines for Wind Energy, outline requirements for the modelling of shadow flicker to determine the duration and timing of shadow flicker occurrence under real weather conditions at specific receptors located within the zone of potential shadow flicker impact.

The guidelines require the model to predict flicker based on an astronomical worst-case scenario, which is defined as follows:

- There is continual sunshine and permanently cloudless skies from sunrise to sunset.
- There is sufficient wind for continually rotating turbine blades.
- Rotor is perpendicular to the incident direction of the sunlight.
- Sun angles less than 3 degrees above the horizon level are disregarded (due to likelihood for vegetation and building screening).

- Distances between the rotor plane and the tower axis are negligible.
- Light refraction in the atmosphere is not considered.

The IFC criteria for acceptability of flicker is:

- Not more than a combined 30 hours of flicker per year, and no more than 30 minutes of flicker on the worst-case day of the year.

7.2 Observation and Baseline Environment

There is no baseline information on shadow flicker in the Project area. The Project is located near the existing Bash 500 MW and Bash 52 MW wind farms, which were in the final stages of construction during the site visits. Similar to this Project, these wind farms are expected to generate shadow flicker within the locations of their WTGs. However, their shadow flicker zones do not overlap with the Gijduvon Wind Farm and will be confined to the areas specified in their respective ESIAs, which are expected to fall outside the Gijduvon Project area.

7.3 Receptors

According to the Ireland Wind Energy Development Guidelines (2006), the potential for shadow flicker at distances greater than 10 rotor diameters from a turbine is very low. In the instance of this Wind Farm, the rotor diameter of the WTGs is 194 m and therefore the area of influence for shadow flicker is 1942 m from the nearest WTG.

However, in order to cover larger area and account for worst case scenario the shadow flicker assessment has assessed the impact of shadow flicker at all identified residential receptors located within the Project boundary and surrounding area.

The list of sensitive receptors considered for the Shadow Flicker Assessment are presented in **Appendix F**. The general receptor types are shown in the table below.

Table 7-1 Shadow Flicker Assessment – Receptors

Receptor	Receptor Type	Sensitivity	Justification
Herders' houses	Residential	**High**	Herders that reside in these houses will be relatively vulnerable to shadow flicker effect.
Fish Farm (F1 and F2 and fish farm area outside the Project Boundary)	Residential /Ecological	**High**	Herders that use this accommodation will be relatively vulnerable to shadow flicker effect.
Kuklam Village	Residential	**High**	Residents of this village will be relatively vulnerable to shadow flicker effect.
Vahta Post	Industrial	**Low**	Workers will be relatively vulnerable to shadow flicker effect.

Receptor	Receptor Type	Sensitivity	Justification
Zafarobod Hydrocarbons Storage	Industrial	**Low**	Workers will be relatively vulnerable to shadow flicker effect.
Navoiyuran Chemical Warehouse	Industrial	**Low**	Workers will be relatively vulnerable to shadow flicker effect.
Post of Asia Trans Gas	Industrial	**Low**	Workers will be relatively vulnerable to shadow flicker effect.
Agricultural area (outside the Project Boundary)	Residential	**High**	Farmers living in this area will be relatively vulnerable to shadow flicker effect.
Graves	Cultural	**Medium**	Visitor of the graves in this area will be relatively vulnerable to shadow flicker effect.

7.4 Potential Impacts, Mitigation and Management Measures and Residual Impacts

7.4.1 Shadow Flicker Modelling

7.4.1.1 Methodology

Shadow flicker modelling was undertaken using WindPRO, an industry-leading software package for the design and planning of wind energy projects. The modelling considered the 40[10] Sany SI-19580 (8MW capacity) turbines proposed for the Project. The model software considers the sun's path with respect to every turbine location during every minute over a complete year. Any shadow flicker caused by each turbine is then aggregated for each receptor for the entire year.

The input parameters for the model include:

- The turbine locations and dimensions;
- The receptors location;
- The size of windows on each receptor and the direction that the windows face; and
- The topography model of the site (Obtained from the (Space) 'Shuttle Radar Topography Mission', (SRTM) at 30m resolution).

[10] an additional buffer WTG was modelled to replace one other WTG where required and reduce the impact on receptors.

Table 7-2 Turbine Details

Turbine Model	Rotor Diameter (m)	Hub Height (m)	Rotor tip height (m)	Rotor Swept Area (m²)	Rotor Speed Range (rpm)
Sany (SI-19850)	194	130	227.5	29620	5.61 – 9.88

In order to determine the number of hours shadow flicker might occur at receptor location, the modelling study considered two (2) scenarios; a conservative worst-case approach based on the requirements outlined in IFC EHS Guideline for Wind Energy and a more realistic approach to consider actual site conditions.

The conservative worst-case scenario assumed the following:

- There is continual sunshine and permanently cloudless skies from sunrise to sunset (i.e. there is clear sky 365 days per year);
- There is sufficient wind for continually rotating turbine blades (i.e. the turbine blades are rotating for 365 days per year);
- Sun angles less than 3 degrees above the horizon level are disregarded (due to likelihood for vegetation and building screening);
- The receptor is occupied at all times;
- No screening (from either trees or man-made obstacles) is taken into account; and
- All receptors have a 2m x 2m window facing directly towards the turbine.

Note: WindPro utilises the concept of 'Green House' mode which allows for shadow flicker effects to be evaluated for each receptor in every direction for the nearest group of WTGs.

The more realistic approach used long term weather conditions obtained from Tashkent meteorological station and the sunshine probability used is presented in the table below. Due to the geographical extent of the Project site, screening (trees or man-made obstacles) was not considered for the realistic scenario.

Note: Other meteorological sites in the immediate vicinity of the Project site do not have a complete set of the required data.

Table 7-3 Sunshine Hours for Realistic Scenario

Sunshine Hours											
Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
3.43	4.40	5.12	7.24	9.40	11.89	12.23	11.73	10.01	7.16	4.87	3.07

7.4.1.2 Results

The modelling predicted that under worst-case scenario indicate that the structures H10-a (F2), H3, H4-a, H4-b, H5-a, H5-b, H6-a, H7, H8-a, H12-a, H12-b, H14-a, H14-b and H14-c which are

within the Project site will experience shadow flicker which exceed the IFC recommended limit of 30 hours per year or 30 minutes per day. However, it should be noted that the worst-case scenario provides an over estimation of the duration of shadow flicker occurrence at the receptor location.

Other receptors will not experience shadow flicker that exceed the threshold of 30 hours per year established by IFC EHS Guideline for Wind Energy.

The modelling also predicts exceedance in IFC recommended limit in the real case scenario. The calculated shadow flicker at the identified residential receptor location is presented in the table below. To keep the report concise, receptors that did not receive any shadow hours under the realistic and the worst-case scenarios were not presented in this table or assessed any further. Please refer to **Appendix F** for the full list of results.

Table 7-4 Shadow Flicker Occurrence at Each Receptor[11]

Receptor	Receptor Classification	Nearest WTG	Distance (m)	IFC Worst-case Shadow hours per year (h/year)	Realistic Shadow hours per year (h/year)	IFC Max Shadow hours per day (h/day)
				HH:MM	HH:MM	HH:MM
H10-a (F2)	Herder's House and Fish Farm	BSH2-11	1295	**51:29**	00:38	**38:19**
F3	Fish Farm (Outside the Site)	BSH2-18	1585	15:14	00:27	11:17
H3	Herder's House	BSH2-19	1065	**36:14**	00:43	17:24
H4-a	Herder's House	BSH2-09	537	**104:23**	01:18	**49:03**
H4-b	Herder's House	BSH2-09	522	**167:12**	01:31	**75:18**
H5-a	Herder's House	BSH2-15	583	**206:13**	01:22	**112:16**
H5-b	Herder's House	BSH2-15	547	**200:13**	01:26	**101:36**
H6-a	Herder's House (Trailer)	BSH2-30	1239	**35:36**	00:33	**25:33**
H7	Herder's House (Trailer)	BSH2-24	368	**353:06**	01:59	**239:10**
H8-a	Herder's House	BSH2-07	1657	**31:05**	00:29	**23:58**
H12-a	Herder's House	BSH2-36	836	**91:36**	00:57	**70:06**
H12-b	Herder's House	BSH2-18	420	**174:08**	01:41	**102:03**
H14-a	Herder's House	BSH2-38	558	**167:17**	01:24	**120:04**
H14-b	Herder's House	BSH2-37	570	**41:01**	00:59	**14:05**
H 14-c	Herder's House (Trailer)	BSH2-39	232	**529:41**	02:57	**254:25**

[11] To keep the report concise, receptors that did not receive any shadow hours under the realistic and the worst-case scenarios were not presented in this table or assessed any further.

It should be noted that receptors H4-a, H4-b, H5-a, H5-b, H7, H12-b, H14-a, H14-b, and H 14-c will be relocated. H10-a (F2), H3, H6-a, H8-a, and H12-a will require mitigation.

Table 7-5 Shadow Flicker Impact Significance, Mitigation & Management Measures and Residual Impacts – Operation

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
Wind Turbines Operational Shadow Flicker	**Moderate Negative**	Herders' houses (H4-a, H4-b, H5-a, H5-b, H7, H12-b, H14-a, H14-b, and H 14-c)	High	**Moderate**	Herders with structures at the Project site will be relocated to alternative land outside the impact zone in accordance with the Project specific RAP.	**n/a**
	Moderate Negative	Herders' houses (H10-a (F2), H3, H6-a, H8-a, and H12-a)	High	**Moderate**	• Relocate the location of the windows away from the WTGs to ensure the shadow flicker does not affect the herders using these houses. • Third parties/herders will have access to a grievance mechanism to raise their concerns and grievances regarding shadow flicker during the operation phase.	**Negligible**
	Negligible Negative	Fish Farms (F1, F2 and F3 (outside the project site))	High	**Minor**		**Negligible**

7.4.2 Cumulative Impacts

During operation, Bash 52 MW WF, Bash 500 MW WF, and Gijduvon 300 MW WF will run concurrently. Shadow flicker modelling was conducted for all three projects, and the results did not indicate any cumulative shadow flicker impacts. For the full results, refer to **Appendix F.**

7.4.3 Decommissioning Phase

Potential shadow flicker impacts relating to decommissioning are not anticipated.

7.5 Monitoring

The O&M Company will undertake shadow flicker monitoring as outlined in the table below. The final monitoring methodology with specific monitoring details (i.e. locations, frequencies, durations, parameters etc.) will be developed in the specific 'Environmental Monitoring Plan' as part of the respective construction or operational phases ESMS.

Table 7-6 Shadow Flicker Monitoring Requirements - Operation

Monitoring	Parameter	Frequency	Monitoring Location	Responsibility
Shadow flicker from WTGs	Shadow flicker	Minimum of 3 months	If complaints are received from receptors regarding WTG flicker, monitoring will be undertaken at complainant's locations.	O&M Contractor E&S Manager

8 SOIL, GEOLOGY, SURFACE WATER AND GROUNDWATER QUALITY

8.1 Applicable Requirements & Standards

8.1.1 National Regulations

The protection of geological formations, soil and water resources in Uzbekistan is regulated by the following laws and regulations:

8.1.1.1 Soil quality

- SanPiN No.0272-09 Sanitary rules and norms for compiling hygienic justifications for soil protection schemes from pollution in Uzbekistan": The Sanitary Rules and Norms include the basic requirements for development of hygienic justification for the soil protection schemes against pollution, duties and functions of state sanitary supervision bodies in this area.
- SanPiN No.0191-05 Maximum permissible concentrations (MPC) and Approximate allowable concentrations (AAC) of exogenous harmful substances in soil: This defines MPC values of chemicals and pesticides polluting the soil. MPCs and AACs are designed to ensure that there is no negative direct or indirect impact on human health, its future generations and public health through soil contact.
- SanPiN No.0212-06 Sanitary rules and norms for the hygienic assessment of soil contamination of different types of land use: This document provides a unified methodology for hygienic assessment of soil pollution using a nomenclature of indicators of soil hygienic condition, which should be used both in the development of regulatory and technical documentation on the hygiene of soils, and in assessing the degree of its pollution.

8.1.1.2 Water resources

Water resource management, allocation and use in Uzbekistan 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 river management authority.

Constitution of the Republic of Uzbekistan. Article 55 states "Land, depths, water, flora and fauna and other natural resources are national wealth, should be rationally used and are under state protection."

The Law of the Republic of Uzbekistan "On water and water use" (1993 as amended on 01.12.2021). This law enshrines the key objectives for water legislation in Uzbekistan setting the following requirements:

- Article 1 requires "Regulation of water relations; effective use of water; protection of water from pollution, littering and exhaustion; prevention and liquidation of

harmful impact on water resources; improvement of state water objects; and protection of the rights of enterprises, organisations, farms and citizens in the field of water relations."

- Article 3 stipulates that "Water resources are the state property and wealth of the Republic of Uzbekistan, should be rationally used and is protected by the state."
- The law authorises the State through authorized agencies to carry out management and control of water use and protection.

Other key legislations and standards relevant to the Project include:

- SanPiN No 0255-08 which provides the criteria for hygienic assessment of the level water bodies contamination for health risks to the population in Uzbekistan.
- Decree of the Cabinet of Ministers No.255 of 31.03.2018 On the approval of some administrative regulations of the provision of public services in the field of nature use (scheme for issuing permits for special water use or water consumption) as amended on 15.01.2020.
- SanPiN RUz No. 0318-15. Hygienic and anti-epidemic requirements for the protection of water in reservoirs on the territory of the Republic of Uzbekistan.

The Decree № 981 of December 11, 2019 "Regulation on procedure of establishing water protection zones and sanitary protection zones for water bodies on the territory of the Republic of Uzbekistan".

8.1.2 Lender Requirements

8.1.2.1 ADB

ADB Safeguard Requirements for Environment includes specific requirements to prevent pollution and to minimise or control the intensity or loads of pollutant emissions and discharge. This includes effective management of hazardous materials and wastes, which can all have an influence on soil and/or groundwater quality.

8.1.2.2 AIIB

ESS1 – Environmental and Social Assessment and Management: Point 38 relates to pollution prevention and references international good practice and internationally recognised standards such as the WBG EHS Guidelines.

8.1.2.3 GIIP

As there may be no defined soil and groundwater standards for Uzbekistan, it is proposed to benchmark existing soil and groundwater against the Dutch standards.

The Dutch Standards identify maximum allowable concentrations for contaminants in soil and groundwater. The soil intervention values indicate when the functional properties of the soil for

humans, plants and animals is seriously impaired or threatened. They are representative of the level of contamination above which a serious case of soil contamination is deemed to exist. Groundwater target values provide an indication of the benchmark for environmental quality in the long term, assuming that there are negligible risks for the ecosystem.

Table 8-1 Dutch Standards for Soil and Groundwater Contamination (2013)

Parameters	Soil (mg/kg dry matter)		Groundwater (µg/L)	
	Target value*	Intervention value	Target value	Intervention value
Heavy Metals				
Arsenic	29	76	10	60
Barium	160	-	50	625
Cadmium	0.8	13	0.4	6
Chromium	100	-	1	30
Chromium III	-	180	-	-
Chromium IV	-	78	-	-
Cobalt	-	190	20	100
Copper	36	190	15	75
Lead	85	530	15	75
Mercury	0.3	36 (inorganic) 4 (organic)	0.05	0.3
Molybdenum	3	190	5	300
Nickel	35	100	15	75
Zinc	140	720	65	800
Aromatic Compounds				
Benzene	0.01	1.1	0.2	30
Ethyl benzene	0.03	110	4	150
Toluene	0.01	32	7	1000
Xylene (sum)	0.1	17	0.2	70
Styrene (vinylbenzene)	0.3	86	6	300
Phenol	0.05	14	0.2	2000
Cresols (sum)	0.05	13	0.2	200
Chlorinated Hydrocarbons				
Volatile Hydrocarbons				
monochloroethene (vinyl chloride)	0.01	0.1	0.01	5
dichloromethane	0.4	3.9	0.01	1,000
1,1-dichloroethane	0.02	15	7	900
1,2-dichloroethane	0.02	6.4	7	400
1,1-dichloroethene	0.1	0.3	0.01	10

Parameters	Soil (mg/kg dry matter)		Groundwater (µg/L)	
	Target value*	Intervention value	Target value	Intervention value
1,2-dichloroethene (sum)	-	1	0.01	20
Dichloropropanes (sum)	-	2	0.8	80
Trichloromethane (chloroform)	0.02	5.6	6	400
1,1,1-trichloroethane	0.07	15	0.01	300
1,1,2-trichloroethane	0.4	10	0.01	130
Trichloroethene (Tri)	0.1	2.5	24	500
Tetrachloromethane (Tetra)	0.4	0.7	0.01	10
Tetrachloroethene (Per)	0.002	8.8	0.01	40
Chlorobenzenes				
Monochlorobenzene	-	15	7	180
Dichlorobenzenes (sum)	-	19	3	50
Trichlorobenzenes (sum)	-	11	0.01	10
Tetrachlorobenzenes (sum)	-	2.2	0.01	2.5
Pentachlorobenzene	-	6.7	0.003	1
Hexachlorobenzene	-	2.0	0.00009	0.5
Chlorophenols				
Monochlorophenols (sum)	-	5.4	0.3	100
Dichlorophenols (sum)	-	22	0.2	30
Trichlorophenols (sum)	-	22	0.03	10
Tetrachlorphenols (sum)	-	21	0.01	10
Pentachlorophenol	-	12	0.04	3
Source: Soil Remediation Circular 2013, (*Target values for soil refer to 2000 version as they are not present in the 2013).				

Note: The soil values are calculated for a 'Standard Soil' with 10% organic matter and 25% clay. A case of environmental contamination is defined as 'serious' if >25 m³ soil or >100 m³ groundwater is contaminated above the intervention value.

Where contaminants are found to exceed 'intervention' levels, this is considered to be a case of soil contamination, which is dangerous to the health of humans and the natural environment. Such a level of contamination should prompt a need for remediation, appropriate treatment and disposal.

Furthermore, EU Directive 86/278/EEC on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture is applicable.

8.1.2.4 EPFIs

IFC Performance Standard 3 on 'Resource Efficiency and Pollution Prevention' requires the client and/or the Project to:

- Avoid or minimise adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; and
- Prevent the release of pollutants to water and land due to routine, non-routine, and accidental circumstances, or when not feasible, minimize and/or control the intensity and mass flow of their release.

8.2 Baseline Conditions

8.2.1 Site Conditions

8.2.1.1 Geology Setting

Uzbekistan lies between the Amu-Darya and Syrdarya rivers on the Turan Platform, which consists of Late Paleozoic sedimentary, metamorphic, and igneous rocks (Moores & Fairbridge, 1997 as reported in UzAssystem, 2024a). The region's geology is shaped by the interaction of the Kazakh and Karakum-Tajik microcontinents, separated by the Turkestanian paleo-ocean, which formed in the Late Proterozoic and closed by the Early Triassic, leading to tectonic collisions and granite intrusions (Burtman, 1975; Zonenshain et al., 1990 as reported in UzAssystem, 2024a).

Mesozoic and Cenozoic sediments cover the older orogenic belt, with later tectonic activity forming the Tien Shan Mountains. This setting exposes the basement for geological study while preserving its original structure (Moores & Fairbridge, 1997 as reported in UzAssystem, 2024a). The closure of the Turkestanian paleo-ocean caused subduction, metamorphic belts, and volcanic activity, culminating in deep faults such as the Turkestanian and Gissar Sutures, which define the region's tectonic evolution (Burtman, 1980; Moores & Fairbridge, 1997 as reported in UzAssystem, 2024a).

SITE GEOLOGY

A geotechnical site investigation was undertaken by UzAssystem in June 2024 to understand the geology & physical properties of the project site. This investigation included geological observations, geotechnical drilling works and geophysical field tests.

The Project Site is covered by Quaternary deposits:

- Q(I-II) Quaternary Upper Section
- QIII Quaternary Upper Section
- QE Eopleistocene

During field work, 25 different boreholes were carried out. According to geotechnical boreholes and trial pits, the following conditions were recorded (UzAssystem, 2024a);

- highly to completely weathered, very weak to weak, gravelly sandstone
- moderately to highly weathered, weak to medium strong, sandstone
- moderately weathered, weak to medium strong, claystone
- moderately to highly weathered, weak to medium strong mudstone

A map showing the geological deposits, and the boreholes are shown in the following figure.

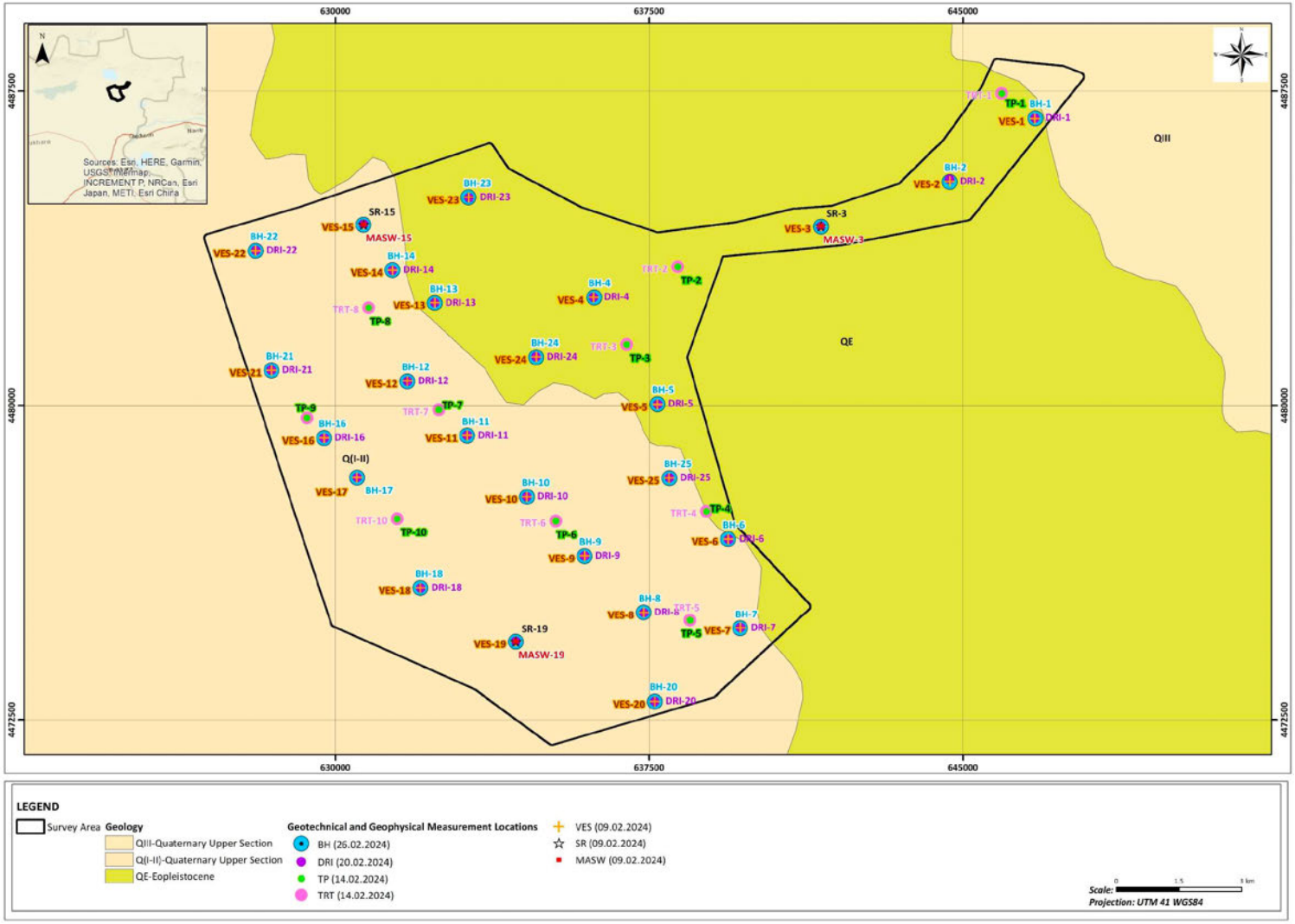


Figure 8-1 Geological Map of the Project Site (UzAssystem, 2024a)

8.2.1.2 Topography

The Project site is located on a flat terrain with some mountain-ranges trending approximately east west within the South Tien Shan (STS) belt (Brunet et al., 2017 as reported in UzAssystem, 2024a). Maximum elevation for the Project site is measured around 270 m towards the eastern parts while the minimum elevation is approximately 220 m towards the lake at the northern part (UzAssystem, 2024a). The maximum slope along the WSW-ENE direction is measured as 8.4%, while the average inclination is 1.8% (UzAssystem, 2024a).

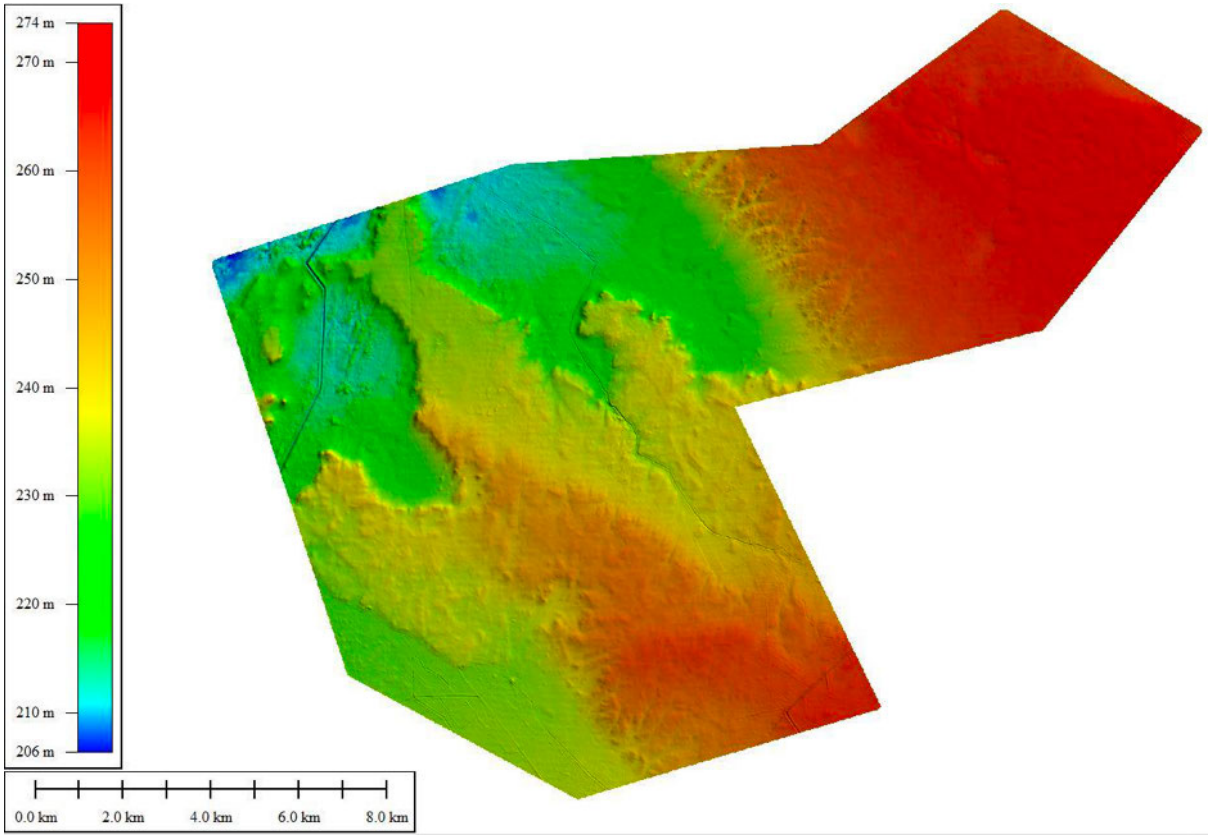


Figure 8-2 Digital Elevation Model of the Project Site (UzAssystem, 2024b)

8.2.1.3 Hydrology

The nearest surface water bodies are Ayakagitma Lake, a freshwater lake located over 6 km north of the project site, and Shurkul Lake, situated more than 17 km southeast as indicated on the following figure. These lakes are desert basins that hold water with no natural outlet and are managed through connections to rivers like the Amu-Darya or other lakes, mainly for irrigation and fishing purposes.

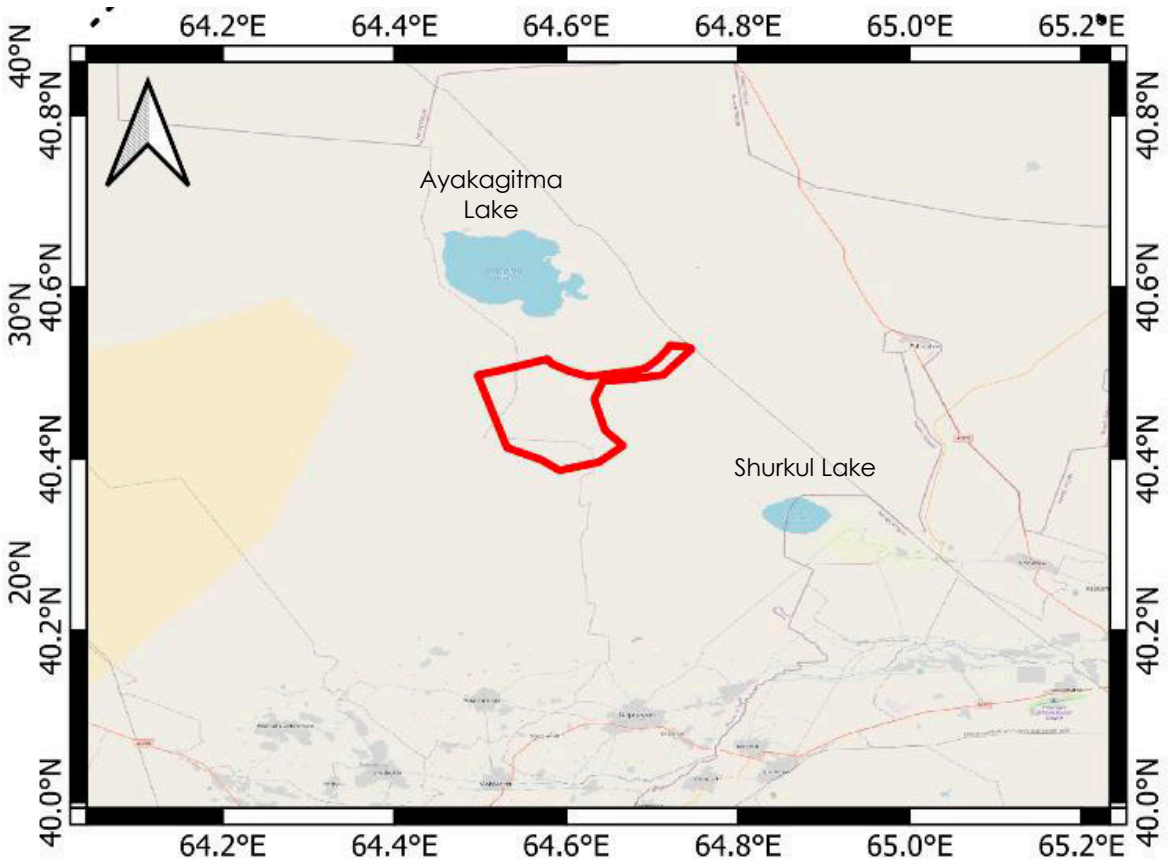


Figure 8-3 Lakes in the Project Area (UzAssystem, 2024c)

Additionally, several small water and fishing ponds have been identified within the project area. Two man-made water channels also cross the site, flowing from Shurkul Lake to Ayakagitma Lake, as shown below.

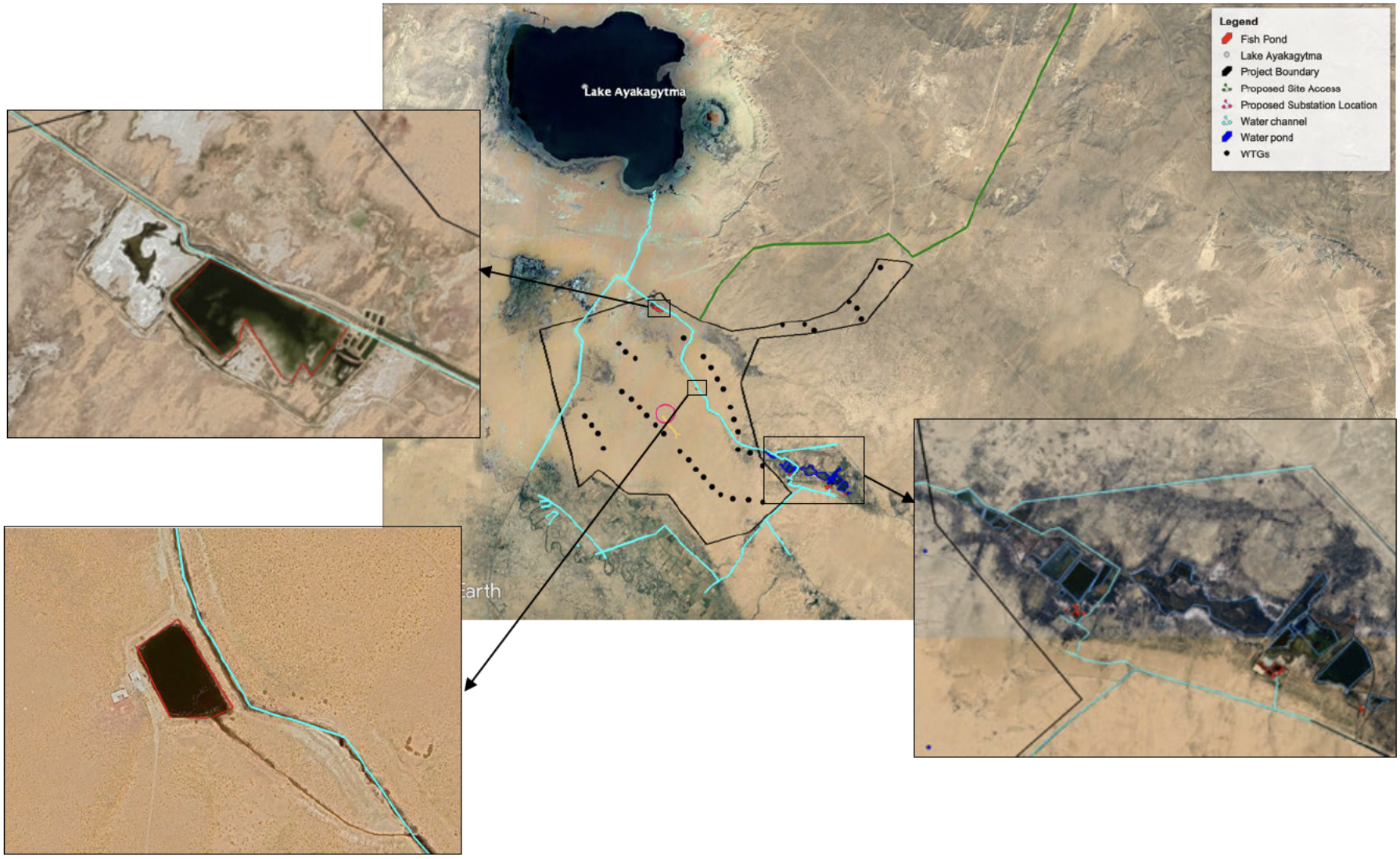

Lake Ayakagytma
Legend
Fish Pond
Lake Ayakagytma
Project Boundary
Proposed Site Access
Proposed Substation Location
Water channel
Water pond
WTGs



Figure 8-4 Water Channels and Ponds in the Project Area

UzAssystem (2024c) delineated the catchment areas contributing to water flow within the project site as shown below. The site receives water flow from eight watersheds with water accumulation being regulated by the lakes. Therefore, the main risk in the Project area is flash flooding. For the flood risk assessment, refer to Section 8.4.1.6 of this report.

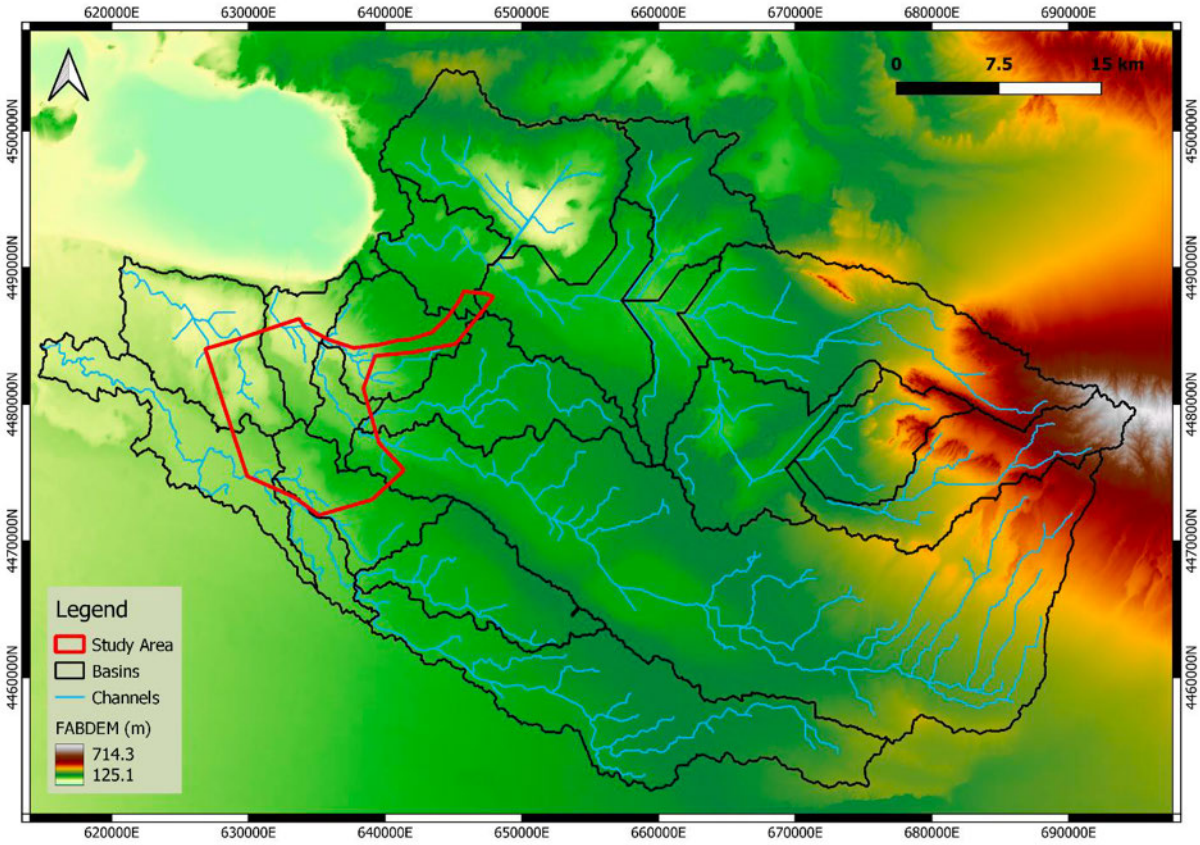


Figure 8-5 Watershed in the Project Area (UzAssystem, 2024c)

8.2.1.4 Groundwater

Drilling operation was performed between the dates of 19/01/2024 and 07/02/2024 including 25 geotechnical boreholes with a total depth of 550 meters to investigate the soil/rock conditions in the Project Site (UzAssystem, 2024a). Groundwater level was encountered at 7 boreholes only, between the depths of 1.6 m and 11.4 m (UzAssystem, 2024a).

8.2.1.5 Seismicity

According to the Geotechnical Site Investigation report, there are several seismically active zones in Uzbekistan due to the large tectonic deformation strike lines capable of generating earthquakes with a magnitude of M>7 (UzAssystem, 2024a).

Several seismic zones have been identified in western and central Uzbekistan that could impact the Project Site. These include the North-Kuldzhuktau-Turkestan and Predkyzylkum

seismic zones to the north, as well as the Auminzatau-Aktau and South-Tyan-Shan seismic zones to the south. The region is dynamically influenced by major fault lines such as the South Tyan Shan Fault, Zaravshan Fault, and Uchbash-Karshi Flexure Fault (Mordvintsev et al., 2017 as reported in UzAssystem, 2024a).

The Project Site is situated within the Predkyzylkum seismic zone, which has the potential to generate earthquakes with magnitudes exceeding M5. Therefore, seismic activity affecting the Project Site should be considered as M > 5 (UzAssystem, 2024a).

The table below shows the few earthquakes that has been recorded to occur close to the Project area with magnitude of M>5 and MSK-64 intensity degrees greater than 7. The location of these earthquakes in relation to the Project Site is presented in the following figure.

Table 8-2 Earthquakes with M>5 Occurred Around the Project Area (Adapted from UzAssystem, 2024a)

Year	Earthquake	Magnitude	MSK-64 degree	Depth (km)	Seismic Zone
1822	Bukhara	6.4	8**	20	Bukhara
1892	Kyzylkum	6.1	7*	25	Besapano-North Nuratinsk
1932	Tamdybulaq	6.1	7*	25	Besapano-North Nuratinsk
1976	Gazliyskoe I	7.0	9***	25	South Tien Shan
1976	Gazliyskoe II	7.3	9***	20	South Tien Shan
1984	Gazliyskoe	7.2	9-10****	15	South Tien Shan

Note:

- *Intensity degree 7 means that most people are frightened and try to run outdoors. Furniture may be shifted and overturned. Objects fall from shelves and water splashes from containers. Older buildings can be seriously damaged and masonry chimneys can collapse. Small landslides can occur (Medevedev et al., 1964).
- **Intensity degree 8 means that many people find it difficult to stand, even outdoors. Furniture may be overturned. Waves may be seen on very soft ground and large cracks and fissure can be opened up. Some rockfalls may occur and older structures may partially collapse or sustain considerable damage (Medvedev et al., 1964).
- ***Intensity degree 9 means that general panic occurs. People may be forcibly thrown to the ground. Many monuments and columns fall or are twisted. Waves are seen on soft ground. Substandard structures may collapse. Substantial damages may happen to well-constructed structures. Underground pipelines rupture. Ground fracturing and widespread landslides may occur (Medevedev et al., 1964).
- ****Intensity degree 10 means that Masonry buildings may be destroyed, infrastructure may be crippled. Massive landslides may occur. Water bodies may be overtopped, causing flooding of the surrounding areas and the formation of new water bodies (Medevedev et al., 1964).

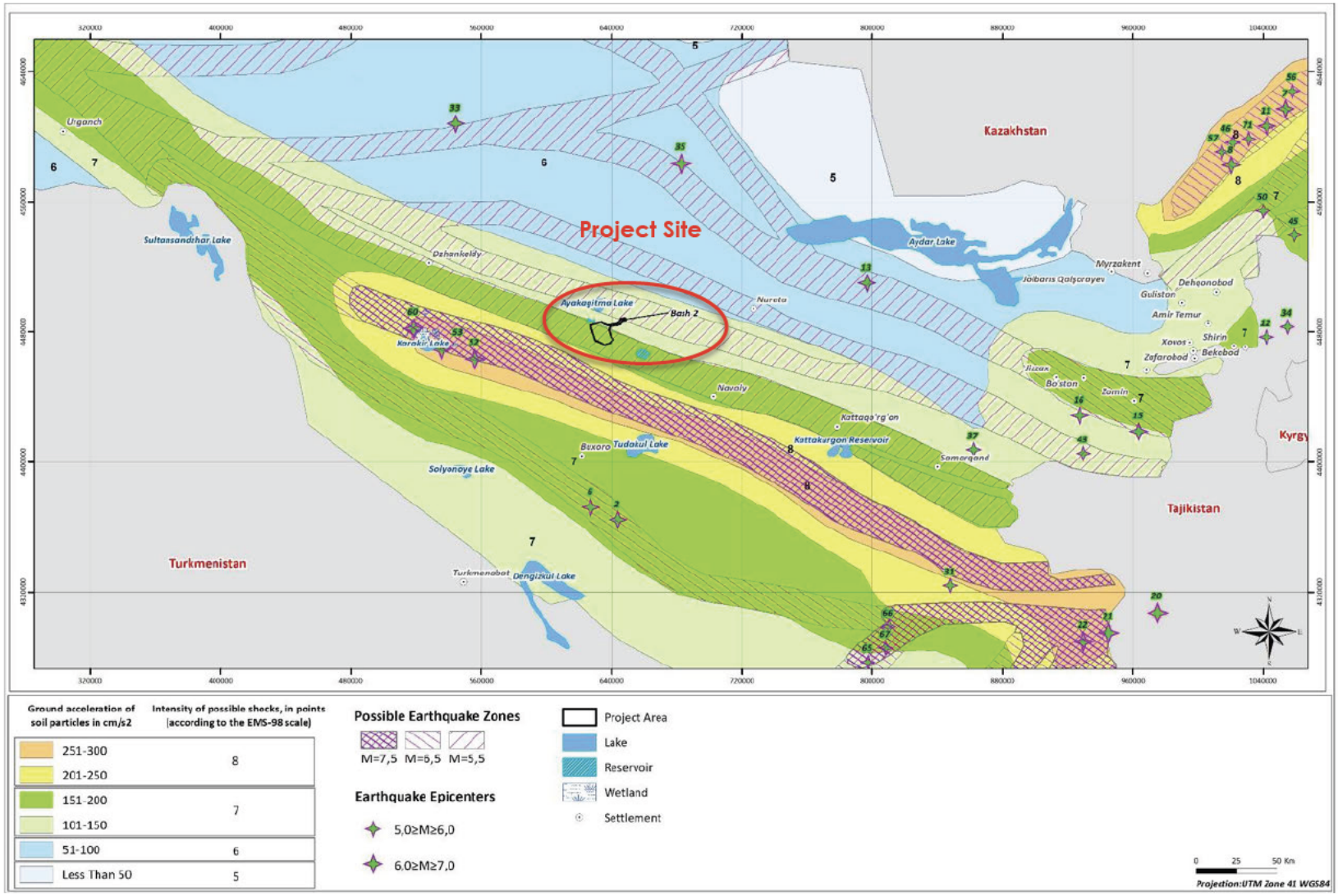


Figure 8-6 Location of Earthquakes with M>5 in Relation to the Bash Project Site (UzAssystem, 2024a)

The figure below shows that there is no fault line passing through the Project site.

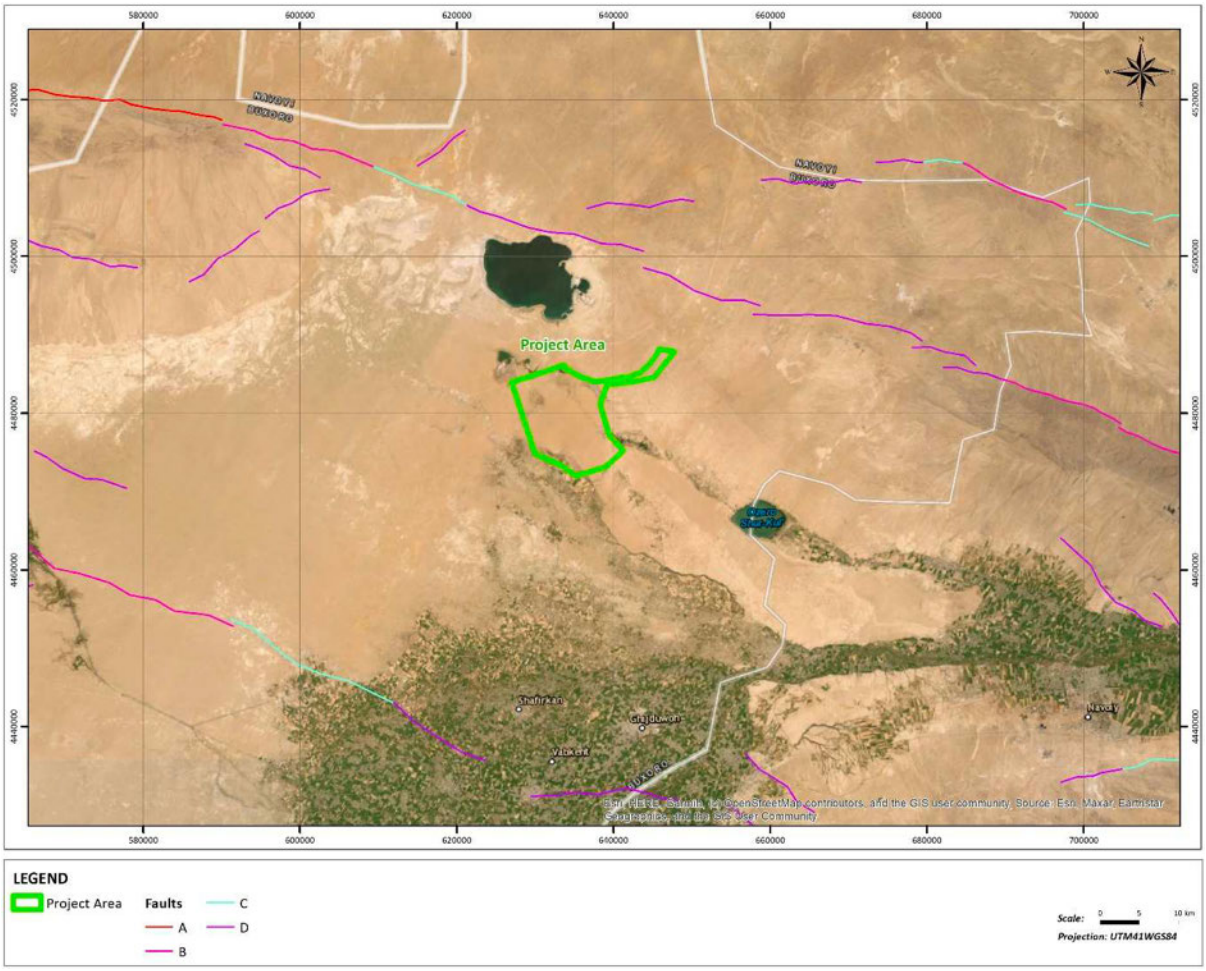


Figure 8-7 Active Fault Line Along the Project Site (UzAssystem, 2024a)

8.2.2 Site Surveys

8.2.2.1 Soil Analysis

As per the soil survey report (**Appendix G**), the Project area has been extensively modified by a network of irrigation and drainage canals sourced from the Zarafshan River. These canals significantly altered the soil cover and transformed the region into a productive agricultural zone, with cotton as the primary crop. Over the last 30-40 years, previously cultivated fields have become distinguishable, and the area is now suffering from desertification with most canals dried up and only the main canals being in use. However, agricultural activities are not practiced within the project site. Currently, land use in the project area is characterized by pasture farms and a couple of fish farming ponds located in the northern section. To the south, there is an active agricultural area (outside the Project site).

There were no specific areas of soil contamination observed during the numerous site visits, However, accumulated waste including rubble, plastic bottles, rags, etc. were observed occasionally. In addition, the presence of existing infrastructure including the power line, underground pipeline corridor and dirt roads across the site provides the potential for the presence of residues (e.g. oils & greases, hydrocarbons and heavy metals) on the surface soils/tops oils causing soil contamination.

Survey Methodology

As a precautionary approach, to establish the baseline soil quality condition within the Project site, a soil survey was carried out on the 22nd of May. During the survey, surface soil samples were collected from six sampling locations within the proposed Project site. The sampling locations were selected to provide representative soil condition for the site in general as shown in the figure below. Soil samples were collected from each sampling location at a depth of 0.2 m (20cm) using the envelope method to ensure representativeness. This includes taking soil from five points within a homogeneous area at the sampling location, mixing the point samples, and selecting a 0.5 kg sample from the mixed soil through quartering. The samples were placed in individual dark containers and transported to a certified laboratory for analysis.

All samples were analysed for concentrations of a suite of physical, chemical parameters and heavy metals.

Table 8-3 Soil Sampling Location

ID	Coordinates	
	Northing	Easting
S1	40.500677°	64.543388°
S2	40.483897°	64.607863°
S3	40.441927°	64.584805°
S4	40.546080°	64.688558°
S5	40.432444°	64.639847°
S6	40.474722°	64.546950°

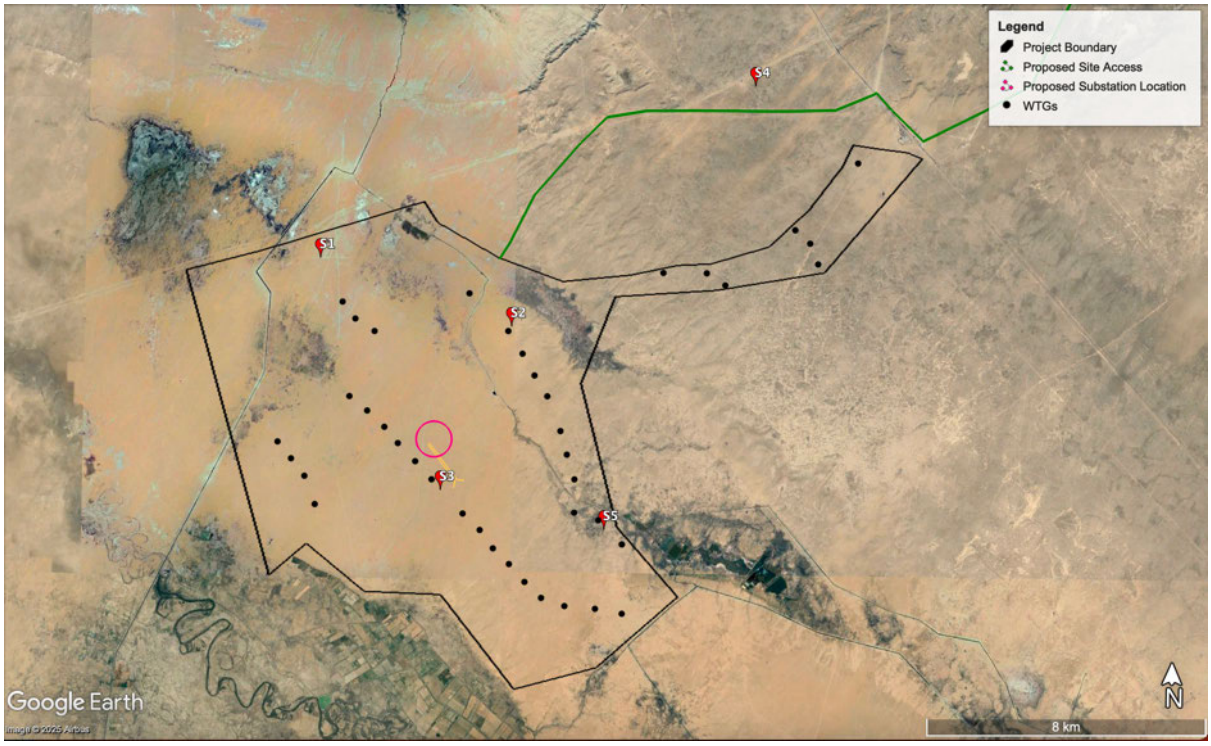


Figure 8-8 Soil Sampling Locations

SURVEY RESULTS

The results of the soil laboratory analysis are presented in the following table and have been compared with the Uzbekistan SanPiN № 0191-05 Maximum allowable concentrations (MPC) and the Dutch Soil Quality Standards. When comparing the results with the MPCs in mobile forms, exceedances were not considered due to differences in measurement methods.

The analysis revealed a consistent distribution of heavy metal concentrations across the entire project area, and the soil quality is generally in compliance with the national MPCs and the Dutch standards with the exception of lead (Pb). Elevated Pb concentrations, 1.5 to 2.5 times higher than other locations, were observed at points S1, S3, and S4, where the national MPCs for total Pb content were exceeded. Despite exceeding the national standards, the results comply with Dutch soil standards. The elevated Pb concentrations are attributable to the anthropogenic activities near these sampling points, such as construction works near S1 and S3, the proximity of a railroad (2 km to the east) and a gas pipeline (300 m northwest) of S4.

The full sets of the soil analysis results are presented in **Appendix G**.

Table 8-4 Soil Analysis Results

PARAMETERS	SAMPLE NUMBER						DETECTABLE LIMITS IN MG/L	SANPIN № 0191-05 MPC	DUTCH STANDARDS (INTERVENTION VALUE)
	S1	S2	S3	S4	S5	S6			
pH	7.90	8.54	8.71	8.70	7.80	8.17	1-14	-	-
Zinc (Zn)	30.4	33.7	37.0	37.8	40.1	33.9	1.0 mg/kg	23 (mobile)	720
Chromium (Cr)	3.1	6.1	7.9	10.5	6.4	15.1	1.0 mg/kg	6.0 (mobile)	100
Cadmium (Cd)	0.108	0.132	0.058	0.074	0.116	0.074	0.005 mg/kg	-	13
Copper (Cu)	23.5	19	21	20.6	20.2	19.7	1.0 mg/kg	3.0 (mobile)	190
Manganese (Mn)	220	254	303	296	269	262	20 mg/kg	1500 (gross content)	-
Mercury (Hg)	<0.03	<0.03	<0.03	0.043	<0.03	0.064	0.03 mg/kg	2.1 (gross content)	36
Nickel (Ni)	17.4	10.2	22.8	25.1	21.8	44.2	1.0 mg/kg	4.0 (mobile)	100
Iron (Fe)	14590	16220	18290	19040	18960	16930	60 mg/kg	-	-
Lead (Pb)	**35.5**	13.3	**34.6**	**42.3**	13.1	24.3	0.1 mg/kg	32 (gross content)	530
Arsenic (As)	3.48	3.49	3.54	3.57	6.00	3.76	0.1 mg/kg	-	76

Note

- Where there is a difference between the SanPiN № 0191-05 Maximum permissible concentrations (MPC) and Dutch Intervention Value, the result obtained have been compared to the most stringent standard.
- Where the results obtained for certain parameters have been color coded, this indicates an exceedance of the standards.

8.2.2.2 Surface Water Analysis

As a precautionary approach and to establish the baseline, surface water samples (WS) were collected on the 22nd of May 2024 in accordance with the established State standard 31861-2012 "Nature protection. Water. General requirements for sampling". To assess water quality, six surface water samples were collected from various sections of the Agitmin collector-drainage network. Point WS-1 collected from the confluence of all canals before they discharge into the Ayakagitma depression. Points WS-02 to WS-04 were collected from the two primary canals prior to their junction. WS-05 was collected from an intermediate section before the water reaches the agricultural fields, while Point WS-06 was collected from the dense network of canals directly connected to the agricultural fields. The locations and coordinates are presented in the following figure and table, respectively. The collected samples were placed in individual glass and polymer bottle and taken to an accredited laboratory for analysis.

Table 8-5 Surface Water Sampling Location

ID	Coordinates	
	Northing	Easting
WS1	40.527130°	64.556844°
WS2	40.481027°	64.525947°
WS3	40.506505°	64.581191°
WS4	40.438880°	64.634325°
WS5	40.402869°	64.648616°
WS6	40.403722°	64.576541°

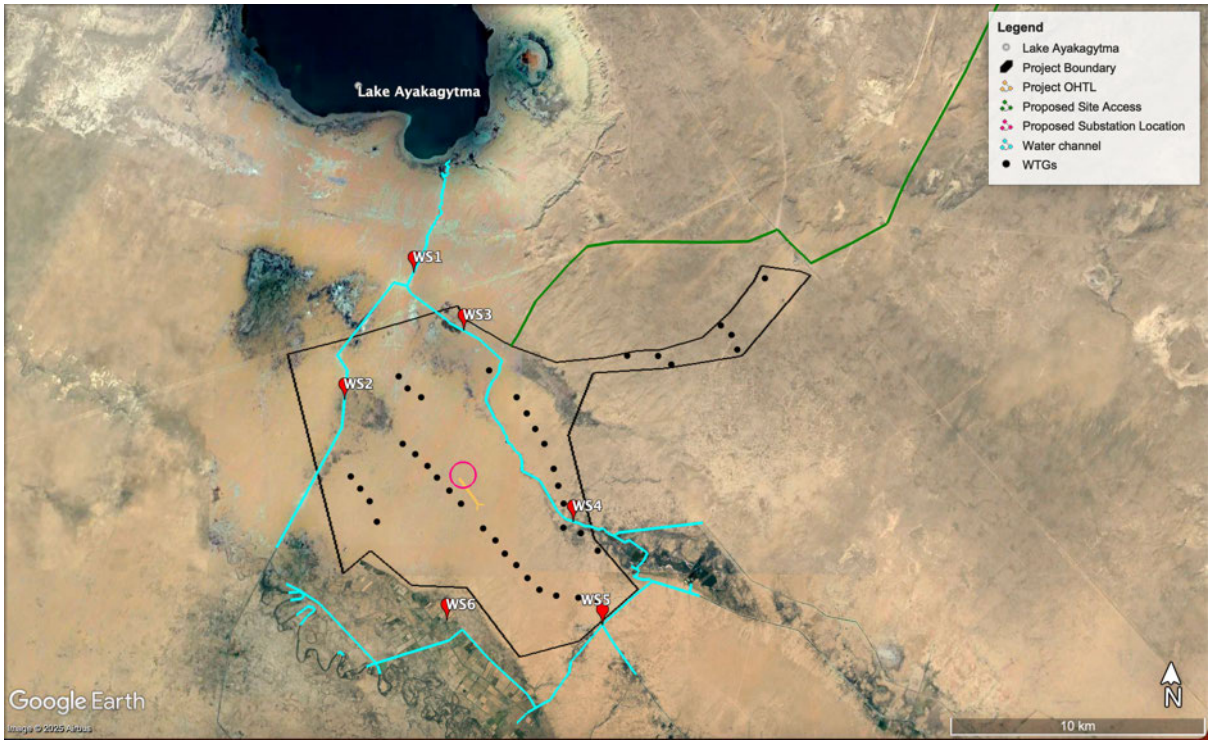


Figure 8-9 Surface Water Sampling Locations

SURVEY RESULTS

The results of the soil laboratory analysis are presented in the following table and have been compared with the surface water MPCs.

The analysis indicated that the surface water quality generally complies with national MPCs, except for Nickel. At WS1, Nickel concentrations reached the MPC for fishery use, while at WS3, WS4, WS5, and WS6, Nickel levels exceeded the MPC for fishery use. However, Nickel concentrations remain within national standards for drinking and domestic use, and this element is not regulated for irrigation water. The elevated Nickel levels may be attributed to either anthropogenic activities or naturally high Nickel content in the underlying rocks.

Table 8-6 Surface Water Analysis Results

Name of Parameters	Locations						The Lower Limit of Detection	Surface Water MPCs[12]			
	WS1	WS2	WS3	WS4	WS5	WS6		Fishery Water Use	Irrigation Water Use	Drinking Water	Domestic Use
pH	7.45	7.54	7.57	7,56	7,67	7.07	1-14	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
Arsenic (As) mg/dm³	0.0025	0.0036	0.0120	0.0096	0.0052	0.0045	0.0001	0.05	0.1	0.05	0.05
Aluminum (Al) mg/dm³	<0.0020	0.0028	0.0031	<0.0020	0.0069	0.0040	0.002	-	-	-	-
Cadmium (Cd) mg/dm³	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	0.005	-	-	0.01
Copper (Cu) mg/dm³	<0.0020	<0.0020	0.0033	0.0035	<0.0020	<0.0020	0.002	0.001	1	1	1
Nickel (Ni) mg/dm³	0.0100	0.0098	**0.0210**	**0.0180**	**0.0130**	**0.0130**	0.002	0.01	-	0.1	0.1
Lead (Pb) mg/dm³	0.0001	0.0001	0.0002	0.0001	0.0001	<0.0001	0.0002	0.03	0.2	0.03	0.1
Zinc (Zn) mg/dm³	0.0022	<0.0020	0.0034	0.0032	0.0024	<0.0020	0.002	0.01	5	3	1

[12] "Handbook of the Ecologist-Expert". State Committee of the Republic of Uzbekistan on Nature Protection. State Environmental Expertise 2009. Tashkent

8.2.2.3 Groundwater Analysis

Water wells are used by several herders across the site. To determine the groundwater quality, one water sample was collected from the well within the project site as shown on the following figure. The sample GW-1 was collected from a depth of more than 10 m. The location of the sample collection is presented in the following Figure.

Water sampling was carried out on June 5, 2024, in accordance with the established State standard 31861-2012 "Nature protection. Water. General requirements for sampling". The collected sample was collected in a polymer bottle and transferred to a licensed laboratory for analysis.

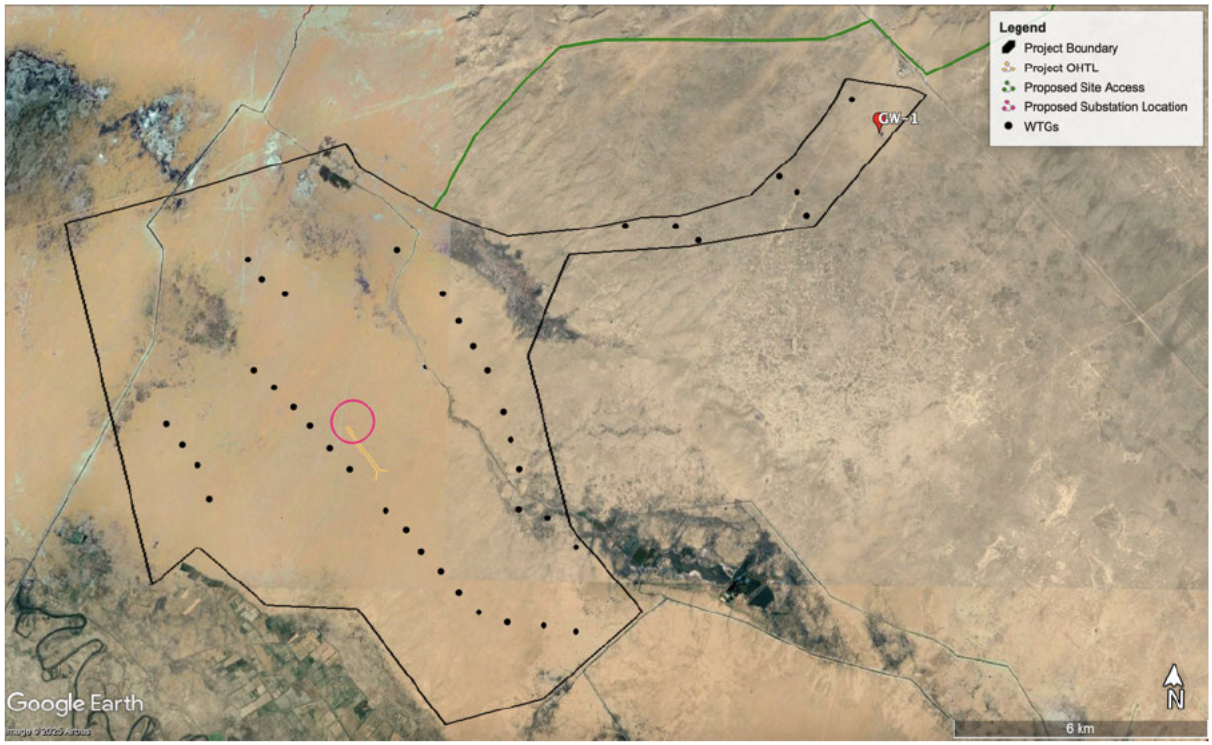


Figure 8-10 Groundwater Sample Location

Table 8-7 Groundwater Analysis Results

Parameter	Unit	GW-1	Detection Limit	MPC O'zDSt 950:201113	Dutch Target Value/ Intervention Value[14]	
pH	-	9.15	1-14	6-9	-	-
Arsenic (As)	**mg/dm³**	**0.0260**	0.0001	0.05	0.01	0.06
Aluminum (Al)	**mg/dm³**	0.100	0.002	0.2	-	-
Cadmium (Cd)	**mg/dm³**	**0.0008**	0.0001	0.001	0.0004	0.006

[13] O'zDSt 950-2011 Drinking water. Hygiene requirements and quality control.

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

Parameter	Unit	GW-1	Detection Limit	MPC O'zDSt 950:201113	Dutch Target Value/ Intervention Value[14]	
Copper (Cu)	**mg/dm³**	**0.032**	0.002	1.0	0.015	0.075
Nickel (Ni)	**mg/dm³**	**0.057**	0.002	0.1	0.015	0.075
Lead (Pb)	**mg/dm³**	**0.0018**	0.0002	0.03	0.015	0.075
Zinc (Zn)	**mg/dm³**	0.042	0.002	3.0	0.065	0.800

Groundwater pH analysis revealed a highly alkaline nature, this is supported by literature which indicates that groundwater mineralization in the Bukhara region exceeds 5 g/l, making it one of the highest in the country[15]. At this pH level, the water fails to meet the national drinking water standards, rendering it unsuitable for consumption.

Heavy metal testing revealed that the groundwater meets national drinking water standards. However, when compared to the stricter Dutch standards, concentrations of all tested metals, except for zinc and aluminum, exceeded target values but remained below intervention thresholds.

8.2.3 Consultations

On January 15, 2024, a letter was sent to the Ministry of Mining, Industry, and Geology to request information on any existing or planned prospecting areas and any geotechnically hazardous land within and around the project sites. This request was based on the previous project layout, which included an extended OHTL line connecting the Project to the Bash 500 substation. In response, on January 26, 2024, the Ministry confirmed that no active mining zones had been officially registered within the Wind Farm project area.

8.3 Receptors

Table 8-8 Soils, Geology, Surface Water & Groundwater - Receptor Sensitivity

Receptor	Sensitivity	Justification
Soil Quality	**Low**	The soil within the Project site is typical of the soil characteristics found in the project area. It is not known to be of particular significance and hence it is of low importance and rarity on a local scale.
Surface Water Quality	**High**	Surface water channels are a vital water source for the local community. The channels within the site discharge into the Ayakagitma lake and local fisheries. In addition, water in the Project area is scarce with limited potential for substitution.

[15] Rakhmatullaev S. et al. Groundwater resources of Uzbekistan: an environmental and operational overview. Central European Journal of Geosciences. 2012. V.4. P. 67-80.

RECEPTOR	SENSITIVITY	JUSTIFICATION
Groundwater Quality	**High**	Water is a vital resource and is of high importance on a national scale with limited potential for substitution. In addition, water is scarce in Uzbekistan and the rest of the region.

8.4 Potential Impacts, Mitigation, Management & Residual Impacts

8.4.1 Construction Phase

Construction activities such as site preparation, civil works, electrical and mechanical works can lead to changes in the chemical and physical properties of the local soil or result in or groundwater contamination thereby degrading soil and groundwater.

8.4.1.1 Water Scarcity

Groundwater abstraction, if required for concrete works in the Project could exacerbate water scarcity, lowering the water table and affecting local communities, farmers, herders, and fisheries that rely on groundwater for irrigation and daily use. Unregulated withdrawals may lead to reduced well yields, crop failures, and conflicts over access, especially in dry seasons.

Given the scarcity of water in the Project area, a water supply assessment will be undertaken to assess the availability of water for the Project and if there will be significant impacts to local community users. This assessment will also include cumulative impacts of other proposed development projects that may also depend on similar water sources and the potential impacts of climate change. In addition, the EPC Contractor will be required to obtain water abstraction permits from the relevant authorities before drilling of any wells can commence.

8.4.1.2 Risk to Water Channels

The site is intersected by two water channels used by local herders and fisheries, connecting Ayakagitma and Shurkul lakes. Construction activities for the main access road with potential upgrades to the road bridges crossing the water channels, if required, may take place near these channels. These activities pose risks of disrupting water flow and increasing sedimentation, which could impact canal users, including farmland irrigation, livestock drinking water, fishponds, and local ecosystems. Without proper management, construction could degrade water quality, disturb aquatic habitats, and alter wetland functions. Additionally, temporary access restrictions for farmers and disruptions to agricultural and fishery productivity present key social and economic concerns.

8.4.1.3 Excavation or Removal of Soils

The Project will require excavation activities in order to establish foundations for the WTGs, substation and OHTL, building structures, underground cabling etc. This may result in the interaction with the geology of the site which could potentially provide direct pathways for contamination of surface water and groundwater during the construction phase. On the other hand, the soil characteristics within the project site will be impacted directly through soil compaction activities of roads and structures to provide stability.

8.4.1.4 Spills and Leaks Associated with Construction

Soil, surface water and groundwater may be susceptible to contamination from various sources during the construction phase. Primary sources of contamination are typically those placed along the handling of products where liquid waste and hazardous liquids/materials can escape directly into the soil potentially resulting in contamination to exposed soils and potentially being transferred via the high porosity sandy soils to the groundwater or with runoff to surface water channels. However, it is noted that there will be very few chemicals, fuels and in relatively small quantitates.

As the wind turbines and OHTL will likely require deep foundation works, soil and groundwater quality can be susceptible to contamination from various construction sources. The risk of accidental spillage and leakage of various chemical products are often attributable to storage areas of the construction site as well as during the transportation of such materials on and off the site. Improper methods of storing, transferring, and handling of these products can result in spillage to the ground and result in soil, surface or ground water contamination.

8.4.1.5 Inadequate Waste and Wastewater Management

Construction will involve activities that generate solid non-hazardous and hazardous waste, as well as potential liquid wastes resulting from sanitary waste streams. Waste generated during these activities poses a threat to the soils. Of particular concern is the management of hazardous waste generated during the construction phase and its handling. Although the hazardous fraction of construction waste such as used oil, machinery lubricants and paints, etc. will represent a very small proportion of the total amount of construction waste it will however require special attention for management and disposal.

Concrete washout water will be highly alkaline and may contain traces of heavy metals such as chromium. Inadequate management of the concrete washout area will pose a risk of contaminating the soil and leaching into the ground leading to groundwater contamination especially during the rainy season.

If the temporary storage and handling of such waste on the construction site is inadequate prior to being removed for disposal, the risk of soil and potentially indirect effects to groundwater quality increases. Potential environmental impacts arising from the generation of hazardous wastes are covered in Chapter 11.3 of this report.

8.4.1.6 Flood Risk

UzAssystem (2024c) conducted hydraulic modelling to assess potential flood risks at the Project site. The model utilized daily precipitation data from the Ayakagitma Meteorological Station for the period 2000 to 2023. The effective rainfall duration was determined based on the time of concentration, which varies across sub-basins depending on factors such as slope, main channel length, and topography.

The study area receives direct runoff contributions from neighbouring dry channels, increasing the risk of local flash floods. Consequently, intense short-duration storms lasting 5, 10, 20, or 30 minutes were also analyzed to assess their impact on flood hazards.

Additionally, Mann-Kendall trend analysis and Sen's slope test found no significant trend in precipitation over time. While precipitation trends are critical for future projections, the analysis indicated an increasing trend in average temperature, though it was not statistically significant at the 90% confidence level. These findings suggest that, based on historical data, no significant changes in precipitation patterns due to climate change are expected for the Project site.

The outcomes of the hydrology modelling are presented on the following figures. The watershed delineation indicates that water is retained by the reservoir at the upstream of the Project site which is in the east. Therefore, all watershed contributions from the upstream of the eastern part are not a concern, since the reservoir can store the water.

Due to the naturally low slope in the southeast areas of the study region (including croplands, grasslands, and wetlands), some local ponding has been observed, resulting in low water velocities. Conversely, the northeast section features dry channels with steeper slopes (UzAssystem, 2024c).

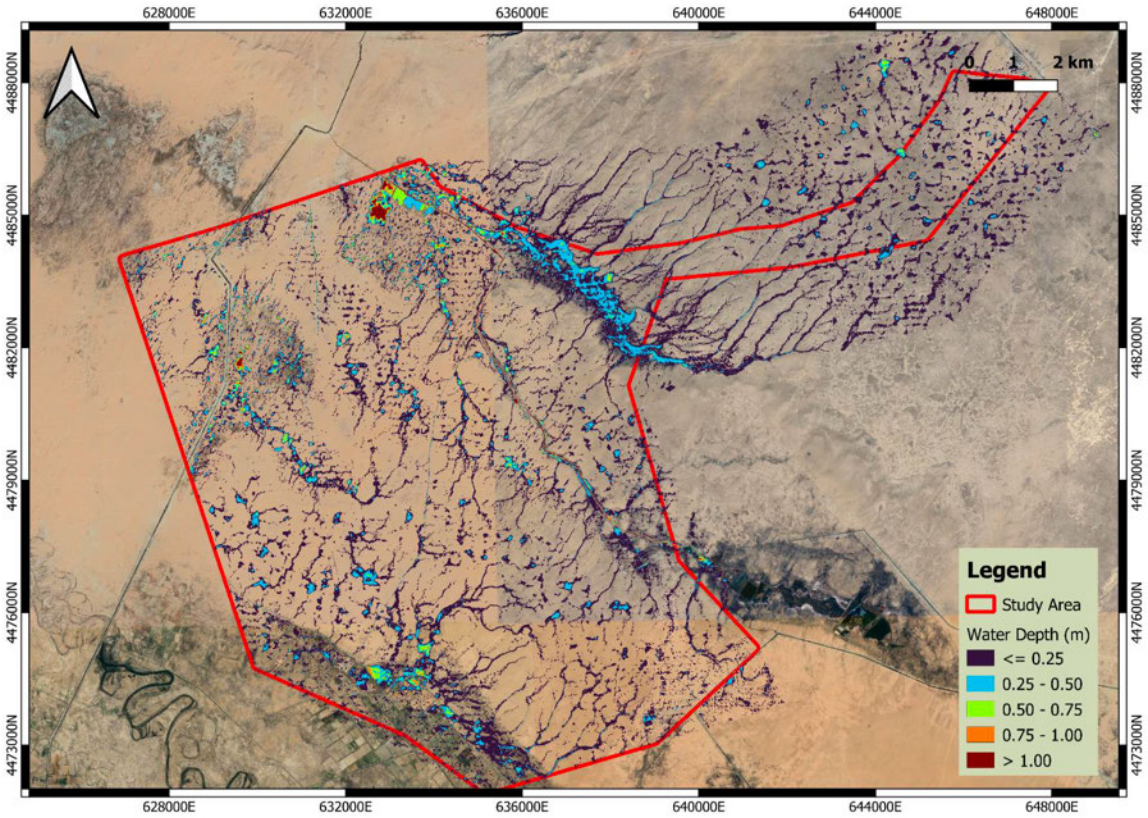


Figure 8-11 Water Depths due to 100-year Storm with DEM (UzAssystem, 2024c)

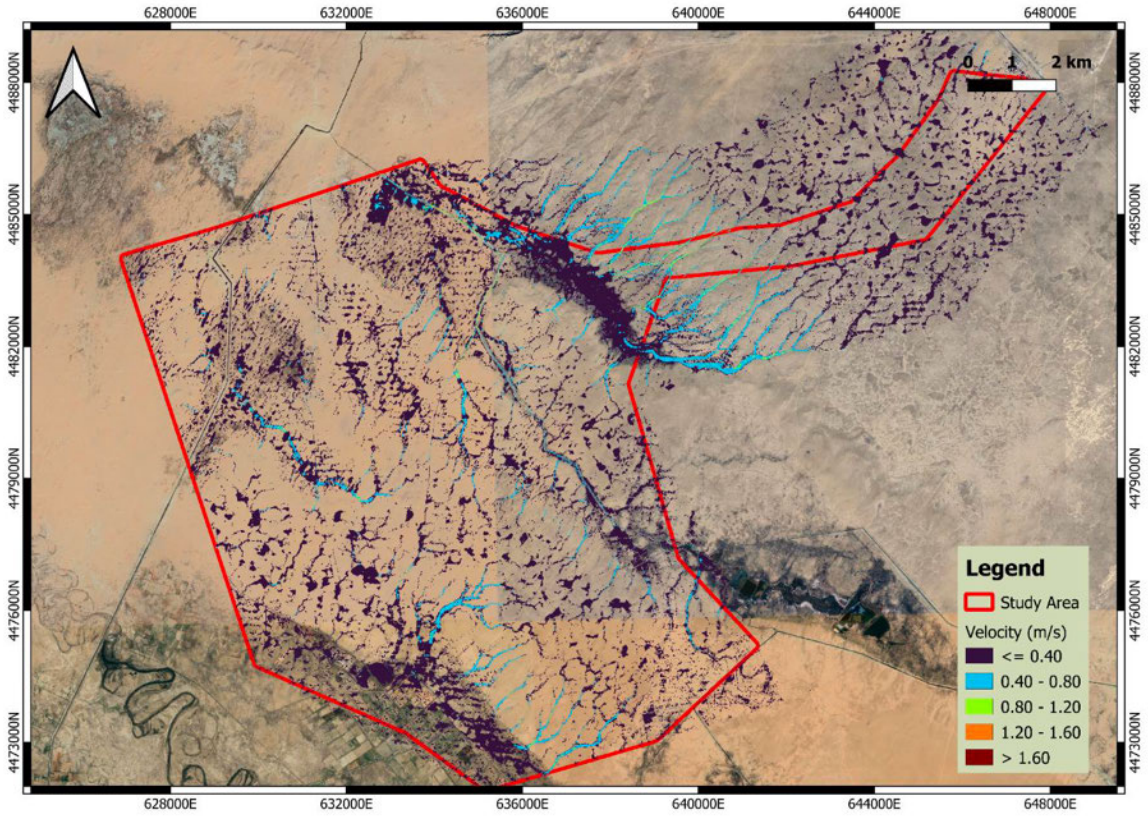


Figure 8-12 Velocities due to 100-year Storm with DEM (UzAssystem, 2024c)

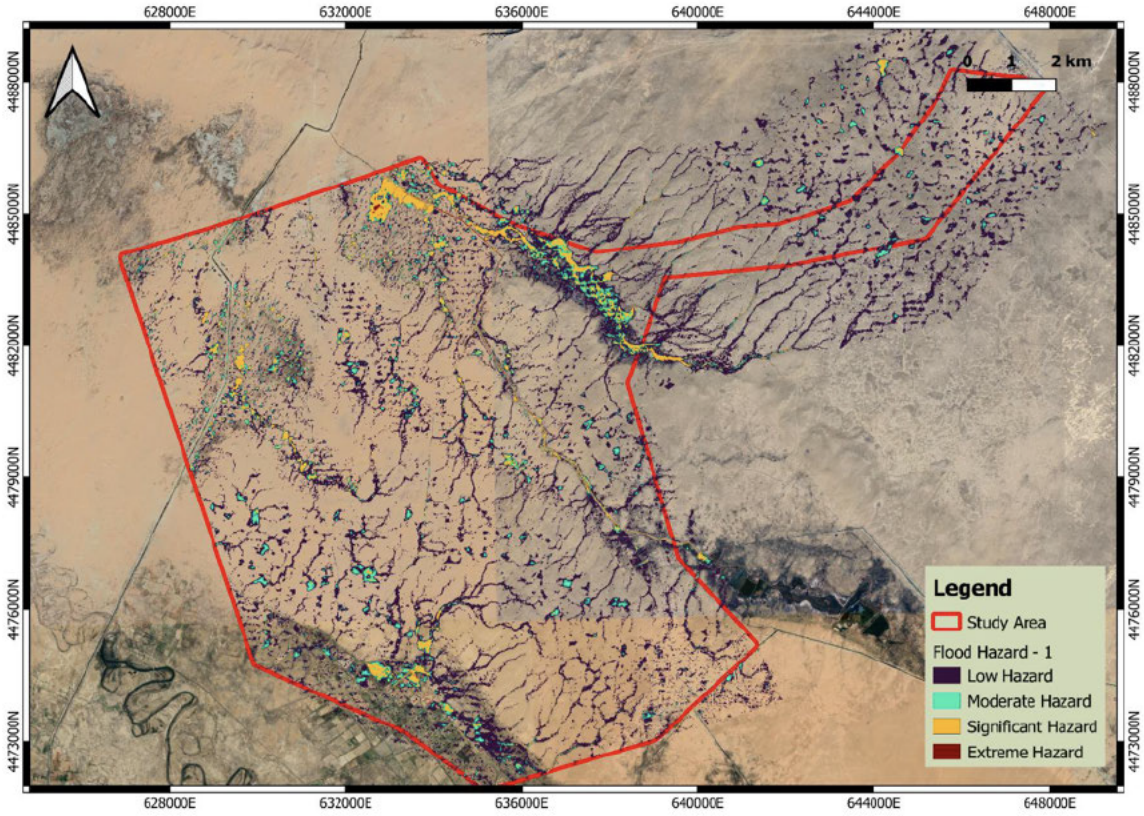


Figure 8-13 Flood Hazard – 1 in 100-year Storm with DEM (UzAssystem, 2024c)

To reduce the risk to certain WTGs, they have been micro-sited away from the areas of concern as presented in the following table.

Table 8-9 WTGs that were Shifted to Mitigate Flood Risk

WTG ID	Distance Moved (m)	Justification
BSH2-11	8.52	Shifted for hydrology and flood risk purposes
BSH2-23	3.29	
BSH2-25	14.81	
BSH2-34	41.10	
BSH2-16	50.87	
BSH2-02	24.53	

Table 8-10 Geology, Soils, Surface Water and Groundwater Impact Significance, Mitigation & Management Measures and Residual Impacts – Construction

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
Water scarcity	**Moderate Negative**	Water Availability	High	**Moderate**	• A water supply assessment will be undertaken to assess the availability of water for the Project and if there will be significant impacts to local community users. This assessment will also include cumulative impacts of other proposed development projects that may also depend on similar water sources and the potential impacts of climate change. • The EPC Contractor will be required to obtain water abstraction permits from the relevant authorities before drilling of any wells can commence.	**Minor**
Risk to water channels	**Moderate Negative**	Channels' Water Flow and Quality	High	**Moderate**	If bridges upgrade for site access is required, the EPC Contractor is required to implement the following: • Implement sediment barriers (e.g., silt fences, sediment basins) to prevent runoff and erosion from construction areas. • Schedule construction during low-flow periods to reduce disruption to water movement. • Limit in-water construction activities and use temporary diversion structures to maintain flow. • Use controlled excavation and backfilling techniques to minimize sediment release. • Avoid the use of hazardous construction materials near waterways and implement spill prevention measures. • Design and construct culverts or upgraded bridges to ensure uninterrupted water flow and sufficient load capacity for local users. • Coordinate closely with local authorities and communities to schedule construction to minimize disruptions to access and water use. • Third parties (herders, farmers etc.) will have access to a grievance mechanism in order to raise their concerns.	**Minor**
Cross contamination	**Minor Negative**	Soil Quality	Low	**Minor**	• Training - Contractor staff to be able to identify signs of potential contamination (smell of hydrocarbons, staining).	**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
of soil during construction					• Washing of equipment, machinery and vehicles will only be permitted in designated areas, with impermeable surfaces and dedicated drainage systems that lead to separate sumps or, treatment facilities and/or lined evaporation ponds. • Washout of concrete trucks will be performed in designated concrete washout areas at the site. Where concrete washout areas will be established onsite, these areas will be located away from water channels storm drainage and water runoff areas and will be designed with adequate holding capacity. The wastewater will be contained within the designated impervious bund. • If contaminated soils are observed during construction activity, the identified contaminated soil will be excavated separately, and stored or disposed of in accordance with the waste management plan as hazardous waste, to avoid cross-contamination. • Any imported soils brought to the site will be from accredited quarries with certificate of quality	
Pollution from Accidental Leaks or Spillage	**Minor Negative**	Soil Quality	Low	**Minor**	• No storage of hazardous chemicals, oils or fuels within 100m of water channels or water flow path at the Project site. • Storage of all hazardous materials such as fuels and chemicals on an impermeable base with liners and/or secondary containment bund with enough capacity to hold 110% of the bulk storage container and 25% of the total volume of the multiple containers. • Store all chemicals/materials according to manufacturer's instructions and MSDS; MSDSs for all chemicals to be readily available on-site in close proximity to storage areas. • All hazardous materials must be labelled according to manufacturer's instruction and Good International Industry Practice (GIIP). • The chemical storage area will have proper ventilation and cover from the elements (i.e. rain, sun) and different storage areas to allow for segregation of incompatible chemicals. • All equipment using oils will have drip trays underneath to capture any oil leaks or drips.	**Negligible**
	Minor Negative	Surface Water Quality	High	**Moderate**		**Minor**
	Negligible Negative	Groundwater Quality	High	**Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					• Contractor will develop and implement an Emergency Response Plan (ERP) and Spill Response and Contingency. • Maintain an inventory of all potentially hazardous materials and chemicals used and stored on-site. • All spills and leaks will be reported promptly to the Construction Manager and to be investigated to confirm the cause and put in place appropriate corrective/preventative actions. • Refuelling and maintenance of vehicles/equipment will be within a dedicated depot area at the site, on impermeable surface. • No vehicle or machinery maintenance or repair will be carried out outside the Project boundary. • Spill kits will be made available at chemical storage areas and fully stocked with appropriate absorbent materials. • Availability of suitable containment and spill clean-up materials/equipment at specific locations within the project site (e.g. where refuelling is to take place). • Relevant personnel to be trained on emergency and spill response, containment, material handling and storage procedures. • Regular emergency drills to practice timely and effective spill response. • Fuel transport vehicles and equipment to be maintained and routinely inspected to ensure the tank, pumps, pipe work and the vehicle itself are free from leaks and fit for purpose-No equipment will be placed in service until deficiencies are corrected. • Implement regular maintenance program of vehicles and equipment to minimise leaks or mechanical failures and keep document evidence. • The EPC Contractor will obtain relevant permits to store large quantities of hazardous materials such as diesel etc (where necessary) in accordance with Uzbek regulations. • First aid kits will be available at all hazardous and chemical storage areas.	

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
Inadequate waste and wastewater management	**Minor Negative**	Soil Quality	Low	**Minor**	• The implementation of the project CESMP and associated Waste Management Plan and Procedures will ensure that spills are kept to a minimum and are cleaned up quickly using spill kits located in risk areas. • Develop and maintain a hazardous waste inventory to document and track and show chain of custody of hazardous wastes generated, and their disposal route. • All hazardous waste being temporarily stored outside of its designated storage areas will be kept in well-equipped, leak-tight containers with drip protection to avoid leaks to the ground. • Concrete washout will only be undertaken at designated and signed areas, with adequate protection to soils, to prevent leaks or spread of wastewater • Implementation of good housekeeping practices during construction activities including procedures and requirements for proper handling, storage, and transport of hazardous materials and waste. • The EPC Contractor and sub-contractors will provide induction training and Tool Box Talks (TBTs) relating to the management, transportation and handling of hazardous materials and wastes – in line with any procedures developed to guide the on-site management of such activities. • Further mitigation is presented in section 11.3.111.4.	**Negligible**
	Minor Negative	Surface Water Quality	High	**Moderate**		**Minor**
	Negligible Negative	Groundwater Quality	High	**Minor**		**Negligible**
Flood risk	**Minor Negative**	Project	Medium	**Minor**	Implement the drainage management measures provided in the geotechnical study (UzAssystem, 2024a). These include: • Instal a concrete drainage channel on top and on foot of permanent excavations to prevent infiltration of surface run-off into ground in the vicinity of slope face and its toe. • All earth retaining walls should involve sufficient drainage systems that will prevent rising of water columns behind the walls. • A permanent shallow drainage system is required in order to move the surface run-off water (from rainfall) away from the location of foundations.	**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					Implement the drainage management measures provided in the flood risk study (UzAssystem, 2024c). These include: • Filling the ponding areas in the northern part of the site and directing water from the low-slope regions into the channels. • Drainage mitigation should be implemented along the water canals. • Mitigation against water leaking from buried pipes near to foundations should be considered in the design of infrastructure. • Consider ground improvement (mitigation) techniques where needed.	

8.4.2 Operational Phase

Specific project impacts to soil, geology, surface water and groundwater are not expected during the operational phase as the site will be static and will not have direct interactions with these environmental parameters. Potential risks of concern during the operational phase are expected to be limited to the management and storage of hazardous materials, wastes, wastewater, chemicals, fuels and sanitary provision.

8.4.2.1 Spills and Leaks Associated with Operation

Although there will be little or no interaction with hazardous materials or chemicals, storage and usage of any hazardous wastes during the operational phase, there remains a small potential risk associated with spills and leaks to ground.

Certain sources of contamination that can introduce risks to soil, surface water and groundwater are cleaning fluids and solvents, oils from transformers and fuels stored for use by site vehicles and back-up generators, sanitary wastewater in septic tanks etc. Although these materials may be present and used in small quantities, precaution must be paid to ensure proper storage, handling, transportation and adequate spill prevention. It is expected that the storage of any of these materials, chemicals and fuels will be within designated areas, which have specific management and mitigation measures in place to prevent exposure of these pollutants to unprotected soils and runoff areas that could contaminate surface or groundwater.

Table 8-11 Geology, Soils, Surface Water and Groundwater Impact Significance, Mitigation & Management Measures and Residual Impacts – Operation

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
Accidental minor Leaks & Spillage	**Negligible Negative**	Soil Quality	Low	**Negligible**	• Operator to develop and implement an Emergency Response Plan (ERP) to include or link to a Spill Response and Contingency Plan. • Conformance with ERP procedures (preventative and response) will be monitored through routine inspections. • Appropriate training of staff in regard to the handling and response to spill/leak events. • Availability of complete spill kits in all hazardous material storage areas. • Availability of MSDS on-site for any chemicals in use (to be made available at the chemical storage area). • Availability of a chemical register for all the hazardous chemicals on site. • Storage of all hazardous materials such as fuels and chemicals on an impermeable base with liners and/or secondary containment bund with enough capacity to hold 110% of the bulk storage container and 25% of the total volume of the multiple containers. • The chemical storage area will have proper ventilation and cover from the elements (i.e. rain, sun) and different storage areas to allow for segregation of incompatible chemicals. • O&M Company to ensure that sanitation facilities have effective leak tight plumbing systems and the manholes will be inspected regularly for any blockage. • If used in landscaped areas, the application of fertilisers and pesticides must be limited and monitored.	**Negligible**
	Negligible Negative	Surface Water Quality	High	**Minor**		**Negligible**
	Negligible Negative	Groundwater Quality	High	**Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					• Use of any toxic/non-biodegradable pesticides will be prohibited in accordance with the Stockholm Convention on banned chemicals. • Only organic, chloride free and environmentally friendly fertilizers will be applied. • O&M will obtain relevant permits to transport and dispose any hazardous waste from operational processes.	

8.4.3 Cumulative Impacts

Project related impacts would mainly be the deterioration and/or contamination of soil and groundwater resources during construction and operation due to improper or uncontrolled handling, storage, transport and disposal of waste, oils and chemicals.

However, given that the Bash 500 MW and Bash 52 MW Projects would be operational at the time of the Project's construction, it is not envisaged that cumulative impacts with other projects will be significant.

8.4.4 Decommissioning Phase

Potential impacts relating to decommissioning will be similar to those encountered during the construction phase. As such, it is assumed that the risk of accidental spills (such as oils, transformer oils, machinery lubricants, fluids and solvents, etc.) and waste management (such as lubricated turbine parts, OHTL parts, substation components, machinery lubricants and paints) associated with the Project will be expected for the decommissioning phase. Likewise, the mitigation & management measures outlined for the construction & operational phase in relation to accidental spills and waste management will be applicable to the decommissioning phase as well.

For additional information on decommissioning/demolition waste impacts & mitigation and management measures, see Chapter in 11.3.4 of this ESIA.

8.5 Monitoring

The minimum expected requirements for the monitoring are outlined in the table below. The final monitoring methodology with specific monitoring details (i.e. locations, frequencies, durations, parameters etc.) will be developed in the specific 'Environmental and Social Monitoring Plan' as part of the respective construction or operational phases ESMS.

Table 1-1 Monitoring Requirements

Monitoring	Parameter	Frequency	Monitoring Location	Responsibility
Construction				
Soil Quality	Visible spills & leaks of hydrocarbons and other potentially hazardous or chemical pollution sources	Incidental siting's during day-to-day activities and as part of weekly inspections	Working areas, temporary facilities and along the access road during construction	EPC Contractor E&S Manager Construction Workers

Monitoring	Parameter	Frequency	Monitoring Location	Responsibility
Surface Water Quality	Visible sediments, leaks or waste within the water channels	Incidental siting's during day-to-day activities and as part of weekly inspections	Water channels in the project area	EPC Contractor E&S Manager Construction Workers
Operation				
Soil Quality	Visible spills & leaks of hydrocarbons and other potentially hazardous or chemical pollution sources	Incidental siting's during day-to-day activities and as part of periodic inspections	The entire Project area during operation	O&M Contractor E&S Manager Operation Workers
Surface Water Quality			Water channels in the project area	

9 TERRESTRIAL ECOLOGY

9.1 Applicable Requirements & Standards

9.1.1 National Regulations

The Law of the Republic of Uzbekistan "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 organisational basis for the conservation of the environment and the rational use of natural resources. Article 25 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.

The Law of the Republic of Uzbekistan "On Protected Natural Reserves" (2004) as amended in 2020

This law regulates the use and protection of protected natural territories. The main aim is to ensure preservation of typical, unique, genetic banks of plants and animals, prevent negative impact of human activities on nature, promote the study of natural processes and monitoring of the environment including promotion of environmental education.

The Law of the Republic of Uzbekistan "On Protection and Use of the Wildlife" (1997) as amended in 2016

This law regulates the use, protection, reproduction and restoration of wildlife in order to promote conservation and ensure diversity of species in their natural habitat.

Other laws and regulations include:

- The Law of the Republic of Uzbekistan "On Protection and Use of Vegetation" (1997) as amended in 2021.
- Decree of the Cabinet of Ministers "Regulation on the procedure for using plant world objects and passing licensing procedures in the field of using plant world objects" No. 290 of 10.10.2014 as amended in 2020. The law sets out the requirements to obtain permission to cut wood and shrub plantations that are in the zone of the construction site.

Decree of The President of The Republic of Uzbekistan, Dated December 30, 2021, No. UP-46 on Measures to Accelerate Greening Works and Further Effective Organization of Tree Protection in the Republic

The Decree prohibits the following:

- Acceptance of applications for tree cutting through centres of state services and the Unified Portal of Interactive Government Services.
- Issuance of conclusions on tree and shrub cutting by territorial environmental protection authorities.
- Issuance of permits by district and city administrations for the cutting of trees and shrubs not included in the state forest fund, for which a moratorium has been introduced.
- Pruning and cutting of trees and shrubs damaged by natural factors, plant diseases, and those posing a threat to human life and health, according to the document, can only be carried out by the landscaping authorities.
- Where trees not included in the forest fund have to be cleared for development and construction purposes, compensatory replanting must be carried out at a ratio of 10 young trees for one tree cut.

9.1.2 Lender Requirements

9.1.2.1 ADB

An element of the ADB Safeguard Requirement 1: Environment includes 'Biodiversity Conservation and Sustainable Natural Resource Management'.

It is stated that, '*The borrower/client will assess the significance of project impacts and risks on biodiversity and natural resources as an integral part of the environmental assessment process... The assessment will focus on the major threats to biodiversity, which include destruction of habitat*'… Further, '*The borrower/client will need to identify measures to avoid, minimize, or mitigate potentially adverse impacts and risks*…

Concerning the proposed Project site, as the land has been used for agriculture, '*the borrower/client will exercise care to minimize any further conversion or degradation of such habitat, and will, depending on the nature and scale of the project, identify opportunities to enhance habitat and protect and conserve biodiversity as part of project operations.*'

9.1.2.2 AIIB

As outlined in AIIB's ESF, the Bank "*recognises that protecting and conserving biodiversity, sustainably managing terrestrial and aquatic natural resources and maintaining core ecological functions and services are fundamental to sustainable development. The objective of biodiversity conservation and sustainable management of natural resources should be balanced with a commitment to sustainable use of the multiple economic, social and cultural values of biodiversity and natural resources in an optimized manner. Through the Projects it finances, the Bank seeks, where applicable, to: (a) avoid adverse impacts on biodiversity and*

ecosystem services; and (b) assist its Clients in protecting and conserving biodiversity and promoting the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities."

9.1.2.3 EPFIs

The assessment of impacts upon terrestrial ecology is required with due consideration to IFC Performance Standard 6 on Biodiversity Conservation and Sustainable Natural Resource Management. PS6 establishes requirements for protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources. When avoidance of impacts is not possible, measures to minimise impacts and restore biodiversity and ecosystem services should be implemented. Specifically, it is necessary to determine baseline conditions and categorise the projects habitats as 'critical', 'modified' or 'natural' to undertake the necessary assessment. The Performance Standard defines the different habitats as follows:

- Natural Habitat: "Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition";
- Critical Habitat: "Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes"; and
- Modified Habitat: "Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed6 coastal zones, and reclaimed wetlands".

9.2 Baseline Conditions

The following subsections summarise the key information from ecological survey reports. Refer to Volume 4 for the reports in full.

9.2.1 Spatial Context

9.2.1.1 Regional Context and Scale

The site covers an area of approximately 126km^2 and is located in the Bukhara region, is situated within the edges of the Kyzylkum desert. Reviews of satellite imagery show the habitat to be largely sandy and rocky desert substrate, which is sparsely vegetated. A region of

elevated, rocky landscape. There are at least two streams (runoff from the reservoir) and a small water body with a surface area coverage of approximately 0.15 km^2 within the boundaries of the site. Tracks and small roads are visible across the proposed site, with scattered evidence of anthropogenic activity, which suggests most of the location is somewhat disturbed. Some small developments, potentially small residential buildings, can be seen just outside the perimeter of the site including a railway line that borders the North-East boundary and is crossed by the Bash-Karakul OHTL.

The proposed site is near to the under-construction Bash 500MW Wind Farm, which lies to the East of Lake Ayakagytma. At its closest point, turbines located in Bash 500MW Wind Farm and the proposed Gijduvon site would be approximately 6 km apart. A proposed OHTL of approximately 1.5 km in length will be used to connect the Gijduvon substation to an existing Bash-Karakul OHTL that runs South from the Bash Wind Farm site.

9.2.1.2 Seasonality

Uzbekistan is defined by four main seasons (spring, summer, autumn and winter). The general weather characteristics of the region can be described as cold winters with hot summers. Generally, the precipitations are highest in winter and spring, with summer being the driest period of the year.

Spring typically commences at the end of February / beginning of March and concludes in May. This period is characterised by sudden changes in weather from cold, heavy rains to warm, sunny days. Summer commences around May/June and concludes around August/September. As mentioned previously, this is the driest and hottest time of the year. Autumn spans from September/October to November/December and levels of precipitation increase during this period. Lastly, winter spans from December to February, and this period is characterised by low temperatures and high levels of precipitation.

9.2.1.3 Ecosystems and Habitats

The Kyzlkum desert accounts for a large proportion of the Bukhara region, characterized by sandy deserts and stony plains. However, outside of the desert landscape the region supports a variety of habitats including broad steppe, mountain ranges, wetlands and areas of anthropogenic activity, primarily agricultural lands.

FLORA

The flora of the desert Kyzylkum (including its south-western part) has been well studied, where botanical research in this region spans about two centuries. The general patterns of vegetation, classification scheme and description of the plant communities of Kyzylkum Desert are given in the 2nd volume of the "Vegetation cover of Uzbekistan and the ways of its

practical use" (1971–1984, in 4 volumes). Four main vegetation types were identified for the desert zone of Uzbekistan: Psammophyta (psammophilous vegetation of sandy deserts), Gypsophyta (vegetation of gypsum and stony deserts), Halophyta (vegetation of saline lands, solonchak and takyrs) and Potamophyta (riparian vegetation or so-called tugay). (1971-1984) Burygin, V.A.

Several new botanical studies have been performed in the Uzbek part of Kyzylkum Desert since 2000 (Tojibaev, Beshko, 2007; Khassanov et al., 2011; Esanov, 2017, 2019, 2023; Abduraimov, 2017; Akhmedov, 2018; Shomurodov et al., 2018; Shomurodov, 2018; etc.). In particular, F.O. Khassanov et al. (2011) estimated the entire flora of the Kyzylkum desert to be no less than 1043 species with 41 endemic and 11 sub-endemic species and noted that most of endemic species are localized in the relic mountains.

The most recent data on the floristic diversity of south-western Kyzylkum and Bukhara Oasis is given in the thesis of Kh.K. Esanov (2023): 795 species of 346 genera and 68 families are reported, among them 671 species are native and 124 are alien; 23 species of the flora of south-western Kyzylkum are red listed at the national level. It is worth noting that many of these species have likely not been assessed to determine their conservation importance. Currently only 289 taxa of more than 4380 species recorded for the flora of Uzbekistan were assessed by IUCN (6.6% of the flora), 27 species of them were included in the IUCN Red List as threatened (7 – CR, 10 – EN, 10 – VU), 17 of them are red listed at the national level. 12 plant species were assessed as Near Threatened (NT), 227 – Least Concern (LC), and 23 species belong to the category DD (Data Deficient). The majority of species of the flora of Uzbekistan has not yet been assessed by IUCN and belongs to the category NE (Not Evaluated).

To date, 5 editions of the Red Data Book of Uzbekistan have been published. The most recent fifth edition (2019), includes 314 plant species. National categories of threatened plants are follows: 0 (probably extinct species) – more or less corresponds to EX or EW categories of the IUCN Red List (www.iucnredlist.org), 1 (endangered, disappearing species) – meets CR category of IUCN, 2 (rare species) – meets EN category of IUCN and 3 (vulnerable, declining species) – corresponds to VU or NT category of IUCN. In 2023, Institutes of Botany and Zoology of the Academy of Sciences of Uzbekistan began a project supported by the Ministry of Ecology, Environmental Protection and Climate Change, and aimed at bringing the Red Data Book of Uzbekistan to the modern global standards of the IUCN Red List. The publication of the sixth edition of the Red Data Book of Uzbekistan based on the IUCN Red List Categories and Criteria is planned for 2025.

According to literature, herbarium data and online sources (GBIF, Plantarium, iNaturalist), the following 6 species included in the Red Data Book of Uzbekistan can be found in the Project area.

Table 9-1 Flora Species Listed in the Uzbekistan Red Data Book Potentially Present in the Project AoI

Family	Species	IUCN	UzRDB	Endemic Status	Notes
Caryophyllaceae	*Acanthophyllum cyrtostegium* Vved.	NE	3 (VU: Declining)	Endemic (Uzbekistan)	This is perennial which grows on gypsaceous, gravelly and sandy soils, on sands and outcrops of variegated beds in piedmonts of insular relic mountains of Kyzylkum, and occurs sporadically, solitary or in small populations.
Polygonaceae	*Calligonum zakirovii* (Khalk.) Czerep.	NE	1 (EN: Disappearing)	Endemic (Uzbekistan)	This is small shrub which grows on gypsaceous, gravelly and sandy soils in piedmonts of insular relic mountains of Kyzylkum, and occurs sporadically, in small groups.
Amaranthaceae	*Climacoptera amblyostegia*	NE	2 (Rare)		This is annual plant which grows on saline lands, and occurs sporadically in Hungry Steppe, Karshi Steppe, Fergana valley, Bukhara oasis in Uzbekistan and in Syrdarya valley in Kazakhstan.
Lamiaceae	*Eremostachys eriolarynx* Pazij et Vved.	NE	1 (EN: Disappearing)	Endemic to Kyzylkum Desert (Uzbekistan, Kazakhstan	This is perennial which grows on gravelly and sandy soils. Only 2 populations of about 200 individuals in total are known in Uzbekistan (both in Bukhara Province).
Lamiaceae	*Phlomoides transoxana*	NE	2 (Rare)	Endemic to Kyzylkum desert (including relic mountains).	Perennial, grows on sandy soils and shallow sands in piedmonts of insular relic mountains of Kyzylkum, and occurs sporadically, in small groups.

Family	Species	IUCN	UzRDB	Endemic Status	Notes
Liliaceae	Tulipa lehmanniana Merckl.	NT	3 (VU: Declining)		Bulbous perennial. Vulnerable species of Irano-Turanian deserts with decreasing range and populations. Recent field studies (Abduraimov, 2017; Shomurodov & al., 2018) showed that large populations with thousands of specimens grow in the Uzbek part of the Kyzylkum desert, in Dzhizak, Samarkand, Navoi and Bukhara Regions.

FAUNA

Zoogeographically, the study area belongs to the faunal complex of the Iranian-Turanian community of the Palearctic province (Kostin, 1961). Therefore, the most characteristic representatives of the fauna are steppe species. The presence of nearby reservoirs (Shorkul Reservoir and Lake Ayakagitma) allows for species more reliant on constant water sources to reside, from larger mammals to water obligate bird species.

The vertebrate complex in the region consists of typical rodents (including the Tolai hare, Yellow ground squirrel, Severtsov's jerboa, Libyan Gerbil, etc.) and predatory mammals (Red Fox, Wild cats, and Weasels). According to literature and archival materials, 29 species of mammal fauna have been recorded at the project area, which represents 27.1% of the total mammalian fauna of Uzbekistan. Species of elevated conservation concern that may be present at the site include the Goitered Gazelle (IUCN; VU), and the Brandt's Hedgehog (*Paraechinus hypomelas*) and Corsac fox (*Vulpes corsac*) which are included in the Red Book of the Republic of Uzbekistan (2019). In addition, 2 species are included in the Annexes of the Convention on International Trade in Species of Fauna and Flora, and 1 species in the Convention on the Conservation of Migratory Species of Wild Animals; the Steppe Cat (*Felis lybica*) and Chaus Cat *(Felis chaus*).

The regions varied habitat and topography, in addition to the presence of important wetlands supports a number of avian species for breeding and wintering. Moreover, Uzbekistan is located in the Central Asian migratory flyway, one of the major flyways that covers a large continental area between Eurasia and the Arctic and Indian Oceans. Annual migrations see large numbers of birds moving South in spring and back Northward in autumn. As many bird species are likely to make stop-overs along their migration route, the Bukhara region sees an influx of migrating bird species making use of the areas wetlands during spring and autumn.

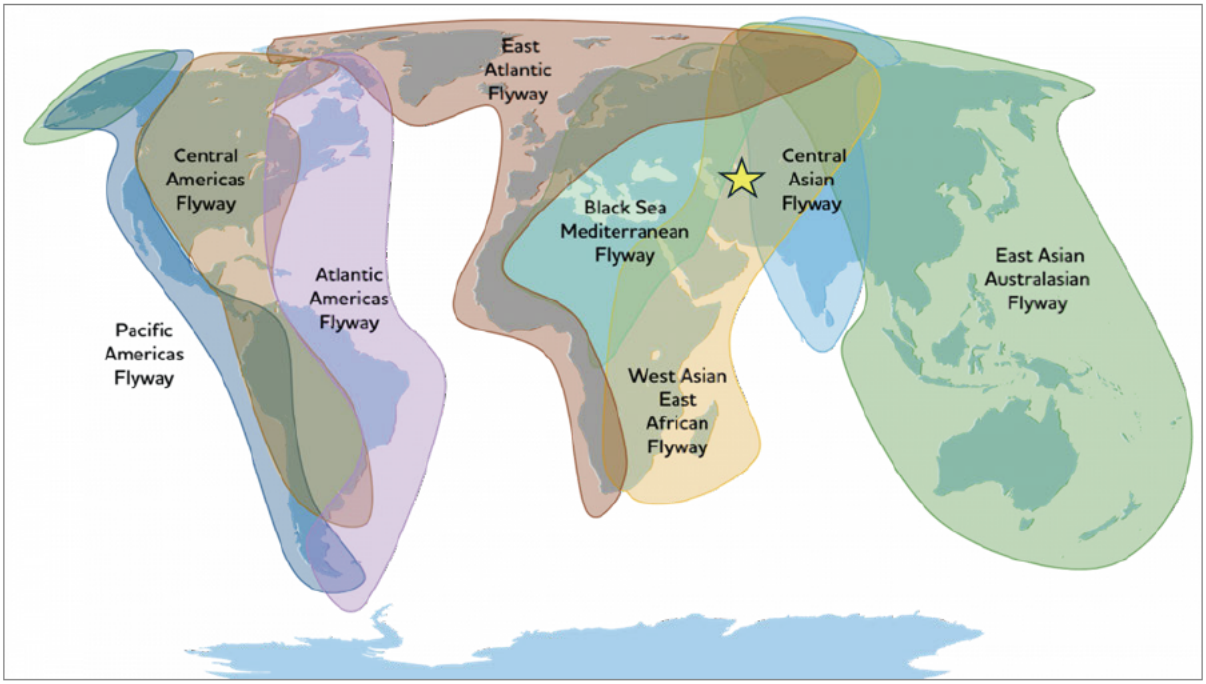


Figure 9-1 Global Migratory Flyways

Several bird species known to this region are conservationally important, due to their threatened status, either globally or nationally. The Egyptian Vulture (*Neophron percnopterus*) for example, is globally Endangered due to rapid declines and is nationally protected in Uzbekistan. They are known to breed in Bukhara, and nesting sites have been identified at lake Ayakagitma. Similarly, the Steppe Eagle (*Aquila nipalensis*) is listed as Endangered on the IUCN RedLlist and has been known to use the area as a stop-over during migrations. In fact, many threatened Eagle species are known to breed near to, or migrate through, the project area. The Asian Houbara Bustard (*Chlamydotis macqueenii*), is an iconic inhabitant of steppe and semi-desert in Central Asia and the Middle East. The species, which is classified as Vulnerable by the IUCN RedList, is known to breed and migrate through Uzbekistan and has been recorded breeding at three Important Bird Areas (IBAs) located near to the proposed Gidjuvon site.

Birds are however not the only animal that migrates. Bats have been known to migrate throughout the area of Uzbekistan. The most common species, the Common Pipistrelle (*Pipistrellus pipistrellus*), is a migratory species. Many other bat species are known to migrate, however research is much more restricted when compared to bird migrations. In general bat activity is restricted to warmer months and there is little activity during the coldest months of winter.

In addition to cyclical migrations, there are other annual activities undertaken by regional biodiversity elements. An example of this is the increase in reptile activities that occur between

spring and summer. The increase in temperatures result in higher diurnal and nocturnal reptile activity. For some reptiles, such as Horsfield tortoise (*Testudo horsefieldii*) this period of activity is limited only to only three months (March – May) (Theile, 2000). This tortoise species spends most of its time hibernating and aestivating in underground burrows. Similarly, there is a decline in reptile activity as temperatures drop in autumn and winter.

9.2.1.4 Recognised Biodiversity Areas

In order to fully analyse the potential impacts on conservationally important species, the spatial context around the project site was assessed to determine the presence of Key Biodiversity Areas (KBAs), Important Bird Areas (IBAs) and other Nationally Protected Areas. The presence of IBAs is of particular importance given that avifauna species are perhaps the most sensitive to the impact of windfarms. IBAs are designated by an internationally agreed upon set of criteria that is globally important for the conservation of bird populations. These populations are often species specific, and each site is then recognized as an IBA due to specific species triggering the criteria.

A total of seven IBA/KBA's and six Nationally Protected Areas were identified, which are either fully or largely encompassed by this 100km^2 buffer zone. These areas are shown in the following figure.

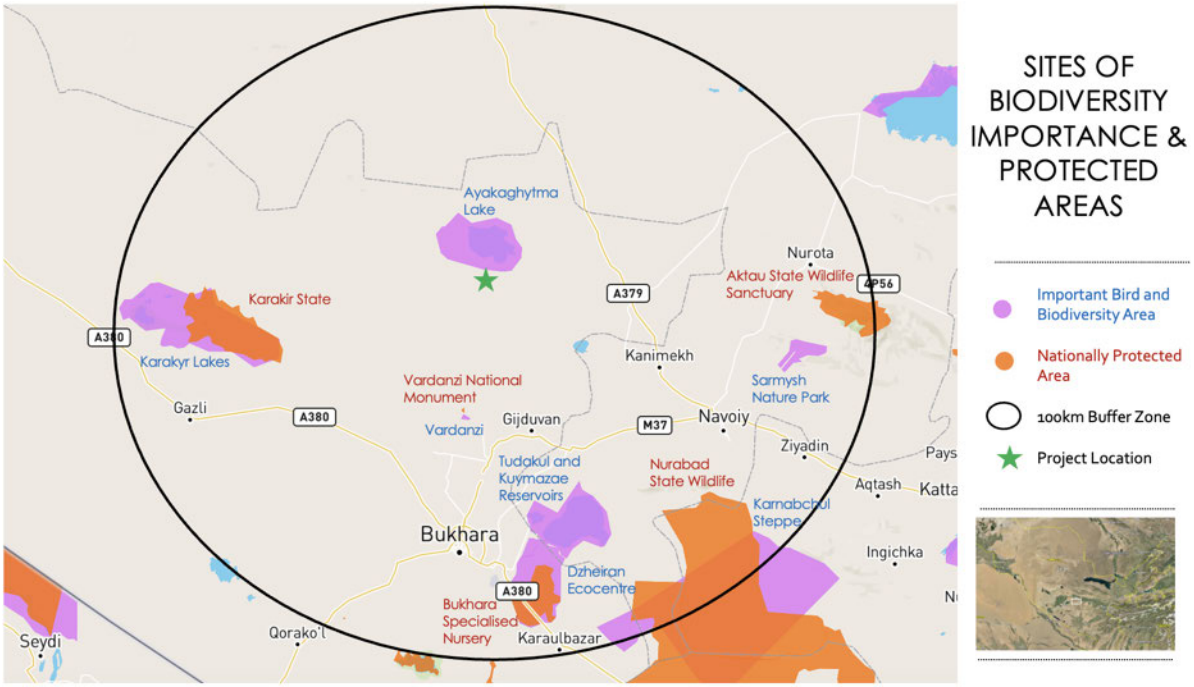


Figure 9-2 Map of KBA/IBA's and Nationally Protected Areas within a 100km Radius of the Proposed Site

The below table summarises all conservation areas within 100 km of the project site, along with details on the size and type of conservation area.

Table 9-2 Summary of Protected Areas within a 100km Proximity to Proposed Site

Name	Size	Designation	Habitats	Notable Species	Proximity to Project Area
Ayakagytma Lake	32,854 ha	• Important Bird Area (Birdlife) • Key Biodiversity Area (KBA Partnership)	Due to having a rich food supply and remaining unfrozen in winter, Ayakagytma Lake is of international significance for wintering waterfowl; extensive salt marshes adjacent to the lake attract many shorebirds.	The loess cliffs bordering the depression are good for nesting birds of prey (Egyptian Vulture, Long-legged Buzzard, Common Kestrel, Saker Falcon, Eagle Owl, Little Owl) and other cliff-nesting species.	3km
Vardanzi / Vardanzi National Monument	317 Ha	• Terrestrial Protected Area (Protected Planet) • Important Bird Area (Birdlife) • Key Biodiversity Area (KBA Partnership)	This sandy desert IBA contains three biotopes: tree-shrubs, human constructions and agricultural lands. There are also small water bodies (a collector and canals).	European Roller and Zerafshan subspecies of pheasant *Phasianus colchicus*.	30km
Tudakul and Kuymazar Water Reservoirs	33,648 Ha	• Terrestrial Protected Area (Protected Planet) • Important Bird Area (Birdlife) • Key Biodiversity Area (KBA Partnership)	Predominantly wetland containing saltwater lake, freshwater reservoir, swamps and marshland. Some shrubland and desert habitat.	Over 250 bird species including White-headed duck. This territory is of international importance for the sustainability of migratory and wintering waterbirds.	55km
Kara-Kir - state wildlife sanctuary / Karakyr Lakes	64,242 ha	• Terrestrial Protected Area (Protected Planet), • Important Bird Area (Birdlife) • Key Biodiversity Area (KBA Partnership)	Forest, Shrubland, Desert, Wetlands (inland), Rocky areas (inland cliffs, mountain peaks, Artificial/Terrestrial	White-headed duck, Lesser White-fronted Goose, Common Pochard, Asian Houbara.	60km

Name	Size	Designation	Habitats	Notable Species	Proximity to Project Area
Nurabad State Wildlife Sanctuary/ Karnabuchal Steppe	177,156 Ha	• Terrestrial Protected Area (Protected Planet) • Important Bird Area (Birdlife)	The IBA includes various key habitats: desert, saline lakes and marshlands, shrubs. The area is used for grazing.	Saker Falcon, Lesser-white Footed Goose and Asian Houbara	70km
Bukhara Specialized Nursery "Jeyran" Nature Nursery/ Dzheiran Ecocentre	31,682 Ha	• Important Bird Area (Birdlife) • Key Biodiversity Area (KBA Partnership) • Terrestrial Protected Area (Protected Planet)	The first part is fenced (5,145 Ha) and includes saltmarsh depression, plains of salt desert, sands, mountain foothills, Kaykasach mountain and four brackish lakes. The second part (18,350 Ha) is jointly used and includes farmland, gas and electric infrastructure, with similar habitats to fenced sight including 10 shallow reservoirs.	257 bird species (37% of all avifauna in Uzbekistan), including Saker Falcon and White-headed duck. Goitered Gazelle, Kulans, Przewalski's horses.	70km
Sarmysh Nature Park	5,704 Ha	• Important Bird Area (Birdlife) • Key Biodiversity Area (KBA Partnership)	Typical low mountains of the Kyzylkum desert. Vegetation wild thorny almond and other bushes on the stony plots. Hydrophilic vegetation (e.g. Tamarix sp., Eleagnus, reed) is developed in the gorges on the riverbanks. Plantations of mulberry, walnut and other fruit trees.	The nature park is located on the Central-Asian Flyway: key resting place for many migratory bird species.	80km
Aktau State Wildlife Sanctuary	1542 Ha	• Terrestrial Protected Area (Protected Planet)	Rocky, mountain habitat.	Saker Falcons, Vultures and other Migratory birds. Goitered Gazelle.	90km

The project site is located immediately adjacent to Lake Ayakagitma, which is a designated IBA and KBA. In particular, the lake is of international significance for wintering waterfowl and shorebirds. The loess cliffs bordering the depression are good for nesting birds of prey (Egyptian Vulture, Long-legged Buzzard, Common Kestrel, Saker Falcon, Eagle Owl, Little Owl) and other cliff-nesting species. Large waterfowl and raptors

The following sections and sub-sections represent a summary of the surveys undertaken to establish baseline ecological conditions of the WF site. Refer to **Appendix H**, which includes full detailed reports of specific methodologies, a recount of all results, photos, maps and the full spectrum of collected data for each aspect of terrestrial ecology that was surveyed.

9.2.2 Ecosystems, Habitats and Plant Communities

9.2.2.1 Survey Methodology

The first field survey, which assessed spring vegetation cover and formed the basis of habitat mapping, was conducted on 10th and 11th April 2024. The second survey, to capture seasonal variations in vegetation, was conducted on 14th and 15th September 2024. Surveys utilised traditional methods of botanical surveys commonly used for sampling and mapping of native non-forest vegetation, recognition of floristic composition and spatial patterns of plant communities (Field geobotany, 1959–1976; Granitov, 1980; Kent, 2011).



Figure 9-3 Flora Plots (n = 54) Sampled During the Autumn and Spring Surveys[16]

The habitat and LULC maps were created using QGIS 3.32 free software on the basis of visual interpretation of Google Earth free satellite imagery, topographic maps (1:100,000, available online for free at http://loadmap.net/), and the data of field survey. It should be noted that detailed classification and mapping of habitats, and identification of threatened habitat types (as it was done in EU) has not yet been carried out in Uzbekistan. As such, for the classification of habitats of project area, the IUCN Habitats Classification Scheme, ver. 3.1 (https://www.iucnredlist.org/resources/habitat-classification-scheme) and typology of native vegetation published in the "Vegetation cover of Uzbekistan" (1971–1984) were used. As far it was applicable to the local conditions, the pan-European system, EUNIS habitat classification scheme, was also followed.

[16] the survey covered the main 39 WTGs and the buffer WTG areas that were considered in the preliminary layout.

The structure of plant communities was studied using 100x100 m geobotanical sample plots; checklists of plant species recorded for each sample plot and a summary check-list of the flora of the proposed wind farm project area were compiled.

Refer to the detailed habitat and flora reports in **Appendix H** for detailed survey methodology and full datasets of results.

9.2.2.2 Results

HABITATS

A total of four habitat types were described across the Gijduvon Wind Farm site and associated OHTL. Natural habitats dominated the site, with modified habitats accounting for just a small proportion of the area. Habitat types are discussed below.

Sandy and sabulous-loamy desert plain

This is a natural habitat type which prevails in the Project area. Characterised by flat and flat-wavy terrain, with sandy or sandy-loamy soil, covered by communities of sagebrush, saltworts, desert bindweed and ephemeroids, sometimes with plantations of black saxaul.

Fixed and semi-fixed sands

Fixed and semi-fixed sands were most dominant in the central part of the project area, this habitat type was covered by communities of psammophilous shrubs, subshrubs, sagebrush and desert sedge.

Saline lands

Saline lands are situated in depressions and along irrigation and discharge channels and collectors of the irrigation system of Bukhara oasis (Agytma discharge channel, Shurkul channel, etc.).

Modified habitats

Accounts for a very small proportion of the project site. They are represented by saline fallow lands and farmsteads (shepherds houses, corrals and wells surrounded with tramped areas). The term fallow land throughout this report refers to abandoned or recently abandoned fields or arable lands. Characterised by sparse communities of native weeds, camel thorn, annual saltworts, ephemerals, and with solitary black saxaul, wolfberry and tamarisk.

The following figure showcases the habitat map for the Gijduvon Wind Farm site.

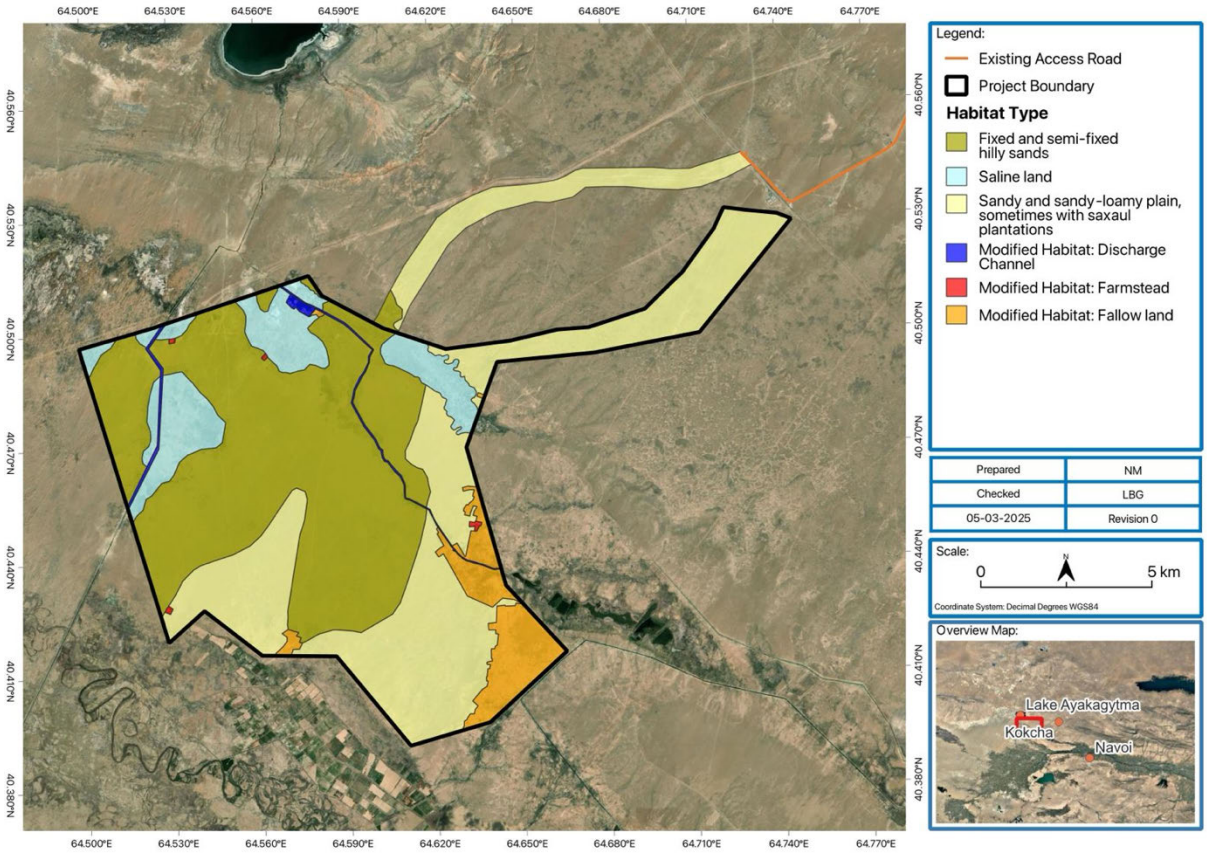


Figure 9-4 Habitat Map of Gijduvon Wind Farm Site

FLORA

Spring Survey

The majority of species recorded during Spring surveys were ephemerals, typical of the desert zone of Central Asia and are considered to be common to the region. No alien species were identified. Three species of elevated conservation concern were recorded; one species, *Tulipa lehmanniana (*Figure 9-5*)*, is globally recognised as Near Threatened (NT) on the IUCN RedList and included in the Red Data Book of Uzbekistan (UzRDB). Two additional species, *Calligonum zakirovii* (Figure 9-6) and *Eremostachys eriolarynx* are also listed as Endangered in the UzRDB and Nationally or Regionally endemic. Further discussion of abundance and distribution is included below (Seasonal Variation).



Figure 9-5 Flowering *T. lehmanniana* at the Gijduvon Wind Farm site



Figure 9-6 Nationally red-listed *Calligonum zakirovii*, endangered national endemic, endemic to south-western Kyzylkum



Figure 9-7 Nationally red-listed *Eremostachys eriolarynx*, endangered species endemic to Kyzylkum Desert

Autumn Survey

During surveys conducted in September 2024, flora species primarily included shrubs, subshrubs, annuals and perrenials. Two species listed in the UzRDB were noted, *Calligonum zakirovii* (UzRDB 1), also observed during Spring surveys, and *Climacoptera amblyostegia* (UzRDB 2), an annual species native to Uzbekistan and Kazakstan. Again, no alien species were found.

Seasonal Variation

A total of 111 species were recorded during the combination of Spring and Autumn surveys. Four of these are of elevated conservation concern, all recorded in the Uzbekistan Red Data Book, one of which is also listed as Near Threated on IUCN global RedLists.

Table 9-3 Gijduvon Wind Farm – Threatened and Important Flora

Species	Season Recorded	Abundance on Site	Range	IUCN /RDB Status
Calligonum zakirovii	Spring	Three populations (27 specimens in total)	National (Endemic)	Not Evaluated (NE) / UzbRDB 1 (endangered, disappearing)
	Autumn	One population (23 specimens total)		
Climacoptera amblyostegia	Autumn	Four populations (100-200 specimens total)	Central Asia	Not Evaluated (NE)/ UzRDB 2 (Rare)
Eremostachys eriolarynx	Spring	Two small populations (25 specimens total)	Regional (Endemic)	Not Evaluated (NE) / UzbRDB 1 (endangered, disappearing
Tulipa lehmanniana	Spring	Found across the majority of sample plots. Density varies from solitary specimens to several thousand per 1 hectare.	Central Asia	Near Threatened (NT)/UzbRDB 3 (reducing)

The following figures show the locations of the populations of conservationally important species across the project site.

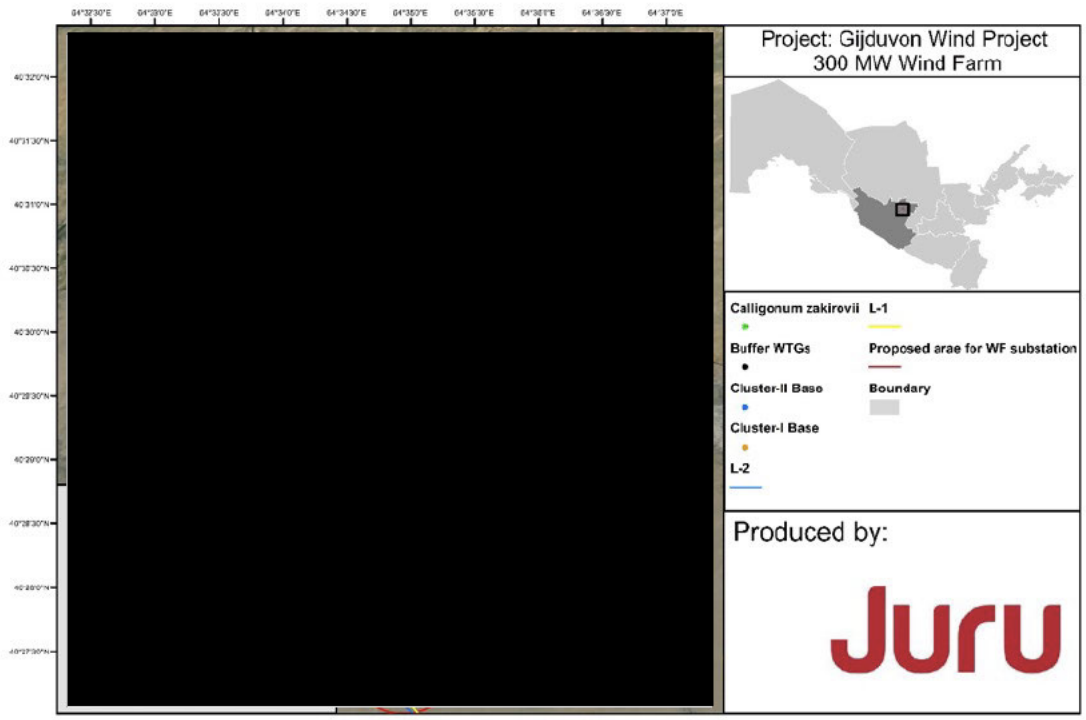


Figure 9-8 Locations of *Calligonum zakirovii* Near the Proposed Turbines

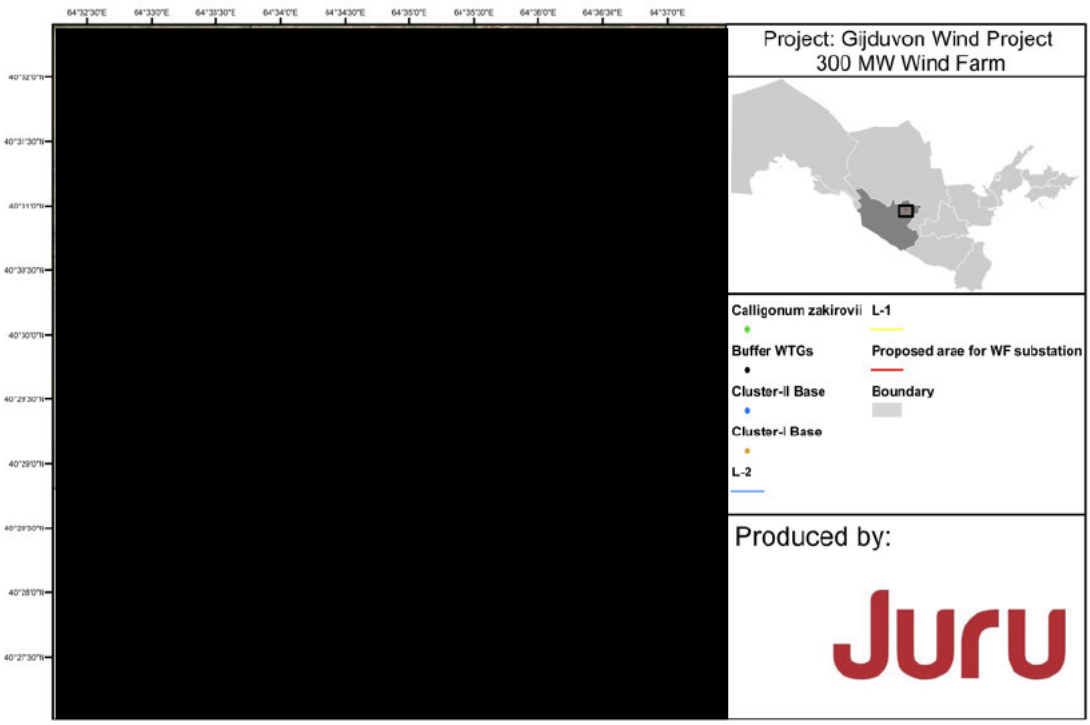


Figure 9-9 Locations of *Climacoptera amblyostegia* Near the Proposed Turbines

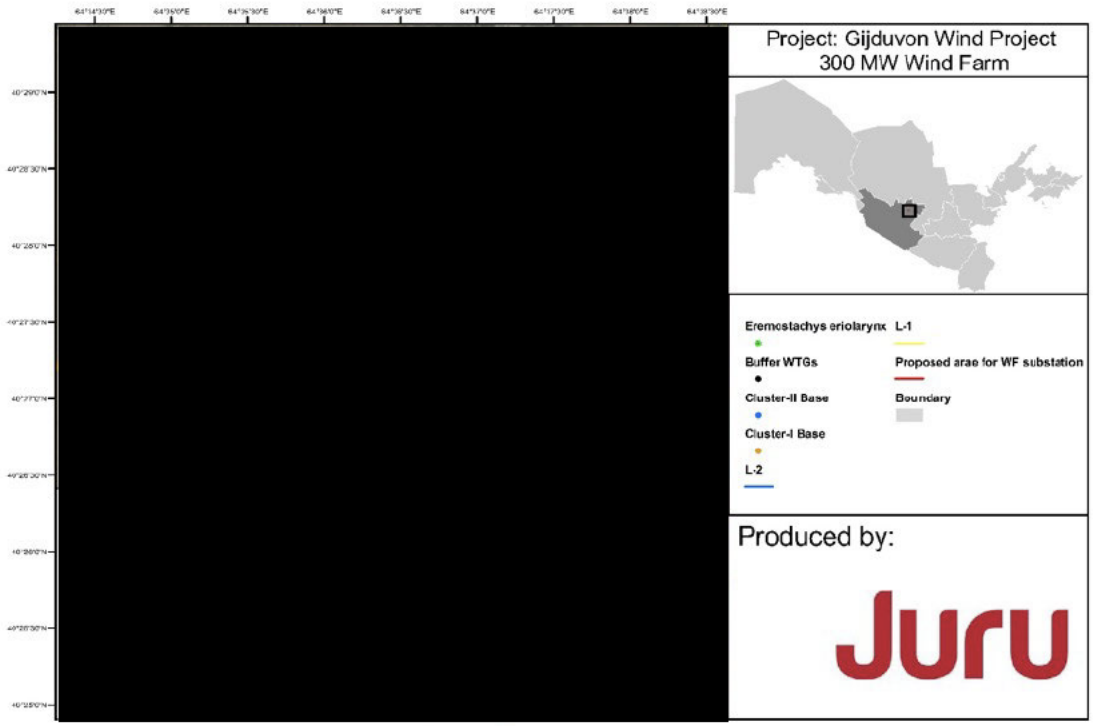


Figure 9-10 Locations of *Eremostachys eriolarynx* Near the Proposed Turbines

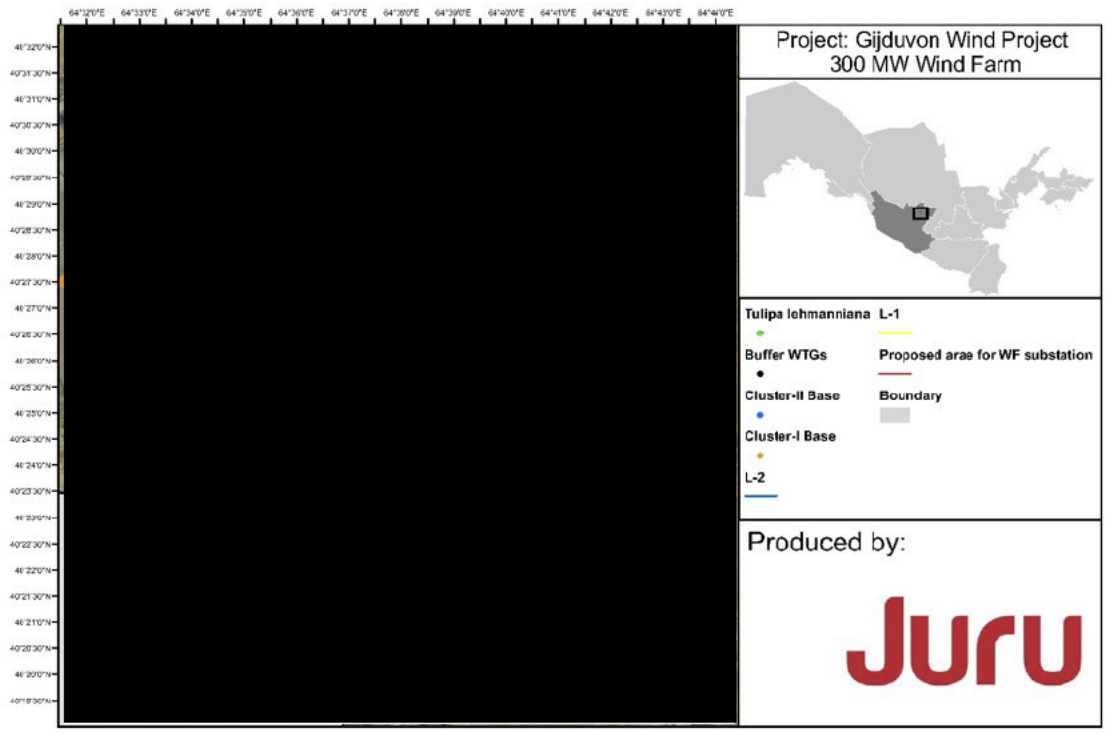


Figure 9-11 Locations of *Tulipa lehmanniana* Near the Proposed Turbines

The main difference between the Spring and Autumn assemblages of vegetation recorded is the high abundance of ephemerals, and low abundance of annual saltworts, in the Spring season. After the end of growing season (late April-early May), ephemerals fade quickly and begin a long dormant period which continues for nine months. Since at the end of June the dry above-ground part of these plants has already been eaten by livestock and scattered by the wind, their abundance decreased. The vegetation observed during autumn was dominated mainly by shrubs (*Tamarix, Lycium, Calligonum, Haloxylon, Xylosalsola*), subshrubs (*Artemisia, Astragalus villosissimus, Convolvulus hamadae*), xerophytic perennials (*Alhagi pseudalhagi, Acanthophyllum elatius*, etc.) and annual and perennial representatives of the family Amaranthaceae (*Salsola, Suaeda, Caroxylon, Climacoptera, Halimocnemis, Ceratocarpus*, etc.) blooming and bearing fruits in late summer and autumn.

9.2.3 Phototrapping

9.2.3.1 Survey Methodology

The placement of cameratraps represents a general methodology helpful in surveying species across taxonomic groups that are elusive, shy or nocturnal.

A total of 15 cameratraps were installed across various habitats within the project area, with their locations determined during a preliminary site visit. The camera traps were installed on February 12th and 13th 2024, and were collected on May 31st and June 3rd 2024, resulting in a total study period of 108-110 days. During the survey, two camera traps (№54 and №56) were stolen, and one camera trap (№50) had been turned off by a local herder, resulting in no data from that unit. Despite this, the remaining functional camera traps provided approximately 1310 effective camera trap days of data.

Table 9-4 Locations and installation dates of cameratraps

Phototrap Number	Co-ordinates		Installation Date	Notes
	N	E		
42	[redacted]		12.02.2024	
43			12.02.2024	
44			13.02.2024	
45			12.02.2024	
46			12.02.2024	
47			13.02.2024	
48			13.02.2024	
49			12.02.2024	

Phototrap Number	Co-ordinates		Installation Date	Notes
	N	E		
50	[redacted]		12.02.2024	Turned off by herder
51			13.02.2024	
52			12.02.2024	
53			13.02.2024	
54			13.02.2024	Lost
55			13.02.2024	
56			13.02.2024	Lost

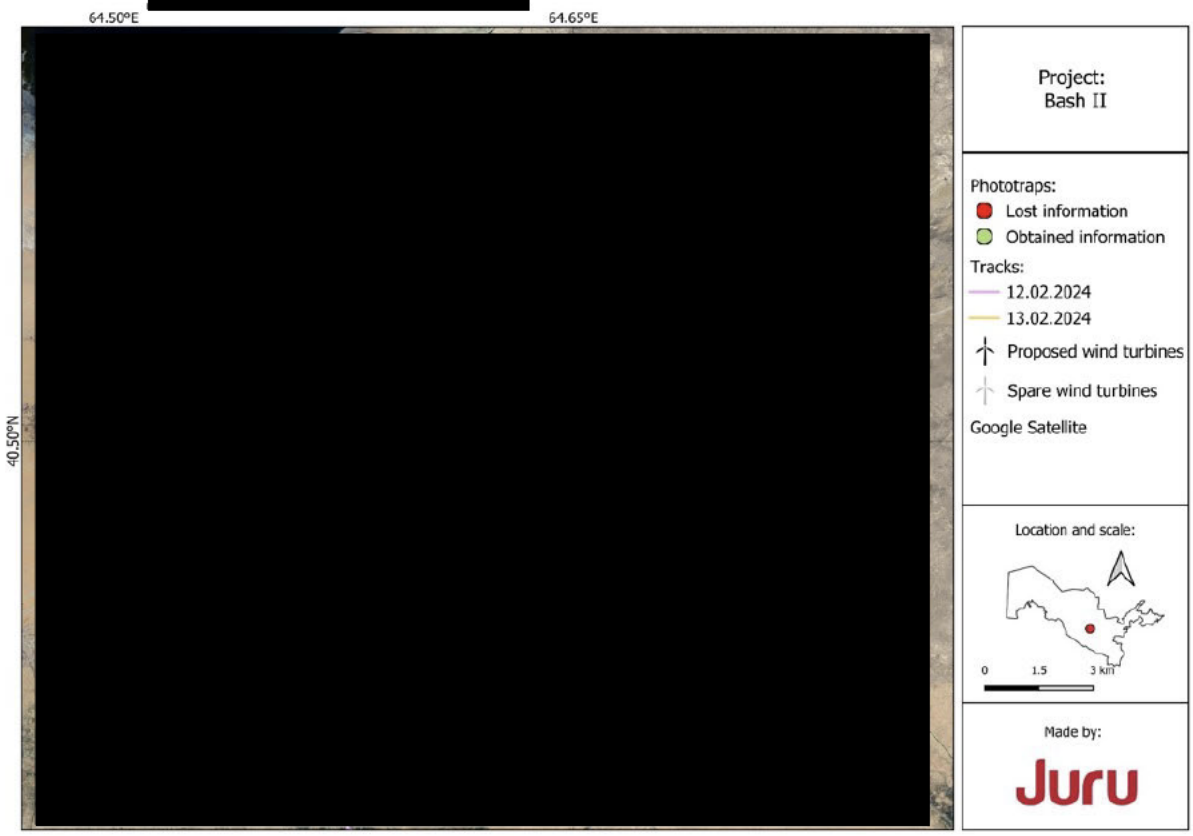


Figure 9-12 Map of cameratrap deployment locations

9.2.3.2 Results

Camera trap surveying recorded 34 bird species, 7 mammal species and 3 reptile species across the study area. The results are incorporated into the following relevant sections specific to the taxonomic groups (Avifauna, Mammals and Herpteofauna).

9.2.4 Avifauna

9.2.4.1 Survey Methodology

OVERVIEW OF SURVEY TECHNIQUES

Bird surveys were carried out covering the following seasons and target species:

- VP Surveys: Winter (9th January –15th March), Spring (20th March –13th May), Summer (10th June – 27th August) and Autumn (1st September – 10th November) 2024. A total of 9 VPs were surveyed for a minimum of 36 hours per VP per season.
- Asian Houbara Survey: March – April 2024
- Summer Waterbird Survey: March 30th and May 13th 2024
- Raptor nest survey: Round 1 April 24th – 26th 2024 and Round 2 June 9th to 10th 2024

Refer to the detailed reports in **Appendix H** for full methodologies and data sets.

VANTAGE POINT

Vantage Point surveys were conducted for each season across the 9 selected VPs. Surveys were conducted under suitable weather conditions with good ground visibility (>2km). The survey was designed to quantify the level of flight activity and the distribution of birds across the survey area. Its primary objective is to gather data for the Collision Risk Model (CRM), which informs the Collision Risk Assessment (CRA) by predicting mortalities resulting from collisions with operational turbines. This data can also provide insights into bird usage of the site, aiding in the assessment of potential impacts such as habitat loss, disturbance, displacement, and barrier effects.

The survey methods adhere to international best practice guidance, particularly the Scottish Natural Heritage: Recommended bird survey methods to inform impact assessment of onshore wind farms (March 2017, v2.) (SNH guidance 2017) and the IFC EHS Guidelines for Wind Energy (2015).

Focal species, those of conservation concern and/or most sensitive to the impacts of windfarms, were grouped into Tier 1 target species and Tier 2 species. Tier 1 included those that are of high conservation concern with a global IUCN status of Vulnerable or higher, or species known to breed in the area and deemed to be sensitive to the impacts of windfarms such as the Golden Eagle. These Tier 1 species were given priority during surveying to ensure adequate data was collected for these high priority species, for use in CRM, when many birds are present. Tier 2 species included those that were listed as Near Threatened or Least Concern on the IUCN Redlist or deemed unlikely to be present on site and susceptible to the impacts of windfarms.

The following map shows the location of VPs across the wind farm site.



Figure 9-13 Map of VP locations (yellow pins) in relation to Wind Turbines Across the Proposed Windfarm Site

Table 9-5 Vantage point locations

Vantage Points	Coordinates (DD)	
	N	E
VP01		
VP02		
VP03		
VP04		
VP05		
VP06		
VP07		
VP08		
VP09		

ASIAN HOUBARA

The Asian Houbara is one of the most characteristic representatives of the avifauna of Uzbekistan. It primarily occurs in the Kyzylkum and Ustyurt regions during nesting and migration seasons and occasionally winters in the southern regions of the country (Kreutzberg-Mukhina, 2003). Due to the secretive and shy nature of the species, specialized Houbara surveys were undertaken during the peak Houbara mating season, one of the only times that Houbara can readily be viewed. Two rounds of surveys were conducted; the first round took place between March 25-29, 2024, and the second round between April 24-26 2024. The survey consisted of point counts, taking advantage of the visual observability of males' courtship displays. This provides an opportunity for male population assessment with a relatively high degree of accuracy (Koshkin et al., 2016a). Observations were made across all 14 survey points.

The following figure shows the 14-point count locations where Houbara spring point count surveys were conducted.



Figure 9-14 Survey point locations and tracks used for VP surveys

Table 9-6 Asian Houbara Survey Locations

N	Point	Northing	Easting	Habitat
1	AH01	[redacted]	[redacted]	Sagebrush sandy desert
2	AH02	[redacted]	[redacted]	Sagebrush sandy desert with rare saxaul trees
3	AH03	[redacted]	[redacted]	Sagebrush sandy desert
4	AH04	[redacted]	[redacted]	Sagebrush desert with *Peganum harmala*
5	AH05	[redacted]	[redacted]	Sparse low shrubland with Ferula
6	AH06	[redacted]	[redacted]	Sparse low shrubland with Ferula
7	AH07	[redacted]	[redacted]	Sagebrush sandy desert
8	AH08	[redacted]	[redacted]	Sagebrush sandy desert
9	AH09	[redacted]	[redacted]	Sagebrush sandy desert
10	AH10	[redacted]	[redacted]	Sparse low shrubland with Ferula
11	AH11	[redacted]	[redacted]	Sagebrush sandy desert

9.2.4.1.1 Waterbird Survey

Targeted waterbird surveys were carried out in the Spring and Autumn of 2024, at nine survey points (WB01–WB09) across different aquatic habitats within the project area.

In Spring, the survey was conducted over two rounds:

- the first on March 30, 2024, during the peak spring migration period;
- the second on May 13, 2024, during the early breeding season.

In Autumn the survey was conducted over three rounds:

- the first on September 23, 2024;
- the second on October 6 and 7, 2024;
- the third on November 13.

Survey points were strategically selected to represent a variety of waterbodies, including:

- Artificial ponds (WB01, WB04, WB05, WB07): characterized by reeds, Tamarix bushes, and perennial grasses.
- Wetlands (WB03, WB08): both temporary and permanent wetlands, with shallow saline water and *Tamarix sp.* fringes.
- Reedbeds (WB06): overgrown waterbodies dominated by reeds, surrounded by Tamarix vegetation.
- Takyr (saltmarsh) (WB09): saline areas prone to flooding after rain, providing suitable habitat for migrating waders.

Observers conducted point count surveys at each of the nine designated survey points, recording all birds seen or heard, with a focus on waterbirds and migratory species. The count duration ranged from 15 to 40 minutes, depending on the habitat complexity and bird activity.

Phototraps deployed near water sources also provided key information regarding the presence of waterbirds across the sites, specifically phototraps 45, 46, 48 and 52 which are highlighted on survey maps below.

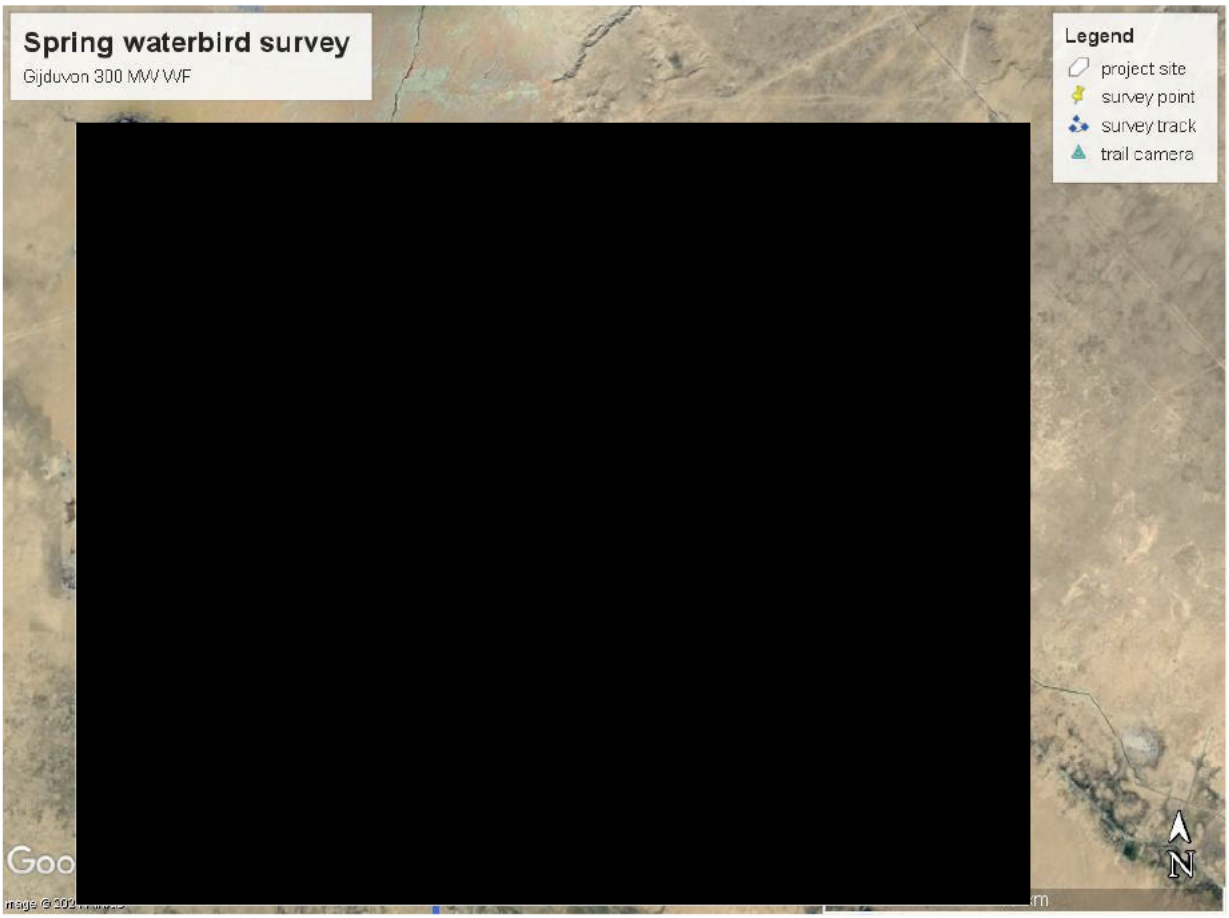


Figure 9-15 Survey Points and Tracks Used in Targeted Waterbird Surveys, and Locations of Phototraps

Table 9-7 Survey Point Co-Ordinates

Survey Points	Coordinates (dd)		Spring		Autumn			Habitat
	N	E	Round 1	Round 2	Round 1	Round 2	Round 3	
WB01	[redacted]	[redacted]	Mar 30	May 13		Oct 6-7	Nov 13	Pond
WB02	[redacted]	[redacted]	Mar 30	May 13	Sep 23			Waterbody
WB03	[redacted]	[redacted]	Mar 30	May 13	Sep 23		Nov 13	Wetland
WB04	[redacted]	[redacted]	Mar 30	May 13	Sep 23		Nov 13	Pond
WB05	[redacted]	[redacted]	Mar 30	May 13	Sep 23		Nov 13	Pond

Survey Points	Coordinates (dd)		Spring		Autumn			Habitat
	N	E	Round 1	Round 2	Round 1	Round 2	Round 3	
WB06	[redacted]	[redacted]	Mar 30	May 13		Oct 6-7		Overgrown reedbed waterbody
WB07	[redacted]	[redacted]	Mar 30	May 13		Oct 6-7		Pond
WB08	[redacted]	[redacted]	Mar 30	May 13		Oct 6-7		Temporary wetland
WB09	[redacted]	[redacted]	Mar 30	May 13		Oct 6-7		Takyr (saltmarsh)

9.2.4.1.2 Raptor Nest Search

The breeding season for Raptors in the region typically extends from March to August. Nesting substrates include cliffs, bushes, karst caves, OHTL poles, and abandoned buildings. These substrates are generally rare within the project area, meaning raptor nesting activity was expected to be limited.

The raptor nest survey was conducted in 2024 across 2 rounds:

- First Round: April 24-26, 2024;
- Second Round: June 9-10, 2024

The methodology employed a combination of field transect surveys and Vantage Point (VP) surveys to identify potential nesting sites across the project site and a 5 km buffer zone. Due to the remoteness of the area, its size, and the relatively flat terrain, transects were conducted by vehicles with stops at potential nesting sites (trees, bushes, power line poles, cliffs, escarpments, and karst sinkholes).

Research on the potential nesting of the Marsh Harrier was conducted alongside studies of waterfowl (see Waterbird Survey). Observing Marsh Harrier nests in dense reed beds is very difficult. The most suitable nesting sites were identified at permanent ponds surrounded by dense reed beds.

The survey map showing tracks covered during Raptor Nest Searches are shown in the figure below.

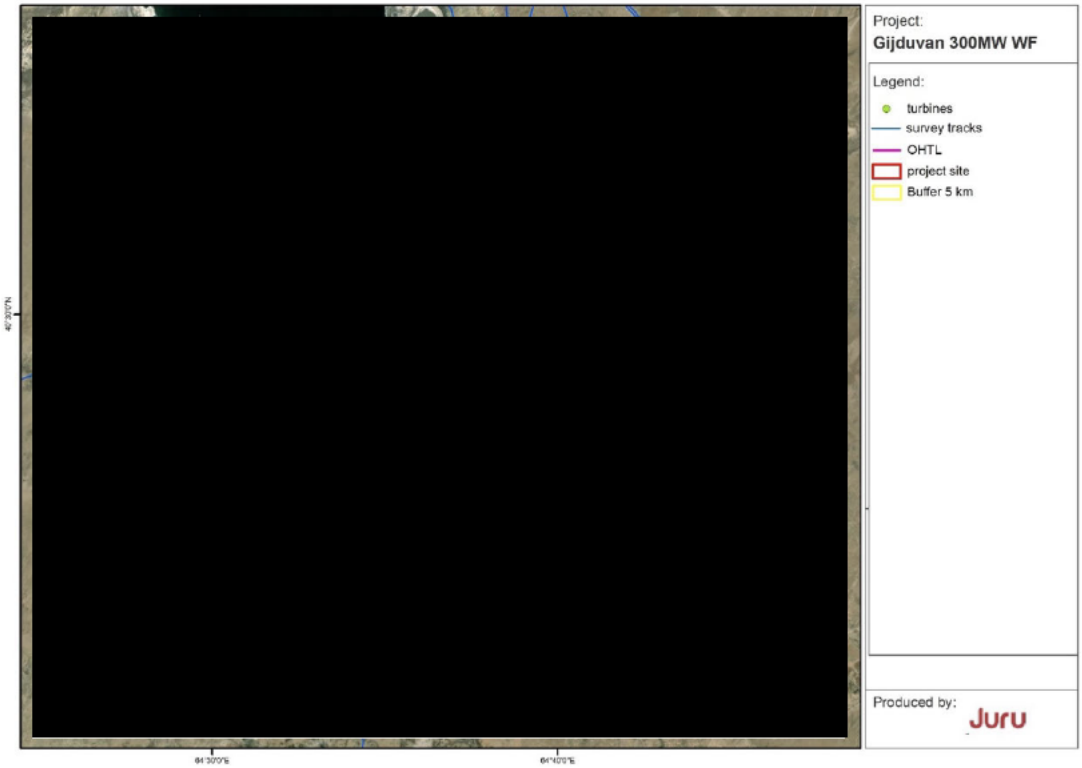


Figure 9-16 Raptor Nest Survey Tracks Across the Project Site

9.2.4.2 Results

9.2.4.2.1 Winter VP Survey

During winter VP surveys, a total of 58 bird species were observed, 12 listed in the Red Book of Uzbekistan (2019) and 8 included in the IUCN Red List (2023-1). Several key wintering species were observed including Merlin, Cinereous Vulture and Steppe Eagle. Black-billed Sandgrouse and larks were found in abundant numbers during winter, demonstrating the ecological importance of the site for these species. Local movements were observed around small ponds surrounding the site, particularly in late February after melting. These attracted water obligate species such as pelican and swans.

Spring migration began in the second part of February, with the first wave of migrants overlapping with the winter season.

Several species of elevated conservation concern were recorded. This included the Critically Endangered Sociable Lapwing and Endangered Steppe Eagle. Numbers of Steppe Eagle were notably high, with 85 individuals recorded to be migrating across the whole site. The Black-bellied Sandgrouse, whilst not determined to be a Tier 1 or 2 species, was recorded to be migrating through the project site in extremely high numbers (n = 536). A full list of Tier 1 and Tier 2 species recorded during Winter 2024 are shown in the following table.

Table 9-8 Observations of Tier 1 and 2 Species During Winter VP Surveys

Species	Common Name	IUCN	UzRDB	Tier	Observations on VPs									Count	Notes
					VP 01	VP 02	VP 03	VP 04	VP 05	VP 06	VP 07	VP 08	VP 09		
Vanellus gregarius	Sociable Lapwing	**CR**	**VU:R**	**1**									1	3	a flock of 3 birds
Aquila nipalensis	Steppe Eagle	**EN**	**VU:D**	**1**	3	6	2	13	6	3	6	3	7	85	34 records of single birds and 15 groups from 2 to 8
Chlamydotis macqueenii	Asian Houbara	**VU**	**VU:D**	**1**		1	1							2	two records of single birds
Clanga clanga	Greater Spotted Eagle	**VU**	**VU:R**	**1**				1		1	1	1		4	four records of single birds
Aquila heliaca	Imperial Eagle	**VU**	**VU:D**	**1**				1	1			1		4	two records of single birds and group of 2 birds
Pelecanus crispus	Dalmatian Pelican	**NT**	**EN**	**1**		1						3	2	95	a single bird and five groups from 3 to 31
Circaetus gallicus	Short-toed Snake-eagle	**LC**	**VU:D**	**1**			1							1	a single bird
Aquila chrysaetos	Golden Eagle	**LC**	**VU:R**	**1**		1				1	1			3	a single bird and two pairs
Aegypius monachus	Cinereous Vulture	**NT**	**NT**	**2**	1				1					2	two records of single birds
Haliaeetus albicilla	White-tailed eagle	**LC**	**VU:R**	**2**									1	1	a single bird
Anser anser	Greylag Goose	**LC**	-	**2**		1				1				9	two flocks of 4 and 5 birds
Grus grus	Common Crane	**LC**	-	**2**									1	9	a flock of 9 birds

Species	Common Name	IUCN	UzRDB	Tier	Observations on VPs									Count	Notes
					VP 01	VP 02	VP 03	VP 04	VP 05	VP 06	VP 07	VP 08	VP 09		
Circus aeruginosus	Western Marsh Harrier	**LC**	-	**2**	1	10	2	1		3	2	8	4	31	31 records of single birds
Circus cyaneus	Hen Harrier	**LC**	-	**2**	1		5	9		2		1	2		20 records of single birds
Accipiter nisus	Eurasian Sparrowhawk	**LC**	-	**2**	2		1				1			4	four records of single birds
Milvus migrans	Black Kite	**LC**	-	**2**		1						1		4	a single bird and flock of 3 birds
Buteo buteo	Common Buzzard	**LC**	-	**2**	1	1	1			2		1		6	six records of single birds
Buteo japonicus	Eastern Buzzard	**LC**	-	**2**	2				1		1	1		5	five records of single birds
Buteo rufinus	Long-legged Buzzard	**LC**	-	**2**	1	4	3	6	2	2	3	4	6	42	26 single birds and 5 groups from 2 to 7 birds
Athene noctua	Little Owl	**LC**	-	**2**				1						1	a single bird
Falco tinnunculus	Eurasian Kestrel	**LC**	-	**2**	1	2	5	8	1	3	2	2	3	27	27 records of single birds
Falco columbarius	Merlin	**LC**	-	**2**			2		2					4	four records of single birds
Cygnus olor	Mute Swan	**LC**	**NT**	**2**								1		15	a flock of 15 birds
Circus macrourus	Pallid Harrier	**NT**	**NT**	**2**	1				1					2	two records of single birds
Pterocles orientalis	Black-bellied Sandgrouse	**LC**	-	**NA**	15	7	8	11	5	18	11	8	6	536	13 single birds and 76 groups from 2 to 22 birds

9.2.4.2.2 Spring VP Survey

During Spring VP surveys, a total of 77 bird species were recorded, 12 were listed in the Red Book of Uzbekistan (2019), and 5 were included in the IUCN Red List (2023-1). Those species of elevated conservation concern, along with all Tier 1 and 2 species, are presented in the table below. Recorded numbers of migrating species were generally lower than winter surveys. Notably, Steppe Eagles and Dalmatian Pelicans occurred in much lower numbers; 2 and 11 individuals respectively compared with 85 and 95 recorded during winter. This suggests much of the expected spring migration for these species had already occurred by the time surveys began.

Table 9-9 Observations of Tier 1 and 2 Species During Spring VP Surveys

Species	Common Name	IUCN	UzRDB	Tier	Observations on VPs (observations)									Count	Notes
					VP 01	VP 02	VP 03	VP 04	VP 05	VP 06	VP 07	VP 08	VP 09		
Aquila nipalensis	Steppe Eagle	**EN**	**VU:D**	**1**		1					1			2	2 single birds observed at heights 15-250m
Chlamydotis macqueenii	Asian Houbara	**VU**	**VU:D**	**1**		1							2	3	3 single displaying males
Aquila heliaca	Imperial Eagle	**VU**	**VU:D**	**1**	1						1		1	3	Migrating 3 single birds observed at heights 200-600m
Pelecanus crispus	Dalmatian Pelican	**NT**	**EN**	**1**		2								11	2 groups (7 and 4 birds) were observed at heights of 200-450 m
Circaetus gallicus	Short-toed Snake-eagle	**LC**	**VU:D**	**1**						1				1	1 single bird was observed roosting on a pole and later flying at a height of 30 m
Aquila chrysaetos	Golden Eagle	**LC**	**VU:R**	**1**				1						1	1 bird was seen perched on a pole
Circus macrourus	Pallid Harrier	**NT**	**NT**	**2**	2	1			1		2		1	7	7 single birds were observed at heights between 3-12 m
Cygnus olor	Mute Swan	**LC**	**NT**	**2**								3		4	Two single and two birds were flying at an average height of 150 m
Anser anser	Greylag Goose	**LC**	-	**2**									1	380	1 flock (380 birds) was observed at heights between 30-40 m
Grus virgo	Demoiselle Crane	**LC**	-	**2**		1								9	1 flock (9 birds) was observed at an average flight height of 250 m

Species	Common Name	IUCN	UzRDB	Tier	Observations on VPs (observations)									Count	Notes
					VP 01	VP 02	VP 03	VP 04	VP 05	VP 06	VP 07	VP 08	VP 09		
Plegadis falcinellus	Glossy Ibis	**LC**	**VU:D**	**2**		1								65	1 flock (65 birds) was observed at a height of 300 m
Pandion haliaetus	Osprey	**LC**	-	**2**			1							1	1 bird was seen perched on a pole
Circus aeruginosus	Western Marsh Harrier	**LC**	-	**2**	9	14	3		10	7	14	14	6	83	77 records of single birds were recorded almost on all VPs especially along drainage channels at heights between 3-12 m.
Circus pygargus	Montagu's Harrier	**LC**										1	1	2	2 single birds were observed at a height of 4-5m
Circus cyaneus	Hen Harrier	**LC**	-	**2**	4		2	4	4	7	3	3	1	30	Broad migration of this species was observed. 28 single birds recorded at heights 2-50 m with an average height of 12m
Accipiter nisus	Eurasian Sparrowhawk	**LC**	-	**2**	1	1		1	4		2	1	3	13	Broad migration of this species was observed. 13 records of single birds were recorded at heights between 1-250 m.
Milvus migrans	Black Kite	**LC**	-	**2**					1		1		1	3	3 records of birds were recorded at heights between 8 and 600m.
	Buteo sp.	**-**	-	**2**		2	1					1		4	4 records of single unidentified buzzards were observed at heights between 40-400m
Buteo buteo	Common Buzzard	**LC**	-	**2**	2	2	1	1	1		5	2		26	8 single birds and 6 small groups (2-5 birds) were

Species	Common Name	IUCN	UzRDB	Tier	Observations on VPs (observations)									Count	Notes
					VP 01	VP 02	VP 03	VP 04	VP 05	VP 06	VP 07	VP 08	VP 09		
															observed at heights between 15-600 m
Buteo japonicus	Eastern Buzzard	**LC**	-	**2**							2	2	1	5	5 single birds were observed at heights between 7-300m
Buteo rufinus	Long-legged Buzzard	**LC**	-	**2**	2	2	1	1	1		4	2		15	13 single birds (both migrating and local movements of breeding in adjacent areas birds) and 1 pair were recorded at heights between 7 and 200m.
Falco naumanni	Lesser Kestrel	**LC**	-	**2**	1		1	2			1			5	5 single birds were observed at heights between 1-150 m
Falco tinnunculus	Eurasian Kestrel	**LC**	-	**2**	2	2	3	7	4	2	2	2	1	26	25 single birds were observed at heights between 2-40m
Pterocles orientalis	Black-bellied Sandgrouse	**LC**	-	**NA**	13	5	3	2	16	5	14	4	6	177	68 records of local movements of breeding birds among them 15 single birds and small groups (2-16 birds) were recorded at heights between 4 and 30m.

9.2.4.2.3 Summer VP Survey

During the Summer VP monitoring, 54 bird species were observed. Of these, nearly half (n = 26) were recorded as breeding and a quarter (n=14) were observed to be migrating. Early migration activity was observed for some passerines, waders, raptors, and Black Stork. Three species were considered important migratory species, classified as Tier 1, Tier 2 or seen in significant number to be notable (Table 9-10).

Table 9-10 Observations of Tier 1 and 2 Species During Summer VP Surveys

Species	Common Name	IUCN	UzRDB	Tier	Observations on VPs (observations)									Count	Notes
					VP 01	VP 02	VP 03	VP 04	VP 05	VP06	VP 07	VP 08	VP 09		
Chlamydotis macqueenii	Asian Houbara	**VU**	**VU:D**	**1**				1	1	Trace			Trace	4	2 birds observed on 4th and 9th August. Traces on 23rd and 24th August.
Ciconia nigra	Black stork		**VU:R**	**2**		2								2	Same bird recorded on 23rd and 24th August.
Pterocles orientalis	Black-bellied Sandgrouse	**VU**	**VU:D**	**-**		1	1							97	97 records of 51 single birds, 26 pairs and 20 small groups 3-15 birds

9.2.4.2.4 Autumn VP Survey

During the Autumn VP surveys (that occurred from 1 September to 1 November 2024), 68 bird species were observed where 12 were listed in the Red Book of Uzbekistan and 5 were included in the IUCN Red List with VU and EN statuses. Steppe Eagle was one of the numerous raptor species that was observed during the autumn surveys, with a total of 22 single birds and 23 flocks (of roughly 2-3 individuals).

Table 9-11 Observations of Tier 1 and 2 species during spring VP surveys

Species	Common Name	IUCN	UzRDB	Tier	Observations on VPs (observations)									Total number	Notes
					VP 01	VP 02	VP 03	VP 04	VP 05	VP 06	VP 07	VP 08	VP 09		
Aquila nipalensis	Steppe Eagle	**EN**	**VU:D**	**1**	5	1	13	6	16		4	143	3	191	22 single birds and 23 flocks (mostly 2-3 individuals) were observed, totalling 191 birds.
Chlamydotis macqueenii	Asian Houbara	**VU**	**VU:D**	**1**					1				1	2	Two single birds were observed feeding on the ground at separate locations.
Aquila heliaca	Imperial Eagle	**VU**	**VU:D**	**1**		1	1	1	1		1	2		7	Five single birds and 1 pair were recorded across the project site. One bird was observed resting on the ground
Circaetus gallicus	Short-toed Snake-eagle	**LC**	**VU:D**	**1**						1		1		2	Two single birds were observed at VP6 and VP8.
Aquila chrysaetos	Golden Eagle	**LC**	**VU:R**	**1**								1		1	1 bird was seen perched on a pole A single bird was recorded at VP8.
Circus macrourus	Pallid Harrier	**NT**	**NT**	**2**									1	1	A single bird was recorded at VP9.
Anser anser	Greylag Goose	**LC**	-	**2**		63								63	One flock comprising 63 individuals was observed in flight, indicating a migratory movement.
Grus virgo	Demoiselle Crane	**LC**	-	**2**	170	141		27			21	73	3	435	10 flocks observed, totalling 435 cranes.
Circus aeruginosus	Western Marsh Harrier	**LC**	-	**2**	2	5	1			7		1	7	24	Twenty-two single individuals and 2 birds were recorded migrating.
Circus cyaneus	Hen Harrier	**LC**	-	**2**		2		2		2	1	1	4	12	Eleven single birds were observed migrating across various vantage points.
Accipiter nisus	Eurasian Sparrowhawk	**LC**	-	**2**	4						2			6	Four single and 2 birds were recorded
Buteo buteo	Common Buzzard	**LC**	-	**2**	1				1		1	2	2	7	Seven single birds were observed, indicating dispersed migration patterns.

Species	Common Name	IUCN	UzRDB	Tier	Observations on VPs (observations)									Total number	Notes
					VP 01	VP 02	VP 03	VP 04	VP 05	VP 06	VP 07	VP 08	VP 09		
Buteo rufinus	Long-legged Buzzard	**LC**	-	**2**	2	3	8	1	4		6	4	3	31	Twenty-eight single birds and one flock with four individuals were observed, totalling 31 birds.
Falco naumanni	Lesser Kestrel	**LC**	-	**2**		1			1				8	10	Three individual birds and one flock of seven were observed.
Falco tinnunculus	Eurasian Kestrel	**LC**	-	**2**		3	1	1	2	7	1	2	2	26	Nineteen records of single migrating kestrels were documented. Observations included hunting and perching activities.
Pterocles orientalis	Black-bellied Sandgrouse	**LC**	-	**NA**	211	174	44	78	85	137	275	124	76	1204	160 records: 14 single individuals, 23 pairs, and several small flocks observed.
Tetrax tetrax	Little Bustard	**NT**	**VU:D**			1								1	A single bird was observed in flight.
Vanellus vanellus	Northern Lapwing	**NT**		**2**	134						32			166	Three flocks totalling 166 birds were recorded.
Microcarbo pygmeus	Pygmy Cormorant	**NT**								1				1	A single bird was observed perching on a pole at VP6.
Clanga clanga	Greater Spotted Eagle	**VU**	**VU:R**	**1**					1					1	A single bird was observed at VP5.
Hieraaetus pennatus	Booted Eagle	**LC**	**VU:D**	**2**								1		1	A single bird was observed in flight at VP8.
Buteo hemilasius	Upland Buzzard	**LC**		**2**	1									1	Single bird was recorded at VP1
Bubo bubo	Eurasian Eagle-owl	**LC**		**2**				1		1				2	Two individuals were observed sitting on perches, likely indicating territorial behaviour
Athene noctua	Little Owl	**LC**		**2**	3	1	2		1	1				8	Eight individuals were observed either sitting on the ground or perching.
Falco columbarius	Merlin	**LC**		**2**		1								1	A single bird was observed in flight.

Species	Common Name	IUCN	UzRDB	Tier	Observations on VPs (observations)									Total number	Notes
					VP 01	VP 02	VP 03	VP 04	VP 05	VP 06	VP 07	VP 08	VP 09		
Falco cherrug	Saker Falcon	**EN**	**EN**	**1**			1							1	A single bird was recorded at VP3
Grus grus	Common Crane	**LC**		**2**		58	5	73	31		250		29	446	Nine flocks totalling 446 cranes were recorded, indicating regular migratory passage.

9.2.4.2.5 Asian Houbara

A total of 5 Asian Houbara were recorded during targeted surveys, comprising of 4 males and 1 female.

Based on observed densities, the estimated male population within the study site is between 4 individuals, suggesting a total breeding population of 8 individuals assuming a 1:1 sex ratio. The density of males observed in sagebrush desert habitats during this survey was calculated to be 0.039 males/km². This figure is lower compared to previous studies in the Bukhara region of Uzbekistan which estimated densities in this habitat type to be 0.090 males/km² (Koshkin, 2016).

Incidental sightings of other bird species were also recorded, noting 7 additional species. Notably, 2 Golden Eagles, which are listed as Vulnerable in the UzRDB, were recorded in flight over survey location AH12.

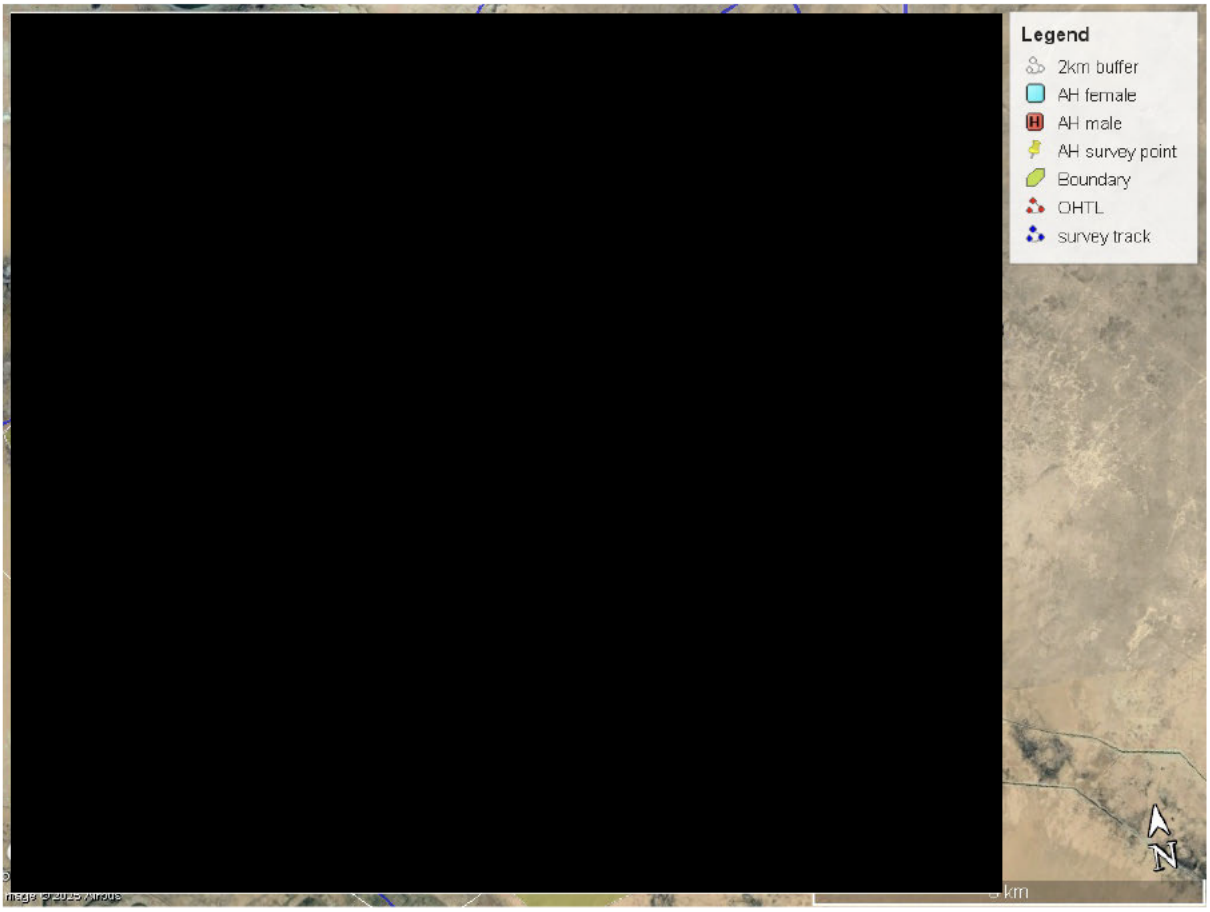


Figure 9-17 Map of Asian Houbara Sightings Across the Project Site

9.2.4.2.6 Waterbird Survey

SPRING

During point count surveys in Spring 2024, a total of 48 species were recorded, none of which are currently listed as globally threatened under the IUCN Red List categories of CR, EN, or VU. However, 36 Glossy Ibis (*Plegadis falcinellus*) were recorded, classified as Vulnerable (VU) in the Uzbekistan Red Data Book.

The first round of surveys, conducted in late March, identified a higher number of migratory species, as many waterbird species use the site as a stopover during spring migration. In the second round, conducted in mid-May, a shift toward breeding species was observed. The most common breeding waterbirds included ducks (e.g., Mallard, Ruddy duck), waders (e.g., Black-winged Stilt; White-tailed Lapwing), and terns (e.g., Little Tern). Non-waterbird species breeding in the riparian vegetation surrounding waterbodies included the Clamorous Reed-warbler (*Acrocephalus stentoreus*), Bank Swallow (*Riparia riparia*), and Rufous-tailed Scrub-robin (*Cercotrichas galactotes*).

Table 9-12 Summary table of waterbird point counts in Spring 2024

Survey Site	Sample Date	Number of Species	Total bird counts	Notes
WB01	30/03/2024	7	47	
	13/05/2024	9	19	
WB02	30/03/2024	7	72	High numbers of Mallard (n=30). 7 Glossy Ibis (VU, UzRDB)
	13/05/2024	11	58	
WB03	30/03/2024	4	21	15 Glossy Ibis (VU, UzRDB)
	13/05/2024	11	39	1 Glossy Ibis (VU, UzRDB)
WB04	30/03/2024	3	18	
	13/05/2024	7	25	
WB05	30/03/2024	8	83	High numbers of Northern Shoveler (n=40) and Black-bellied Sandgrouse (n=20)
	13/05/2024	10	118	High numbers of Bank swallow (n=70)
WB06	30/03/2024	1	13	
	13/05/2024	18	109	
WB07	30/03/2024	4	13	
	13/05/2024	14	42	
WB08	30/03/2024	5	63	High numbers of Green-winged teal (n=35)
	13/05/2024	9	231	High numbers of Spanish sparrow (n=approx. 200)
WB09	30/03/2024	3	8	

Survey Site	Sample Date	Number of Species	Total bird counts	Notes
	13/05/2024	12	234	High numbers of Spanish Sparrow (approx. 200)

PHOTOTRAPS

Across the 10 phototraps deployed at the project site, 34 bird species were recorded, many of these waters obligate species. Two species listed in the Uzbekistan Red Data Book were noted; a single Black Stork (*Ciconia nigra*) and a flock of Glossy Ibis (*Plegadis falcinellus*), both listed as Vulnerable in the UzRDB, 2019. The highest numbers of observations were recorded at traps 48, 46 and 45 located near water sources (canal and temporary water bodies), highlighting their importance for local bird communities.

Table 9-13 Summary of phototrap data for avifauna species

Phototrap	No of Observations	Notable species
42	3	
43	2	
44	1	
45	**11**	**Glossy Ibis (UzRDB VU:D)**
46	**12**	
47	7	
48	**15**	**Black Stork (UzRDB VU:R)**
51	1	
52	**9**	
55	4	





Figure 9-18 Phototrap images of Glossy Ibis and Black Stork at the Project Site

AUTUMN

During the surveys, 31 bird species were recorded, none of which are currently listed as globally threatened under the IUCN Red List categories of CR, EN, or VU, nor do they appear in the UzRDB. However, notable observations included a single record of Western marsh Harrier at WB04 and extremely high numbers of Greylag Goose recorded at WB04. A summary table of the Autumn results is presented below.

Table 9-14 Summary table of waterbird point counts in Autumn 2024

Survey Site	Sample Date	Number of Species	Total bird counts	Notes
WB01	Oct 6-7	12	136	High number of Demoiselle Crane (n=54)
	Nov-13	4	21	
WB02	Sep-23	7	20	
WB03	Sep-23	4	11	
	Nov-13	3	11	
WB04	Sep-23	6	38	1 Western Marsh Harrier
	Nov-13	4	273	High number of Greylag Goose (n=250)
WB05	Sep-23	11	110	High number of Spanish Sparrows (n=60)
	Nov-13	7	131	High number of Eurasian Teal (n=57)
WB06	Oct 6-7	8	50	
WB07	Oct 6-7	6	19	
WB08	Oct 6-7	6	44	
WB09	Oct 6-7	4	19	

9.2.4.2.7 Raptor Nest Search

No nests were found within the project site; however 2 old inactive nests were recorded in the 5km buffer zone. Further, one active nest of Egyptian Vulture was observed just beyond the 5 km buffer zone during the first survey round on 25th April, 2024, with one adult in the nest and another nearby. During the subsequent survey round, on 10th June, 2024 the nest was observed to be abandoned and a pair was observed near the shoreline of Lake Agytma.

The Western Marsh Harrier nests in dense reed beds, making its nest nearly impossible to locate. However, based on waterbird surveys in April-May 2024, nesting pairs were identified, with one pair within the project area and three beyond boundary of the project within the 5km buffer zone.

The following figure shows the recorded locations of nests and breeding pairs.

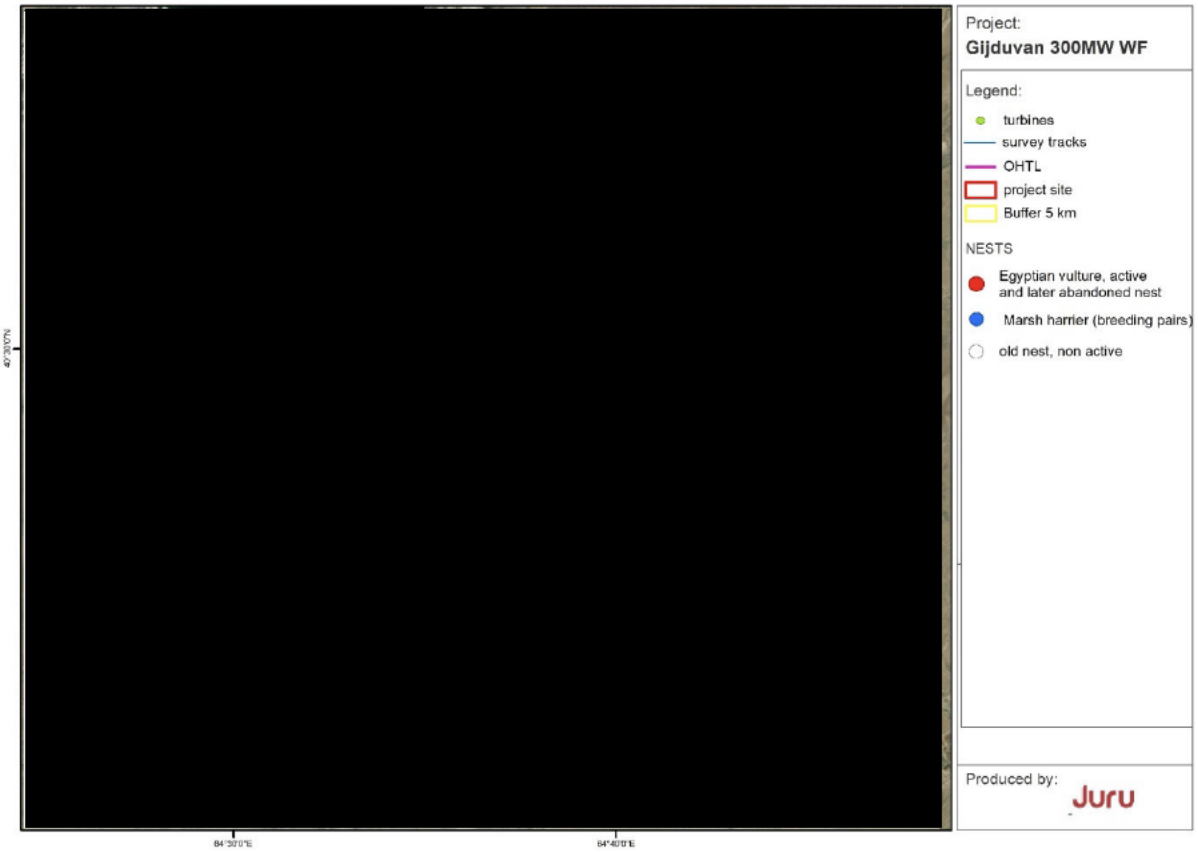


Figure 9-19 Recorded Locations of Nests and Breeding Pairs

Table 9-15 Species Identified During Raptor Nest Search

Common Name	Species Name	Conservation Status	Active nests	Abandoned nests	Old nests	Total nests	Breeding
Egyptian vulture	*Neophron percnopterus*	IUCN, EN UzRDB, VU:D	1	1		1	1 pair
Unknown Species	-	-	-	-	2	2	-
Western marsh harrier	*Circus aeruginosus*	IUCN, LC					4 pairs

9.2.5 Bats

9.2.5.1 Survey Methodology

9.2.5.1.1 Roost search

Potential roost sites, within the project site and a 5km buffer, were determined using analysis of satellite images, supplemented by literature reviews. A lack of suitable, natural habitats, such as caves and the presence of natural waterbodies, was noted during analysis. Anthropogenic structures like buildings and bridges, particularly those near to available water sources (i.e. canals), became the most probable habitats for bats. Subsequent field surveys were conducted between August 25 and 29 2024 to assess the potential sites.

When a roost was found, it was thoroughly examined, both for the presence of bats (visually or by voice), and for signs of their presence – droppings (excrement). Using flashlights, all crevices in vertical walls in buildings were examined.

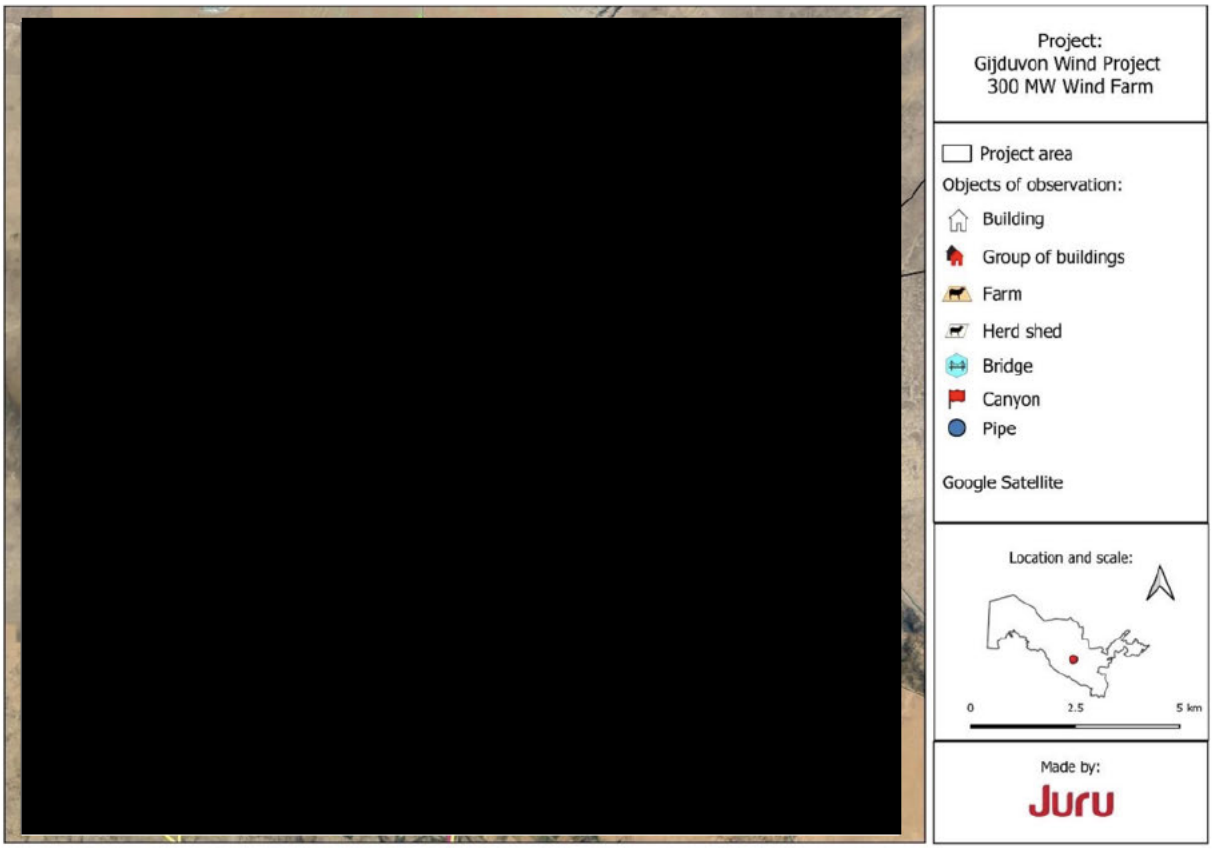


Figure 9-20 Map of Survey Tracks and possible roosting sites assessed during bat roost search.

Table 9-16 Coordinates of surveyed structures

Location ID Number	Place of Observation	Coordinates (N, E)
1	Pipe	[redacted]
2	Building	
3	Group of buildings	
4	Herd shed	
5	Building	
6	Farm	
7	Building	
8	Bridge	
9	Farm	
10	Group of buildings	
11	Bridge	
12	Farm	
13	Farm	
14	Canyon	

Location ID Number	Place of Observation	Coordinates (N, E)
15	Bridge	[redacted]
16	Building	
17	Group of buildings	
18	Building	
19	Group of buildings	
20	Bridge	
21	Farm	
22	Building	
23	Building	
24	Farm	
25	Farm	
26	Farm	
27	Building	
28	Group of buildings	
29	Bridge	

9.2.5.1.2 Mist Netting

Mist-netting was conducted in 4 localities from sunset (20:00) to 00:00-02:00 in places suitable for bat feeding and drinking water. Nets of 10 x 8 metres wide were deployed at sunset (20:00) until 00:00 to 02:00.

When bats were captured their species, sex, age, and measurements were recorded. Species identification was carried out according to generally accepted methods (Kuzyakin, 1950; Bogdanov, 1953; Kozhurina, 1997). The captured bats were examined, photographed, and released within the same territory they had been captured.

Table 9-17 Co-ordinates of mist net deployment

N	Date	Co-ordinates (N, E)	Habitat
1	25.08.2024	[redacted]	Canal with reed
2	26.08.2024	[redacted]	Fish pounds
3	27.08.2024	[redacted]	Canal with reeds and steep clay-sandy sides
4	28.08.2024	[redacted]	Canal with reeds and bushes

9.2.5.1.3 Acoustic Surveys

PASSIVE ACOUSTIC SURVEYS

Monitoring commenced when Bat detectors Song Meter SM4Bat FS were installed at the Bash II Windfarm on 19th April and removed on 8th November 2024. The two bat detectors were installed on two met masts at 13m and 63m respectively (hereinafter we will use rounded values of 10 and 60 m). Additionally, two detectors were installed at 4-5m next to the outbuildings near fishponds.

The operation of the detectors was programmed to start half an hour before sunset and stop half an hour after sunrise.

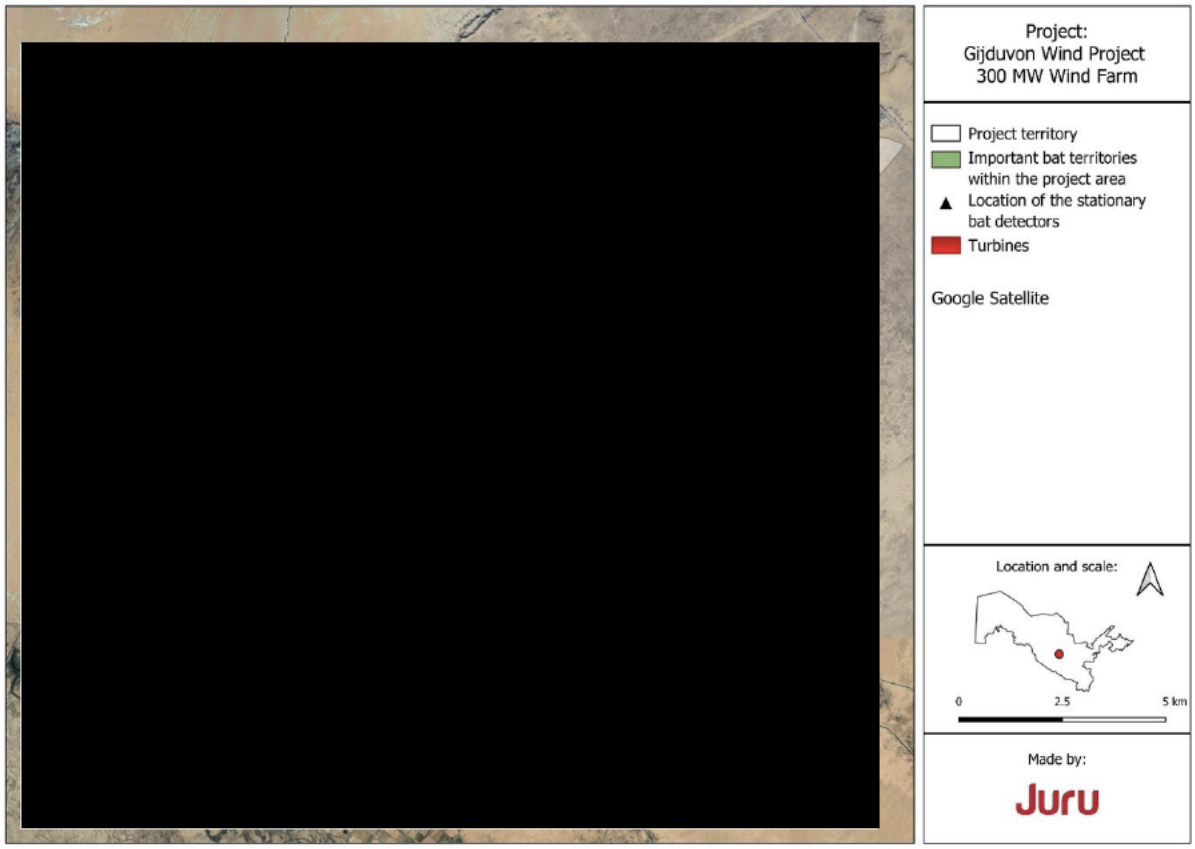


Figure 9-21 Location and Height of the Stationary Bat Detectors

Table 9-18 Co-ordinates of passive bat detectors

N	BAT DETECTOR NUMBER	HEIGHT OF INSTALLATION	CO-ORDINATES (N, E)	COMMENTS
1	BD09	4-5 meters	[redacted]	On a hut in the northern part of the area near the fish ponds
3	BD03	10 meters	[redacted]	North mast

N	Bat detector number	Height of installation	Co-ordinates (N, E)	Comments
2	BD02	60 meters	[redacted]	North mast
6	BD04	4-5 meters	[redacted]	On a hut in the southern part, 1800 meters from the project area, near the fish ponds
5	BD07	10 meters	[redacted]	South mast
4	BD20	60 meters	[redacted]	South mast

Data collection and replacement of batteries were carried out on a monthly basis (rounds). The table below shows the start date and end date of each round when each SD cards and batteries were replaced.

Table 9-19 Schedule of rounds (replacing SD cards and batteries)

Round N	Start date	End date
1st round	April 19	May 19
2nd round	May 19	June 11
3rd round	June 11	July 23
4th round	July 23	August 26
5th round	August 26	September 19
6th round	September 19	October 12
7th round	October 12	November 8

The auto-filtering was performed to separate bat calls form noise in Kaleidoscope Pro software using an automatic mode with a conservative filter. The data was processed using the Auto ID (Conservative) function of the Kaleidoscope program with "preloaded" parameters of ultrasonic calls from "European" bats found in Uzbekistan for the primary processing of recordings. In cases where the program could not identify a specific species but detected a bat call, the recording was assigned the status "No ID." In cases where multiple bat calls were present in a single recording, they were counted as one. BatSound 4 was then used to measure the call parameters and to vet the IDs made by the Kaleidoscope Pro Auto Analysis program.

In addition, an analysis of bat activity dependence on season, time of day, and wind speed was conducted. However, due to a clock failure and the absence of date and time information in some files (a total of 980 files from 1st round – BD04, 3rd round – BD 2A), rounds instead of months were used to analyse seasonal distribution. To enable correct comparisons of rounds with varying durations, the data was normalized to relative values by dividing the

total number of recorded calls of each round by the actual number of recording days of each round and subsequently multiplying by the average number of days for the entire period (29 days).

Anemometers were installed on two meteorological masts at a height of 130 meters which recorded wind speed every 10 minutes. To compare bat activity with wind speed data, the time of bat activity registrations was rounded to the nearest 10 minutes. Two or more bat signal recordings falling within the same 10-minute interval were ignored. Subsequently, bat activity data was compared with wind speed values using the built-in Excel function VLOOKUP.

ACTIVE ACOUSTIC SURVEYS

The active acoustic survey consisted of transects with stops at designated points, where bat calls were recorded using the Echo Meter Touch 2 on a monthly basis from May to October 2024. A total of 23 points were established, ranging from 500 to 3000 meters, which were evenly distributed across the entire area. The duration of stops at each point was 10 minutes from May to August and 6 minutes in September and October. To survey the points at different times, the routes were altered, and the first point was chosen randomly each time.



Figure 9-22 Map of location and height of the stationary bat detectors

Table 9-20 Co-ordinates of passive bat detectors

ROUND	DATE
1	May 19-20
2	June 11-12
3	July 23-24
4	August 28-29
5	September 19-20
6	October 12-13

9.2.5.2 Results

Initial literature reviews found 20 bat species to be potentially inhabiting the area. The only species with an elevated status on the IUCN Redlist is the Long-fingered Bat, listed at Vulnerable. Whilst it is considered extinct for the territory of Uzbekistan, due to bats being poorly studied in the region, a precautionary approach should be taken when considering the species likely to be present in the region, so its presence cannot be 100% ruled out. Four species are included in the Red Data Book of the Republic of Uzbekistan – Lesser Horseshoe Bat, Hemprich's Long-eared Bat, Bukhara Mouse-eared Bat and European Free-tailed Bat, the latter is included in Appendix II of CMS. All are found in the Eastern mountainous part of the country. Two species – the Bukhara Horseshoe Bat and Bukhara Mouse-eared Bat – are endemics of Central Asia. For species where the taxonomic status is unclear, such as the *Barabastella walteri*, they may be endemic to the region, however their range is therefore largely unclear. The table below shows a complete list of the 20 species with those highlighted in bold confirmed at the project site during 2024 surveys.

Table 9-21 List of bat species potentially inhabiting the project area.

SPECIES	IUCN REDLIST	UZRDB (2019)	CMS	ENDEMISM	SOURCE AND NOTES
Greater Horseshoe Bat (*Rhinolophus ferrumequinum* Schreber, 1774)	LC	-	-		Bogdanov, 1953; Gritsina et al., 2013. Lives in caves, mines and other underground roosts, stone buildings (mosques and other).
Bukhara Horseshoe Bat (*Rhinolophus bocharicus* Kastschenko et Akimov, 1917)	LC	-	-	Endemic to Central Asia	Bogdanov, 1953; Gritsina et al., 2013 Lives in caves, mines and other underground roosts, stone buildings.
Lesser Horseshoe Bat (*Rhinolophus hipposideros* Bechstein, 1800)	LC	2(VU:D)	-		Rare species in Uzbekistan found in the Eastern mountainous part of the country (UzRDB). Lives in caves, mines and other underground roosts, abandoned buildings.

Species	IUCN Redlist	UzRDB (2019)	CMS	Endemism	Source and notes
Blyth's Horseshoe Bat (*Rhinolophus lepidus* Blyth, 1844)	LC	-	-		There are no records in Uzbekistan, but it was found relatively recently in the region and could be confused with Rhinolophus bocharicus during identification (Khabilov et al, 2018)
Lesser Mouse-eared Bat (*Myotis blythii* Tomes, 1857)	LC	-	-		Bogdanov, 1953; Gritsina et al., 2013. Caught in the Kyzylkum desert in 2012 in Navoi region (Gritsina et al., 2013).
Geoffroy's Bat (*Myotis emarginatus* Geoffroy, 1806)	LC	-	-		Bogdanov, 1953: Rare, met mostly in oases.
Bukhara Mouse-eared Bat (*Myotis bucharensis* Kuzyakin, 1950)	DD	1(CR)	-	Regionally Endemic	Endemic to Uzbekistan and Tajikistan. In 2019, a male Myotis bucharensis was captured near the Zeravshan river in Tajikistan, confirming that the species is still present there (Kazakov et al., 2020). Thy only find of species in Uzbekistan was a colony in sandstone tunnels near Samarkand in 1957 – 1963 until the place was destroyed (UzRDB)
Long-fingered bat (*Myotis capaccinii* Bonaparte, 1837)	VU	-	-		1 specimen in Nukus in 1875 (Bogdanov, 1953), no other finds since then.
Myotis nipalensis (previously reported in the literature as *Myotis mystacinus* Kuhl, 1817)	LC	-	-		Bogdanov, 1953: Rare, met mostly in oases.
Asian Barbastelle (*Barbastella cf. walteri* Bianchi, 1916, previously detected as *B. caspica* Satunin, 1908 /*B. leucomelas* Cretzschmar, 1830)	LC	-	-	Yes	Smirnov et al., 2021. Poorly studied species met mostly in mountains and foothills, in Uzbekistan known only from the Eastern part of the country.
Long-eared Bat (*Plecotus strelkovi* Spitzenberger, 2006)/ *Plecotus sp* (taxonomic status needs further research)	LC	-	-		Bogdanov, 1953; Gritsina et al., 2013. Few finds in Uzbekiatan, all specimens detected in settlements, 2 of 4 locations in Samarkand.
Noctule Bat (*Nyctalus noctula* Schreber,1774)	LC	-	-		Bogdanov, 1953: Rare, met mostly in cities and oases.
Common pipistrelle bat	LC	-	-		Bogdanov, 1953; Gritsina et al., 2013. Most common bat species in

Species	IUCN Redlist	UzRDB (2019)	CMS	Endemism	Source and notes
(Pipistrellus pipistrellus Schreber, 1774)					cities and other settlements, easily occupies roosts in different buildings.
Kuhl's pipistrelle (*Pipistrellus kuhlii* Kuhl, 1817)	LC	-	-		Bogdanov, 1953: 1 specimen caught in Uzbekistan 26-07-1873 in the city garden of Atadjan in Khiva by M.N. Bogdanov. The species is known for significant enlargement of its range to the north in Eastern Europe during recent decades; possibly, it explores new territories in Uzbekistan, too.
Savi's Pipistrelle (Hypsugo savii Bonaparte, 1837)	LC	-	-		Bogdanov, 1953: Few specimen obtained in Uzbekistan in 1914 in Kugitangtau Range.
Serotine Bat (*Eptesicus serotinus* Schreber,1774)	LC	-	-		Bogdanov, 1953: Common in deserts of Uzbekistan.
Botta's serotine (*Eptesicus Ognevi* Bobrinskoy, 1918)	LC	-	-		Bogdanov, 1953; Gritsina et al., 2013. Mountain foothills, deserts, including caves in loess walls of river canyons. Found in Kyzylkum in Navoi region in drainage pipe (Gritsina et al., 2013).
Particoloured Bat (Vespertilio murinus Linnaeus, 1758)	LC	-	-		Bogdanov, 1953; Gritsina et al., 2013. Widespread bat species inhabiting different biotopes, often synanthropic.
Turkestani Long-eared Bat (*Otonycteris leucophaea)* Peters, 1859)	LC	2(VU:R)	-		Rare species in Uzbekistan found mostly in the Eastern mountainous part of the country, can be met in desert flats, too. Lives in caves, mines, rock cracks, abandoned buildings (UzRDB).
European Free-tailed Bat (Tadarida teniotis Rafinesque, 1814)	LC	2(VU:R)	II		Inhabits mountains and foothills, hides in deep cracks and cravices in rocks (UzRDB).

UzRDB – Red Data Book of Republic of Uzbekistan. CMS - Convention on the Conservation of Migratory Species of Wild Animals, Appendix I, II (effective 17 May 2024).

9.2.5.2.1 Roost search

The habitat types described across the project site presented an absence of suitable, natural, roosts and a general lack of water. Any suitable roosting sites identified were man-made structures. During roost searches, 29 possible roosting sites were surveyed which included 5 concrete bridges over canals and numerous buildings made of different materials (mud/clay

constructions, with or without cracks, bricks or foam blocks, and others). All five bridges are inhabited by bats forming, very likely, maternal colonies earlier in summer. Of the other 24 locations, bat droppings were found at 10 locations, and one live bat at another (farm shed).

A conglomerate of dried, dead specimens (about 15 bats together) were found under a concrete bridge (location 8) with three more detected in crevices. These were later confirmed to be Common Pipistrelle. The mass of carcasses seems to suggest a mass die-off event, which could be caused by an unexpected late frost. Droppings observed on the carcasses indicates that survived bats continued to use this roost. The remaining 14 locations had no clear evidence of bat presence but many of them look suitable for bats.



Table 9-22 Skull fragments of carcasses found at location 8, confirming species to be Common Pipistrelle.

Table 9-23 Survey observations from the project area and its 5km buffer

Location ID Number	Place of Observation	Notes on structure	Observations of Bat Activity
1	Pipe	Two drainage pipes connecting canals under a road, with reeds by canal sides.	No bats found, only wasps.
2	Building	Single building – a mud (clay) construction with walls painted in white, with few cracks. The ceiling is made of wooden logs and branches. There are canals nearby.	No bats or activity but suitable.
3	Group of buildings	A mud (clay) construction with an additional shed, and few cracks in walls. Fish ponds and canals nearby.	No bat activity.
4	Herd shed	A three-wall sheep shed made of bricks and with a ceiling made of wooden logs, united with a small empty house (bricks covered with clay). Located near a canal.	A small amount of bat droppings and many wasp nests with wasps were found in the cracks of the walls and narrow spaces between bricks.
5	Building	Half-ruined small building with two rooms, one kept the roof. The walls are made of bricks covered with clay a long time ago (crevices).	No bats or activity but suitable.
6	Farm	A complex of farm buildings including mud constructions and herd sheds with walls made of bricks.	Bat droppings were found mostly between bricks.
7	Building	A farmhouse consisting of two rooms and a gap with a roof between them. The walls were covered with clay, with almost no cracks.	Inside a closed room with a broken window, a few bat droppings were found. Traces of rodents, lizards, birds and a bird nest.
8	Bridge	A concrete bridge over a canal.	Bat droppings on concrete beams under vertical crevices (in the places of beams' contact). Under one of crevices a conglomerate of dried small bat corpses (about 15) was found, and three more in crevices – Identified as Common pipistrelle. A significant accumulation of bat droppings under the crevices in the ceiling of the bridge indicates the long-term residence of bats, presumably a maternal colony.
9	Farm	A complex of farm buildings including mud constructions and herd shed with walls made of bricks. There was a house with a blue mosaic on the outer walls, which was also a white mud construction.	No bat activity.
10	Group of buildings	Living house – a mud (clay) construction with no cracks.	Bat droppings in crevices within Henhouse. Size indicated

Location ID Number	Place of Observation	Notes on structure	Observations of Bat Activity
		Henhouse is built of foam blocks with numerous crevices.	presence of 2 different bat species (smaller pipistrelle-size and larger species)
11	Bridge	Concrete bridge over canal.	Few bat droppings on concrete beams under vertical crevices (in the places of beams' contact).
12	Farm	A large farm with several buildings surrounded by saxauls. Most walls were covered by clay, and part of the herd shed was built with foam blocks.	Bat droppings were found there under a piece of matting on the wall in the donkey pen.
13	Farm	Farm near tamarix shrubs. Most walls were covered with clay (no cracks, except for a narrow shelf of clay wall under the ceiling), herd shed was built with foam blocks.	Bat droppings were found in Herd shed.
14	Canyon	A wide canyon cutting through a sand-loess formation, with vertical walls 10-40 meters high with suitable cavities in the upper part of the walls (inaccessible for visual survey), in the lower part a watercourse and coastal shrub vegetation. The canyon is situated to the North of the Project area.	No activity recorded but possible location for mist netting.
15	Bridge	A concrete bridge over a canal.	Few bat droppings on concrete beams under vertical crevices (in the places of beams' contact). Bat droppings indicate a bat maternal colony earlier in summer.
16	Building	A single building on top of a hill in the desert - a mud (clay) construction with few cracks.	No bat activity. Dead wasps in cracks.
17	Group of buildings	A farm with several buildings. The living house and toilet are covered with clay, herd shed walls are made of foam blocks with cracks.	No bat activity.
18	Building	A single mud (clay) construction with no cracks, comprises a toilet (foam blocks, but no roof.	No bat activity.
19	Group of buildings	Living house - a mud (clay) construction with no cracks, barn the same. There are fishponds nearby, grass, reeds, and bushes.	The owner said a bat flew away from the barn while he was moving packs (supposedly, it was roosting between bags in the barn).
20	Bridge	A concrete bridge over a canal.	A few bat droppings on concrete beams under vertical crevices were found (in the places of beams' contact).

Location ID Number	Place of Observation	Notes on structure	Observations of Bat Activity
21	Farm	A farm in saxaul plantings, many buildings. Some walls were covered with clay, some were made of foam blocks.	Bat droppings were found between blocks and inside cavities in wooden logs (part of the roof in a clay construction with no other cracks). The owner saw flying bats at night.
22	Building	A single mud (clay) construction with no cracks, but the ceiling had numerous crevices.	No bat activity.
23	Building	Single mud (clay) construction with two rooms, partly ruined (one room had a fallen outer wall, the second room was still used by people); the ceiling had numerous crevices.	No bat activity.
24	Farm	Garage-looking large cattle shed with small buttresses, with the walls built of bricks covered with clay. Abandoned at the time of the survey. Three mud constructions nearby (no bat droppings).	Cattle shed had cracks and crevices with bat droppings.
25	Farm	A farm with a garden. All walls are covered with clay but have several cracks, in many buildings the ceiling has many crevices.	No bat activity.
26	Farm	A farm with goats. The walls of sheds are covered with clay and have deep crevices.	Deep crevices used by bats. Numerous bat droppings and a living male of Kuhl's pipistrelle were found.
27	Building	Two ruined buildings without roofs, brick walls covered with clay.	No bat activity.
28	Group of buildings	Half-ruined long building with clay-covered walls (with some cracks), brick building.	Brick building had many wasps in crevices and few bat droppings.
29	Bridge	A concrete bridge over a canal.	Bat droppings on concrete beams under vertical crevices (in the places of beams' contact).

During mist netting, 16 individual bats were captured across the four sites, identified as two species; Particoloured Bat (*Vespertillio murinus*) and Kuhl's Pipistrelle (*Pipistrellus kuhlli)*. Both species are common and widespread in the region and not of elevated conservation concern. A map of the locations where each species was captured across the project footprint is shown below.

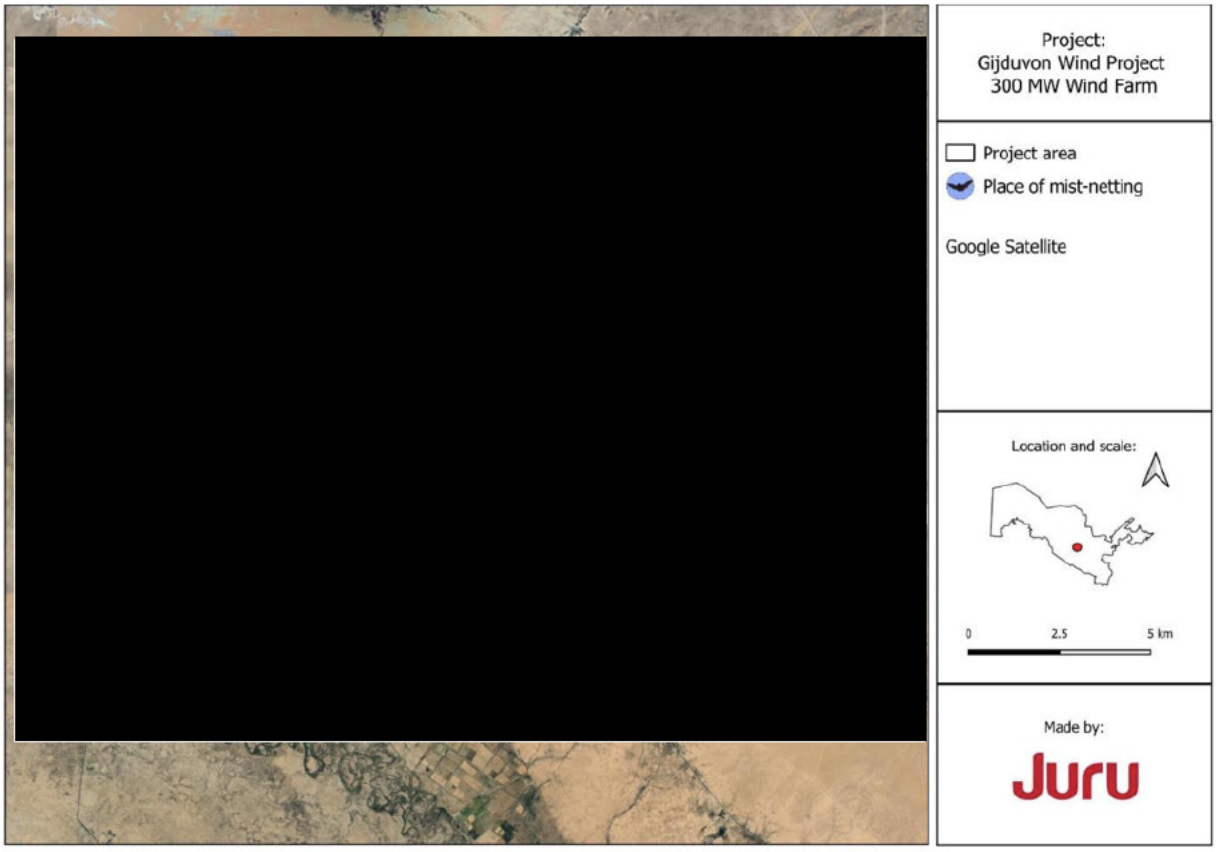


Figure 9-23 Map showing distribution of bat species captured during mist netting activities

Table 9-24 List of individual bats captured during mist netting activities at the project site

No	Mist Net Site	Date	Species	Sex, Age	Body Mass (M), g	Forearm (FA), mm	Notes
1	1	25.08.2024	*Vespertillio murinus*	M, ad	13.7	45.3	Mating, noticeable cheek glands
2	2	26.08.2024	*Vespertillio murinus*	M, ad	18.95	45.0	Mating, noticeable cheek glands
3			*Vespertillio murinus*	M, ad	19.05	43.5	Mating, noticeable cheek glands
4	3	27.08.2024	*Vespertillio murinus*	M, ad	18.2	45.2	Mating, noticeable cheek glands
5			*Vespertillio murinus*	M, ad	14.85	43.3	Mating, noticeable cheek glands
6			*Vespertillio murinus*	F, ad	16.0	44.4	Hasn't bred before. Mating, noticeable cheek glands
7			*Vespertillio murinus*	M, ad	15.5	46.6	Mating, noticeable cheek glands

No	Mist Net Site	Date	Species	Sex, Age	Body Mass (M), g	Forearm (FA), mm	Notes
8			*Vespertillio murinus*	F, ad	17.0	45.1	Hasn't bred before, cheek glands are hardly visible.
9			*Vespertillio murinus*	M, ad	15.6	45.5	Mating, noticeable cheek glands.
10			*Pipistrellus kuhlii*	M, ad	5.6	30.0	Mating, noticeable cheek glands and testicles
11			*Vespertillio murinus*	F, ad	20.3	46.1	Hasn't bred before. Mating, noticeable cheek glands.
12			*Vespertillio murinus*	F, ad	23.4	46.1	Hasn't bred before. Mating, noticeable cheek glands.
13			*Vespertillio murinus*	F, ad	13.2	44.4	Hasn't bred before. Cheek glands were visible but not so big.
14	4	28.08.2024	*Pipistrellus kuhlii*	F, ad	5.0	32.2	Hasn't bred before. Cheek glands slightly visible.
15			*Pipistrellus kuhlii*	F, young	5.15	31.1	Hasn't bred before. Cheek glands slightly visible.
16			*Pipistrellus kuhlii*	F, young	5.1	32.0	Hasn't bred before. Cheek glands slightly visible.

9.2.5.2.2 Acoustic Surveys

Passive Acoustic Surveys

A total of 1.457 TB (295,876 files) of data were recorded during the Stationary Acoustic Survey, of which about 346 GB (72,360 files) were bat calls, including social calls. The detectors were operated for a total of 203 nights (total of 1,193 nights for all detectors).

At least eight species of bats use the territory of the projected wind farm; *Eptesicus spp., Myotis spp., Plecotus spp., Pipistrellus pipistrellus, Pipistrellus kuhlii, Rhinolophus bocharicus, Vespertilio murinus* and *Tadarida teniotis*. These eight species include one species listed in the Red Data Book of Uzbekistan (2019), *Tadarida teniotis*. Calls of this species were recorded in the northern part of the planned wind farm.

Some of the calls have been identified only to the genus level, since the differences in the call parameters are not yet known (Bogdanov, 1953; Benda et al., 2011; Benda et al., 2012; Gritsina et al., 2013; Barataud, 2015; Dietz, Kiefer, 2016; Hackett et al., 2017). *Eptesicus* sp. may include the species *Eptesicus serotinus* and *Eptesicus ognevi*, whose ranges include the territory of the

project site, and the differences in the parameters of the ultrasound calls are unknown. Also unknown are the differences in the genus Plecotus (*Plecotus spp*.) calls parameters, which may be found in Uzbekistan: *Plecotus turkmenicus, Plecotus strelkovi*.

The following tables show number of calls recorded per species at the north and south detectors at 60m height.

Table 9-25 Bat calls recorded by passive detectors on masts in the north and south of the site at height of 60m

Round	North/South Masts	*Plecotus spp.*	*Pipistrellus pipistrellus*	*Pipistrellus kuhlii*	*Vespertilio murinus*	*Eptesicus spp. (ognevi+ serotinus)*	All species:	Total	
								Calls	%
1 round (15 April-15 May)	N mast (BD02)	0	57	0	134	16	207	296	18,0
	S mast (BD20)	0	17	0	56	16	89		
2 round (15 May-13 June)	N mast (BD02)	0	7	0	6	1	14	23	1,4
	S mast (BD20)	0	5	0	3	1	9		
3 round (13 June-23 July)	N mast (BD02)	0	776	0	30	30	836	861	52,4
	S mast (BD20)	0	25	0	0	0	25		
4 round (23 July- 26 August)	N mast (BD02)	3	61	0	15	17	96	122	7,4
	S mast (BD20)	0	18	0	6	2	26		
5 round (26 August-20 September)	N mast (BD02)	0	27	0	30	16	73	149	9,1
	S mast (BD20)	0	51	1	18	6	76		
6 round (22 September- 12 October)	N mast (BD02)	0	73	3	44	7	127	162	9,9
	S mast (BD20)	0	25	0	9	1	35		
7 round (October 12 - November 8)	N mast (BD02)	0	4	0	13	0	17	30	1,8
	S mast (BD20)	0	6	0	5	2	13		
Total	N mast (BD02)	3	1005	3	272	87	1370	1643	100
	S mast (BD20)	0	147	1	97	28	273		
Total (N+S masts)	calls	3	1152	4	369	115	1643		
	%	0,2	70,1	0,2	22,5	7,0	100		

The highest number of calls was recorded by detectors installed at a height of 5 meters near water bodies (a total of over 62,843 call files). This large number of recordings is likely associated with the locally increased activity of bats in areas near water bodies and may also be influenced by social calls. Therefore, the data from these locations represents the species diversity rather than the actual bat activity levels in the project area.

More than 7,784 recorded calls were detected by the detectors placed at a height of 10 meters, and 1,733 or more were recorded by detectors installed at a height of 60 meters. The data from these recorders were used to analyse temporal distribution as these datasets were most relevant for the wind farm project. To standardise the results and account for the varying durations of the rounds, the number of recorded calls per round was recalculated based on the average round duration (29 days). The following figure shows total number of bat calls recorded by detectors installed at heights of 10 m and 60 m during each of the 7 observation rounds.

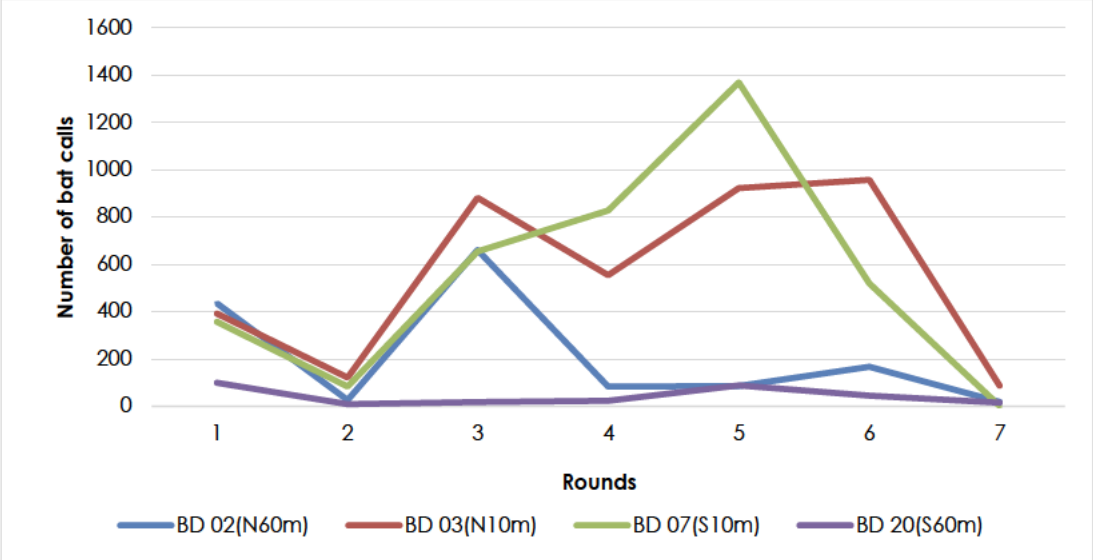


Figure 9-24 Number of bat calls per round recorded at 10 m and 60 m

Table 9-26 Schedule of rounds (replacing SD cards and batteries)

ROUND N	START DATE	END DATE
1st round	April 19	May 19
2nd round	May 19	June 11
3rd round	June 11	July 23
4th round	July 23	August 26
5th round	August 26	September 19
6th round	September 19	October 12
7th round	October 12	November 8

In all rounds, bat activity at a height of 10 m was significantly higher than at 60 m. This difference was especially pronounced in round 5 (August 26 – September 19), where the maximum average value reached approximately 1,400 calls per 29 days at 10 m, while only about 90 calls were recorded at 60 m during the same period for each detector. The highest activity was observed during rounds 3, 5 and 6 with the detectors in the north of the project area recording more calls than the south. The lowest activity at both heights was recorded during rounds 2 and 7. However, even during these periods, detectors at 10 m consistently registered more calls than those at 60 m with detectors in the north recording relatively more calls than recorders in the south.

Overall, the distribution of bat activity across the territory of the planned wind farm is uneven both in space and time. The highest period of the bat activity was in late June – early July (round 3). More than half (52%) of all bat calls recorded from April to November were registered during this period. Bats were most active in the northern part of the planned wind farm. The detector on the northern meteorological mast recorded five times more calls (1370 versus 273) than the detector on the southern meteorological mast.

ACTIVE ACOUSTIC SURVEYS

The following table shows the number of calls recorded per species during the active acoustic survey transects. Higher number of calls were recorded during the third and fifth rounds of survey with noticeable concentration of batts in the northern part of the project area. A total of 4 genus were recorded.

Table 9-27 Summary of the observations with bat species at active acoustic survey points

SURVEY POINT	COORDINATES	EPTESICUS SP.	MYOTIS SP.	P. KUHLII	P. PIPISTRELLUS	SOCIAL CALLS	V. MURINUS
1	[redacted]				3		
2							
3							1
4							
5					1		
6					1		
7		2			23	1	

Survey Point	Coordinates	Eptesicus sp.	Myotis sp.	P. kuhlii	P. pipistrellus	Social calls	V. murinus
8	[redacted]				43		5
9		3			6		1
10					1		
11					21		
12					15		
13		1			7		
14		1			8		
15					3		
16		2	1		19		
17					52	22	
18					14		
19					8		
20					21		
21		1		1	8		
22					6		
23							

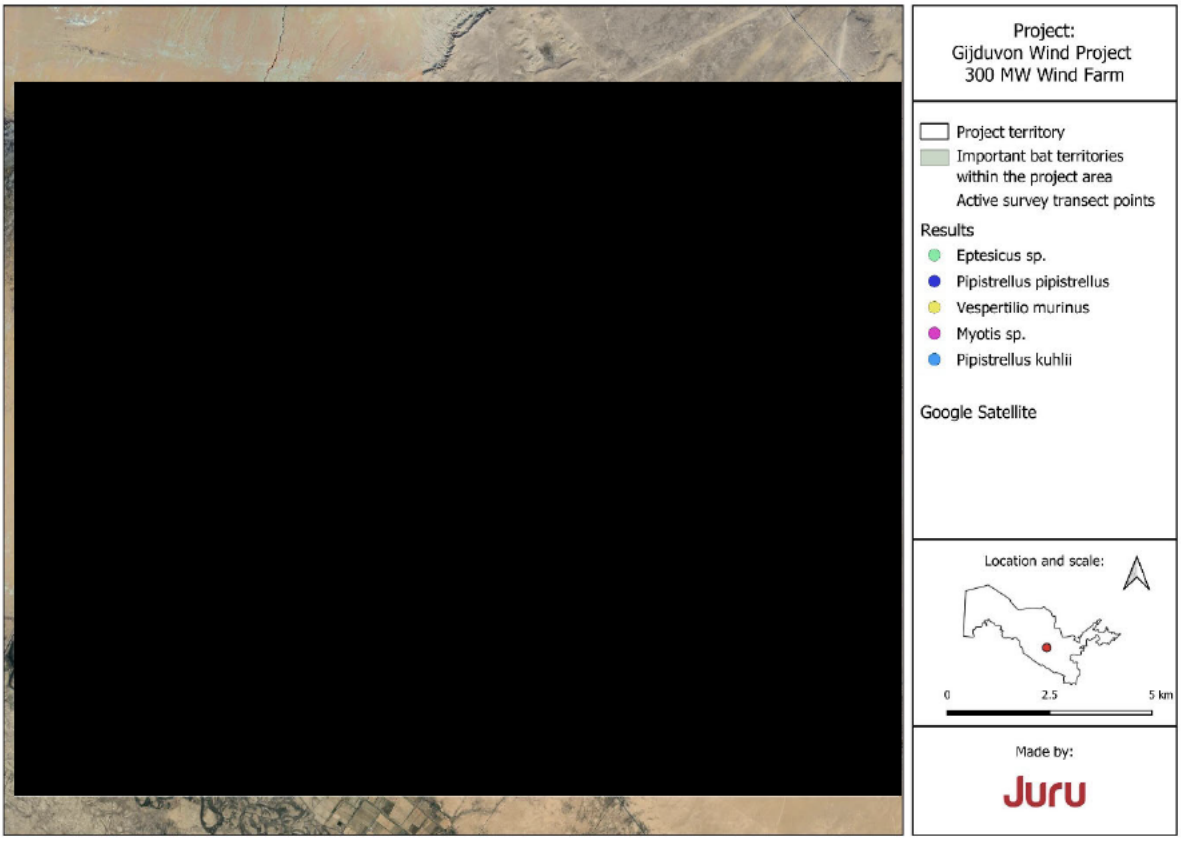


Figure 9-25 Summary of the active acoustic monitoring survey points

9.2.6 Mammals (Non-volant)

9.2.6.1 Survey Methodology

A visual census was undertaken between April 1st and April 12th 2024, to survey the mammal communities present across the Project site. A total of 10 survey points were selected across the site (MS1 – MS10).

The following figure and table provide the co-ordinates of sample locations and a map of survey tracks covered during these targeted mammal surveys.



Figure 9-26 Map of sample locations for targeted mammal survey

Table 9-28 Locations of mammal survey points across the wind farm site.

Survey Point	Co-ordinates		Biotope
	N	E	
MS-1	[redacted]		Access road, Rubbly-sandy desert with shrub vegetation
MS-2			Rubbly-sandy desert with shrub vegetation
MS-3			Rubbly-sandy desert with shrub vegetation and outcrops of salt marshes and takyrs
MS-4			Rubbly-sandy desert with shrub vegetation and outcrops of salt marshes and takyrs
MS-5			Agricultural field along the canal Ayak-Agitma
MS-6			Ephemeral scrub desert
MS-7			Wetland scrub semi-desert
MS-8			Wetland scrub semi-desert
MS-9			Rubbly-sandy desert with shrub vegetation and outcrops of salt marshes and takyrs
MS-10			Access road, Agricultural field along the canal Ayak-Agitma

9.2.6.2 Results

Combined data from the targeted mammal census and phototrapping survey, a total of 18 species of mammal were noted across the project site based on direct observation or indirect evidence such as animal remains, tracks and burrows.

The table below shows the species recorded at the survey locations across the proposed windfarm site.

Table 9-29 Mammal survey (April 2024)

Common Name	Scientific name	IUCN	UzRDB	CITES	MS-1	MS-2	MS-3	MS-4	MS-5	MS-6	MS-7	MS-8	MS-9	MS-10	Phototrap (No of Images)
Long-eared Hedgehog	*Hemiechinus auritus*	LC	-		Carcass							Carcass			
Brandt's Hedgehog	*Hemiechinus hypomelas*	LC	3(NT)			Carcass				Track					
Tolai Hare	*Lepus tolai*	LC	-		Tracks	Tracks		Tracks	Tracks	Tracks	1	Tracks	1		48 (11), 52(1)
Yellow Ground Squirrel	*Spermophilus fulvus*	LC	-			1	Borrows	2	Borrows		Borrows	Borrows	Borrows	1	
Severtzov's Jerboa	*Allactaga sevetzovi*	LC	-			Borrow				Borrow					
Small Five-toed Jerboa	*Allactaga elater*	LC	-						Borrow				Borrow	Borrow	
Grey Hamster	*Cricetulus migratorius*	LC	-			Borrow			Borrow					Borrow	
Zasian Mole Vole	*Ellobius tancrei*	LC	-		1-2 tw/ha	1-2 tw/ha	3-4 tw/ha		1-2 tw/ha	4-5 tw/ha	3-4 tw/ha	3-4 tw/ha			
Great Gerbil	*Rhombomys opimus*	LC	-							1-2 col/ha	1-2 col/ha				
Midday Gerbil	*Meriones meridianus*	LC	-		1-2 col/ha	1-2 col/ha			1-2 col/ha	1-2 col/ha		1-2 col/ha		1-2 col/ha	47 (3)

Common Name	Scientific name	IUCN	UzRDB	CITES	MS-1	MS-2	MS-3	MS-4	MS-5	MS-6	MS-7	MS-8	MS-9	MS-10	Phototrap (No of Images)
Tamarisk Gerbil	*Meriones tamariscinus*	LC	-					Borrows			Borrows	Borrows			
Fox	*Vulpes vulpes*	LC	-		Tracks	1	Tracks	1	Tracks	Tracks	Tracks	1	Tracks	Tracks	43(8). 44(1), 48(2), 51(2), 52(2), 55(4)
Golden Jackal	*Canis aureus*	LC	-					Tracks	Tracks		Tracks				43 (1)
Asian Badger	*Meles leucurus*	LC	-					Track			Track	Track			51 (1)
Afro-asiatic Wildcat	*Felis lybica*	LC	-	CITES II	Track		Track		Track		Tracks	Track	Track		42(1),43(6), 45(3), 46(2), 47(3), 49(2), 51(2)
Jungle Cat	*Felix Chaus*	LC	-	CITES II											52 (6)
Goitered Gazelle	*Gazella subguttur osa*	VU	2 (VU:D)	Cites II		Track				Track					

IUCN - species included in the Red List of Threatened Species of the International Union for Conservation of Nature ; **UzRDB** - the species/subspecies is listed in the Red Data Book of the Republic of Uzbekistan (2019); **CITES II** – a species included in Appendix (I , II) of the Convention on International Trade in Endangered Species of Fauna and Flora

col/ha - number of colonies per 1 ha; **tw/ha** - number of townshper 1 ha. Colonies have burrows, towns do not have open burrows for most of the year, and on the ground, they look like clods of soil.

Among these were four rare and/or protected species:

- Goitered Gazelle (*Gazella subgutturosa*) classified as Vulnerable in both the global IUCN RedList and UzRDB and considered rare in this region. This species was confirmed by tracks at surveys points MS2 and MS6.
- Brandt's Hedgehog (*Hemiechinus hypomelas*) listed in the UzRDB as Near Threatened was confirmed based on a single carcass and tracks at survey points MS2 and MS6 respectively.
- Afro-asiatic Wildcat (*Felis silvestris lybica*) is offered protection from trade under CITES Appendix II. Tracks were observed across much of the site and at least one individual was captured 19 times across 7 of the 15 deployed camera traps.
- Jungle cat (*Felis chaus*) is offered protection from trade under CITES Appendix II. This species was captured 6 times by a single camera trap (trap 52).



Jungle cat (*Felis chaus*)



Wildcat (*Felis lybica*)



Carcass of *Hemiechinus hypomelas* at MS-02 (10.04.2024)

Figure 9-27 Evidence of high priority species captured at the project site

9.2.7 Herptiles

9.2.7.1 Survey Methodology

Herpetological surveys employed the transect method. This consists of counting individuals along a fixed long 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.

Transects were outlined at the project monitoring stations in accordance with different habitat types. Survey efforts during 2024 were carried out as follows:

- Spring Survey 20th and 22nd April 2024: Diurnal
- Autumn Survey 14th to 16th September: Diurnal and Nocturnal

The Central Asian tortoise population density (D) was calculated using the following formula:

$$D = \frac{n}{2LB}$$

where n = number of animal individuals recorded on the transect; L = length of the transect (km); B = width of the limited strip on both sides of the transect axis (20 meters).

The abundance of the reptiles in habitats was estimated using the following population density scale for 1 ha (Kuzyakin, 1962): 0.1 – 0.9 – rare, 1.0 – 9.9 – common, 10.0 and higher – abundant.



Figure 9-28 Transects Covered During Herpetological surveys in Spring 2024

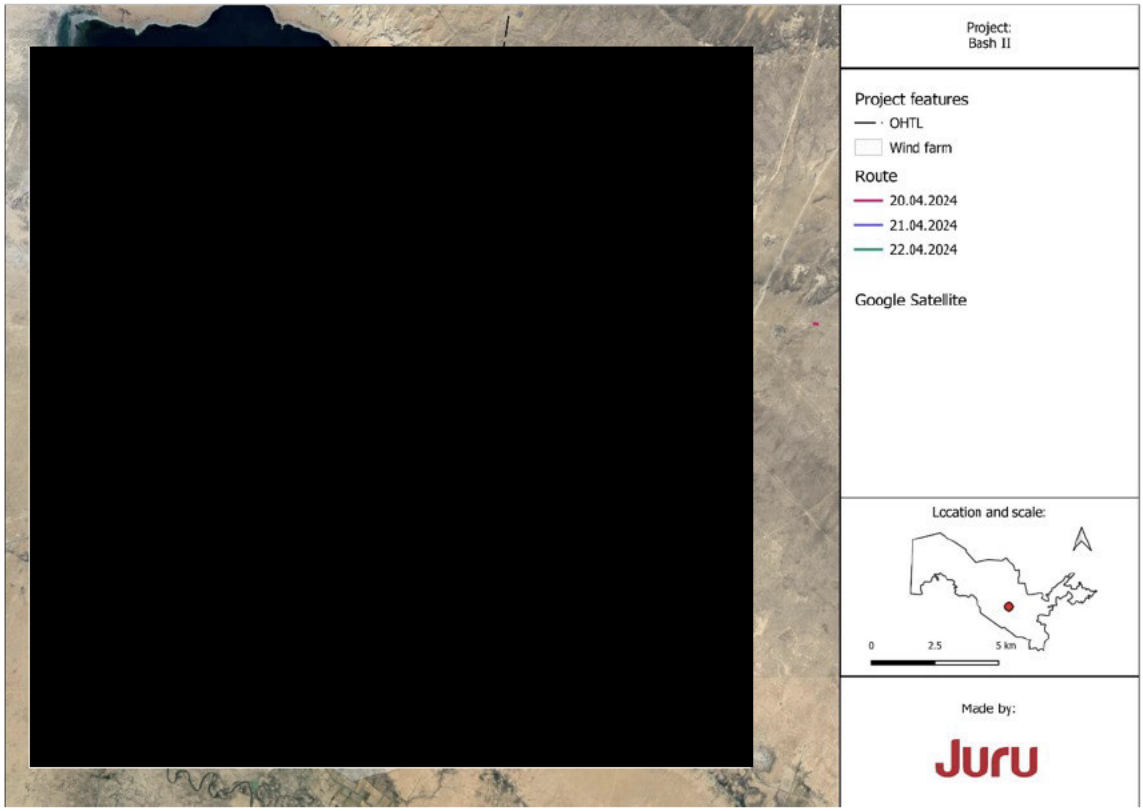


Figure 9-29 Tracks covered during herpetological surveys and the date performed[17]

Table 9-30 Transect locations

Transect No.	Date	Coordinate N, E°		Length (km)
		Beginning of the transect	End of the transect	
1	20/04/24	[redacted]		3
2	21/04/24			3
3	20/04/24			3.2
4	20/04/24			1.6
5	21/04/24			1.7
6	21/04/24			1
7	21/04/24			2.5
8	21/04/24			1
9	22/04/24			1
10	22/04/24			5.5
11	22/04/24			6.4
12	22/04/24			1
13	22/04/24			1

[17] this map presents the old project layout and OHTL

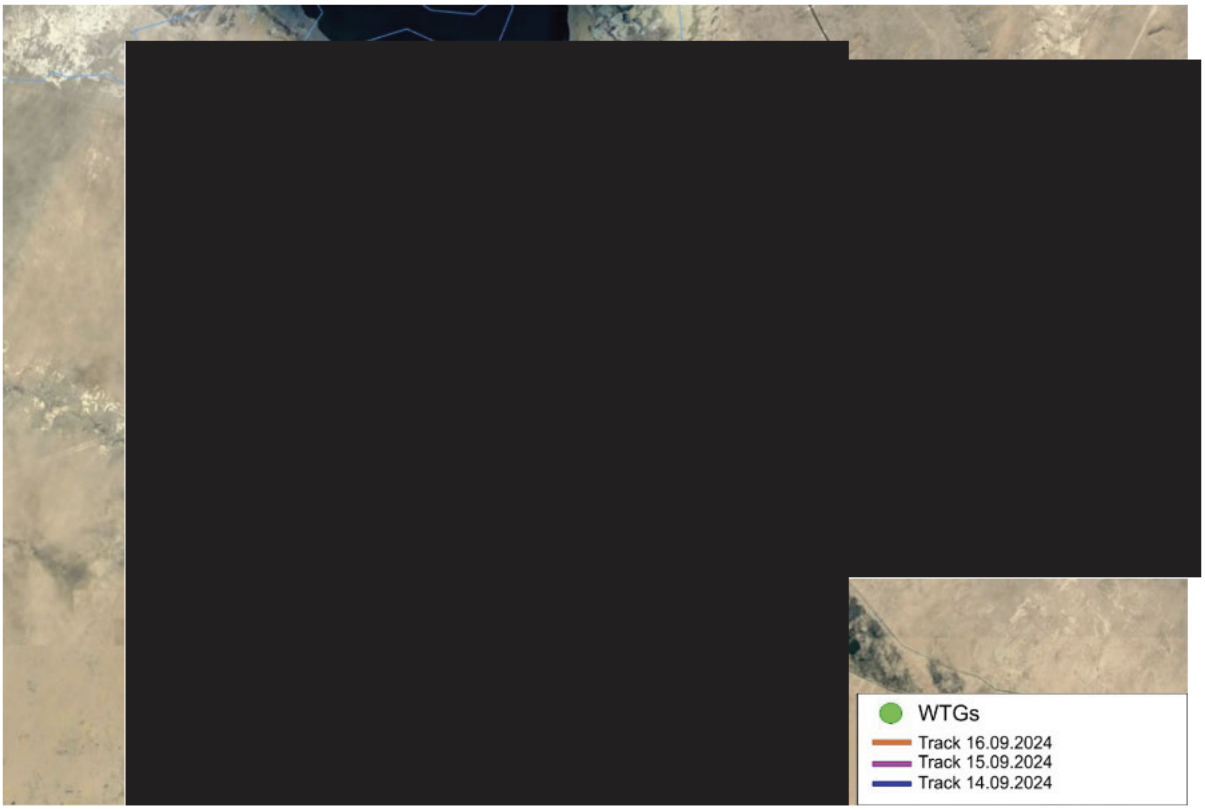


Figure 9-30 Tracks Covered During Autumn Reptile Surveys[18]

9.2.7.2 Results

The total number of species recorded in the Spring and Autumn surveys was 13, which represents over half of the species that could potentially inhabit the region. Whilst most species are common and widespread, three notable species of elevated conservation concern were confirmed at the project site:

- Central Asian Tortoise (*Testudo horsfieldii*), listed as Vulnerable (VU) on both the IUCN Red List and the Red Book of Uzbekistan. Recorded during the Spring season where it was observed at each of the 13 tracks surveyed and captured by several camera traps distributed across the windfarm site.
- Desert monitor (*Varanus griseus*), listed as Vulnerable (VU) in the Red Book of Uzbekistan. During Spring surveys it was observed just once on track 4, located in the centre of the windfarm site, and once by phototraps at a location towards the Nothwest corner. During Autumn surveys footprints of the species were confirmed at 2 localities.
- Dwarf Sand Boa (*Eryx milliaris*), listed as Near Threatened in the Red Data Book of Uzbekistan. During Autumn services, 34 individuals were recorded across the project footprint.

[18] This map shows the preliminary layout with the buffer turbines



Figure 9-31 Captured images of Desert Monitor (left) and Central Asian Tortoise (right) at the project site

During the Spring herpetological survey, nine reptile species were recorded. The most common species recorded were the Steppe Agama (*Trapelus sanguinolentus*) and Central Asian Tortoise (*Testudo horsfieldii*).

During the autumn survey, a total of 86 individual reptiles were observed, representing 10 different species. The three most prevalent reptile species were Steppe Agama, Rapid Racerunner, and Sunwatcher Toadhead Agama. Additionally, Desert Monitor footprints were observed at two distinct locations.

Nocturnal surveys provided further insights, revealing a relatively high density of Common Wonder Gecko (*Teratoscincus scincus)*, Comb-toed Gecko (*Crossobamon eversmanni*) and Dwarf Sand Boa (*Eryx milliaris*) were also recorded.

A comparison between the spring and autumn surveys highlights changes in the dominant species composition within the reptile community. For example, Sand Racerunner (*Eremias scripta*), which was not observed during the spring survey, was abundant in autumn. Conversely, the absence of numerous tortoises was notable in autumn, and Aralo-Caspian Racerunner (*Eremias intermedia*) appeared to be replaced by Rapid Racerunner (*Eremias velox*).

A complete list of species recorded during Spring and Autumn 2024 is shown in the table below.

Table 9-31 Check list of reptile species found at the project site.

Species	Common name	IUCN	UzRDB	Spring	Autumn
Testudo horsfielidii	Central Asian tortoise	VU	2(VU)	45	0
Trapelus sanguinolentus	Steppe agama	LC	LC	12	26

Species	Common name	IUCN	UzRDB	Spring	Autumn
Phrynocephalus mystaceus	Toad-headed agama	LC	LC	5	
Phrynocephalus helioscopus	Sunwatcher toadhead agama	LC	LC	2	8
Eremias grammica	Reticulate racerunner	LC	LC	3	5
Eremias velox	Rapid racerunner	LC	LC	2	19
Eremias intermedia	Aralo-Caspian racerunner	LC	LC	7	3
Varanus griseus	Desert monitor	LC	2(VU:D)	1	2
Psammophis lineolatus	Steppe ribbon racer	LC	LC	1	
Crossobamon eversmanni	Comb-toed Gecko	LC	LC	-	4
Eremias scripta	Sand Racerunner	LC	LC	-	2
Eryx miliaris	Dwarf Sand Boa	LC	3(NT)	-	1
Teratoscincus scincus	Common Wonder Gecko	LC	LC	-	13

In addition to targeted herpetofauna surveys, deployed phototraps captured 3 reptile species; the Central Asian Tortoise, Steppe Agama and Desert monitor. Several observations of the Central Asian Tortoise were captured across 8 of the deployed cameras (42, 43, 45, 47, 49, 51, 53 and 55), two sightings of Steppe agame (43 and 48) and one observation of the Desert monitor on 5th May 2024 (CT45).

The average density of *Testudo horsfieldii* was calculated to be 1.4 individuals per hectare, falling near the lower end of the common range (1.0 – 9.9 individuals/ha). Density at each track ranged from 0.1 ind/ha to 2.9 ind/ha, showing a heterogeneous distribution of density across the territory, with some areas being more inhabited than others. Tortoises tended to concentrate around the canals and in the sandy areas located in the central part of the project territory. The following table shows the densities calculated for each track.

Table 9-32 Number of Tortoises recorded and calculated denisty at each survey track

Track Number	Track Length	Number of Testudo horsfieldii	Density (inds/ha)
1	3	2	0.1
2	3	1	0.3
3	3.2	8	2.5
4	1.6	5	2.1
5	1.7	2	2.4
6	1	1	0.4
7	2.5	6	0.8

Track Number	Track Length	Number of Testudo horsfieldii	Density (inds/ha)
8	1	4	2.3
9	1	5	2.9
10	5.5	2	0.2
11	6.4	3	0.2
12	1	4	1.7
13	1	2	2.1

9.3 Receptors

9.3.1 Area of Influence

The area of influence is the area within which project activities may affect receptors. As different aspects carry differing spatial extents, the AoI varies considerably. The paragraphs below provide the AoI that was considered for each type of predicted potential impact.

The area of influence for Habitat Loss impacts is inclusive of the full project construction and operation footprint, including associated facilities, laydown areas, and any existing or new roads utilized for incoming and outbound transport.

The area of influence for Direct Mortality impacts is inclusive of the full project construction and operation footprint, including associated facilities, laydown areas, and any existing or new roads utilized for incoming and outbound transport, as well as the airspace of the wind farm and OHTL corridor.

The area of influence for Habitat Degradation impacts extends beyond the footprint of the project inclusive of a 1km buffer, to account for the phenomenon of edge effect.

The area of influence for Habitat Fragmentation and Disturbance impacts extends beyond the footprint of the project inclusive of a 5 km buffer, to account for the phenomenon of barrier effect.

The area of influence for Displacement impacts extends beyond the footprint of the project inclusive of a 50km buffer, to account for the secondary impacts of displaced wildlife into adjacent territories.

The area of influence for Introduced Species / Proliferation of Species impacts extends beyond the footprint of the project inclusive of a 50km buffer, to account for (1) potential major invasive spread and (2) secondary impacts caused by displacement of less competitive fauna into adjacent areas.

9.3.2 Sensitive Receptors

The following overview table groups the conservation value of ecological receptors that may be impacted by project works. It includes species registered during the surveys as well as sensitive species that are anticipated to possibly occur within the area of influence.

Table 9-33 Potential Terrestrial Ecology Receptors[19]

Group	Receptor(s)	Justification	Value
Natural Habitats	Sandy and sabulous-loamy desert plain	• terrain is flat, wavy or gently hilly, sometimes with dry riverbeds and debris cones • vegetation is represented with native ephemeroid-sagebrush, ephemeroid-saltwort-sagebrush, sagebrush-saltwort and saltwort plant communities on sabulous, loamy, slightly saline, gypsaceous or skeleton sabulous-loamy grey-brown desert soil • The canopy cover is sparse (20-50%), and plant species diversity is 15-30 species per sample plot • Two nationally red-listed species, *Tulipa lehmanniana* and *Eremostachys eriolarynx*, occurs sporadically within all territory of this habitat type of the project area.	High
	Fixed and semi-fixed sands	• This habitat type is characterized by strongly rugged terrain, and the vegetation is represented by native sagebrush-saltwort and ephemeroid-saltwort-sagebrush vegetation on loamy and skeleton grey-brown desert soils with outcrops of bedrocks. The slopes are eroded and dissected with numerous dry riverbeds. • The canopy cover is 40-50% and plant is 20-30 species per sample plot. Two species, *Calligonum zakirovii* and *Tulipa lehmanniana*, are listed in the Red Data Book of Uzbekistan	High
	Saline lands	• Saline lands are situated in depressions and along irrigation and discharge channels and collectors of the irrigation system of Bukhara oasis • This habitat type is characterized by more or less rugged hilly terrain • The vegetation is represented by tugay and salt marsh communities with halophilic shrubs, other halophytes, halomesophytes and halohydrophytes and pastoral weeds • This wetland habitat functions as an important watering place for animal	High

[19] Secondary data from the baseline of Bash 500MW Project will be incorporated to supplement the information on potential receptors in the final version of the ESIA report. However, this additional data is unlikely to influence either the CH determination or the conclusions regarding the species which are likely to remain as SBVs.

Group		Receptor(s)	Justification	Value
Modified Habitats		Fallow lands and farmsteads	• Represented with saline fallow lands (abandoned fields) and farmsdeads (shepherds houses, corrals and wells surrounded with tramped areas). • Old fallow lands are covered with secondary communities with domination of tamarisk, annual and perennial saltworts and camel thorn, similar to those growing on saline lands.	Low
Threatened Flora		*Tulipa lehmanniana* (Confirmed) *Tulipa affinis* (Not Confirmed)	Listed as vulnerable or near threatened on the IUCN Red List and is Category 3 species (Reducing) on the Uzb Red Data Book	High
Nationally threatened and Protected Flora		*Calligonum zakirovii* (Confirmed) *Eremostachys eriolarynx* (Confirmed) *Climacoptera amblyostegia* (Confirmed)	*Calligonum zakirovii* and *Eremostachys eriolarynx* are listed as Category 1 species (endangered) in the Uzb Red Data Book *Climacoptera amblyostegia* is a Category 2 species (Rare)	High
All other Flora		All other Flora	Listed as Least Concern, not considered to be of national importance.	Low
Endangered Birds	**Raptors**	Steppe Eagle (Confirmed) Egyptian Vulture (Confirmed) Pallas's Fish Eagle (Not Confirmed) Saker Falcon (Confirmed)	Listed as critically endangered or endangered on IUCN Red List.	Very High
	Groundbirds	Great Bustard (Not Confirmed)	Listed as critically endangered or endangered on IUCN Red List.	Very High
	Waterbirds	Sociable Lapwing (Confirmed) White-headed Duck (Not Confirmed)	Listed as critically endangered or endangered on IUCN Red List	Very High
Threatened Birds	**Raptors**	Greater Spotted Eagle (Confirmed) Eastern Imperial Eagle (Confirmed)	Listed as vulnerable or near threatened on the IUCN Red List	High

Group		Receptor(s)	Justification	Value
		Cinereous Vulture (Confirmed) Pallid Harrier (Confirmed)		
	Waterbirds	Marbled Teal (not confirmed) Lesser White-fronted Goose (not confirmed) Common Pochard (Not confirmed) Eurasian Curlew (Not confirmed) Dalmatian Pelican (confirmed) Pygmy Cormorant (confirmed)	Listed as vulnerable or near threatened on IUCN Red List.	High
	Groundbirds	Asian Houbara (Confirmed) Little Bustard (Confirmed)	Listed as vulnerable or near threatened on IUCN Red List.	High
	Songbirds/ Allies	European Turtle Dove (Not confirmed) Yellow-eyed Pigeon (Not confirmed)	Listed as vulnerable or near threatened on IUCN Red List.	High
Nationally-threatened Birds	**Raptors**	Short-toed Snake Eagle (Confirmed) Golden Eagle (Confirmed) White-tailed Sea Eagle (Confirmed) Lesser Kestrel (Confirmed) Booted Eagle (Confirmed) Peregrine Falcon (Not confirmed)	Classified as Least Concern on the global IUCN Red List but listed as vulnerable or near-threatened under Uzbekistan Red Data Book.	High

Group		Receptor(s)	Justification	Value
		Pallid Harrier (confirmed)		
	Waterbirds	Dalmatian Pelican (Confirmed) Mute Swan (Confirmed) Squacco Heron (Not confirmed) Black Stork (confirmed)		
	Groundbirds	Pin-tailed Sandgrouse (Not confirmed) Glossy Ibis (confirmed)		
Non-threatened Birds	**Raptors**	Eastern Buzzard (confirmed) Common Buzzard (confirmed) Long-legged Buzzard (confirmed) Upland Buzzard (confirmed) Eurasian Kestrel (confirmed) Western Marsh-Harrier (confirmed) Hen Harrier (confirmed) Black Kite (confirmed) Eurasian Sparrowhawk (confirmed) Montagu's Harrier (confirmed) Little Owl (confirmed) Merlin (confirmed) Eurasian Eagle-owl (confirmed) Osprey (confirmed)	Classified as Least Concern on the global IUCN Red List, but separated categories due to increased sensitivity to wind farm impacts.	Low

Group		Receptor(s)	Justification	Value
	Waterbirds	Black Stork (Confirmed) Greylag Goose (confirmed) Common Crane (confirmed) Demoiselle Crane (confirmed) Pygmy cormorant (confirmed) Northern Lapwing (confirmed)		
	Ground birds	Black-bellied Sandgrouse (Confirmed)		
All other Birds		All other Bird species	Listed as Least Concern on the IUCN Red List, not of national importance.	Low / Lower
Threatened Bats		Long-fingered bat *Myotis capaccinii (Not confirmed)*	Listed as Vulnerable on the IUCN Redlist	High
Nationally Important or Endemic Bats		Hemprich's Long-eared Bat (Not confirmed) European Free-tailed Bat (not confirmed) Bukhara Mouse-eared Bat (Not confirmed) Bukhara Horseshoe Bat (Not confirmed)	These species are nationally protected on the UzRDB and/or endemic to Uzbekistan.	High

Group		Receptor(s)	Justification	Value
Non-threatened Bats		All other bats including: Common Pipistrelle *Pipistrellus pipistrellus* (Confirmed) Kuhl's Pipistrelle *Pipistrellus kuhli* (Confirmed) Particloured Bat *Vespertilio murinus* (Confirmed)	These species are not threatened, and generally common and widespread. Bats however are important for ecosystem function and are generally understudied, with many global populations thought to be on the decline. The species play important roles for ecological function in top-down control of insect populations	Medium
Threatened Mammals		Goitered Gazelle *Gazella subgutturosa* (Confirmed) Marbled Polecat *Vormela peregusna* (Not confirmed)	These species are listed as Vulnerable on the IUCN Red List and nationally protected.	High
		Eurasian Otter *Lutra lutra* (Not confirmed)	This species is Near Threatened on the IUCN Red List but nationally Endangered in the UzRDB	High
Nationally Threatened Mammals		Brandt's hedgehog *Paraechinus hypomelas* (Confirmed)	This species is listed as near threatened in the Uzbekistan Red Data Book.	Low
Non-threatened Mammals	**Suidae**	Wild Boar *Sus scrofa* (Not confirmed)	Important species for aerating soil and breaking up leaf litter encouraging vegetation growth. Common and widespread species.	Low
	Carnivores	Grey Wold *Canis lupus* (Not confirmed) Red fox Vulpes *vulpes* (Confirmed) Afro-asiatic wildcat *Felis lybica* (Confirmed) *Jungle Cat Felix chaus* (Confirmed)	This carnivore acts as top-down control on prey populations and help control disease. However, these species are not threatened or endemic and are common and widespread.	Low

Group		Receptor(s)	Justification	Value
		Asian Badger *Meles leucurus* (Confirmed) Golden Jackal *Canis aureus* (Confirmed)		
	Hedgehog	Long-eared Hedgehog *Hemiechinus auratus (Confirmed)*	Insectivores are an important top-down control for various invertebrate populations. However, this species is not threatened or endemic and is common and widespread.	Low
	Hare	Tolai hare *Lepus tolai* (Confirmed)	Hare is an important prey species, however this species is not threatened or endemic and are common and widespread.	Low
	Rodents	Yellow Ground Squirrel *Spermophilus fulvus* (Confirmed) Severtzov's Jerboa *Allactaga sevetzovi* (Confirmed) Small Five-toed Jerboa *Allactaga elater* (Confirmed) Grey Hamster *Cricetulus migratorius* (Confirmed) Zasian Mole Vole *Ellobius tancrei* (Confirmed) Great Gerbil *Rhombomys opiums* (Confirmed) Midday Gerbil *Meriones meridianus* (Confirmed) Tamarisk Gerbil *Meriones tamariscinus* (Confirmed)	Rodents are an important prey species and also contribute to soil health via burrow aeration and vegetation spread via seed banking. However, these species are not threatened or endemic and are common and widespread.	Low
Threatened Herptiles		Central Asian Tortoise *Testudo horsfieldii* (Confirmed)	This tortoise is listed as Vulnerable on the IUCN Red List.	High

Group		Receptor(s)	Justification	Value
		Southern Even-fingered Gecko *Alsophylax laevis* (Not confirmed)		
Nationally important Herptiles		Desert Monitor *Varanus griseus* (Confirmed)	This species is listed as vulnerable in the Uzbekistan Red Data Book.	Medium
Endemic and Range Restricted		Bogdanov's Thin-toed Gecko *Tenuidactylus bogdanovi* (Not confirmed) Reticulated Toad-headed Agama *Phrynocephalus reticulatus* (Not confirmed)	These species are not threatened, however they are either endemic to the region or are range restricted with an EOO of <50,000km^2	Medium
Non-threatened Herptiles	**Geckos and Lizards**	Reticulate racerunner Eremias grammica (Confirmed) Rapid racerunner Eremias velox (Confirmed) Aralo-caspian Racerunner Eremias intermedia (Confirmed) Toad-headed agama Phrynocephalus mystaceus (Confirmed) Steppe agama *Trapelus sanguinolentus* (Confirmed) Sunwatcher toad-headed agama *Phrynocephalus helioscopus (Confirmed)*	These species are not threatened and are common and widespread.	Low / Lower
	Snakes	Steppe Ribbon Racer *Psammophis lineolatus* (Confirmed)		

Group	Receptor(s)	Justification	Value
Nationally Important Invertebrates	Large Keeled Apollo *Pamassius tianschanicus* (Not confirmed)		Low

9.4 Critical Habitat Screening and Assessment

The concept of Critical Habitat is widely utilized and the principles for protection of critical habitat widely applied by DFIs. A specific screening and assessment process is undertaken to identify if any CH criteria are triggered by the project. This requires screening to identify potential species candidates for triggering CH, and subsequently using information obtained from surveys, secondary sources, and stakeholders to extrapolate a population estimate for the individual species/species group's "Ecologically Appropriate Area of Analysis" (EAAA), which may in many cases be overlapping but not 100% aligned with a project impacts' Area of Influence. If any extrapolated population estimates (extrapolated from existing information across the qualified EAAA) meet the appropriate CH thresholds, then CH will be triggered.

There are several international lending organizations that have produced varying criterion for which critical habitat is defined by; however, they are generally aligned with the IFC PS6 criterion. The below provides an overview of all applicable criteria as per IFC and ADB:

- IFC PS6 Criterion 4: Highly Threatened or Unique Ecosystems
- IFC PS6 Criterion 1: Critically Endangered and Endangered Species /// ADB criterion "habitat required for the survival of critically endangered or endangered species";
- IFC PS6 Criterion 2: Endemic and Restricted-range Species /// ADB criterion "areas with special significance for endemic or restricted-range species";
- IFC PS6 Criterion 3: Migratory and Congregatory Species /// ADB criteria "sites that are critical for the survival of migratory species" and "areas supporting globally significant concentrations or numbers of individuals of congregatory species";
- IFC PS6 Criterion 5: Key Evolutionary Processes /// ADB criterion "areas with unique assemblages of species that are associated with key evolutionary processes or provide key ecosystem services";
- ADB criterion "areas with biodiversity that has significant social, cultural or economic importance to local communities".

Significant Biodiversity Values (SBVs) are similarly, species of elevated concern but do not trigger CH. SBVs, particularly any species listed as endangered or critically endangered, requires No Net Loss (NNL). Further, IFC P.S. 6 requires the designation of habitats into Natural and Modified habitat typologies, for which Natural Habitat requires a NNL residual impact.

It is important to note that NNL does not translate to zero loss. The definition of NNL for species and habitats should be taken on a spatially and temporally broad view, meaning that the

regional population / ecosystem function is not diminished in any significant way in the long term even if there are individual losses / quantifiable habitat loss. Thus, a regional population of a species achieving NNL may see incremental losses or gains but overall remains stable or in a similar dynamic as if the project did not exist. (For example if non-project impacts are causing population decline, this would not be counted against the NNL target of the project). Similarly, a specific habitat typology may lose acreage from the project but if the overall ecosystem function and carrying capacity does not change and is able to retain the same biodiversity value as if the project did not exist, this can similarly be considered as NNL.

9.4.1 CH Criteria and Thresholds

Some of the CH criteria listed above have quantitative thresholds associated with them, defined in lender policy, while others can only be assessed using more qualitative evaluation of the criterion. In the present section, biodiversity features potentially affected by the Project are assessed against the quantitative thresholds associated with some of the CH criteria. The specific criteria and associated quantitative thresholds evaluated (where applicable) consist of the following:

Thresholds for IFC CH Criterion 4 (Highly threatened or unique ecosystems) are the following:

a) EAAA that is ≥5% of global extent of an ecosystem type with IUCN status of Endangered (EN) or Critically Endangered (CR); and

b) EAAA that is an ecosystem determined to be of high priority for conservation by national or regional systematic conservation planning.

Thresholds for IFC CH Criterion 1 (Habitats of significant importance to endangered or critically endangered species) are the following:

a) Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species);

b) Areas that support globally significant population of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR, meets the threshold (a) above; and

c) EAAA that contains important concentrations of a nationally or regionally listed EN or CR species.

Thresholds for IFC CH Criterion 2 (Habitats of significant importance to endemic or geographically restricted species and sub-species) is the following:

a) EAAA that regularly holds ≥ 10% of global population AND ≥ 10 reproductive units of a species.

Thresholds for IFC CH Criterion 3 (Habitats supporting globally significant concentrations of migratory or congregatory species) are the following:

a) EAAA that sustains, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population at any point of the species' lifecycle; and

b) EAAA that predictably supports ≥10 percent of global population during periods of environmental stress.

IFC CH Criterion 5 (Areas associated with key evolutionary processes) does not have a set of associated quantitative thresholds. The qualitative (expert-based) basis for evaluating this criterion is the following:

a) Areas with landscape features that might be associated with particular evolutionary processes evolutionary processes or populations of species that are especially distinct and may be of special conservation concern given their distinct evolutionary history. For example:

- Isolated lakes or mountaintops
- Populations of species listed as priorities by the Edge of Existence Programme.

IFC CH Criterion 5 that makes provisions for Key evolutionary processes. This criterion does not have quantitative thresholds however there qualitative and illustrative examples that are provided, which include:

- Landscapes with high spatial heterogeneity are a driving force in speciation, as species are naturally selected based on their ability to adapt and diversify.
- Environmental gradients, also known as ecotones, produce transitional habitat, which has been associated with the process of speciation and high species and genetic diversity.
- Edaphic interfaces are specific juxtapositions of soil types which have led to the formation of unique plant communities characterized by both rarity and endemism.
- Connectivity between habitats (for example, biological corridors) ensures species migration and gene flow, which is especially important in fragmented habitats and for the conservation of metapopulations. This also includes biological corridors across altitudinal and climatic gradients and from "crest to coast."
- Sites of demonstrated importance to climate change adaptation for either species or ecosystems are also included within this criterion.

9.4.2 CHA Screening

9.4.2.1 Methodology

A list of all species from the IUCN Red List and, where relevant, categorized ecosystems from the Red List of Ecosystems is generated by cross-referencing the Study Area with known spatial distributions from the IUCN Global database. This list of all possible species/ecosystems (biodiversity features) is then supplemented by a review of Key Biodiversity Areas (and other recognised biodiversity areas of importance), national or regional level Red Lists / Red Data Books, contextual connectivity of flyways and habitats across the landscape, and any other verified sources of available existing ecological information. Migratory bird species lists are obtained from Birdlife International and other reputable public sources and databases.

At this stage, a CHA Screening Table has been created with a full list of species who should be further investigated under specific criterion, and whose known range may overlap with the project AoI. Each species is assessed to determine the likelihood of its presence based on habitat requirements compared to the known habitat types within the Project AoI.

The final CHA Screening list all identified species/elements as to why it was screened in for further assessment or screened out due to unsuitable habitat or other available information indicating lack of regular presence.

9.4.2.2 Initial Screening Exercise

As a result of the Initial screening exercise, a total of 40 species were identified as potential elements of concern. The list was predominantly avifauna, with twenty-five bird species in addition to one ichthyofauna and two mammals, four bats, two reptiles, one insect and five flora species.

The following table gives a complete list of species assessed in detail as part of this CHA report.

Table 9-34 Species Screened In for further investigation in the CHA

TAXA GROUP	SPECIES	COMMON NAME	IUCN RED LIST	NATIONAL RDB	CRITERION (IFC)
AVIFAUNA	*Anser erythropus*	Lesser White-fronted Goose	VU	VU	Criteria 1,3
	Aquila heliaca	Eastern Imperial Eagle	VU	VU	Criteria 1,3
	Aquila nipalensis	Steppe Eagle	EN	NT	Criteria 1,3 and 5
	Ardeola ralloides	Squacco heron	LC	VU	Criteria 1

Taxa Group	SPECIES	COMMON NAME	IUCN RED LIST	NATIONAL RDB	CRITERION (IFC)
	Aythya ferina	Common Pochard	VU	-	Criteria 1, 3
	Chlamydotis macqueenii	Asian Houbara	VU	VU	Criteria 1,3
	Ciconia nigra	Black Stork	LC	VU	Criteria 1
	Circaetus gallicus	Short-toed (Snake) Eagle	LC	VU	Criteria 1
	Clanga clanga	Greater Spotted Eagle	VU	VU	Criteria 1,3
	Columba eversmanni	Yellow-eyed Pigeon	VU	VU	Criteria 1,3 & 5
	Falco cherrug	Saker Falcon	EN	NT	Criteria 1,3
	Gyps fulvus	Griffon vulture	LC	VU	Criteria 1
	Haliaeetus leucoryphus	Pallas's Fish-eagle	EN	EN	Criteria 1,3
	Haliaeetus albicilla	White Tailed Sea Eagle	LC	VU	Criteria 1
	Hieraaetus pennatus	Booted Eagle	LC	VU	Criteria 1
	Marmaronetta angustirostris	Marbled Teal	NT	EN	Criteria 1
	Neophron percnopterus	Egyptian Vulture	EN	VU	Criteria 1,3 & 5
	Numenius arquata	Eurasian Curlew	NT	VU	Criteria 1
	Otis tarda	Great Bustard	EN	CR	Criteria 1,3
	Oxyura leucocephala	White-headed Duck	EN	EN	Criteria 1,3
	Pelecanus crispus	Dalmatian Pelican	NT	EN	Criteria 1
	Pterocles alchata	Pin-tailed Sandgrouse	LC	VU	Criteria 1
	Streptopelia turtur	European Turtledove	VU	VU	Criteria 1,3
	Tetrax tetrax	Little Bustard	NT	VU	Criteria 1
	Vanellus gregarius	Sociable Lapwing	CR	-	Criteria 1,3 & 5
ICHTHYOFAUNA	*Luciobarbus brachycephalus*	Aral Barbel	VU	EN	Criteria 1
INSECTA	*Parnassius tianschanicus*	Large Keeled Apollo	LC	VU	Criteria 1
MAMMALS	*Vormela peregusna*	Marbled Polecat	VU	VU	Criteria 2 & 5
	Lutra lutra	Eurasian Otter	NT	EN	Criteria 1
	Tadarida teniotis	European Free-tailed Bat	-	2(VU:R)	Criterion 1
	Otonycteris hemprichi	Hemprich's Long-eared Bat	-	2(VU:R)	Criterion 1

Taxa Group	SPECIES	COMMON NAME	IUCN RED LIST	NATIONAL RDB	CRITERION (IFC)
	Myotis bucharensis	Bokhara Whiskered Bat Bukhara Mouse-eared Bat	DD	1(CR)	Criterion 1 & 3
	Rhinolophus hipposideros	Lesser Horseshoe Bat	-	2(VU:D)	Criterion 1
HERPTILES	*Testudo horsfieldii*	Central Asian Tortoise	VU	VU	Criteria 1
	Varanus griseus	Desert Monitor	LC	VU	Criteria 1
	Alsophylax laevis	Southern Even-fingered Gecko	CR	-	Criteria 1
FLORA	*Calligonum zakirovii*	-	-	1: Very Rare Endemic	Criteria 2
	Climacoptera amblyostegia	-	-	2: Rare Endemic	Criteria 2
	Tulipa affinis	-	VU	2: Rare Endemic	Criteria 2
	Tulipa lehmanniana	-	-	-	Criteria 2
	Eremostachys eriolarynx	-		1: Very Rare Endemic	Criteria 2

Engagement with stakeholders is an essential part of the environmental and social assessment process and there are specific requirements for this stated by all of the lenders considered. The main objective is to establish dialogue with those parties who may be involved in aspects of the Project or may have an interest in the outcome of the ESIA process.

The following table provides a list of stakeholders that are being contacted:

Table 9-35 Stakeholder Engagement

Stakeholder Group	Stakeholder Bodies	Relevance to Project
State Committees	MEEPCC	National environmental policy and protection standards. Responsible for approval national EIA.
Research Institutions	Faculty of Biology, Bukhara State University	These faculties are involved in research and data collection in different regions of Uzbekistan.
	Department of Ecology and Geography, Gulistan State University	
	Institute of Zoology of the Academy of Sciences of the Republic of Uzbekistan	
	Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan	
Experts	Robert Burnside Houbara Bustard specialist	These experts have knowledge of the project site region and have been involved in past surveys and research.
	Maxim Koshkin Houbara Bustard specialist	
	Igor Karyakin Ornithologist	
	Rob Sheldon Ornithologist	
	Roman Nazarov Herpetologist	
	Joao Paulo Silva Houbara Bustard specialist	
	Paul Dolman Houbara Bustard specialist	
	Dr. Mimi Kessler Great Bustard specialist	
	Louis-Philippe Campeau Little Bustard specialist	

Stakeholder Group	Stakeholder Bodies	Relevance to Project
	Aziz Mukhtorovich Kobilov Ichthyofauna Expert	
	Nodir Azimov Specialist Institute of Zoology, Institute of Gene Pool of Plant and Animals of Academy of Sciences of Republic Uzbekistan	
National Agencies	Uzbekistan Society for the Protection of Birds (UZSPB)	These agencies are involved in research and data collection in different regions of Uzbekistan.
NGOs and CSOs	Emirates Center for Conservation of Bustard Beauty	Actively involved in conservation efforts and have been involved in releasing captive bred Asian bustards in the Navoi region.
	BirdLife International	Interest in the development of the project near an IBA & KBA area and potential impacts from wind farm operation and associated transmission lines.
	Bankwatch	Interest in social and environmental impacts associated with construction and operation of the wind farm and transmission lines

9.4.3 CHA Findings

9.4.3.1 Significant Biodiversity Values (SBV)

Significant Biodiversity Values (SBVs) are species of elevated concern but do not trigger CH. Significant biodiversity values that might occur in the study area include species of conservation concern (for example, species that are threatened or otherwise identified as important by stakeholders) and remnant ecological features that persist in the modified landscape, especially those that perform important ecological functions and that are important to stakeholders. SBVs, particularly any species listed as endangered or critically endangered or associated with Natural Habitat, requires NNL.

9.4.3.2 CHA Process

The initial stage of the entire CHA process, as mentioned, is the CHA Screening exercise which results in the list of species (and/or other features) that should be further investigated in order to determine if any thresholds are met to trigger criticality. This involves comprehensive assessment of databases including the Global and National IUCN Red Lists, and Key Biodiversity Areas (KBAs), Important Bird Area (IBA) and Protected Areas.

Once the list of species/features is generated, each of these must be assessed in detail, considering the following elements: literature and baseline data, stakeholder engagement, and information relating to the species' ecology, spatial distribution, movement behaviour, and current status.

The analysis of criticality is undertaken, considering the likely maximum population of the species in question regularly utilizing the EAAA. The analysis is done to assess if the EAAA population of the species exceeds any of the relevant criteria thresholds and therefore triggers the designation of critical habitat.

9.4.3.3 Ecologically Appropriate Area of Analysis

CONCEPT OF EAAA

As per IFC PS 6 GN59 and GN60:

The project should identify an **ecologically appropriate area of analysis (EAAA)** to determine the presence of critical habitat for *each* species with regular occurrence in the project's area of influence covered by Criteria 1-3.

DEFINING THE EAAA

Defining the EAAA is an integral step in determining criticality. The critical thresholds must be measured against the population of the species present within the "EAAA", which on a practical level roughly translates into the full range covered by members of a population regularly utilizing or occurring within a particular area.

Therefore, to determine EAAA and assess criticality, the following steps must be followed:

1. Determine the largest Area of Influence for the species based on the project's identified impacts and the species' ecology (habitat affiliation, dispersal, displacement etc.).
2. Determine the likely home range inhabited by members of the species population which utilize the area of influence. This is based on mobility and habitat distribution.
3. Map the EAAA by taking the area of influence, adding the mobility distance as a buffer, and mapping based on contiguous preferred and/or suitable habitat. This would be considered to encompass all populations of a species expected to potentially interact with and be impacted by the project.
4. The next step is calculating the estimated population present within the EAAA (where quantification is possible) and comparing these ratios to the thresholds for determination of criticality status. This can be done using population extrapolations where sufficient baseline data is available and a global population is known; or by using Extent of Occurrence where the size of the EAAA is compared to the size of the global EOO on a percentage basis.

EAAA

The EAAA for each species has been developed taking into account the potential area of influence of the project on the species, the applicable home range or average distance travelled by the species, and the suitable habitat and known hotspots, as well as other pertinent species-specific ecology and behaviour. The "formula" used to determine the applicable buffer and inclusions that were used to delineate the EAAA spatially is provided in the following table.

Species	Applicable Home Range / Average Daily Flight Distance	Suitable Habitat and Known Hotspots	EAAA = Largest AoI+ Applicable Home Range/Daily Distance+ Suitable Habitat/Known Hotspots)
Steppe Eagle (passage migrant)	Overall distance covered by the eagle during autumn migrations averaged 6635 ± 4746km and lasted between 51-91 days depending on the migration year. Overall distance covered by the eagle during the two spring migrations averaged 11261 ± 2909km and lasted between 55 and 65 days, depending on the migration year average cover per day: 167.4km/day	The species inhabits areas of steppe and semi-desert and is recorded breeding up to 2,300 m in mountainous regions. No known KBA's exist for this species in Uzbekistan.	Largest AoI is 5km + 167.4km daily coverage **172.4km radius around the wind farm = EAAA** + integrate several ebird hotspots with species records
Saker Falcon (resident, native breeding, native non-breeding and passage migrant)	**Home range**: Females: 78km² to 103km² Males: 215km² Winter home range area occupied by individual Saker Falcons varied greatly with median being 166km² and range between 5 and 18,469km² **Travel Distance**: No info	It inhabits open grassy landscapes such as desert edge, semi-desert, steppes, agricultural and arid montane areas where it hunts. It uses coppices or cliffs for nest sites (sometimes even the ground)	Largest AoI is 5km due to disturbance during construction + 77km radius of 18,469km² home range **82km radius around the wind farm = EAAA** + several ebird hotspots with species records
Egyptian Vulture (native breeder and possible passage migrant)	The home range of the Egyptian Vulture has a median value of 1,257km².	Suitable habitats include extensive open areas in dry or arid regions; steppe, desert, scrub, pastures and field of cereals; requires rocky sites for nesting. No known IBA's in the region. Forages in lowland and montane regions over open, arid, country and also scavenges at human settlements.	Largest AoI is 5km + 20km home range **25km radius around the wind farm = EAAA** + 2 ebird hotspots with species records
Eastern Imperial Eagle	**Home range**: 89, 941 - 969km²	The species have historically inhabited lowland habitats but has been pushed to higher altitudes by persecution and habitat loss in Europe. In	Largest AoI is 5km

Species	Applicable Home Range / Average Daily Flight Distance	Suitable Habitat and Known Hotspots	EAAA = Largest AoI+ Applicable Home Range/Daily Distance+ Suitable Habitat/Known Hotspots)
(passage migrant and native breeder)	**Travel Distances:** 84 ± 31km/day 131.5 ± 26.4km/day during autumn migration 18.0 ± 7.5km/day during the wintering period 81.0 ± 80.5km/day during spring migration 22.2 ± 3.0km/day during the summering period	Central and Eastern Europe, it breeds in forests up to 1,000 m and also in steppe and agricultural areas with large trees, and nowadays also on electricity pylons. In the Caucasus, it occurs in steppe, lowland and riverine forests and semi-deserts. Wetlands are apparently preferred on the wintering grounds.	+ 131.5km daily coverage **136.5km radius around the wind farm= EAAA** + several ebird hotspots with species records
Greater Spotted Eagle (passage migrant)	Average daily flying distance is 129km/day	It occurs in lowland forests near wetlands, nesting in different types of (generally tall) trees, depending on local conditions. Individuals wintering in the Mediterranean Basin preferentially use salt marshes, coastal lagoons and water courses (Maciorowski *et al*. 2019). No known KBAs for this species in Uzbekistan	Largest AoI is 5km + 129km daily coverage **134km radius around the wind farm= EAAA** + several ebird hotspots with species records
Griffon Vulture (native resident and migrant)	**Home Range:** The home range (95% UD) sizes varied between locations from 6794km² (India) to 53684km² (Kazakhstan). **Daily coverage** 161.02±40.42km - 214.52±51.98km	Griffon vulture is a species of expansive open areas in a wide array of environments, from mountains to semi-desert, and is recorded regularly from sea level up to c.3,000 m	Largest AoI is 5km + 130.7km radius of 53684km² home range **135.7km radius around the wind farm= EAAA** + ebird hotspots with species records within EAAA radius
White-tailed Sea Eagle (native non-breeder)	average home range size was 13.48 km² with a mean radius of 2.07 km	The species requires large and open expanses of lake, coast or river valley, within the boreal, temperate and tundra zones, nearby to	Largest AoI is 5km

Species	Applicable Home Range / Average Daily Flight Distance	Suitable Habitat and Known Hotspots	EAAA = Largest AoI+ Applicable Home Range/Daily Distance+ Suitable Habitat/Known Hotspots)
		undisturbed cliffs or open stands of large, old-growth trees for nesting.	+ 2.07km radius **7.07km radius around the wind farm= EAAA** no ebird hotspots with species records within EAAA radius
Short-toed (Snake) Eagle (native breeder and passage migrant)	**Home range** identified to be between 173km² and 254km². **During migration:** Distance covered per day is between 151.48 and 146.06km.	The Short-toed (Snake) Eagle uses a variety of habitats within warm temperature and tropical environments and is recorded up to 2,300m. This species always requires some degree of tree cover. Nests are almost always built relatively low in a tree.	Largest AoI is 5km + 151.5km daily coverage **156.5km radius around the wind farm= EAAA** + several ebird hotspots with species records
Booted Eagle (native breeder)	Home ranges of the Booted Eagle are reported to be between 20 and 253km².	Closest global IBA is Ortau upland massif in Kazakhstan.	Largest AoI is 5km + 9km radius home range **14km radius around the wind farm= EAAA** no ebird recordings within the 14km EAAA radius
Great Bustard (passage migrant and non-breeder resident)	**Home Range:** average home range in 2 summers was 856.65km² and in 2 winters 205.23km². **Migration daily coverage:** The male Great Bustards moved 121.21±96.62km/day on average during the	This species was originally mainly associated with Eurasian steppe, but it has acclimated to agricultural landscapes and can now be found in open, flat or somewhat rolling landscapes, mixture of low-intensity farmland activities and crops (cereals, vineyards, fodder plants, as well as fallow fields, pastureland and steppe grassland)	Largest AoI is 5km + 121.21km radius **126.2km radius around the wind farm= EAAA**

Species	Applicable Home Range / Average Daily Flight Distance	Suitable Habitat and Known Hotspots	EAAA = Largest AoI+ Applicable Home Range/Daily Distance+ Suitable Habitat/Known Hotspots)
	migration season, faster than the female, which averaged 46.87±23.99km/day.	In Asia, it can also be found in Artemisia and Stipa steppes, mountain foothills and in semi-desert habitats. The eastern subspecies inhabits both open steppe and forest steppe, including small forest openings, and using trees as sources of shade and food and are more often found in wet habitats such as river islands and moist meadows	No KBA/IBA or ebird sightings within EAAA
Asian Houbara (native resident and native breeder)	Home range: 116 to 977km²	This species inhabits open, arid and sparsely vegetated steppe and semi-desert	Largest AoI is 5km + 17.6km radius of 977km² home range **22.6km radius around the wind farm= EAAA** + ebird hotspots with species records and 1 KBA/IBA within EAAA radius
Little Bustard (passage migrant and non-breeder resident)	**Home Range:** average kernel 95% home range was 0.60 ± 0.50km² and the average cluster 85% area was 0.17 ± 0.17km² **Migratory Daily Coverage:** nocturnal migration flights of 400–600km per night	This species inhabits dry grassland, and, in Europe, it also occurs in areas of low-intensity arable cultivation and pastoral land, selecting areas with a high diversity of ground cover such as mosaics of pasture, stubble fields, long-rotation fallow land, legume and cereal crops. It prefers large fields in areas with high plant species richness providing high arthropod abundance, which is important for male displaying and female breeding sites. Wintering birds in Azerbaijan prefer semi-desert and steppe areas under winter pasturing and avoid areas of intensive agriculture	Largest AoI is 5km + 600km radius **605km radius around the wind farm= EAAA** + 4 KBA/IBA and several ebird sightings within EAAA

Species	Applicable Home Range / Average Daily Flight Distance	Suitable Habitat and Known Hotspots	EAAA = Largest AoI+ Applicable Home Range/Daily Distance+ Suitable Habitat/Known Hotspots)
Pin-tailed Sandgrouse (passage migrant, native breeder and native resident)	**Home range:** 11.08km² **Daily coverage:** No info	The species inhabits steppe habitats requiring dry, open grassland plains without trees or high bushes.	Largest AoI is 5km + 1.9km radius of 11.08km² home range **6.7km radius around the wind farm= EAAA** + 1 ebird hotspot with species records within EAAA radius
Yellow-eyed Pigeon	Average daily migration distance: 102km	open areas with scattered trees, often with agricultural crops, and in areas with suitable fruiting trees, where it roosts and feeds gregariously	Largest AoI is 5km as part of construction impacts (disturbance). Add radius 102km. **107km radius around the wind farm = EAAA**
European Turtledove	Foraging trips up to 10km Home range size: 4.973km² =1.26km	wide variety of woodland types, as well as steppe and semi-desert frequently relying on agricultural land for feeding It uses hedges, borders of forest, groves, spinneys, coppices, young tree plantations, scrubby wasteland, woody marshes, scrub and garigue. no known IBAs in the area but ebird sightings recorded	Largest AoI is 5km due to potential impacts of disturbance and displacement Add radius 10km. **15km radius around the wind farm = EAAA**
Sociable Lapwing	It has been recorded a daily migration of 534km.	Suitable habitat: most abundant in the periphery of villages. For the non-breeding birds, on migration it uses mainly sandy plains with short grass, dry meadows, fallow land and cultivated fields	Largest AoI is 100km due potential habitat fragmentation. Add radius 534**km.**

Species	Applicable Home Range / Average Daily Flight Distance	Suitable Habitat and Known Hotspots	EAAA = Largest AoI+ Applicable Home Range/Daily Distance+ Suitable Habitat/Known Hotspots)
		IBA Tallymarzhan is a significant stopover site, on the border between Uzbekistan and Turkmenistan	**634km radius around the wind farm = EAAA**
White Headed Duck	No Info on home range or daily migrations Estimate is around 20km as it not known for long distance movements.	larger, deeper alkaline or saline waters IBA Karakyr Lankes, Dengizkul and Ayadarkul. It is also mentioned at following IBAS, although does not qualify as a trigger spp: Ayakghytma Lake, Tudakul Reservoir and Dzheiran Ecocentre. Amu Darya is important passage	Largest AoI is 100km due to habitat fragmentation). Add radius 20km. **120km radius around the wind farm = EAAA**
Lesser White-fronted Goose	20.59km is recorded daily migration distance	On migration it used grassland, steppe and semi-arid zones. IBAs include Karakyr and Karnabchul steppe. Recorded at Tudakul and Kuymazar reservoirs but not yet recognised as trigger species there. They are also known to frequent arable farmland and pastures.	Largest AoI is 100km due to potential habitat fragmentation Add radius 21**km.** **121km radius around the wind farm = EAAA**
Common Pochard	118.3km is its daily migration distance	Well vegetated swamps, lakes… Ebird sightings in nearby areas and Karakyr lake, Dengizkul Lake and Dzheiran Ecocentre are knows IBAs Dengizkul Lake is however, not within the 218km radius/the EAAA.	Largest AoI is 100km due to potential habitat fragmentation Add radius 118.3**km.** **218km radius around the wind farm = EAAA**
Dalmatian Pelican	Home range is 461km² This equates to 12km radius	Mainly at inland, freshwater wetlands. Large lakes are important stopovers	Largest AoI is 100km due to potential habitat fragmentation

Species	Applicable Home Range / Average Daily Flight Distance	Suitable Habitat and Known Hotspots	EAAA = Largest AoI+ Applicable Home Range/Daily Distance+ Suitable Habitat/Known Hotspots)
	Daily migration was calculated to be between 99 and 164km/day As daily migration is larger, this is used to calculate EAAA.	IBA Karakyr Lakes, Dengizkul lake, Northern Shore of Ayadarkul lake, Tuzkan Lake and Dzheiran Ecocentre as well as bird sightings in surrounding areas Recorded at adjacent IBA Ayakaghytma lake and surrounding desert and IBA Tudakul and Kuymazar Reservoirs	Add radius 164km. **246km radius around the wind farm = EAAA**
Eurasian Curlew	Home range is 5,55km2	utilises wet grassland and arable fields during migration IBA Tudakul and Kymazov Reservoir	Largest AoI is 100km due to potential habitat fragmentation Add radius 1,3km. **113km radius around the wind farm = EAAA**
Black Stork	Home range: 495.56 ± 231.64km² for adults with chicks at nest (*n*=4); 488.85 ± 432.65km² for adults with fledged chicks (*n*=4); 699.87 ± 106.93km² for non-breeding adults (*n*=3), while the pre-breeding female used ca. 425km² **This is a breeder in Uzbk, therefore largest home range was used for breeding birds.**	old, undisturbed, open forests from sea-level up to mountainous regions (e.g. 2,000-2,500 m in altitude). It forages in shallow streams, pools, marshes, swampy patches, damp meadows, flood-plains, pools in dry riverbeds and occasionally grasslands especially where there are stands of reeds or long grass Ebird sightings and sightings during baseline surveys recorded in vicinity of the project and north parts of the project area, respectively.	Largest AoI is 100km due potential habitat fragmentation Add radius of 495.56km² which is approximately **12.56km.** **112km radius around the wind farm = EAAA**
Marbled Teal	No Info on home range or daily migrations Estimate is around 20km	breeds in fairly dry, steppe-like areas on shallow freshwater, brackish or alkaline ponds with well vegetated shorelines, and rich emergent and submergent vegetation. breeds on delta marshes where receding waters leave behind large areas of shallow water with abundant sedges and bulrushes.	Largest AoI is 100km due to potential habitat fragmentation Add radius 20km.

Species	Applicable Home Range / Average Daily Flight Distance	Suitable Habitat and Known Hotspots	EAAA = Largest AoI+ Applicable Home Range/Daily Distance+ Suitable Habitat/Known Hotspots)
		avoids waters of high salinity. it may use slow rivers and saline coastal lagoons, and man-made wetlands including fish-rearing ponds, small reservoirs and sewage farms. No IBAs listed for which this bird is a trigger species. However, following IBAS as mentioned as breeding and nesting sites: Tudakul Reservoir and Dzheiran Ecocentre. Dengizkul is listed as wintering site/	**120km radius around the wind farm = EAAA**
European Free-tailed Bat	Flights of up to 100km from the refuge can occur in a single night of hunting	Primary roosts include caves and vertical rock crevices (often at high, inaccessible elevations) as well as human structures.	Largest AoI is 5km - areas impacted by disturbance due to construction Add radius 100km. **150km radius around the wind farm = EAAA**
All Other Bats	For open foragers, flights of up to 100km from the refuge can occur in a single night of hunting	Primary roosts include natural and man-made habitats	Largest AoI is 5km - areas impacted by disturbance due to construction Add radius 100km. **150km radius around the wind farm = EAAA**
Marbled Polecat	Home range is approximately 0.5 – 0.6km²	Desert, Semi-Desert & Steppe Habitats	Largest AoI is 5km - areas impacted by disturbance due to construction + an average home range of 0.6km²

Species	Applicable Home Range / Average Daily Flight Distance	Suitable Habitat and Known Hotspots	EAAA = Largest AoI+ Applicable Home Range/Daily Distance+ Suitable Habitat/Known Hotspots)
			- areas avoided **5.6km radius around the wind farm = EAAA**
Central Asian Tortoise	Females have the largest territories (~30Ha) = 0.3km²	Dzheiran Ecocentre is 70km away from project area, therefore, given species' home range of 0.3km², not relevant as it is too far.	Largest AoI is 5km as part of various construction impacts Add radius of 0.3km² approximately 300m. **5.3km radius around the wind farm = EAAA**
Desert Monitor	home range sizes between 0.075 and 0.228km 2 across 5 desert monitors in Egypt and 0.137km2 to 1.159km2 across 10 desert monitors in Israel. 0.4km² average was taken	sandy desert areas with some vegetation (including dunes), gravelly plains, steppe-like grassland habitats, dry riverbeds and valleys between dunes, can be found in traditionally cultivated areas	Largest AoI is 5km as part of various construction impacts Add radius of 0.4km² approximately 400m. **5.4km radius around the wind farm = EAAA**
Southern Even-fingered Gecko	No Info on home range	'Takyr' patches of suitable habitat restricted to immediate areas around Ayakaghytma lake and west-northern areas to the lake.	Largest AoI is 5km as part of various construction impacts **5km radius around the wind farm = EAAA**
Eremostachys eriolarynx	Unknown	Kyzylkum (Bukhara region), gravelly and sandy soils	Largest AoI is 5km due to potential biosecurity risks **5km radius around the wind farm = EAAA**
Calligonum zakirovii	Unknown	Gypsaceous, gravelly and sandy soils in piedmonts of insular relic mountains of Kyzylkum	Largest AoI is 5km due to potential biosecurity risks

Species	Applicable Home Range / Average Daily Flight Distance	Suitable Habitat and Known Hotspots	EAAA = Largest AoI+ Applicable Home Range/Daily Distance+ Suitable Habitat/Known Hotspots)
			5km radius around the wind farm = EAAA
Climacoptera amblyostegia	Unknown	Saline soils and fallow land, Kyzylkum, Mirzachul and Syrdarja river basin (Syrdarja, Navoi districts)	Largest AoI is 5km due to potential biosecurity risks **5km radius around the wind farm = EAAA**
Tulipa lehmanniana	Unknown	Sand and sandy-loam deserts; Sandy, stony- slopes and gypseous rocks in remnant hills.	Largest AoI is 5km due to potential biosecurity risks **5km radius around the wind farm = EAAA**

Pallas's Fish Eagle

In Central Asia, this species has been recorded in three IBA's; Tuzkan Lake in Uzbekistan, Dashtidjum IBA and Ishkashim IBA both in Tajikistan. There are no known records of this species in the Lake Ayakagytma IBA. This species is associated with large freshwater lakes and rivers. Habitat suitability for this species specifically indicate requirement for extensive wetlands of which there are none within largest applicable AoI for this species which is impacts due to potential disturbance, avoidance and dispersal (5km). The small size and brackish nature of Lake Ayakagytma and surrounding areas of the project present unsuitable habitat for this species. Therefore, due to the unlikelihood of presence in the project AoI, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

Squacco Heron

Habitat suitability for this species specifically indicate a preference for freshwaters. The wetland habitats in the project area are brackish or saline in nature. Section 4.1.2 of the main CHA Report identifies and describes all of the known recognized biodiversity areas of importance, within a

100km distance of the project site. This species is not listed as a trigger species across the identified IBA's/KBA's and protected areas, nor were records in and around the Study area reported on the public database, eBird. This further highlights the unsuitable habitat for Sqacco Heron within the project AoI. Therefore, due to the unlikelihood of presence in the project AoI, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

BOKHARA WHISKERED BAT

The only record of this species in Uzbekistan was a colony in sandstone tunnels near Samarkand, recorded in 1957 – 1963 until the place was destroyed. The specie is now considered possibly extinct in Uzbekistan. The closest known location of a live specimen is from near the Zeravshan river in Tajikistan in 2019. It is therefore unlikely that this species occurs in the project AoI which is considered as which is considered as all areas within 5km of the project footprint to account for potential disturbance due to construction impacts. Due to this, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

LESSER HORSESHOE BAT

In Uzbekistan, this species is distributed near the Village Shakhimardan (the Alay Range), the Nuratau and Zaravshan ranges, the Ugam and Pskem river valleys (the Western Tien–Shan), near Tashkent City. These areas are located over 200km away from the project AoI, which is considered as which is considered as all areas within 5km of the project footprint to account for potential disturbance due to construction impacts. It is therefore unlikely that this species occurs in the project AoI. Due to this, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

HEMPRICH'S LONG-EARED BAT

In Uzbekistan, this species is distributed in the Kugitang, Nuratau, Kurama ranges, the Syrdarya and Zaravshan river valleys. These areas are located over 150km away from the project AoI, which is considered as which is considered as all areas within 5km of the project footprint to account for potential disturbance due to construction impacts. It is therefore unlikely that this species occurs in the project AoI. Due to this, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

EURASIAN OTTER

The Uzbekistan National Red Data Book states that this species inhabits freshwaters. Such habitats are not present within the AoI for this species. The largest applicable AoI for this species is inclusive of all areas within 5km of the construction footprint which accounts for construction impacts that may result in contamination of water canals and degradation of environmental quality. Furthermore, current known locations for this species include Jeyran (Dzheiran) Ecocentre and Dengizul Reservoir through Amu-Bukhara canal, Dargom Canal of the Zeravshan River (Samarkand Province), along the Amu Darya River down to Lake Sarikamysh and Karazhengeldy Lake in southern Karakalpakstan. The closest of these locations is Jeyran (Dzheiran) Ecocentre located over 85km to the southeast. Therefore, due to the lack of suitable habitat and unlikelihood of presence in the project AoI, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

LARGE-KEELED APOLLO

This species is known only from few locations in Uzbekistan according to the National Red Data Book; the Chatkal, Pskem, Ugam, Karzhantau, Kuramin Mountains; the Alay Mountains; Turkestan, Zaravshan, Baysuntau and Hissar Mountains. These are high altitude locations in alpine areas. The project area relatively flat with max elevation of 260m. Therefore, due to the unlikelihood of presence in the project AoI which is considered as the project footprint and construction buffer for invertebrates, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

TULIPA AFFINIS

In Uzbekistan, this species is distributed along the western Pamir-Alay, the Turkestan and Malguzar ranges; the Nuratau mountains (the Djizakh, the Samarkand and Navoi regions). Habitat requirements of this species indicates stony slopes and rock ledges. Such habitats are not present within project AoI which is considered as all areas within 5km of the project footprint to account for potential biosecurity impacts during construction. Due to unlikelihood of presence in the AoI, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

ARAL BARBEL

In Uzbekistan, this species inhabits the basin of lower reaches and mid-stream of the River Amudarya where it is now fully land-locked in the riverand adult individuals are thought to survive in the main river channel and major artificial canal systems outside of the reproductive period. The Amudarya river and its major canals are over 150km away from the project AoI which is considered as all areas within 5km of the project footprint to account for potential construction impacts that may result in contamination of water canals and degradation of environmental quality. Therefore, due to the unlikelihood of presence in the project AoI, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

SOUTHERN EVEN-FINGERED GECKO

In Uzbekistan, the species occurs in "takyrs", which are bare, flat clay areas free from vegetation. Based on the information gathered during previous projects in the adjacent landscape, the extent of the suitable habitats of the species is restricted to immediate surrounding areas of Ayakaghytma lake and west-northern areas to the lake. **Figure 9-32** shows that these habitats do not overlap with the Project area or any associated infrastructure. In addition, the baseline surveys did not confirm the presence of the species within the Project area. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

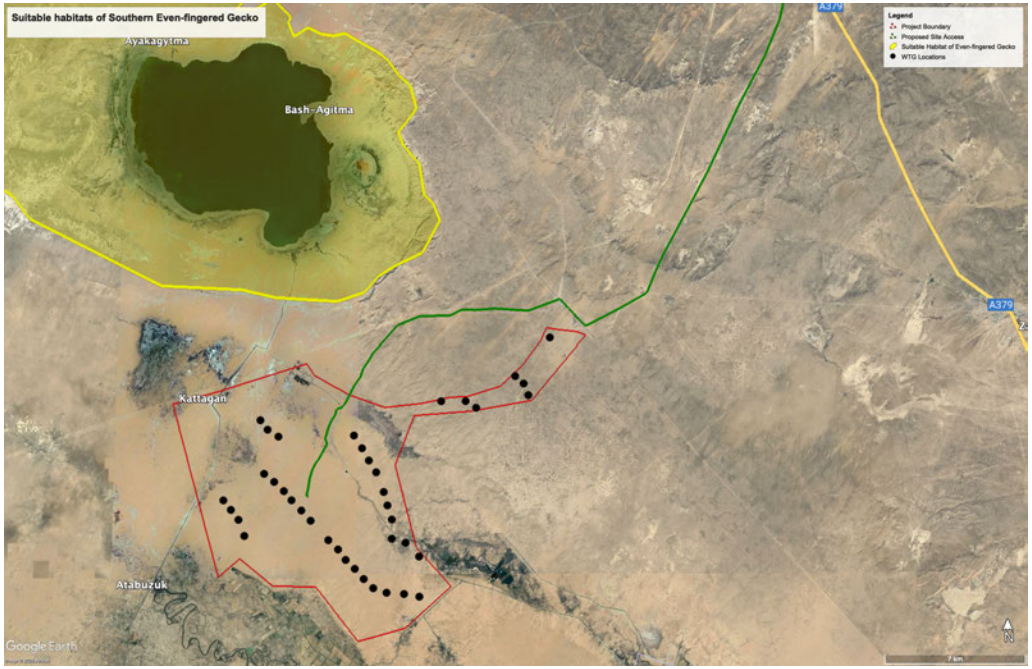


Figure 9-32 Suitable Habitat of Southern Even-fingered Gecko

9.4.3.4 Criticality[20]

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
Steppe Eagle	Number of mature individuals: 50,000 - 75,000	Criterion 1 (0.5% of global pop) = 250 individuals Criterion 3 (1% of global pop) = 500 individuals	Passage migrant for site IBA – not considered a trigger species for Dzheriran Ecocentre IBA however it is known to regularly migrate through this IBA's airspace. Baseline observations = 278 individuals Winter = 85 Spring =2 Autumn = 191	N/A	The baseline surveys included 278 observations during migration over a total of 1,301.5 hours of surveying on site. These observations, each likely represent a different individual bird, rather than multiple flights from individual birds, as Steppe Eagle are a passage migrant through the region. The number of observations already exceed the threshold of 250 individuals. **Therefore, the species has triggered Critical Habitat under Criterion 1.**	N/A as it is CH	Net Gain
Saker Falcon	Global Population 12,200 - 29,800	Criterion 1 (0.5% of global pop) = 61 individuals	Breeding, Passage and Non-breeding for EAAA	N/A	The baseline surveys recorded 1 observation during autumn VP surveys likely on migration; over a total of 1,301.5 hours of surveying on site.	Y (confirmed present, EN)	No Net Loss

[20] Secondary information from Bash 500MW Project will be incorporated to supplement the baseline of the target species in the final version of the ESIA report. However, this additional data is unlikely to influence either the CH determination or the conclusions regarding the species which are likely to remain as SBVs.

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
	mature individuals	Criterion 3 (1% of global pop) = 122 individuals National RDB = NT	IBA = Karnachabul Steppe Baseline observations = 1 individual		The Karnachabul Steppe IBA has a known record of 1-5 individuals in winter between 1968-1980. This IBA is located outside the EAAA, 15km away to the southeast and over 90km from the nearest turbine. There are no other areas mapped as IBAs within the EAAA for which the Saker Falcon is a trigger species. The public database, E-bird, shows 30 observations of this species for the country to date. Given the relatively low number of observations during the multi seasonal baseline surveys, along with a lack of IBAs for which Saker Falcon is a trigger species within the EAAA, **it is considered unlikely that the EAAA supports the minimum number of individuals that would trigger criticality against Criterion 1 or Criterion 3.**		
Egyptian Vulture	Global Population = 12,400 - 36,000 mature individuals	Criterion 1 (0.5% of global pop) = 62 individuals Criterion 3 (1% of global pop) = 124individuals National RDB = VU	Native breeder for site IBA = Lake Ayakagytma (trigger species) Baseline observations = 0 individuals recorded during VP surveys A total of 2 individuals Egyptian	N/A	The baseline surveys recorded 1 breeding pair (2 individuals) during the Nest Survey recorded 5km North of the Project Site, close to Lake Ayakagytma. None were observed throughout seasonal VP surveys, spanning a total of 1,301.5 hours of surveying on site. The IBA has a known record from 2021 of 5 breeding pairs (i.e., 5 reproductive units) indicating 10 adult birds. The IBA is 9km from the nearest turbine Given the relatively low number of observations during the multi seasonal baseline surveys and the known recorded numbers from the IBA, **it is**	Y (confirmed present, EN)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
			Vultures were recorded during the Nest Search Survey		**considered unlikely that the EAAA supports the minimum number of individuals that would trigger criticality against Criterion 1 or Criterion 3.**		
Eastern Imperial Eagle	Global Population = 2,500 - 9,999 mature individuals	Criterion 1 = No quantitative thresholds as this is a VU species Criterion 3 (1% of global pop) = 25 individuals National RDB = VU	Passage for site IBA = none Baseline observations = total 14 individuals Winter = 4 individuals Spring = 3 individuals Autumn VP = 7 single individuals	N/A	The baseline surveys included 14 observations during migration, likely 14 individual birds, during a total of 1301.5 hours of surveying on site. There are no known congregating areas or bottle neck sites mapped as IBAs for Eastern Imperial Eagle within the EAAA. Based on the known migratory corridors for this species, it is unlikely that such habitats exist within the EAAA. Therefore, it is considered unlikely that the EAAA support a global population the loss of which would trigger uplisting to CR/EN status. **Therefore, it is not considered to have triggered critical habitat under Criterion 1.** Criterion 3 includes areas that regularly or, on a cyclical basis, sustain more than 1% of the global population of a migratory/congregatory species i.e., areas that sustain more than 1% of the global population during any one season or period of the year over consecutive years. Using the precautionary approach, this would mean the threshold would be 25 individuals. Arguably, as 14 observations were made over the course of the year, it is plausible that more than 25 individual Eastern Imperial Eagle may utilize and/or pass through the EAAA on an annual basis. However, the IFC PS 6 GN (2019) clearly states that Criterion 3 has been developed following the IUCN	Y (confirmed present, VU)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
					KBA Standard, which refers to "an aggregation, representing >1% of the global population size of a species, over a season; and during one or more key stages of its' life cycle…aggregations are indicated by highly localised relative abundance, two or more orders of magnitude larger than the species' average recorded numbers or densities at other stages during it's life-cycle…" In the spirit of the IUCN KBA, as there are no known congregative stopover sites or bottle necking flyway occurring for this species in the EAAA, it is considered that even if more than 25 individuals were to fly through the EAAA on an annual basis, the requirements to trigger Criterion 3 would still not be met, as there is no factor causing "aggregations of highly localised relative abundance…". **Therefore, it is not considered to have triggered critical habitat under Criterion 3.**		
Greater Spotted Eagle	Global Population = 3,900 – 10,000 mature individuals	Criterion 1 = No quantitative thresholds as this is a VU species Criterion 3 (1% of global pop) = 39 individuals National RDB = VU	Passage for site IBA = None Baseline observations = a total of 5 observations Winter = 4 Autumn = 1	N/A	The multi-seasonal baseline surveys recorded 5 observations during migration, likely 5 individual birds, during a total of 1301.5 hours of surveying on site. There are no known congregating areas or bottle neck sites mapped as IBAs for this species within the EAAA. Based on the known migratory corridors for this species, it is unlikely that such habitats exist within the EAAA. Therefore, it is considered unlikely that the EAAA support a global population the loss of which would trigger uplisting to CR/EN status. **Therefore, it is not considered to have triggered critical habitat under Criterion 1.**	Y (confirmed present, VU)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
					Criterion 3 includes areas that regularly or, on a cyclical basis, sustain more than 1% of the global population of a migratory/congregatory species i.e., areas that sustain more than 1% of the global population during any one season or period of the year over consecutive years. Using the precautionary approach, this would mean the threshold would be 39 individuals. Although only 5 observations were made over the course of the year, it is still *within possibility* that more than 39 individual birds may utilize and/or pass through the EAAA on an annual basis. However, the IFC PS 6 GN (2019) clearly states that Criterion 3 has been developed following the IUCN KBA Standard, which refers to "an aggregation, representing >1% of the global population size of a species, over a season; and during one or more key stages of its' life cycle…aggregations are indicated by highly localised relative abundance, two or more orders of magnitude larger than the species' average recorded numbers or densities at other stages during it's life-cycle…" In the spirit of the IUCN KBA, as there are no known congregative stopover sites or bottle necking flyway occurring for this species in the EAAA, it is considered that even if more than 39 individuals were to fly through the EAAA on an annual basis, the requirements to trigger Criterion 3 would still not be met, as there is no factor causing "aggregations of highly localised relative abundance…". **Therefore, it is not considered to have triggered critical habitat under Criterion 3.**		

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
Griffon Vulture	Global Population = 80,000 – 900,000 mature individuals	Criterion 1 = No quantitative thresholds as this is a Nationally VU species IUCN Red List = LC National RDB = VU	Native resident for site IBA = none Baseline observations = None	N/A	The multi-seasonal baseline surveys recorded 0 observations during a total of 1301.5 hours of surveying on site. There are no IBAs in the country for which Griffon Vulture is listed as a trigger species. Records on E-bird indicate that presence has been observed previously in the EAAA. The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant enough that the loss of which would trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.**	Y (potentially present, Nationally VU)	No Net Loss
White-tailed Sea Eagle	Global Population = 20,000 – 60,000 mature individuals	Criterion 1 = No quantitative thresholds as this is a Nationally VU species IUCN Red List = LC National RDB = VU	Non-breeding resident for site IBA = none Baseline observations 1 individual during winter	N/A	The multi-seasonal baseline surveys recorded 1 observation during a total of 1301.5 hours of surveying on site. There are no IBAs in the country for which White-tailed Sea Eagle is listed as a trigger species. Records on E-bird indicate that presence has been observed previously in the EAAA. The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant enough that the loss of which would trigger uplisting to CR/EN status at the national level.	Y (confirmed present, Nationally VU)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
					Therefore, the species has not triggered Critical Habitat under Criterion 1.		
Short-toed Snake Eagle	Global Population = 50,000 – 99,999 mature individuals	Criterion 1 = No quantitative thresholds as this is a Nationally VU species IUCN Red List = LC National RDB = VU	Native breeder for site IBA= None Baseline observations = a total of 4 observations Winter = 1 Spring = 1 Autumn = 2	N/A	The multi-seasonal baseline surveys recorded 4 observations during a total of 1301.5 hours of surveying on site. There are no IBAs in the country for which Short-toed Snake Eagle is listed as a trigger species. Records on E-bird indicate that presence has been observed previously in the EAAA. The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant enough that the loss of which would trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.**	Y (confirmed present, Nationally VU)	No Net Loss
Booted Eagle	Global Population = 150,000 – 195,000 mature individuals	Criterion 1 = No quantitative thresholds as this is a Nationally VU species IUCN Red List = LC National RDB = VU	Breeding for site IBA = none Baseline observations = total of 1 individual in Autumn	N/A	The multi-seasonal baseline surveys recorded a single individual during a total of 1301.5 hours of surveying on site. There are no IBAs in the country for which Booted Eagle is listed as a trigger species. Records on E-bird indicate that presence has been observed previously in the EAAA. The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant	Y (confirmed present, Nationally VU)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
					enough that the loss of which would trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.**		
Great Bustard	Global Population = 29,600 - 33,000 mature individuals	Criterion 1 (0.5% of global pop) = 148 individuals Criterion 3 (1% of global pop) = 296 individuals National RDB = CR	Passage for site IBA= Karnabchul Steppe (not a trigger species) Baseline observations = None Stakeholder inputs	N/A	The multi-seasonal baseline surveys recorded zero observations during a total of 1301.5 hours of surveying on site. The Karnachabul Steppe IBA has a known record of 6 birds and one pair in 2009 and 2013, respectively during migration. This IBA is located inside the EAAA, over 90km southeast from the nearest turbine. The Karshynskaya Steppe (which is close to Djeiran ecocentere, an IBA site) has a known record of a flock of 11 birds spotted during migration in 1991. The Karshynskaya Steppe is located inside the EAAA approximately 85km south from the nearest turbine. There are no other areas mapped as IBAs within the EAAA for which Great Bustard was recorded. The public database, E-bird, shows zero observations of this species within the EAAA. Given the lack of observations during the multi seasonal baseline surveys, along with a lack of IBAs for which the species is a trigger species within the EAAA, paired with the understanding of its preferred wintering grounds within Uzbekistan not overlapping with the EAAA, **it is considered unlikely that the EAAA supports the minimum**	Y (potentially present, EN)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
					number of individuals that would trigger criticality against Criterion 1 or Criterion 3.		
Asian Houbara	Global Population = 33,000 - 67,000 mature individuals	Criterion 1 = No quantitative thresholds as this is a VU species National RDB = VU	Native resident and native breeding for site IBA= Karakyr Lakes, Karnabchul Steppe Baseline observations = total 13 individuals Asian Houbara survey (March) = 5 individuals were recorded (4 males and 1 female) Vantage Point Surveys = Winter (n=2), Spring (n = 2), Summer (n=2) and Autumn (n=2).	N/A	The multi-seasonal baseline surveys recorded 13 individuals during a total of 1301.5 hours of surveying on site. The IBA Karakyr Lakes located 40km southwest of the EAAA recorded between 2 and 14 adult individuals during the breeding season between the years 1998 and 2002. The Karnabchul Steppe IBA located 67km southeast of the EAAA recorded between 1 and 60 individuals during the breeding season of 1985 and 1989. Both of these IBAs are located beyond the EAAA. There are no other areas mapped as IBAs within the EAAA for which the species was recorded. In addition, the public database, E-bird, shows 176 observations of this species for the country to date. Based on the baseline information gathered for the adjacent Bash 500MW, a total 12 individuals of the species were recorded near and on the east of Ayakalytma Lake in 2022. However, a satellite telemetry study of Houbara conducted in 2011-2021 in Uzbekistan indicates that the birds breeding in Bukhara move extensively throughout the region. Some of this movement may also overlap the Project area. Nevertheless, given the lack of sufficient records during the multi seasonal baseline surveys, along with a lack of IBAs for which the species is a trigger species within the EAAA, **The EAAA is less likely to hold a population significant enough that its loss would cause the global IUCN status of the species to be uplisted or**	Y (confirmed present, VU)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
					trigger criticality under Criterion 1. However, this conclusion will be further validated and updated following input from Houbara expert.		
Little Bustard	Global Population = 100,000 - 499,999 mature individuals	Criterion 1 = No quantitative thresholds as this is a Nationally VU species IUCN = NT	Non-breeder/Passage for site IBA= None Baseline observations = 1 individual during Autumn VP survey	N/A	The multi-seasonal baseline surveys recorded a single individual during a total of 1301.5 hours of surveying on site. There are no known congregating areas or bottle neck sites mapped as IBAs for this species within the EAAA. Based on the known migratory corridors for this species, it is unlikely that such habitats exist within the EAAA. Records on E-bird indicate that presence has been observed previously in the EAAA. The context indicates that although the species is present, the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant enough that the loss of which would trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.**	Y (confirmed present, National VU)	No Net Loss
Pin-tailed Sandgrouse	Global Population = 100,000 - 499,999 mature individuals	Criterion 1 = No quantitative thresholds as this is a Nationally VU species IUCN = NT	Native breeder for site IBA= none Baseline observations = 0	N/A	The multi-seasonal baseline surveys recorded 0 observations during a total of 1301.5 hours of surveying on site. There are no IBAs in the country for which Pin-tailed Sandgrouse is listed as a trigger species. Records on E-bird indicate that presence has been observed previously in the EAAA.	Y (potentially present, Nationally VU)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
					The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant enough that the loss of which would trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.**		
Yellow-eyed Pigeon	Global Population = 10,000 -19,999 mature individuals	Criterion 1 = No quantitative thresholds as this is a VU species Criterion 3 (1% of global pop) = 100 individuals National RDB = VU	Native resident for site IBA = None Baseline observations= 0	N/A	The multi-seasonal baseline surveys recorded 0 observations during a total of 1301.5 hours of surveying on site. There are no known congregating areas or bottle neck sites mapped as IBAs for this species within the EAAA. The public database, E-bird, shows zero observations of this species within the EAAA. Based on the known migratory corridors for this species, it is unlikely that such habitats exist within the EAAA. Therefore, it is considered unlikely that the EAAA support a global population the loss of which would trigger uplisting to CR/EN status. **Therefore, it is not considered to have triggered critical habitat under Criterion 1.** As there are no known congregative stopover sites or bottle necking flyway occurring for this species in the EAAA, it is considered that the EAAA does not contain more than 1% of the global population (100 individuals) **Therefore, it is not considered to have triggered critical habitat under Criterion 3.**	N (unlikely to be present)	*Mitigation as per ESIA*

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
European Turtle-dove	Global Population = 12,800,000-47,600,000 individuals	Criterion 1 = No quantitative thresholds as this is a VU species Criterion 3 (1% of global pop) = 128,000 individuals National RDB = VU	Passage for site IBA = None Baseline observations = 0	N/A	The multi-seasonal baseline surveys recorded 0 observations during a total of 1301.5 hours of surveying on site. There are no IBAs in the country for which European Turtle-dove is listed as a trigger species. Records on E-bird indicate that presence has been observed previously in the EAAA. The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant enough that the loss of which would trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.** As there are no known congregative stopover sites or bottle necking flyway occurring for this species in the EAAA, it is considered that the EAAA does not contain more than 1% of the global population (128,000 individuals) **Therefore, it is not considered to have triggered critical habitat under Criterion 3.**	Y (potentially present, VU)	No Net Loss
Sociable Lapwing	Global Population = 11,200 mature individuals	Criterion 1 (0.5% of global pop) = 56 individual Criterion 3 (1% of global pop) = 112 individuals	Passage for site IBA= Lake Talimardzhan Reservoir	N/A	The multi-seasonal baseline surveys recorded 3 observations during a total of 1301.5 hours of surveying on site. Talimardzhan Reservoir has been recognised as an important staging location for Social Lapwing with a total of 4,225 birds recorded in 2016. This IBA is located 210km southeast of the nearest turbine	Y (confirmed present, CR)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
			Baseline observations = 3 individuals during Autumn Stakeholder inputs		and is likely the most preferred habitat within the EAAA The migration strategy of this species is characterised by infrequent long-distance movements followed by often lengthy stopovers in a small number of staging areas that are used consistently across years. Studies have shown that this species is highly faithful to wintering sites. Therefore, even though a few individuals may pass through the EAAA, **it is unlikely to be in congregatory numbers high enough to trigger any relevant thresholds, for either Criterion 1 or 3.**		
White-headed Duck	Global Population = 5,300 – 8,700 mature individuals	Criterion 1 (0.5% of global pop) = 26.5 individuals Criterion 3 (1% of global pop) = 530 individuals National RDB = EN	Native non breeder for site IBA = Karakyr Lakes Baseline observations =0 Stakeholder inputs	N/A	The multi-seasonal baseline surveys recorded 0 observations during a total of 1301.5 hours of surveying on site. The Karakyr Lakes IBA recorded 30-5000 adult birds during wintering season between 2004and 2006. The lake is located inside the EAAA 60km from the nearest turbine. Records on E-bird indicate that presence has been observed previously in the EAAA. The lack of observations during the baseline surveys suggest that the migration routes to the IBAs does not occur through project footprint and airspace. Furthermore, the IBA data does not indicate that over 1% of the population is congregated within the AoI at any given time on a	Y (potentially present, EN)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
					regular, frequent, seasonal or annual basis which would trigger CH. In this context, **the species has not triggered Critical Habitat under Criterion 1 nor under Criterion 3.**		
Lesser White-fronted Goose	Global Population = 16,000 – 27,000 mature individuals	Criterion 1 = No quantitative thresholds as this is a VU species Criterion 3 (1% of global pop) = 160 individuals National RDB = VU	Passage for site IBA=Karakyr Lakes Karnabchul Steppe Baseline observations = 0	N/A	The multi-seasonal baseline surveys recorded 0 observations during a total of 1301.5 hours of surveying on site. Lesser White-fronted Goose is a trigger species for Karakyr Lakes IBA which has a known record of 30 adult individuals during the winter season in 2005. The Karnabchul Steppe IBA recorded 4-142 individuals during the winter season between 2003 and 2006. The public database, E-bird, shows zero observations of this species within the EAAA. The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant enough that the loss of which would trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.** Criterion 3 includes areas that regularly or, on a cyclical basis, sustain more than 1% of the global population of a migratory/congregatory species i.e., areas that sustain more than 1% of the global population during any one season or period of the year over consecutive years.	Y (potentially present, VU)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
					However, the IFC PS 6 GN (2019) clearly states that Criterion 3 has been developed following the IUCN KBA Standard, which refers to "an aggregation, representing >1% of the global population size of a species, over a season; and during one or more key stages of its' life cycle…aggregations are indicated by highly localised relative abundance, two or more orders of magnitude larger than the species' average recorded numbers or densities at other stages during it's life-cycle…" In the spirit of the IUCN KBA, records over consecutive years have not triggered the criterion threshold. Furthermore, it is considered that even if more than 160 individuals were to fly through the EAAA on an annual basis, the requirements to trigger Criterion 3 would still not be met, as there is no factor causing "aggregations of highly localised relative abundance…". **Therefore, it is not considered to have triggered critical habitat under Criterion 3.**		
Common Pochard	Global Population = 760,000 - 790,000 mature individuals	Criterion 1 = No quantitative thresholds as this is a VU species Criterion 3 (1% of global pop) = 7600 individuals	Native breeder for site IBA = Karakyr Lakes and Dzherian Ecocenter Baseline observations =0	N/A	Common Pochard is a trigger species for Karakyr Lakes IBA which has a known record of 184 - 34,050 adult individuals during the winter season between 2000 and 2005; Dzherian Ecocenter IBA recorded 50 and 249 individuals during passage between 2012 and 2016. Karakyzky Lakes is located approximately 60km west from the nearest turbine whereas Dzherian Ecocentre approximately 67km south from the nearest turbine. Species presence has also been previously confirmed at Lake Ayakagytma.	Y (potentially present, VU)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
					Records on E-bird indicate that presence has been observed previously in the EAAA. The multi-seasonal baseline surveys recorded 0 observations during a total of 1301.5 hours of surveying on site. The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant enough that the loss of which would trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.** The lack of observations during the baseline surveys suggest that the migration routes to the above IBAs does not occur through project footprint and airspace. Furthermore, the IBA data does not indicate that over 1% of the population is congregated within the AoI at any given time on a regular, frequent, seasonal or annual basis which would trigger CH. **Therefore, the species has not triggered Critical Habitat under Criterion 3.**		
Dalmatian Pelican	Global Population = 11,400 - 13,400 mature individuals	Criterion 1 = No quantitative thresholds as it is a Nationally EN Species	Passage for site IBA= Dzheiran Ecocentre IBA Karakyr Lakes	Upto a 1000 migrating individuals have been recorded in Uzbekistan (Red Data Book)	The multi-seasonal baseline surveys recorded 106 observations during a total of 1301.5 hours of surveying on site. Dalmatian Pelican is a trigger species for Karakyr Lakes IBA which recorded 44 adult individuals during the winter season in 2004; Dzherian	N/A as it is CH	Net Gain

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
		Criterion 3 (1% of global pop) = 114 individuals	Baseline observations = total of 106 individuals. Spring =11 Winter =95		Ecocenter IBA recorded 5-700 individuals during passage between 2012 and 2015. Records on E-bird indicate that presence has been observed previously in the EAAA. The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant enough that the loss of which would trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.** Considering that up to 700 individuals have been recorded at Dzheiran Ecocenter IBA and assuming that the multi-seasonal baseline surveys covered 1301.5 hours out of 3286.36 hours seasonal daylight hours, and that 95 observations were from one season, it is possible that the threshold for Criterion 3 (114 individuals) is reached during winter passage season. **Therefore, this species has triggered Critical Habitat under Criterion 3.**		
Eurasian Curlew	Global Population = c. 835,000-1,310,000	Criterion 1 – No quantitative thresholds as it is a Nationally VU Species	Passage for site IBA = Tudakul and Kuymazar Reservoirs Baseline observations = 0	N/A	The multi-seasonal baseline surveys recorded 0 observations during a total of 1301.5 hours of surveying on site. Eurasian Curlew is a trigger species for Tudakul and Kuymazar Reservoirs which recorded 37 adult individuals during passage in 2016	Y (potentially present, Nationally VU)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
					Records on E-bird indicate that presence has been observed previously in the EAAA. The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant enough that the loss of which would trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.**		
Black Stork	Global Population = c.24,000-44,000	Criterion 1 – No quantitative thresholds as it is a Nationally VU Species	Native breeder for site IBA = None Baseline observations = Total of 17 observations Summer VP = 2 observations Camera trap =15 observations	N/A	The multi-seasonal baseline VP surveys recorded 2 observations during a total of 1301.5 hours of surveying on site. 15 observations were recorded on camera traps deployed towards the North of the Project footprint Records on E-bird indicate that presence has been observed previously in the EAAA. The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant enough that the loss of which would trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.**	Y (confirmed present, Nationally VU)	No Net Loss
Marbled Teal	Global Population = 10,000 - 42,000 mature individuals	Criterion 1 – No quantitative thresholds as it is a Nationally EN Species	Native resident for site IBA = None	N/A	The multi-seasonal baseline VP surveys recorded 0 observations during a total of 1301.5 hours of surveying on site. The Marbled Teal is not a trigger species for IBA Lake Tudakul but is known to nest here	Y (potentially present, Nationally EN)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
			Baseline observations =0		Records on E-bird indicate that presence has been observed previously in the EAAA. The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support important concentrations of this nationally endangered species. **Therefore, the species has not triggered Critical Habitat under Criterion 1.**		
European Free-tailed Bat	Global Population = Unknown EOO = 18,885,688km²	Criterion 1 = No quantitative thresholds as this is a Nationally VU species IUCN Red List = LC National RDB = VU	Baseline observations = recorded by an ultrasonic detector from the northern met mast tower (BD03) at a height of 10 m.	N/A	Given the extensive EOO of this (≈18,885,688km²), the EAAA likely does not contain sufficient suitable habitat that can support a portion of the national population significant enough that the loss of which would trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.**	Y (Confirmed present, Nationally VU species)	No Net Loss
European Free-tailed Bat	All species recorded have widespread global distributions	Criterion 3 (1% of global pop) = 114 individuals IUCN Red List = LC	Plecotus spp. Epesticus spp. Myotis spp. Common Pipistrelle Kuhl's Pipistrelle Parti-coloured Bat Bokhara Horseshoe-Bat	N/A	In many cases for the species of insectivorous bats recorded during the baseline surveys, global population estimates are not available and thus cannot be assessed against the numerical thresholds. However, given the small size of the EAAA and relatively large geographic distribution of these common and widespread species the EAAA likely does not contain sufficient suitable habitat that can support more than1% of the species global populations. **Therefore, these species have not triggered Critical Habitat under Criterion 3.**	N (not qualifying)	*Mitigation as per ESIA*

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
Marbled Polecat	Global Population = Unknown EOO >20,000km²	Criterion 2 (10% of global population/EOO) = 2000km² Nationally VU Species	Resident for site Baseline observations = 0	National population = 5000 individuals	Quantitative extrapolation can be done using favoured or suitable habitat cover as a proxy for species population. The assessment proposes that this species would trigger critical habitat if the size of the EAAA is ≥10% of the EOO. The EOO for this species is estimated at 20,000km2. The EAAA is anticipated to cover an area of 399km² which comprises of 1.995% of the EOO, which is well below the 10% threshold for Criterion 2 This **species has not triggered Critical Habitat under Criterion 2.**	N (unlikely to be present)	*Mitigation as per ESIA*
Central Asian Tortoise	Global Population = Unknown EOO = Unknown	Criterion 1 = No quantitative thresholds as this is a VU species National Red Data Book = VU	Baseline observations = 45 records Spring surveys conducted in April 2024. Recorded 8 of the 15 camera traps deployed between May and June 2024.	15-20 million mature individuals (Mitropolski & Kashkarov, 2000; Bozhansky & Polinova, 2000)	This species is widespread across 12 countries; Afghanistan; Armenia; Azerbaijan; China; Iran, Kazakhstan; Kyrgyzstan; Pakistan; Russian Federation; Tajikistan; Turkmenistan and Uzbekistan. It is therefore likely that the global population estimate is much higher than 15-20 million individuals. The context indicates that although the species may be present, the EAAA does not contain sufficient suitable habitat that would support a portion of the global population significant enough that the loss of which would trigger uplisting to CR/EN status. **Therefore, the species has not triggered Critical Habitat under Criterion 1.**	Y (Confirmed present, VU species)	No Net Loss
Desert Monitor	Global Population = Unknown EOO ≈ 13,200,000km²	Criterion 1 = No quantitative thresholds as this is a Nationally VU species	Baseline observations =1	In 1990-s the national population was estimated at 45,000 individuals	The EAAA (537km²) makes up 0.004% of the EOO and is miniscule compared to the EOO (≈ 13,200,000km²) Given the extensive EOO of this species the EAAA does not contain sufficient suitable habitat that would support a portion of the national population significant enough that the loss of which would	Y (Confirmed, present, VU species)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
		National Red Data Book = VU			trigger uplisting to CR/EN status at the national level. **Therefore, the species has not triggered Critical Habitat under Criterion 1.**		
Southern Even-fingered Gecko	Global Population = Unknown EOO = Unknown	Criterion 1 (0.5% of global pop), population unknown	Baseline observations = 0	N/A	The species' suitable "Takyr" habitats are located in the valley adjacent to the lake, in its immediate surroundings and to the west. The Project area is situated on south outside these areas with no overlap with suitable habitats. In addition, the baseline surveys recorded 0 individual of the species. **Therefore, the species has not triggered Critical Habitat under Criterion 1.**	Y (Precautionary considering potential presence)	No Net Loss
Eremostachys eriolarynx	Global Population = Unknown EOO = 448,900km²	Criterion 2 (10% of global population/EOO) = 44890km² National Red Data Book = Category 1 (endangered, disappearing)	Baseline observations = two small populations, totalling 25 specimens in Spring	Only 2 populations of about 200 individuals in total are known in Uzbekistan	Quantitative extrapolation can be done using favoured or suitable habitat cover as a proxy for species population. The assessment proposes that this species would trigger critical habitat if the size of the EAAA is ≥10% of the EOO. The EOO for this species is estimated at 448,900km2. The EAAA is anticipated to cover an area of 511km² which comprises of 0.113% of the EOO, which is well below the 10% threshold for Criterion 2 Therefore, **the species has not triggered Critical Habitat under Criterion 2.**	Y (Confirmed present, nationally endangered)	No Net Loss
Calligonum zakirovii	Global Population = unknown EOO = 448,900km²	Criterion 2 (10% of global population/EOO) = 44890km² National Red Data Book = Category 1	Baseline observations = Total of 50 specimens: Spring 3 populations ;27 specimens	N/A	Quantitative extrapolation can be done using favoured or suitable habitat cover as a proxy for species population. The assessment proposes that this species would trigger critical habitat if the size of the EAAA is ≥10% of the EOO. The EOO for this species is estimated at 448,900km2. The EAAA is anticipated to cover an area of 511km² which	Y (Confirmed present, nationally endangered)	No Net Loss

Species	Global Population & EOO	Applicable Thresholds	Recap of known and Assumed Presence	Other pertinent Information	Is it CH?	Is it SBV?	Applicable Targets
		(endangered, disappearing)	Autumn=1 population; 23 specimens.		comprises of 0.113% of the EOO, which is well below the 10% threshold for Criterion 2 **Therefore, the species has not triggered Critical Habitat under Criterion 2.**		
Climacoptera amblyostegia	Global Population = Unknown EOO = 3,172,946km²	Criterion 2 (10% of global population/EOO) = 317,294.6km² species is nationally red listed as Rare Category 2 National Red Data Book = Category 2 (rare, endemic)	Baseline observations = Four populations, totalling 124 specimens during Autumn 2024	N/A	Quantitative extrapolation can be done using favoured or suitable habitat cover as a proxy for species population. The assessment proposes that this species would trigger critical habitat if the size of the EAAA is ≥10% of the EOO. The EOO for this species is estimated at 3,172,946km². The EAAA is anticipated to cover an area of 511km² which comprises of 0.016% of the EOO, which is well below the 10% threshold for Criterion 2 Therefore, **the species has not triggered Critical Habitat under Criterion 2.**	N (not qualifying)	*Mitigation as per ESIA*
Tulipa lehmanniana	Global Population = Unknown EOO = 1,309,706km²	Criterion 2 (10% of global population/EOO) = 130,970.6km² IUCN Red List = NT National Red Data Book = Category 3 (Reducing, rare)	Baseline observations = Specimens were found across the majority of sample plots. Population density on different plots is 1–3 to 50–70 generative specimens per 100 m2	N/A	Quantitative extrapolation can be done using favoured or suitable habitat cover as a proxy for species population. The assessment proposes that this species would trigger critical habitat if the size of the EAAA is ≥10% of the EOO. The EOO for this species is estimated at 1,309,706km². The EAAA is anticipated to cover an area of 511km² which comprises of 0.113% of the EOO, which is well below the 10% threshold for Criterion 2 Therefore, **the species has not triggered Critical Habitat under Criterion 2.**	N (not qualifying)	*Mitigation as per ESIA*

9.4.4 Conclusion

The following species have triggered the designation of Critical Habitat within the project's area of influence:

- Steppe Eagle
- Dalmatian Pelican

Net Gain is required, ensuring net positive impact for the species population and/or habitat.

9.4.4.1 Natural Habitats

Three types of Natural Habitats were identified in the Project for which No Net Loss is required:

- Sandy and Sabulous-loamy Plains
- Fixed and Semi-fixed Sands
- Saline Lands.

9.4.4.2 Final List of SBVs

Some species have been classified as "Significant Biodiversity Values", SBVs, which are defined in IFC PS6 as requiring a No Net Loss residual impact.

The complete list of SBVs for the project is as per the table below. The table includes SBV species that, though were not recorded during the baseline surveys, may possibly occur in the project area and are hence categorised as SBV as per IFC PS6.

S.No	Common Name	Globally Threatened	Nationally Threatened	Range-restricted (Endemic)	Migratory/ Congregatory
1	Saker Falcon	✓ IUCN EN triggers SBV	✓ EN on RDB	-	Passage Migrant in Uzbekistan
2	Egyptian Vulture	✓ IUCN EN triggers SBV	✓ VU on RDB	-	Passage Migrant in Uzbekistan
3	Eastern Imperial Eagle	✓ IUCN VU triggers SBV	✓ VU on RDB	-	Passage Migrant in Uzbekistan
4	Greater Spotted Eagle	✓ IUCN VU triggers SBV	✓ VU on RDB	-	Passage Migrant in Uzbekistan
5	Griffon Vulture	IUCN LC	✓ VU on RDB; triggers SBV	-	-
6	White-tailed Sea Eagle	IUCN LC	✓ VU on RDB; triggers SBV	-	Native Breeder

S.No	Common Name	Globally Threatened	Nationally Threatened	Range-restricted (Endemic)	Migratory/ Congregatory
7	Short-toed Snake Eagle	IUCN LC	✓ VU on RDB; triggers SBV	-	Non-native Breeder and Passage Migrant
8	Booted Eagle	IUCN LC	✓ VU on RDB; triggers SBV	-	Native Breeder
9	Great Bustard	✓ IUCN EN triggers SBV	✓ CR on RDB	-	Passage Migrant
10	Asian Houbara	✓ IUCN VU triggers SBV	✓ CR on RDB	-	-
11	Little Bustard	IUCN NT	✓ VU on RDB; triggers SBV	-	Passage Migrant
12	Pin-tailed Sandgrouse	IUCN LC	✓ VU on RDB; triggers SBV	-	Passage Migrant
13	European Turtle Dove	✓ IUCN VU Status triggers SBV	✓ Listed as VU on RDB	-	Full Migrant
14	Sociable Lapwing	✓ IUCN CR triggers SBV		--	Migrant
15	White-headed Duck	✓ IUCN EN triggers SBV	✓ EN on RDB	-	Native-non breeder and passage migrant
16	Lesser White-fronted Goose	✓ IUCN VU triggers SBV	✓ CR on RDB	-	Passage Migrant
17	Common Pochard	✓ IUCN VU triggers SBV	✓ VU on RDB	-	Native Breeder
18	Eurasian Curlew	IUCN NT	✓ VU on RDB; triggers SBV	-	Passage Migrant in Uzbekistan
19	Black Stork	IUCN LC	✓ VU on RDB; triggers SBV	--	Native Breeder
20	Marbled Teal	IUCN NT	✓ EN on RDB; triggers SBV	-	Passage Migrant and Resident
21	European Free-tailed Bat	IUCN LC	✓ VU on RDB; triggers SBV	-	-
22	Central Asian Tortoise	✓ IUCN VU Status triggers SBV	✓ Listed as VU on RDB	Native to Uzbekistan	-
23	Desert Monitor	IUCN LC	✓ EN on RDB; triggers SBV	-	-
24	Eremostachys eriolarynx	-	✓ Cat 1 on RDB; triggers SBV	National Endemic	-

S.No	Common Name	Globally Threatened	Nationally Threatened	Range-restricted (Endemic)	Migratory/ Congregatory
25	Calligonum zakirovii	-	✓ Cat 1 on RDB; triggers SBV	National Endemic	-

9.5 Potential Impacts, Mitigation, Management & Residual Impacts

9.5.1 Construction Phase

9.5.1.1 Ecosystem Function

Habitat Loss

Clearing, grading, excavation and other earthworks during early construction stages results in habitat loss over the full construction footprint of the project, including temporary structures, lay-down areas, and new and existing roads used for incoming and outbound traffic.

Vegetation and wildlife species that currently inhabit the affected areas will be impacted by habitat loss, as well as overarching ecosystem function on a wider regional scale. Vegetation cannot re-establish in impermeable paving or compacted soils, and wildlife dependent upon natural features and resources cannot utilize the converted land which restricts available habitat on a regional scale. Ecosystem function likewise will be degraded or lost.

Construction footprint typically involves some degree of buffer. However, maintaining strict requirements to minimize the construction buffer as much as practicable will reduce the magnitude of habitat loss impact.

The EPC will be instructed to maintain a strict buffer of 6m for access roads and BoP, and a maximum buffer of 30m is allocated for the WTG.

Table 9-36 Habitat Loss

Habitat	Habitat Loss - Permanent (Ha)	Habitat Loss – Temporary (inclusive of Construction Buffers) (Ha)
Natural Habitat		
Sandy and sabulous-loamy desert plain	34.91	28.85
Fixed and semi-fixed sands	28.69	27.18
Saline lands	1.40	1.40
Modified Habitat		
Fallow lands and farmsteads	4.15	3.09

Habitat loss within the footprint of the structures will be permanent or at least until the project is eventually decommissioned. Habitat loss is certain to occur, however, overall magnitude of habitat loss is anticipated to be relatively minimal compared to the overall extent of the available habitats.

Table 9-37 Significance of Unmitigated Habitat Loss

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Natural Habitat) Sandy and sabulous-loamy desert plain	High	Minor	**Moderate**
(Natural Habitat) Fixed and semi-fixed sands	High	Minor	**Moderate**
(Natural Habitat) Saline lands	High	Minor	**Moderate**
(Modified Habitat) Fallow lands and farmsteads	Low	Minor	**Negligible**

As per IFC PS6, areas classified as Natural Habitat require No Net Loss (NNL) Residual Impact. It is important to note that No Net Loss does not translate to zero loss. The definition of No Net Loss for habitats should be taken on a spatially and temporally broad view, meaning that the ecosystem function is not diminished in any significant way in the long term even if there are quantifiable habitat losses. Therefore, a specific habitat typology may lose acreage from the project but if the overall ecosystem function and carrying capacity does not change and is able to retain the same biodiversity value as if the project did not exist, this can similarly be considered as NNL. With appropriate implementation of the following mitigation measure, NNL is considered achievable

The following mitigation measures will be implemented to reduce the impacts:

- Site ecologist to undertake pre-clearance survey of temporary and permanent construction areas. Where possible flora should be left in situ unless within clearance footprint.
- The EPC contractor will undertake seed collection and relocation programs (where relevant) for *Tulipa lehmanniana, Calligonum zakirovii, Eremostachys eriolarynx* and *Climacoptera amblyostegia* prior to site clearance.
- The EPC Contractor commit to restoration of habitat post-construction via removal of invasive species (if any) and seeding, re-planting, and landscaping with native, high-value species, in unused land areas that are not required for operation and maintenance. Prior to site clearance, the EPC ecologist, supervised by the PC Ecologist, will undertake a comparison of sample plots within and adjacent to the WTG areas. This will provide reference for future restoration.
- Temporary construction areas (labor camp, laydown areas and construction buffer) and permanent land take (E.g., for WTG footprint, substation, OHTL towers etc.) that are classified as natural habitats will be restored to achieve NNL.

With post-construction restoration and compensatory restoration, the residual significance is presented in the subsequent table.

Table 9-38 Residual Significance of Mitigated Habitat Loss

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Natural Habitat) Sandy and sabulous-loamy desert plain	High	Negligible	**Minor**
(Natural Habitat) Fixed and semi-fixed sands	High	Negligible	**Minor**
(Natural Habitat) Saline lands	High	Negligible	**Minor**
(Modified Habitat) Fallow lands and farmsteads	Low	Negligible	**Negligible**

9.5.1.2 Biodiversity Loss – Direct Mortality, Lowered Reproduction and Survivorship

Earthworks (Clearing, Excavation)

The clearing of existing vegetation results in the direct loss and mortality of removed specimens. Four species of sensitive flora were recorded across the site; *Tulipa lehmanniana, Calligonum zakirovii, Climacoptera amblyostegia* and *Eremostachys eriolarynx*. Seasonality had an impact of the presence of these species which must be considered during mitigation.

Furthermore, wildlife utilising these areas, particularly burrowing rodents and herptiles known to be present at the site, may be directly crushed during earthworks, or may suffer stress-induced mortality. The Central Asian Tortoise (VU, IUCN) is a burrowing species active for just a couple of months each year, spending the majority of the year in aestivation and hibernation below ground. This behaviour makes the species all the more susceptible to earthworks. Other burrowing species known to inhabit the site, such as the Brandt's Hedgehog (NT, UzRDB), are at high risk of being directly crushed during clearing and excavation activities.

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 9-39 Significance of Unmitigated Earthworks

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Flora) Threatened Species - *Tulipa lehmanniana*	High	Moderate	**Major**
(Flora) Nationally Threatened and Protected Species - *Caligonium zakirovii, Eremostachys eriolarynx*	High	Minor	**Moderate**
(Flora) Least concern species	Low	Minor	**Negligible**
(Herptiles) Threatened Species - Central Asian Tortoise	High	Moderate	**Major**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Moderate	**Moderate**

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, Steppe agama and - Steppe Ribbon Racer	Low	Minor	**Negligible**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Major	**Minor**
(Mammals) Non-threatened species - Wild Boar, Tolai Hare	Low	Minor	**Negligible**
(Mammals) Non-threatened Species - Hedgehog - Long-eared Hedgehog, Yellow Ground Squirrel, Severtzov's Jerboa and Small Five-toed Jerboa	Low	Major	**Minor**

However, the following mitigation measures will be implemented to reduce the impacts on floral species:

- Pre-construction survey to carry out in-situ signage and protection where possible;
- Seed-collection of threatened and protected flora during peak season (chiefly Spring, however *Climacoptera amblyostegia* may only appear in Autumn);
- Post-construction restoration via seeding, re-planting, and landscaping with native, high-value species.

The following mitigation measures will be implemented to reduce the impacts on fauna species:

- Minimization of the built footprint in design, minimise the construction buffer zone and limit construction to the delineated construction zones
- Full-time Ecologist as part of EPC contractor team to be on site throughout all construction works from the time of LNTP, inclusive of all early site preparation works, and throughout the entirety of the construction period;
- The EPC Contractor ecologist, to conduct a pre-construction survey for the Central Asian Tortoise during the species active season (March–May and September–October), and relocation of individuals in consultation with the Institute of Zoology to determine whether they are relocated to another site or placed in a temporary holding facility until construction is complete;
- The EPC must coordinate early site preparation works within delineated construction zones in a staggered manner to facilitate successful self-dispersion of mobile fauna;
- Chance Find Procedure has been included within the CESMP to provide general guidance on potential ecological triggers for work stoppage and will be implemented by the Ecologist and EPC contractor team. For all other species such as other herptiles and small mammals, a Chance-Find Procedure with individual relocations as deemed necessary may be sufficient.

With the above measures, the **residual** significance is presented in the following table.

Table 9-40 Residual Significance of Mitigated Earthworks

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Flora) Threatened Species - *Tulipa lehmanniana*	High	Negligible	**Minor**
(Flora) Nationally Threatened and Protected Species - *Caligonium zakirovii Eremostachys eriolarynx*	High	Negligible	**Minor**
(Flora) Least concern species	Low	Negligible	**Negligible**
(Herptiles) Threatened Species - Central Asian Tortoise	High	Negligible	**Minor**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Minor	**Minor**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, Steppe agama and - Steppe Ribbon Racer	Low	Negligible	**Negligible**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Minor	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Tolai Hare	Low	Negligible	**Negligible**
(Mammals) Non-threatened Species - Hedgehog - Long-eared Hedgehog, Yellow Ground Squirrel, Severtzov's Jerboa and Small Five-toed Jerboa	Low	Minor	**Negligible**

Vehicular Collision

Vehicle collision is a notable risk for terrestrial species where the use of motorised vehicles and equipment will be required. Site vehicles and equipment should travel under speed-restrictions, for a variety of health and safety reasons. This will help limit vehicle-related deaths particularly in larger mammal species, such as Gazelle and Fox, which are more likely to disperse and avoid collision.

Small to medium sized wildlife such as hare, hedgehogs and reptiles which can display basking behaviour on roads, have a higher chance of mortality from vehicular and machinery collisions. This is also true for birds, particularly ground birds, that walk on or fly close to the ground.

The presence of road-kill from any collisions which do occur can in turn attract scavengers who then become susceptible to vehicle collisions.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 9-41 Significance of Unmitigated Vehicular Collision

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Herptiles) Threatened Species - Central Asian Tortoise	High	Moderate	**Major**

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Moderate	**Moderate**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, Steppe agama and - Steppe Ribbon Racer	Low	Minor	**Negligible**
(Mammals) Threatened Species - Goitered Gazelle, Marbled Polecat	High	Minor	**Moderate**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Moderate	**Minor**
(Mammals) Non-threatened species - Large mammals incl. Grey wolf, Red fox, Wild Boar, Tolai Hare and Rodents and Small mammals incul. Yellow Ground Squirrel, Small Five-toed Jerboa	Low	Minor	**Negligible**
(Mammals) Non-threatened Species - Hedgehog - Long-eared Hedgehog	Low	Moderate	**Minor**
(Avifauna) Endangered Species - Raptors - inclu. Steppe Eagle	Very High	Minor	**Moderate**
(Avifauna) Threatened Species - Raptors - inclu. Cinereous vulture	High	Minor	**Moderate**
(Avifauna)Threatened Species - Groundbirds - Asian Houbara, Little Bustard	High	Minor	**Moderate**
(Avifauna) Non-threatened species - Raptors - Long-legged Buzzard	Low	Minor	**Negligible**

However, the following mitigation measures will be implemented to reduce the risks from these potential impacts:

- Strict speed controls (25km/h on access roads) which will be enforced by EPC HSE and Security teams, especially during the active period (March–May and September–October) for the Central Asian Tortoise;
- Ban against driving outside of delineated access roads and restricting driving and machinery operation to daylight hours;
- The CESMP will include protocol for removal of any road-kill carcasses immediately upon observation to at least 5-10 meters away from the access roads during the construction phase by the EPC contractor.

With the above measures, the residual significance is presented in the following table.

Table 9-42 Residual Significance of Mitigated Vehicular Collision

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Herptiles) Threatened Species - Central Asian Tortoise	High	Negligible	**Minor**

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Negligible	**Negligible**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, Steppe agama and - Steppe Ribbon Racer	Low	Negligible	**Negligible**
(Mammals) Threatened Species - Goitered Gazelle, Marbled Polecat	High	Negligible	**Minor**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Negligible	**Negligible**
(Mammals) Non-threatened species -Large mammals incl. Grey wolf, Red fox, Wild Boar, Tolai Hare and Rodents and Small mammals incul. Yellow Ground Squirrel, Small Five-toed Jerboa	Low	Negligible	**Negligible**
(Mammals) Non-threatened Species - Hedgehog - Long-eared Hedgehog	Low	Negligible	**Negligible**
(Avifauna) Endangered Species - Raptors - inclu. Steppe Eagle	Very High	Negligible	**Minor**
(Avifauna) Threatened Species - Raptors - inclu. Cinereous vulture	High	Negligible	**Minor**
(Avifauna)Threatened Species - Groundbirds - Asian Houbara, Little Bustard	High	Negligible	**Minor**
(Avifauna) Non-threatened species - Raptors - Long-legged Buzzard	Low	Negligible	**Negligible**

"Take" (Poaching, Hunting, Fishing, Gathering)

The presence of site workers may lead to increased hunting, poaching, or gathering on site. Flora and vegetative matter may be gathered for consumption or for fuel; eggs taken from breeding bird nests; poaching of hare, ground birds or tortoise for consumption or for domestic trade; and persecution of raptors, snakes, and carnivores could potentially take place.

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 9-43 Significance of Unmitigated "Take"

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Flora) Threatened Species - *Tulipa lehmanniana, Caligonium zakirovii, Eremostachys eriolarynx, Climacoptera amblyostegia*	High	Minor	**Minor**
(Flora) Least concern species	Low	Minor	**Negligible**
(Herptiles) Threatened Species - Central Asian Tortoise	High	Moderate	**Moderate**

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Minor	**Minor**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Minor	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Red fox, Afro-asiatic wildcat, Jungle cat ,Long-eared Hedgehog, Tolai Hare	Low	Moderate	**Minor**
(Avifauna) Endangered Species - Sociable Lapwing	Very High	Minor	**Moderate**
(Avifauna) Threatened Species - Waterbirds incl. Dalmatian Pelican, Pygmy Cormorant	High	Moderate	**Moderate**
(Avifauna) Threatened Species - Groundbirds - Asian Houbara, Little Bustard	High	Moderate	**Moderate**
(Avifauna) Nationally-threatened Species - Waterbirds - Dalmatian Pelican, Mute Swan Glossy Ibis	High	Moderate	**Moderate**
Non-threatened Species - Waterbirds incl. Greylag Goose, Black Stork	Low	Moderate	**Minor**
(Avifauna) Non-threatened Species - Ground birds - Black-bellied Sandgrouse	Low	Moderate	**Minor**

However, the following mitigation measures will be implemented to reduce the impacts:

- Strict controls forbidding the gathering, poaching or otherwise disturbance of any flora or fauna on site, included in induction training.
- Zero tolerance of poaching, hunting and illegal take with enforcement of 'One-strike-out' policy.
- Staff training such as toolbox talks on the importance of ecosystem integrity, especially focused on species of importance such as Central Asian Tortoise.

With the above measures, the residual significance is presented in the following table.

Table 9-44 Residual Significance of "Take"

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Flora) Threatened Species - *Tulipa lehmanniana, Caligonium zakirovii, Eremostachys eriolarynx, Climacoptera amblyostegia*	High	Negligible	**Minor**
(Flora) Least concern species	Low	Negligible	**Negligible**
(Herptiles) Threatened Species - Central Asian Tortoise	High	Negligible	**Minor**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Negligible	**Negligible**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Negligible	**Negligible**

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Red fox, Afro-asiatic wildcat, Jungle cat, Long-eared Hedgehog, Tolai Hare	Low	Negligible	**Negligible**
(Avifauna) Endangered Species -Sociable Lapwing	Very High	Negligible	**Minor**
(Avifauna) Threatened Species - Waterbirds incl. Dalmatian Pelican, Pygmy Cormorant	High	Negligible	**Minor**
(Avifauna) Threatened Species - Groundbirds - Asian Houbara, Little Bustard	High	Negligible	**Minor**
(Avifauna) Nationally-threatened Species - Waterbirds - Dalmatian Pelican, Mute Swan Glossy, Ibis	High	Negligible	**Minor**
Non-threatened Species - Waterbirds incl. Greylag Goose, Black Stork,	Low	Negligible	**Negligible**
(Avifauna) Non-threatened Species - Ground birds - Black-bellied Sandgrouse	Low	Negligible	**Negligible**

Littering

Improper management of solid waste, particularly non-biodegradable waste such as plastic containers and plastic bags, may result in wind-blown litter, which are a danger to wildlife due to entanglement or ingestion.

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 9-45 Significance of Unmitigated Littering

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Herptiles) Threatened Species - Central Asian Tortoise	High	Minor	**Moderate**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Minor	**Minor**
(Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, Steppe agama and - Steppe Ribbon Racer	Low	Minor	**Negligible**
(Mammals) Threatened Species - Goitered Gazelle	High	Minor	**Moderate**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Minor	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa	Low	Minor	**Negligible**

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing	Very High	Minor	**Moderate**
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara , Little Bustard	High	Minor	**Moderate**
(Avifauna) Nationally threatened Species inclu. Short-toed Snake Eagle, Golden Eagle, Mute Swan, Black Stork, Glossy Ibis	High	Minor	**Moderate**
(Avifauna) Non-threatened species inclu. Common Buzzard, Greylag Goose, Black-bellied Sandgrouse	Low	Minor	**Negligible**

However, the following mitigation measures will be implemented to reduce the risk of these potential impacts:

- Preparation of a Waste Management Plan as one of the supplementary plans to the CESMP;
- Training will be provided to staff such as toolbox meetings which include waste management and the effects of littering;
- Strict waste management supervision and controls under the HSE Team;
- Zero tolerance for littering on site;
- Daily inspections and clean-up of litter by EPC/sub-contractor(s) responsible.

With the above measures, the residual significance is presented below.

Table 9-46 Residual Significance of Mitigated Littering

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Herptiles) Threatened Species - Central Asian Tortoise (confirmed)	High	Negligible	**Minor**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Negligible	**Negligible**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, Steppe agama and - Steppe Ribbon Racer	Low	Negligible	**Negligible**
(Mammals) Threatened Species - Goitered Gazelle	High	Negligible	**Minor**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Negligible	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat ,Long-eared	Low	Negligible	**Negligible**

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa			
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing	Very High	Negligible	**Minor**
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara , Little Bustard	High	Negligible	**Minor**
(Avifauna) Nationally threatened Species inclu. Short-toed Snake Eagle, Golden Eagle, Mute Swan, Black Stork, Glossy Ibis	High	Negligible	**Minor**
(Avifauna) Non-threatened species inclu. Common Buzzard, Greylag Goose, Black-bellied Sandgrouse	Low	Negligible	**Negligible**

Disturbance

The presence of anthropogenic activity is disturbing to many sensitive species, which can result in reduced survivorship, reproductive success, and ultimately, population decline.

Species particularly sensitive include shy species, which at the Project site includes the Goitered Gazelle and bustard species. However, given the remoteness of the project site and dominance of natural habitats, most wildlife not already habituated to anthropogenic disturbance is anticipated to be negatively affected.

Breeding birds, especially those with fidelity to nesting sites, will be negatively affected if works occur during the breeding season. 1 active nest of Egyptian Vulture recorded just beyond the 5km buffer in April 2024. Given the distance to the EV nest from the construction footprint (minimum 5km), the significance of impact is considered minor to negligible.

1 breeding pair of Western Marsh Harrier was recorded in the project site during the waterbird surveys in months of April and May 2024 with another three pairs recorded beyond the boundary of the project within the 5km buffer zone. While impacts due to disturbance are considered to be moderate in magnitude, significance of unmitigated impacts is considered to be minor due to low value/sensitivity of this common and globally widespread species.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 9-47 Significance of Unmitigated General Disturbance

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Herptiles) Threatened Species - Central Asian Tortoise	High	Moderate	**Moderate**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Moderate	**Moderate**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer	Low	Moderate	**Minor**
(Bats) Nationally Important or Endemic Species - European Free-tailed Bat	High	Minor	**Moderate**
(Bats) Non-threatened Species	Medium	Moderate	**Moderate**
(Mammals) Threatened Species - Goitered Gazelle	High	Minor	**Moderate**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Moderate	**Minor**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa	Low	Minor	**Negligible**
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing	Very High	Minor	**Moderate**
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara, Little Bustard	High	Minor	**Moderate**
(Avifauna) Nationally-threatened Species inclu. Short-toed Snake Eagle, Golden Eagle, Mute Swan, Black Stork, Glossy Ibis	High	Minor	**Minor**
(Avifauna) Non-threatened species inclu. Western Marsh Harrier	Low	Minor	**Minor**

However, the following mitigation measures will be implemented to reduce the risk of these potential impacts occurring:

- Minimize construction footprint buffer zones and temporary laydown areas.
- Minimize duration of construction period avoiding most sensitive months/ seasons (e.g., breeding season) where possible.
    - Western Marsh Harrier breeds from March (nest site selection) to September (when fledglings leave the nest)
- The EPC contractor will commit to restoration of habitat post-construction via removal of invasive species (if any) and seeding, re-planting, and landscaping with native, high-value species, in unused land areas that are not required for operation and maintenance.

With the above measures, the residual significance is presented in the following table.

Table 9-48 Residual Significance of Mitigated General Disturbance

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Herptiles) Threatened Species - Central Asian Tortoise	High	Negligible	**Minor**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Negligible	**Negligible**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer	Low	Negligible	**Negligible**
(Bats) Nationally Important or Endemic Species - European Free-tailed Bat	High	Negligible	**Minor**
(Bats) Non-threatened Species	Medium	Negligible	**Negligible**
(Mammals) Threatened Species - Goitered Gazelle	High	Negligible	**Minor**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Negligible	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa	Low	Negligible	**Negligible**
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing	Very High	Negligible	**Minor**
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara, Little Bustard	High	Negligible	**Minor**
(Avifauna) Nationally-threatened Species inclu. Short-toed Snake Eagle, Golden Eagle, Mute Swan, Black Stork, Glossy Ibis	High	Negligible	**Minor**
(Avifauna) Non-threatened species inclu. Western Marsh Harrier	Low	Minor	**Negligible**

9.5.1.3 Biodiversity Displacement

Dispersal and Competition

During construction, shy species who are sensitive to disturbance may be displaced away from the project site. This has indirect secondary impacts on the adjacent territories they move into via increased competition for resources, subsequently compromising population stability and ecosystem balance.

However, on a landscape level the habitats found within the project site can also be found adjacent to the site with good habitat connectivity, not constrained by large-scale urban or industrial development. This suggests that displacement of wildlife will not cause an influx into a habitat that it does not utilise already. It is acknowledged that there could be an increased amount of pressure on existing resources. Based on the types of species and habitats present in the area, we don't anticipate that this impact is of high magnitude. Therefore, it is not anticipated that displaced individuals will have a significant impact on adjacent ecosystems.

Proliferation of Generalist Species

In instances where shy species are dispersed away from disturbed areas, this can lead to ecological niches being filled by generalist species who are more tolerant of human disturbance. This includes species such as the Red fox which are well adapted to anthropogenic habitats.

In addition, poor management of solid waste can result in the proliferation of pest species, such as feral dog, cat, rats, and other urban-adapted species. This can cause further competition and displacement of native fauna.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 9-49 Significance of Proliferation of Generalist Species

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Herptiles) Threatened Species - Central Asian Tortoise	High	Minor	**Moderate**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Minor	**Minor**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer	Low	Minor	**Negligible**
(Bats) Nationally Important or Endemic Species - European Free-tailed Bat	High	Minor	**Moderate**
(Bats) Non-threatened Species	Medium	Minor	**Minor**

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Mammals) Threatened Species - Goitered Gazelle	High	Minor	**Moderate**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Moderate	**Minor**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Wild Boar, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa	Low	Moderate	**Minor**
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing	Very High	Minor	**Moderate**
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara, Little Bustard	High	Minor	**Moderate**
(Avifauna) Nationally-threatened Species inclu. Short-toed Snake Eagle, Golden Eagle, Mute Swan, Black Stork, Glossy Ibis	High	Minor	**Moderate**
(Avifauna) Non-threatened species inclu. Western Marsh Harrier, Common Buzzard, Greylag Goose, Black-bellied Sandgrouse	Low	Minor	**Negligible**

The following mitigation measures will be implemented to minimize the magnitude of these potential impacts to terrestrial species:

- Development of a solid waste management strategy
- Where possible, limiting construction activities to one locality at a time to minimise disturbance, which should already have been implemented in construction phase.
- Preparation of a Waste Management Plan as one of the supplementary plans to the CESMP;
- Strict waste management supervision and controls under the HSE Team;
- Zero tolerance for littering on site;
- Training will be provided to staff such as toolbox meetings which include waste management;
- Daily inspections and clean-up of litter by EPC/sub-contractor(s) responsible;
- No provision of food waste or encouragement of feral cats and dogs.

However, the dispersal of shy species is hard to limit, and some species will be affected. With the above measures, the residual significance is presented in the following table.

Table 9-50 Residual Significance of Proliferation of Generalist Species

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Herptiles) Threatened Species - Central Asian Tortoise	High	Negligible	**Minor**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Negligible	**Negligible**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer	Low	Negligible	**Negligible**
(Bats) Nationally Important or Endemic Species - European Free-tailed Bat	High	Negligible	**Minor**
(Bats) Non-threatened Species	Medium	Negligible	**Negligible**
(Mammals) Threatened Species - Goitered Gazelle	High	Negligible	**Minor**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Negligible	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Wild Boar, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa	Low	Negligible	**Negligible**
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing	Very High	Negligible	**Minor**
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara , Little Bustard	High	Negligible	**Minor**
(Avifauna) Nationally-threatened Species inclu. Short-toed Snake Eagle, Golden Eagle, Mute Swan, Black Stork, Glossy Ibis	High	Negligible	**Minor**
(Avifauna) Non-threatened species inclu. Western Marsh Harrier, Common Buzzard, Greylag Goose, Black-bellied Sandgrouse	Low	Negligible	**Negligible**

9.5.1.4 Biosecurity Risks

Introduction of Pathogens & Invasive Species

Soil imports, intentional or via previously used excavation and earthworks equipment, may contain pathogens that can spread and infect native vegetation and fauna that do not have natural defence mechanisms.

Exotic seeds in soil imports, or landscaping design that incorporates non-native exotic species may lead to the introduction of potentially invasive, weed species which out compete native species. Secondary impacts may occur on wildlife which utilise the reduced native vegetation for foraging or shelter.

Table 9-51 Significance of Unmitigated Introduced Species

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Flora) Threatened Species - *Tulipa lehmanniana*	High	Moderate	**Moderate**
(Flora) Nationally Threatened and Protected Species - *Caligonium zakirovii, Eremostachys eriolarynx*	High	Moderate	**Moderate**
(Flora) Least concern species	Low	Minor	**Negligible**

However, the following mitigation measures will be implemented to reduce the risks from these potential impacts:

- Soil imports will be taken from local quarry or borrow pit as close to the site as reasonably practical to avoid risk of foreign seeds and invasive species;
- Soil imports from outside of the area will undergo checks to prevent accidental introduction of exotic species / pathogens.
- Plant and machinery will require an HSE certificate of inspection, issued by the EPC, before coming onto site and this will include necessary cleaning /washing to reduce risks of importing invasive species in mud taken from urban sites.
- The EPC contractor will commit to removal of invasive species (if any) during restoration of habitat post-construction in unused land areas that are not required for operation and maintenance.

With the above measures, the **residual** significance is presented in the following table

Table 9-52 Residual Significance of Mitigated Introduced Species

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Flora) Threatened Species - *Tulipa lehmanniana*	High	Negligible	**Minor**
(Flora) Nationally Threatened and Protected Species - *Caligonium zakirovii , Eremostachys eriolarynx*	High	Negligible	**Minor**
(Flora) Least concern species	Low	Negligible	**Negligible**

9.5.1.5 Environmental Quality

Air Quality

Airborne dust particles produced during clearing and construction can coat vegetation, reducing photosynthesis and respiration ability, causing desiccation. Emissions of pollutants such as NOx, SOx, PM and CO can lower survivorship of all organisms, and increase susceptibility of affected wildlife to disease.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 9-53 Significance of Construction Air Pollution

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Flora) Threatened Species - *Tulipa lehmanniana*	High	Minor	**Moderate**
(Flora) Nationally Threatened and Protected Species - *Caligonium zakirovii , Eremostachys eriolarynx*	High	Minor	**Moderate**
(Flora) Least concern species	Low	Minor	**Minor**
(Herptiles) Threatened Species - Central Asian Tortoise	High	Minor	**Minor**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Minor	**Minor**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer	Low	Minor	**Negligible**
(Bats) Nationally Important or Endemic Species - European Free-tailed Bat	High	Minor	**Moderate**
(Bats) Non-threatened Species	Medium	Minor	**Minor**
(Mammals) Threatened Species - Goitered Gazelle	High	Minor	**Moderate**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Minor	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Wild Boar, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa	Low	Minor	**Negligible**
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing	Very High	Minor	**Moderate**
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara, Little Bustard	High	Minor	**Moderate**
(Avifauna) Nationally-threatened Species inclu. Short-toed Snake Eagle, Golden Eagle, Mute Swan, Black Stork, Glossy Ibis	High	Minor	**Moderate**

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Avifauna) Non-threatened species inclu. Western Marsh Harrier, Common Buzzard, Greylag Goose, Black-bellied Sandgrouse	Low	Minor	**Negligible**

However, the following mitigation measures will be implemented to reduce the risks from these potential impacts:

- Refer to air quality control measures.
- All tracks will be damped down to reduce risk of dust and this will be checked daily.

With the above measures, the **residual** significance is presented in the following table.

Table 9-54 Residual Significance of Air Pollution

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Flora) Threatened Species - *Tulipa lehmanniana*	High	Negligible	**Minor**
(Flora) Nationally Threatened and Protected Species - *Caligonium zakirovii* , *Eremostachys eriolarynx*	High	Negligible	**Minor**
(Flora) Least concern species	Low	Negligible	**Negligible**
(Herptiles) Threatened Species - Central Asian Tortoise	High	Negligible	**Minor**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Negligible	**Negligible**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer (all confirmed)	Low	Negligible	**Negligible**
(Bats) Nationally Important or Endemic Species - European Free-tailed Bat	High	Negligible	**Minor**
(Bats) Non-threatened Species	Medium	Negligible	**Negligible**
(Mammals) Threatened Species - Goitered Gazelle	High	Negligible	**Minor**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Negligible	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Wild Boar, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa (all confirmed)	Low	Negligible	**Negligible**
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing (all confirmed)	Very High	Negligible	**Minor**

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara , Little Bustard (All confirmed)	High	Negligible	**Minor**
(Avifauna) Nationally-threatened Species inclu. Short-toed Snake Eagle, Golden Eagle, Mute Swan, Black Stork, Glossy Ibis(all confirmed)	High	Negligible	**Minor**
(Avifauna) Non-threatened species inclu. Western Marsh Harrier, Common Buzzard, Greylag Goose, Black-bellied Sandgrouse	Low	Negligible	**Negligible**

Noise

Construction noise and vibration can cause acoustic masking, disturbance and displacement, and general reduction in survivorship and reproductive success in a variety of fauna. Most heavily impacted are acoustic communicators such as bird and bat species and a growing body of research is also investigating acoustic impacts on herpetofauna.

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 9-55 Significance of Noise Impacts

Receptor	Value/ Sensitivity	Magnitude	Significance
(Herptiles) Threatened Species - Central Asian Tortoise	High	Minor	**Moderate**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Minor	**Moderate**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer (all confirmed)	Low	Minor	**Negligible**
(Bats) Nationally Important or Endemic Species - European Free-tailed Bat	High	Minor	**Moderate**
(Bats) Non-threatened Species	Medium	Minor	**Moderate**
(Mammals) Threatened Species - Goitered Gazelle	High	Minor	**Moderate**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Minor	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Wild Boar, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa (all confirmed)	Low	Minor	**Negligible**
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing (all confirmed)	Very High	Minor	**Moderate**

Receptor	Value/ Sensitivity	Magnitude	Significance
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara , Little Bustard (All confirmed)	High	Minor	**Moderate**
(Avifauna) Nationally-threatened Species inclu. Short-toed Snake Eagle, Golden Eagle, Mute Swan, Black Stork, Glossy Ibis(all confirmed)	High	Minor	**Moderate**
(Avifauna) Non-threatened species inclu. Western Marsh Harrier, Common Buzzard, Greylag Goose, Black-bellied Sandgrouse	Low	Minor	**Negligible**

However, the following mitigation measures will be implemented to minimize the magnitude of these potential impacts:

- Refer to noise control measures.
- Avoid exceptionally disturbing works such as blasting and drilling, if applicable, during sensitive ecological periods (breeding seasons, etc.). Baseline surveys suggest that the period from late winter through summer was the most active breeding period for many sensitive species at the site.
    - 1 breeding pair of Western Marsh Harrier was recorded in the project site during the surveys in months of April and May 2024
    - 1 active nest of Egyptian Vulture recorded just beyond the 5km buffer in April 2024
    - The Central Asian Tortoise was recorded across the project footprint are most active and breeding, and therefore at their most sensitive, between March and May.

With the above measures, the residual significance is presented in the following table.

Table 9-56 Residual Significance of Noise Impacts

Receptor	Value/ Sensitivity	Magnitude	Residual
(Herptiles) Threatened Species - Central Asian Tortoise	High	Negligible	**Minor**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Negligible	**Negligible**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer (all confirmed)	Low	Negligible	**Negligible**
(Bats) Nationally Important or Endemic Species - European Free-tailed Bat	High	Negligible	**Minor**
(Bats) Non-threatened Species	Medium	Negligible	**Negligible**

Receptor	Value/ Sensitivity	Magnitude	Residual
(Mammals) Threatened Species - Goitered Gazelle	High	Negligible	**Minor**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Negligible	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Wild Boar, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa (all confirmed)	Low	Negligible	**Negligible**
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing (all confirmed)	Very High	Negligible	**Minor**
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara , Little Bustard (All confirmed)	High	Negligible	**Minor**
(Avifauna) Nationally-threatened Species inclu. Short-toed Snake Eagle, Golden Eagle, Mute Swan, Black Stork, Glossy Ibis(all confirmed)	High	Negligible	**Minor**
(Avifauna) Non-threatened species inclu. Western Marsh Harrier, Common Buzzard, Greylag Goose, Black-bellied Sandgrouse	Low	Negligible	**Negligible**

Light Pollution

Night-time lighting can impact nocturnal wildlife behaviour. It can act as an attractant, which can cause congregation and higher predation rates or change movement and migration behaviour; act as a repellent which causes displacement; interfere with the circadian cycle and cause lower survivorship and reproductive success. However, lighting will be required only at specific work areas and not across the wider area or along access roads, thereby limiting lighting to relatively small areas, where night work is required.

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 9-57 Significance of Light Pollution

Receptor	Value/ Sensitivity	Magnitude	Significance
(Herptiles) Threatened Species - Central Asian Tortoise	High	Minor	**Moderate**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Minor	**Minor**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer (all confirmed)	Low	Minor	**Negligible**

Receptor	Value/ Sensitivity	Magnitude	Significance
(Bats) Nationally Important or Endemic Species - European Free-tailed Bat	High	Minor	**Moderate**
(Bats) Non-threatened Species	Medium	Minor	**Minor**
(Mammals) Threatened Species - Goitered Gazelle	High	Minor	**Moderate**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Minor	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Wild Boar, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa (all confirmed)	Low	Minor	**Negligible**
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing (all confirmed)	Very High	Minor	**Major**
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara , Little Bustard (All confirmed)	High	Minor	**Moderate**
(Avifauna) Nationally-threatened Species inclu. Short-toed Snake Eagle, Golden Eagle,Mute Swan, Black Stork, Glossy Ibis(all confirmed)	High	Minor	**Moderate**
(Avifauna) Non-threatened species inclu. Western Marsh Harrier, Common Buzzard, Greylag Goose, Black-bellied Sandgrouse	Low	Minor	**Negligible**

However, the following mitigation measures will be implemented to minimize the magnitude of potential impact:

- Ensure any work conducted between dusk and dawn, that requires artificial light, is essential.
- Minimize external lighting as much as possible, only using minimal amounts as required for Health and Safety.
- Ensure lighting is fit for purpose and duration of lighting to be controlled and minimized as much as possible.
- Lights will be shielded and faced into the site to prevent light spill and glare onto adjacent habitat.
- Consider use of light sources with minimal ultraviolet and blue light wavelengths – favoring white light with neutral to warm colours.

With the above measures, the **residual** significance is presented in the following table.

Table 9-58 Residual Significance of Light Pollution

Receptor	Value/ Sensitivity	Magnitude	Residual
(Herptiles) Threatened Species - Central Asian Tortoise	High	Negligible	**Minor**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Negligible	**Negligible**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer (all confirmed)	Low	Negligible	**Negligible**
(Bats) Nationally Important or Endemic Species - European Free-tailed Bat	High	Negligible	**Minor**
(Bats) Non-threatened Species	Medium	Negligible	**Negligible**
(Mammals) Threatened Species - Goitered Gazelle	High	Negligible	**Minor**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Negligible	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Wild Boar, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa (all confirmed)	Low	Negligible	**Negligible**
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing (all confirmed)	Very High	Negligible	**Minor**
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara , Little Bustard (All confirmed)	High	Negligible	**Minor**
(Avifauna) Nationally-threatened Species inclu. Short-toed Snake Eagle, Golden Eagle, Mute Swan, Black Stork, Glossy Ibis(all confirmed)	High	Negligible	**Minor**
(Avifauna) Non-threatened species inclu. Western Marsh Harrier, Common Buzzard, Greylag Goose, Black-bellied Sandgrouse	Low	Negligible	**Negligible**

Contamination

Fuels and solvents will be used during construction activities and maintenance. Improper use, storage and handling can result in chemical spills and contamination of the soil and groundwater. Flora and fauna that come into contact may become ill or die.

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 9-59 Significance of Contamination

Receptor	Value/ Sensitivity	Magnitude	Significance
(Natural Habitat) Sandy and sabulous-loamy desert plain	High	Minor	**Moderate**
(Natural Habitat) Fixed and semi-fixed sands	High	Minor	**Moderate**
(Natural Habitat) Saline lands	High	Minor	**Moderate**
(Modified Habitat) Fallow lands and farmsteads	Low	Minor	**Negligible**
(Flora) Threatened Species - *Tulipa lehmanniana*	High	Minor	**Moderate**
(Flora) Nationally Threatened and Protected Species - *Caligonium zakirovii* , *Eremostachys eriolarynx*	High	Minor	**Moderate**
(Flora) Least concern species	Low	Minor	**Negligible**
(Herptiles) Threatened Species - Central Asian Tortoise	High	Minor	**Moderate**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Minor	**Minor**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer (all confirmed)	Low	Minor	**Negligible**
(Bats) Nationally Important or Endemic Species - European Free-tailed Bat	High	Minor	**Moderate**
(Bats) Non-threatened Species	Medium	Minor	**Minor**
(Mammals) Threatened Species - Goitered Gazelle	High	Minor	**Moderate**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Minor	**Negligible**
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Wild Boar, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa (all confirmed)	Low	Minor	**Negligible**
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing (all confirmed)	Very High	Minor	**Moderate**
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara , Little Bustard (All confirmed)	High	Minor	**Moderate**
(Avifauna) Nationally-threatened Species inclu. Short-toed Snake Eagle, Golden	High	Minor	**Moderate**

Receptor	Value/ Sensitivity	Magnitude	Significance
Eagle, Mute Swan, Black Stork, Glossy Ibis(all confirmed)			
(Avifauna) Non-threatened species inclu. Western Marsh Harrier, Common Buzzard, Greylag Goose, Black-bellied Sandgrouse	Low	Minor	**Negligible**

However, the following mitigation measures will be implemented to reduce the risks from these potential impacts:

- Refer to hazardous materials control measures, emergency action plan and spill prevention and clean up measures.

With the above measures, the **residual** significance is presented in the following table.

Table 9-60 Residual Significance of Contamination

Receptor	Value/ Sensitivity	Magnitude	Residual
(Natural Habitat) Sandy and sabulous-loamy desert plain	High	Negligible	**Minor**
(Natural Habitat) Fixed and semi-fixed sands	High	Negligible	**Minor**
(Natural Habitat) Saline lands	High	Negligible	**Minor**
(Modified Habitat) Fallow lands and farmsteads	Low	Negligible	**Negligible**
(Flora) Threatened Species - *Tulipa lehmanniana*	High	Negligible	**Minor**
(Flora) Nationally Threatened and Protected Species - *Caligonium zakirovii* , *Eremostachys eriolarynx*	High	Negligible	**Minor**
(Flora) Least concern species	Low	Negligible	**Negligible**
(Herptiles) Threatened Species - Central Asian Tortoise	High	Negligible	**Minor**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Negligible	**Negligible**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer (all confirmed)	Low	Negligible	**Negligible**
(Bats) Nationally Important or Endemic Species - European Free-tailed Bat	High	Negligible	**Minor**
(Bats) Non-threatened Species	Medium	Negligible	**Negligible**
(Mammals) Threatened Species - Goitered Gazelle	High	Negligible	**Minor**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Negligible	**Negligible**

Receptor	Value/ Sensitivity	Magnitude	Residual
(Mammals) Non-threatened species - Wild Boar, Grey wolf, Jungle cat, Wild Boar, Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa (all confirmed)	Low	Negligible	**Negligible**
(Avifauna) Endangered Species - inclu. Steppe Eagle, Saker Falcon, Sociable Lapwing (all confirmed)	Very High	Negligible	**Minor**
(Avifauna) Threatened Species - inlcu. Eastern Imperial Eagle, Cinereous vulture, Dalmatian Pelican, Pygmy Cormorant, Asian Houbara , Little Bustard (All confirmed)	High	Negligible	**Minor**
(Avifauna) Nationally-threatened Species inclu. Short-toed Snake Eagle, Golden Eagle,Mute Swan, Black Stork, Glossy Ibis(all confirmed)	High	Negligible	**Minor**
(Avifauna) Non-threatened species inclu. Western Marsh Harrier, Common Buzzard, Greylag Goose, Black-bellied Sandgrouse	Low	Negligible	**Negligible**

Soils

During construction earthworks and vehicle movement, soils may become compacted, which prohibits vegetation regrowth and use for burrowing. Three conservationally important flora species were recorded on site along with many burrowing species including the Central Asian Tortoise and Brandt's Hedgehog. Soil degradation could have large implications for these species. Further, removal of vegetation may cause an increase in wind-driven soil erosion, leading to loss of native soils.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 9-61 Significance of Soil Impacts

Receptor	Value/ Sensitivity	Magnitude	Significance
(Natural Habitat) Sandy and sabulous-loamy desert plain	High	Minor	**Moderate**
(Natural Habitat) Fixed and semi-fixed sands	High	Minor	**Moderate**
(Natural Habitat) Saline lands	High	Minor	**Moderate**
(Modified Habitat) Fallow lands and farmsteads	Low	Minor	**Negligible**
(Flora) Threatened Species - *Tulipa lehmanniana*	High	Minor	**Moderate**
(Flora) Nationally Threatened and Protected Species - *Caligonium zakirovii* , *Eremostachys eriolarynx*	High	Minor	**Moderate**

Receptor	Value/ Sensitivity	Magnitude	Significance
(Flora) Least concern species	Low	Minor	**Negligible**
(Herptiles) Threatened Species - Central Asian Tortoise	High	Minor	**Moderate**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Minor	**Minor**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer (all confirmed)	Low	Minor	**Negligible**
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Minor	**Negligible**
(Mammals) Non-threatened species - Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa (all confirmed)	Low	Minor	**Negligible**

However, the following mitigation measures will be implemented to reduce the risks from these potential impacts:

- Minimize construction footprint and strict controls to prevent driving out of designated corridors.
- Develop and implement a soil erosion management plan.
- Habitat restoration post-construction inclusive of topsoil replacement or soil tilling where deemed necessary to promote regrowth.

With the above measures, the residual significance is presented in the following table.

Table 9-62 Residual Significance of Soil Impacts

Receptor	Value/ Sensitivity	Magnitude	Residual
(Natural Habitat) Sandy and sabulous-loamy desert plain	High	Negligible	**Minor**
(Natural Habitat) Fixed and semi-fixed sands	High	Negligible	**Minor**
(Natural Habitat) Saline lands	High	Negligible	**Minor**
(Modified Habitat) Fallow lands and farmsteads	Low	Negligible	**Negligible**
(Flora) Threatened Species - *Tulipa lehmanniana*	High	Negligible	**Minor**
(Flora) Nationally Threatened and Protected Species - *Caligonium zakirovii* , *Eremostachys eriolarynx*	High	Negligible	**Minor**
(Flora) Least concern species	Low	Negligible	**Negligible**
(Herptiles) Threatened Species - Central Asian Tortoise	High	Negligible	**Minor**
(Herptiles) Nationally Important Species - Desert Monitor	Medium	Negligible	**Negligible**
Herptiles) Non-threatened species - Geckos, Lizards and Snakes incl. Reticulate racerunner, Toad-headed agama, and Steppe Ribbon Racer (all confirmed)	Low	Negligible	**Negligible**

Receptor	Value/ Sensitivity	Magnitude	Residual
(Mammals) Nationally threatened Species - Brandt's hedgehog	Low	Negligible	**Negligible**
(Mammals) Non-threatened species - Long-eared Hedgehog, Tolai Hare, Yellow Ground Squirrel, Small Five-toed Jerboa (all confirmed)	Low	Negligible	**Negligible**

9.5.2 Operation Phase

9.5.2.1 Ecosystem Function

Habitat Fragmentation (Barrier Effect)

Development and operation of large-scale and linear alignment projects will fragment the landscape's existing habitats, reducing overall ecosystem connectivity and function. This in turn reduces the ability for vegetation recruitment and wildlife movement between habitat patches. Species with large home range requirements and migratory species in particular may be affected by fragmented habitat. Long-term fragmentation caused by physical barriers may also lead to a reduction in genetic exchange which is a concern for r-selected species with rapid generation turnover.

Neither the wind farm nor the OHTL will be fenced; therefore, there will be no physical barriers to movement. However, turbines may deter migratory birds who exhibit macro-scale avoidance behaviour; longer migratory movements can increase stress and lower survivorship of migrants that expend more energy to navigate around wind farms. It is also possible that some mammal species such as Goitered Gazelle and Tolai Hare may avoid the wind farm project area and proximity to wind turbines.

Migratory raptors do not exhibit macro-avoidance behaviour; (in fact, this is the reason that migratory raptors are at high risk for turbine collision); thus habitat fragmentation from the presence of migratory movement barriers is not considered to apply to raptors.

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 9-63 Significance of Habitat Fragmentation

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Avifauna) Threatened Species - Waterbirds - Marbled Teal (not confirmed), Dalmatian Pelican, Pygmy Cormorant	High	Minor	**Minor**
(Avifauna) Nationally-threatened Species – Groundbirds- Houbara Bustard	High	Minor	**Minor**

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Avifauna) Nationally-threatened Species - Waterbirds - Dalmatian Pelican, Mute Swan, Black Stork	High	Minor	**Minor**
Non-threatened Species - Waterbirds incl. Black Stork, Greylag Goose, Common Crane	Low	Minor	**Negligible**
Threatened Mammals – Goitered Gazelle	High	Minor	**Minor**
Non-threated Mammals – Tolai Hare	Low	Minor	**Negligible**

9.5.2.2 Biodiversity Loss

Turbine Collision -Birds

Wind Farms pose a unique threat to birds due to the potential for collision with moving turbines. It has been well documented at existing wind farm developments that turbine collisions result in mortality of birds. However, the magnitude of risk and significance of the potential impact is highly dependent upon the location of the wind farm and landscape context, spatial layout, height and length of turbines, and the types and numbers of birds present. In order to assess the potential impacts, separate assessments are undertaken which are species-specific, location specific and season-specific.

- Generally, larger soaring birds and 'poor fliers' with high wing-loading are thought to be at higher risk.
- Migratory individuals are at higher risk than residents.
- Raptors have restricted forward field of view that may reduce visibility of turbines and avoidance ability.
- Research indicates that many migratory birds, particularly waterfowl, potentially avoid wind farms at macro scales.

Raptor Nest Search Surveys of the project area and a 5km buffer zone indicate that the project area itself is unsuitable for unsuitable for breeding species such as Egyptian Vulture, Golden Eagle and Eastern Imperial Eagle. However, one active nest of Egyptian Vulture was observed in April 2024 in the cliffs on the southern border of Lake Ayakagytma. This nest is located 7km away from the nearest turbine. Further survey efforts indicated that the nest was later abandoned in the season.

Two inactive nests were also recorded in the nest search surveys of April 2024. One of the two inactive nests is located 7km away from the nearest turbine whereas the second inactive nest is 4.83km away from the nearest turbine.

1 breeding pair of Western Marsh Harrier was recorded in the project site during the waterbird surveys in months of April and May 2024 with another three pairs recorded beyond the boundary of the project within the 5km buffer zone.

Waterbird surveys (April-May 2024) in the project area indicate the presence 4 breeding pairs of Western Marsh Harrier in dense reed beds with one pair within the project area and three just beyond boundary of the project within the 5km buffer zone.

Quantitative assessment of the Seasonal Vantage Point Surveys was undertaken by utilizing a Collision Risk Model (CRM) developed as per SNH Guidelines, using *Band et. al* predictive modelling. (Detailed methodology and results for the CRM is available in Interim Bird Report, **Appendix H**).

It is important to note that avoidance rates are predicted and have a large weight on the final collision risk predictions. Further, avoidance behaviour is not only species-specific but may also be influenced by (1) turbine locations and (2) weather conditions (visibility / flight ability). Therefore, even low predicted collision rates do not exclude the need for adaptive mitigation approaches (detailed subsequently).

The CRM for the species of concern is presented below.

Table 9-64 Estimated Rates of Collisions Year for Bird Species at the Gijduvon Wind Farm

English Common Name	Using lower bound CA values for each season		Using most realistic CA values for each season	
	Collisions/year	Years to 1 collision	Collisions/year	Years to 1 collision
Tier 1 Target Species				
Asian Houbara	0	n/a	0	n/a
Sociable Lapwing	0	n/a	0	n/a
Dalmatian Pelican	0.313	3.19	0.156	6.39
Cinereous Vulture	0.000288	3460	0.000144	6930
Short-toed Snake Eagle	0.00222	450	0.000528	1890
Greater Spotted Eagle	0.000386	2590	0.0000919	10800
Booted Eagle	0.00178	561	0.000424	2350
Steppe Eagle	0.0686	14.5	0.0163	61.2
Imperial Eagle	0.00295	339	0.000701	1420
Golden Eagle	0.000282	3540	0.0000672	14800
Unidentified Eagle	0.000818	1220	0.000195	5130
White-tailed Eagle	0.00207	483	0.000186	5370
Saker Falcon	0	n/a	0	n/a
Tier 2 Target Species				

English Common Name	Using lower bound CA values for each season		Using most realistic CA values for each season	
	Collisions/year	Years to 1 collision	Collisions/year	Years to 1 collision
Graylag Goose	0.225	4.45	0.112	8.90
Mute Swan	0.00386	259	0.000772	1290
Green-winged Teal	1.84	<1	0.918	1.08
Black-bellied Sandgrouse	0.102	9.82	0.0509	19.6
Little bustard	0	n/a	0	n/a
Demoiselle Crane	0.179	5.58	0.0895	11.1
Common Crane	0	n/a	0	n/a
Northern Lapwing	0	n/a	0	n/a
Black Stork	0.00198	504	0.000991	1000
Glossy Ibis	0	n/a	0	n/a
Great Egret	0	n/a	0	n/a
Gray Heron	0	n/a	0	n/a
Eurasian Sparrowhawk	0.00514	194	0.00103	973
Western Marsh Harrier	0.253	3.94	0.0253	39.4
Hen Harrier	0.0614	16.2	0.00614	162
Pallid Harrier	0	n/a	0	n/a
Montagu's Harrier	0	n/a	0	n/a
Unidentified Harrier	0	n/a	0	n/a
Black Kite	0	n/a	0	n/a
Common Buzzard	0.0104	95.7	0.00209	478
Long-legged Buzzard	0.111	8.97	0.0223	44.8
Upland Buzzard	0	n/a	0	n/a
Eastern Buzzard	0	n/a	0	n/a
Unidentified Buzzard	0.00429	233	0.000858	1160
Lesser Kestrel	0.0934	10.7	0.00301	331
Eurasian Kestrel	0.182	5.48	0.00588	170
Merlin	0	n/a	0	n/a

Overall, the seasonal and year-round impacts to all target species at the project area are low. Of the primary target species, Dalmatian Pelican (*Pelecanus crispus*) was at the highest risk, with one collision predicted every 3 years under the most realistic CA value scenario, occurring primarily in winter. However, this estimated collision risk is low enough to suggest that biologically significant collision impacts for Dalmatian Pelicans are not likely for the project site.

Steppe Eagle (*Aquila nipalensis*) had the second highest risk, with one collision predicted every 14 years. In spite of the low predicted collision risk, we note that the relatively large number of flights of Steppe Eagle recorded at the site (262) indicates that collision risk for this species could be a significant risk factor for the Project, but we also note that this collision risk prediction

resulted from the relatively direct and short-duration of this species' autumn migratory transit flights over the site, as well as the high altitude of many such flights. All other primary target species are expected to experience fewer than one collision every 140 years under the most realistic CA value scenario.

Predicted risk for secondary species was similarly low, with the highest risk species (Green-winged Teal; *Anas crecca*) expected to generate 1.83 collisions per year under the most realistic CA value scenario, primarily during autumn migration. The two other species expected to generate roughly one collision per 5 years are Graylag Goose (*Anser anser*) and Western Marsh Harrier (*Circus aeruginosus*), closely followed by Eurasian Kestrel (*Falco tinnunculus*), with one predicted collision every 5.48 years. All four of these secondary species are widespread and abundant species with no elevated conservation status, hence predicted collision levels would not be expected to generate biologically significant impacts.

Table 9-65 Significance of Turbine Collision (Birds)

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Avifauna) Endangered Species - Raptors - Steppe Eagle	Very High	Moderate	**Major**
(Avifauna) Endangered Species - Raptors - Saker Falcon	Very High	No Change	**Neutral**
(Avifauna) Endangered Species - Waterbirds - Sociable Lapwing	Very High	No Change	**Neutral**
(Avifauna) Threatened Species - Raptors - Greater Spotted Eagle, Eastern Imperial Eagle, Cinereous vulture, Pallid Harrier	High	Minor	**Moderate**
(Avifauna) Threatened Species - Waterbirds - Dalmatian Pelican	High	Moderate	**Moderate**
(Avifauna)Threatened Species - Groundbirds - Asian Houbara, Little Bustard	High	No Change	**Neutral**
(Avifauna) Nationally-threatened Species - Raptors - Short-toed Snake Eagle, Golden Eagle, White-tailed Sea eagle, Lesser Kestrel, Booted Eagle, Pallid Harrier	High	Minor	**Moderate**
(Avifauna) Nationally-threatened Species - Waterbirds - Mute Swan, Black Stork	High	Minor	**Moderate**
(Avifauna) Non-threatened species - Raptors incl. Western Marsh Harrier Eastern Buzzard, Common Buzzard, Long-legged Buzzard	Low	Moderate	**Minor**
Non-threatened Species - Waterbirds incl. Greylag Goose, Green Winged Teal	Low	Moderate	**Minor**

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Avifauna) Non-threatened Species - Ground birds - Black-bellied Sandgrouse	Low	Minor	**Negligible**

However, the following measures will be implemented to reduce the risks from these potential impacts:

- A Post Construction Fatality Monitoring Plan will be in place to include carcass searches and mortality rate calculations for the Wind Turbines. The Fatality Monitoring will be continued for up to 3 years or until the risk to birds and bats species is considered 'negligible' in consultation with the lenders.
- Quantitative 'take' thresholds developed as per Potential Biological Removal (PBR) approach will be calculated for each species prior to the operation phase. Surpassing these thresholds would trigger the adaptive management response to review the situation, identify mitigation upscaling, control tightening, or offsetting as options to course correct.

In the event that Post Construction Fatality Monitoring triggered adaptive measures, the following residual significance would be expected.

Table 9-66 Residual Significance of Turbine Collision (Birds)

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Avifauna) Endangered Species - Raptors - Steppe Eagle	Very High	Negligible	**Minor**
(Avifauna) Endangered Species - Raptors - Saker Falcon	Very High	No Change	**Neutral**
(Avifauna) Endangered Species - Waterbirds - Sociable Lapwing	Very High	No Change	**Neutral**
(Avifauna) Threatened Species - Raptors - Greater Spotted Eagle, Eastern Imperial Eagle, Cinereous vulture, Pallid Harrier	High	Negligible	**Minor**
(Avifauna) Threatened Species - Waterbirds - Dalmatian Pelican	High	Negligible	**Minor**
(Avifauna)Threatened Species - Groundbirds - Asian Houbara, Little Bustard	High	No Change	**Neutral**
(Avifauna) Nationally - threatened Species - Raptors - Short-toed Snake Eagle, Golden Eagle, White-tailed Sea eagle, Lesser Kestrel, Booted Eagle, Pallid Harrier	High	Negligible	**Minor**
(Avifauna) Nationally-threatened Species - Waterbirds - Mute Swan, Black Stork	High	Negligible	**Minor**
(Avifauna) Non-threatened species - Raptors incl. Western Marsh Harrier Eastern Buzzard, Common Buzzard, Long-legged Buzzard	Low	Minor	**Negligible**

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
Non-threatened Species - Waterbirds incl. Greylag goose, Green Winged Teal	Low	Minor	**Negligible**
(Avifauna) Non-threatened Species - Ground birds - Black-bellied Sandgrouse	Low	Negligible	**Negligible**

Turbine Collision – Bats

Bat fatalities from wind turbine collisions are documented world-wide. However, considering that bats rarely collide with other man-made structures, the driving forces behind this is still unknown. The patterns that have been observed thus far include:

- Migratory bats making long-distance movements are at higher risk of collision than resident "sedentary" bats.
- "Tree" bats, those that roost in trees, are at higher risk of collision fatalities.
- The majority of fatalities occur during late summer and autumn, which coincides with breeding, increased foraging, and migration.
- Collision Risk is higher for species adapted for foraging insects in open spaces.
- Wind turbines may be acting as an attractant to specific bat species. A recent study undertaken in England found that *P. pipistrellus* activity was 37% higher at turbines than at control locations, whereas *P. pygmaeus* activity was consistent with no attraction or repulsion by turbines. This may be due to the attraction of aerial insects to lights and heat associated with turbines.
- Fatalities increase at low wind speeds, and before and after the passage of storm fronts.
- Mortality increases with turbine tower height and rotor diameter.
- Barotrauma does not appear to be a significant contributing factor to mortality.
- Sensitivity to wind turbine collision is strongly influenced by preferred flight altitudes, with lower flying species at less risk of collision than higher flying species.
    - Vespertilio murinus and Tadarida sp. (25-200 m, majority activity at 50-100 m (Voigt etal., 2021, Roemer et al., 2017) are a high-flying species (open space aerial foragers);
    - Eptesicus and Pipistrellus species (5-65 m and above (Wellig et al., 2018)) are a medium-flying species;
    - Rhinolophus sp, Plecotus sp. and Myotis sp. are almost always low-flying species at ground level (Roemer et al., 2017).

The magnitude and unmitigated significance calculations are presented in the table below.

Table 9-67 Significance of Bat Turbine Collision Impact

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
Nationally Threatened Species European Free-tailed Bat (*Tadarida tenitotis*)	High	Moderate	**Major**
Non Threatened Species Parti-colored Bat (*Vespertilio murinus*)	Medium	Moderate	**Moderate**
Non Threatened Species Serotine Species (*Eptesicus ognevi, Eptesicus serotinus*)	Medium	Moderate	**Moderate**
Non Threatened Species Pipistrelle Species (*Pipistrellus pipistrellus, Pipistrellus kuhlii*)	Medium	Moderate	**Moderate**
Non Threatened Species Plecotus Species (*Plecotus turkmenicus, Plecotus strelkovi*)	Medium	Minor	**Minor**
Non Threatened Species Myotis Species (*M. blythii, M. emarginatus, M. bucharensis, M.capaccini, M. davidii*)	Medium	Minor	**Minor**
Non Threatened Species Bokhara Horseshoe Bat (*Rhinolophus bocharicus*)	Medium	Minor	**Minor**

However, the following mitigation measures will be implemented to reduce the risks from these potential impacts:

- Upfront cut-in speed curtailment of turbines BSH2-19, BSH2-20 and BSH2-21and BSH2-16, BSH2-17 and BSH2-18 within the highest activity period.
- Integration of adaptive management such that the findings of fatality monitoring will be used to determine the best cut in speed curtailment regime so that it may be modified if needed.
- A **Post Construction Fatality Monitoring Plan** will be in place to include carcass searches and mortality rate calculations for the Wind Turbines. The Fatality Monitoring will be continued for up to 3 years or until the risk to birds and bats species is considered 'negligible' in consultation with the lenders.
- If applicable, based on the results of post commissioning Fatality Monitoring, quantitative 'take' thresholds developed as per Potential Biological Removal (PBR) approach may need to be calculated for each species. Surpassing these thresholds would trigger the adaptive management response to review the situation, identify mitigation upscaling, control tightening, or offsetting as required.
- Prevention of elements that may attract bats, or insects and therefore bats:
    - All wind turbines, particularly the nacelles, should be designed, constructed and maintained in such a manner that they do not support roosting bats – all the gaps and interstices should be made inaccessible to bats.
    - Use lighting only as needed and use wavelengths and designs such as low UV LED bulbs that do not attract insects or bats; Bright white or bluish lights (mercury vapor, white incandescent and white florescent) are the most

attractive to insects. Yellowish, pinkish, or orange (sodium vapor, halogen, dichroic yellow) are the least attractive to most insects. Low UV LED bulbs are less attractive because they produce low heat and long wavelengths of light as well as little or no ultraviolet radiation.

- Prevent retention of water and growth of weeds/shrub as well as hedges and shrubs that may attract insects in the immediate vicinity.

With the above measures, the residual significance is presented in the following table.

Table 9-68 Residual Significance of Bat Turbine Collision Impact

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
Nationally Threatened Species European Free-tailed Bat (*Tadarida tenitotis*)	High	Negligible	**Minor**
Non-Threatened Species Parti-colored Bat (*Vespertilio murinus*)	Medium	Negligible	**Negligible**
Non-Threatened Species Serotine Species (*Eptesicus ognevi, Eptesicus serotinus*)	Medium	Negligible	**Negligible**
Non-Threatened Species Pipistrelle Species (*Pipistrellus pipistrellus, Pipistrellus kuhlii*)	Medium	Negligible	**Negligible**
Non-Threatened Species Plecotus Species (*Plecotus turkmenicus, Plecotus strelkovi*)	Medium	Negligible	**Negligible**
Non-Threatened Species Myotis Species (*M. blythii, M. emarginatus, M. bucharensis, M.capaccini, M. davidii*)	Medium	Negligible	**Negligible**
Non-Threatened Species Bokhara Horseshoe Bat (*Rhinolophus bocharicus*)	Medium	Negligible	**Negligible**

OHTL Electrocution - Birds

Power transmission lines present potential electrocution risk to birds. In particular, larger-bodied birds which tend to prefer perching at high altitudes such as raptors, including eagles and vultures, have the highest risk for electrocution, as larger wingspans create the opportunity for span the distance between energized and ground components of power lines. Further compounding the impact is the fact that many of these species are K-selected with low reproductive rates, so additive mortality is of significance. For many endangered species worldwide, electrocution by powerlines is considered to be the number one conservation threat contributing to population decline.

Based on size, behaviour, and records from literature, the following categorizes the electrocution risk of the identified species of concern that may occur within the project site.

Table 9-69 Electrocution Risk of various Bird Species

GROUPING VALUE	SPECIES OF CONCERN *(IDENTIFIED/SUSPECTED)*	WINGSPAN	PERCHING BEHAVIOUR	ELECTROCUTION RISK *(I=UN LIKELY; II=POSSIBLE; III=HIGHLY PROBABLE)*
Endangered Birds: Highly Sensitive Raptors	Steppe Eagle	Large	Yes	III
	Egyptian Vulture	Large	Yes	III
	Pallas's Fish Eagle	Large	Yes	III
	Saker Falcon	Medium	Yes	III
Endangered Birds: Highly Sensitive Groundbirds	Great Bustard	Medium	No	II
Endangered Birds: Waterbirds and Waders	White-headed Duck	Medium	No	I
	Sociable Lapwing	Small	No	I
Threatened Birds: Sensitive Raptors	Cinereous Vulture	Large	Yes	III
	Eastern Imperial Eagle	Large	Yes	III
	Greater Spotted Eagle	Large	Yes	III
	Pallid Harrier	Medium	Yes	III
	Short-toed Snake Eagle	Large	Yes	III
	White-tailed Sea Eagle	Large	Yes	III
	Booted Eagle	Large	Yes	III
	Peregrine Falcon	Medium	Yes	III
	Lesser Kestrel	Medium	Yes	III
Threatened Birds: Sensitive Waterbirds and Waders	Dalmatian Pelican	Large	No	II
	Mute Swan	Large	No	II
	Glossy Ibis	Large	No	II
	Squacco Heron	Large	No	I
	Lesser White-fronted Goose	Medium	No	I
	Marbled Teal	Medium	No	I
	Eurasian Curlew	Medium	No	I
Threatened Birds: Sensitive Groundbirds	Asian Houbara	Medium	No	I
	Little Bustard	Small	No	I
	Black Kite	Medium	Yes	III

Grouping Value	Species of Concern (identified/suspected)	Wingspan	Perching Behaviour	Electrocution Risk (I=un likely; II=possible; III=highly probable)
Non-threatened Raptors	Common Buzzard	Large	Yes	III
	Griffon Vulture	Large	Yes	III
	Long-legged Buzzard	Large	Yes	III
	White-tailed Sea Eagle	Large	Yes	III
	Western Marsh Harrier	Medium	No	I
	Eastern Buzzard	Medium	Yes	II
	Long-legged Buzzard	Medium	Yes	II
	Osprey	Medium	Yes	I
	Eurasian Eagle-owl	Large	Yes	III
	Merlin	Medium	Yes	II
	Little Owl	Small	Yes	I
	Montagu's Harrier	Medium	Yes	II
	Eurasian Sparrowhawk	Medium	Yes	II
	Hen Harrier	Medium	Yes	II
	Eurasian Kestrel	Medium	Yes	I
	Lesser Kestrel	Medium	Yes	I

However, impacts due to OHTL electrocution is considered to be minimal due to the short length of the OHTL (approx. 1.5km), minimal number of pylons and therefore lesser opportunities for perching.

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 9-70 Significance of Bird OHTL Electrocution Impact

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Avifauna) Endangered Species - Raptors - Steppe Eagle, Egyptian Vulture, Saker Falcon	Very High	Moderate	**Major**
(Avifauna) Endangered Species - Waterbirds - Sociable Lapwing	Very High	Minor	**Major**
(Avifauna) Threatened Species - Raptors - Greater Spotted Eagle, Eastern Imperial Eagle, Cinereous vulture, Pallid Harrier	High	Moderate	**Major**
(Avifauna) Threatened Species - Waterbirds - Dalmatian Pelican, Pygmy Cormorant	High	Minor	**Moderate**

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Avifauna)Threatened Species - Groundbirds - Asian Houbara, Little Bustard	High	Minor	**Moderate**
(Avifauna) Nationally-threatened Species - Raptors - Short-toed Snake Eagle, Golden Eagle, White-tailed Sea eagle, Lesser Kestrel, Booted Eagle, Pallid Harrier	High	Moderate	**Major**
(Avifauna) Nationally-threatened Species - Waterbirds - Dalmatian Pelican, Mute Swan, Black Stork, Glossy Ibis	High	Minor	**Moderate**
(Avifauna) Non-threatened species - Raptors incl. Eastern Buzzard, Common Buzzard, Long-legged Buzzard	Low	Major	**Moderate**
Non-threatened Species - Waterbirds incl. Black Stork, Greylag Goose, Common Crane	Low	Minor	**Negligible**
(Avifauna) Non-threatened Species - Ground birds - Black-bellied Sandgrouse	Low	Minor	**Negligible**

The optimal design mitigation to completely remove electrocution risk is to bury the lines. However, this is not always possible and comes with other associated impacts. Therefore, for above-ground designs, the following mitigation measures will be implemented to reduce the risks from these potential impacts:

- **Post Construction Fatality Monitoring Plan** will be in place to include carcass searches and will be continued for up to 1 year or until the risk to birds is considered 'negligible' in consultation with the lenders
- Ensure a safe design of the cross arm and related equipment (separate energized conductors and grounded hardware distances by more than largest species wingspan);
- Use suspended insulators and avoid pin and dead-end/strain insulators;
- Ensure safe distance (more than the largest species wingspan) between suspended conductor/jumper wire and lower branch in the cross arm;
- In the configurations with high electrocution risk (derivations, tap, transformer and switch poles and its connected grounded wires and jumpers) all grounded elements should be insulated, and grounded wires and jumpers should be sheathed wires; and
- Design should be as per recommendations provided in Reference Note: Quick Guidance for Preventing Electrocution Impacts on Birds, Initiated by International Association for Falconry and Conservation of Birds of Prey.

With the above measures, the **residual** significance is presented in the following table.

Table 9-71 Residual Significance of Bird OHTL Electrocution Impact

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Avifauna) Endangered Species - Raptors - Steppe Eagle, Egyptian Vulture, Saker Falcon	Very High	Negligible	**Minor**
(Avifauna) Endangered Species - Waterbirds - Sociable Lapwing	Very High	Negligible	**Minor**
(Avifauna) Threatened Species - Raptors - Greater Spotted Eagle, Eastern Imperial Eagle, Cinereous vulture, Pallid Harrier	High	Negligible	**Minor**
(Avifauna) Threatened Species - Waterbirds - Dalmatian Pelican, Pygmy Cormorant	High	Negligible	**Minor**
(Avifauna)Threatened Species - Groundbirds - Asian Houbara, Little Bustard	High	Negligible	**Minor**
(Avifauna) Nationally-threatened Species - Raptors - Short-toed Snake Eagle, Golden Eagle, White-tailed Sea eagle, Lesser Kestrel, Booted Eagle, Pallid Harrier	High	Negligible	**Minor**
(Avifauna) Nationally-threatened Species - Waterbirds - Dalmatian Pelican, Mute Swan, Black Stork, Glossy Ibis	High	Negligible	**Minor**
(Avifauna) Non-threatened species - Raptors incl. Eastern Buzzard, Common Buzzard, Long-legged Buzzard	Low	Negligible	**Negligible**
Non-threatened Species - Waterbirds incl. Black Stork, Greylag Goose, Common Crane	Low	Negligible	**Negligible**
(Avifauna) Non-threatened Species - Ground birds - Black-bellied Sandgrouse	Low	Negligible	**Negligible**

9.5.2.2.1 OHTL Collision - Birds

Thin, dark wires used in overhead transmission lines, as well as guy lines for weather masts, are visually difficult to detect. Bird mortality by collisions with these wires are documented for a variety of species.

In the case of power lines, the bird collides with one of the wires, generally the earth wire, which is less visible. Particularly at risk are birds migrating between 20-50m altitude, birds flying at night, birds flying in flocks, and / or large and heavy birds of limited manoeuvrability.

For the most part, it is the inability to see the thin wires that is attributed to the reason behind collision and thus visual markers are the primarily design mitigation that is recommended. However, there are some species that have extensive blind regions in the frontal hemisphere which fly with deep forward pitch (downward angle of the head, presumably while searching for roosting or foraging opportunities); such as bustards and cranes. Further, birds that fly upwards from the ground at an angle, such as bustards, are highly susceptible to collisions

during take-off or as a result of 'panic flight' flushing. These types of birds may not detect even highly visible powerlines and thus collision may still be imminent even with bird markers.

Based on morphology, behaviour, and records from literature, the following categorizes the collision risk of the identified species of concern that may occur within the project site.

Table 9-72 OHTL Collision Risk of Various Bird Species

Grouping Value	Species of Concern (identified/suspected)	Risky Flight Indicators	Collision Risk (I=un likely; II=possible; III=highly probable)
Endangered Birds: Highly Sensitive Raptors (VH Value)	Steppe Eagle	Migratory	I
	Egyptian Vulture	Poor Manoeuvrability Large-bodied Migratory	II
	Saker Falcon	Low Altitude	I
Endangered Birds: Highly Sensitive Waterbirds (VH Value)	Sociable Lapwing	Migratory Low Altitude	I
Threatened Birds: Sensitive Raptors (H Value)	Cinereous Vulture	Poor Manoeuvrability Large-bodied Migratory	II
	Eastern Imperial Eagle	Migratory	I
	Greater Spotted Eagle	Migratory	I
	Pallid Harrier	Migratory	I
Threatened Birds: Sensitive Waterbirds (H Value)	Dalmatian Pelican	Poor Manoeuvrability Large-bodied Migratory Low Visual Detectability	III
	Pygmy Cormorant	Poor Manoeuvrability Migratory	II
Threatened Birds: Sensitive Groundbirds (H Value)	Little Bustard	Poor Manoeuvrability Migratory Low Altitude Low Visual Detectability	III
	Houbara Bustard	Poor Manoeuvrability Low Visual Detectability Low Altitude	III
Non-threatened Raptors	Black Kite	Migratory	I
	Eurasian Sparrowhawk	Migratory	II
	Hen Harrier	Migratory	II
	Western Marsh-Harrier	Migratory	II
	Long-legged Buzzard	Migratory	II

Grouping Value	Species of Concern (identified/suspected)	Risky Flight Indicators	Collision Risk (I=un likely; II=possible; III=highly probable)
	Eurasian Kestrel	Migratory	II
	Lesser Kestrel	Low Altitude	I
	Eastern Buzzard	Migratory	II
	Common Buzzard	Migratory	II
	Upland Buzzard	Migratory	II
	Montagu's Harrier	Migratory	II
	Little Owl	Low Altitude	I
	Merlin	Migratory	II
	Eurasian Eagle-owl	Low Altitude	I
	Osprey	Migratory	II

However, impacts due to OHTL collision is considered to be minimal due to the short span of the OHTL (approx. 1.5km)

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 9-73 Significance of Bird OHTL Collision Impact

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Avifauna) Endangered Species - Raptors - Steppe Eagle, Egyptian Vulture, Saker Falcon	Very High	Minor	**Major**
(Avifauna) Endangered Species - Sociable Lapwings	Very High	Minor	**Major**
(Avifauna) Threatened Species - Raptors - Greater Spotted Eagle, Eastern Imperial Eagle, Cinereous vulture, Pallid Harrier	High	Minor	**Moderate**
(Avifauna) Threatened Species - Waterbirds - Marbled Teal (not confirmed), Dalmatian Pelican, Pygmy Cormorant	High	Minor	**Moderate**
(Avifauna)Threatened Species - Groundbirds - Asian Houbara, Little Bustard	High	Minor	**Moderate**
(Avifauna) Nationally-threatened Species - Raptors - Short-toed Snake Eagle, Golden Eagle, White-tailed Sea eagle, Lesser Kestrel, Booted Eagle, Pallid Harrier	High	Minor	**Moderate**
(Avifauna) Nationally-threatened Species - Waterbirds - Dalmatian Pelican, Mute Swan, Black Stork, Glossy Ibis	High	Minor	**Moderate**
(Avifauna) Non-threatened species - Raptors incl. Eastern Buzzard, Common Buzzard, Long-legged Buzzard	Low	Minor	**Negligible**

Receptor / Group	Value/ Sensitivity	Magnitude	Unmitigated Significance
(Avifauna) Non-threatened Species - Waterbirds incl. Black Stork, Greylag Goose, Common Crane	Low	Minor	**Negligible**
(Avifauna) Non-threatened Species - Ground birds - Black-bellied Sandgrouse	Low	Minor	**Negligible**

The optimal design mitigation to completely remove electrocution risk is to bury the lines. However, this is not always possible and comes with other associated impacts. Therefore, for above-ground designs, the following measures will be implemented to reduce the risks from these potential impacts:

- **A Post Construction Fatality Monitoring Plan** will be in place to include carcass searches will be continued for up to 1 year or until the risk to birds and bats is considered 'negligible' in consultation with the lenders
- Removing the thin neutral or earth (shield) wire above the high voltage transmission lines where feasible, and where this is not possible, marking the line to make it more visible;
- Bundling high voltage wires, and using spacers to increase visibility;
- Minimising the vertical spread of power lines. Having lines in a horizontal plane reduces collision risk;
- Depending on the location and topography, it may be suitable to have low-lying power lines which are beneath the altitude at which birds may travel;
- Using bird deflectors to increase line visibility by thickening the appearance of the line by a minimum of 20 cm over a length of 10-20cm; or using markers that are moveable, of contrasting colours (e.g. black and white), contrast with the background, protrude above and below the line, and be placed 5-10 m apart. Where bird activity is high at night, UV-light emitters may be considered.
- Any markers must be robust to allow long-term durability for the environmental conditions of exposure; maintenance plans for the OHTL should include inspections of marker devices and replacements as needed.

With the above measures, the **residual** significance is presented in the following table.

Table 9-74 Residual Significance of Bird OHTL Collision Impact

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Avifauna) Endangered Species - Raptors - Steppe Eagle, Egyptian Vulture, Saker Falcon	Very High	Negligible	**Minor**
(Avifauna) Endangered Species - - Sociable Lapwings	Very High	Negligible	**Minor**

Receptor / Group	Value/ Sensitivity	Mitigated Magnitude	Residual Significance
(Avifauna) Threatened Species - Raptors - Greater Spotted Eagle, Eastern Imperial Eagle, Cinereous vulture, Pallid Harrier	High	Negligible	**Minor**
(Avifauna) Threatened Species - Waterbirds - Marbled Teal (not confirmed), Dalmatian Pelican, Pygmy Cormorant	High	Negligible	**Minor**
(Avifauna)Threatened Species - Groundbirds - Asian Houbara, Little Bustard	High	Negligible	**Minor**
(Avifauna) Nationally-threatened Species - Raptors - Short-toed Snake Eagle, Golden Eagle, White-tailed Sea Eagle, Lesser Kestrel, Booted Eagle, Pallid Harrier	High	Negligible	**Minor**
(Avifauna) Nationally-threatened Species - Waterbirds - Dalmatian Pelican, Mute Swan, Black Stork, Glossy Ibis	High	Negligible	**Minor**
(Avifauna) Non-threatened species - Raptors incl. Eastern Buzzard, Common Buzzard, Long-legged Buzzard	Low	Negligible	**Negligible to minor**
(Avifauna) Non-threatened Species - Waterbirds incl. Black Stork, Greylag Goose, Common Crane	Low	Negligible	**Negligible to minor**
(Avifauna) Non-threatened Species - Ground birds - Black-bellied Sandgrouse	Low	Negligible	**Negligible to minor**

9.5.3 Cumulative Impacts

The CHA for Gijduvan 300MW, Bash 500MW and Bash 52MW identified three common reptiles and flora as Significant Biodiversity Values or Priority Biodiversity Features (PBFs):

- Central Asian Tortoise
- *Calligonum zakirovii*
- Eremostachys eriolarynx

No mammals were identified as SBV/PBF for the Gijduvan 300MW WF project. The cumulative impact assessment will be narrated for each category and species-specific significance will be assessed where relevant.

9.5.3.1 Cumulative Impacts on Reptiles

The PBF species included under this category are:

- Central Asian Tortoise

Southern Even-fingered Gecko suitable habitat lies within a valley to the west of the Bash Project(s) footprints. It is considered outside of the area of influence as no project activity will

occur that may impact the gecko population. No suitable habitat or geckos are found within the wind farm footprint or relevant area of influence. Therefore, cumulative impacts on this receptor have not been assessed.

From the direct development of Gijduvan 300MW, Bash 500 & 52MW WF project, the impacts of greatest significance include:

- Direct mortality via vehicular collision, excavation and earthworks
- Construction disturbance (noise, anthropogenic movement, etc) which can cause displacement as well as lowered breeding activity
- Habitat loss in the form of direct vegetation clearing and removal causing secondary impacts caused by decline in forage.

Regional and global threats also impacting Central Asian Tortoise and causing declining population trends include:

- Habitat loss, particularly affecting foraging grounds
- "Take" poaching for the pet trade
- Collisions with vehicles

The culmination of these effects is leading to a decline in wild Central Asian Tortoise populations regionally and globally.

In the context of additive pressures from the Bash 500 & 52MW WF Project, the elements of highest cumulative effect would be:

- Direct mortality

Recognizing the significance of direct mortality risk, the reptile relocation plan and programme has been implemented to capture and remove tortoises prior to earthworks throughout the construction footprint. A suitable release site was selected and a temporary fencing barrier put in place to prevent direct return of tortoises to the cleared areas. Habitat restoration will take place post-construction and the tortoises are envisioned to be able to recolonize the wind farm land, resulting in minimal long-term impacts.

Ultimately, the additive cumulative effects of mitigated impact on Central Asian Tortoise is considered to adequately managed and the residual cumulative impact is not considered to be of significance.

9.5.3.2 Cumulative Impacts on Flora

The species included under this category are:

- *Calligonum zakirovii*

- *Eremostachys eriolarynx*

From the direct development of Gijduvan 300MW, Bash 500 & 52MW WF projects, the impacts of greatest significance include:

- Direct vegetation clearing and removal
- Changes to soil conditions preventing re-colonization

Overgrazing in addition to habitat loss as a result of agriculture and development are the main regional causes in decline. Long-term climate change may also cause further range restriction and loss of suitable habitat due to extreme temperature fluctuations and drought conditions.

In order to minimize additive impact, specimens in the construction footprint are being translocated and seeds/tubers are being collected for propagation during habitat restoration post-construction.

Ultimately, the additive cumulative effects of mitigated impact on threatened flora is considered to adequately managed and the residual cumulative impact is not considered to be of significance.

9.5.3.1 Project-related Impacts

Project related impacts with regards to terrestrial ecology would be those associated with habitat loss, habitat fragmentation, biodiversity loss and displacement. However, the anticipated significance of habitat loss (based on relatively small BUA footprint of windfarms) is not considered to be significant. Seed collection and relocation programs is proposed to mitigate construction impacts on sensitive flora species.

Displacement during active construction works is temporary and it is assumed that there are available adjacent habitats for fauna to utilize during disruptive works. Habitat restoration is proposed to mitigate impacts due to displacement and habitat loss. Furthermore, neither the wind farm projects will be fenced, therefore, there will be no physical barriers to movement of non-volant fauna and fragmentation is not anticipated to occur.

Other construction phase impacts are relatively localised, such as mortality, disturbance and emissions-related impacts and it is not anticipated that they would be additive. Therefore, no cumulative impacts of significance are expected to occur to flora and non-volant fauna due to the development of the projects.

9.5.3.2 Conclusion

It is considered that given the application of sufficient mitigation, cumulative impacts on each species have been adequately managed to the best of the project's ability to ensure that the project does not have additive significant impacts on the species' in question.

9.6 Monitoring & Reporting for Compliance and Performance

The mitigation measures applied to reduce significant impacts will require a number of monitoring and reporting requirements to ensure compliance and measure performance.

Mitigation measures will be categorized into the following types:

- **Design alternatives**, wherein other design options are proposed for avoidance or reduction in environmental impacts.
- **Pre-Construction/Pre-Clearance** mitigation requirements that are relevant to the pre-construction phase of the project wherein construction site layout is designed, relocation surveys are undertaken and the construction phase environmental and social management plan is prepared.
- **Construction mitigation** wherein restrictions are made on construction methods for reduction of environmental impacts as prescribed by the **Construction Environment and Social Management Plan (CESMP)**. This could include Site Layout, Lighting Strategy, Phasing Plan, Chance Find Procedure etc. Checklists, Inspections, Monitoring, Reporting and Auditing form the compliance mechanism.
- Development of the **Biodiversity Management Plan (BMP)**, one for the LNTP & construction and one operational phases of the project which details the biodiversity-related mitigation, management and monitoring commitments as well as the assigned roles and responsibilities of the relevant implementing party. This will include the flora and fauna relocation measures, Habitat Restoration Plan, Ecological Chance Find Procedure, Post-Construction Fatality Monitoring (PCFM) aligned with the Good Practice Handbook and Decision Support Tool (IFC, EBRD, KfW 2023), etc. The BMP will also contain the action plan that ensures No Net Loss (NNL) targets for any Significant Biodiversity Values (SBV) identified by the CHA are met in a transparent manner.
- Development of **Biodiversity Action Plan (BAP)** for achieving net gain and no net loss, including offset measures for the CH trigger species.
- Development of the **Biodiversity Monitoring and Evaluation Programme (BMEP)** for construction and for operation which will demonstrate firstly compliance with biodiversity commitments and secondly effectiveness of the mitigation in achieving desired outcomes through integration of adaptive management.
- **Operational mitigation**, wherein restrictions are made on standard operating procedures for reduction of environmental impacts as prescribed by the **Operational Environment and Social Management Plan (OESMP)**. This could

include Maintenance Procedures, Lighting Strategy, Schedule/Programme, Logistics, etc. Checklists, Inspections, Monitoring, Reporting and Auditing form the compliance mechanism.

- A Front loaded mitigation plan will be required by the lenders demonstrating that mitigation is ordered (e.g., BFDs) or contracted (e.g., PCFM) sufficiently far in advance to meet Project commitments in a timely manner.

9.6.1 Design

The following outline the mitigation requirements during design phase:

- Integration of design mitigation into WTG design related lighting design and specifications, and exclusion of roosting and perching opportunities.
- Development of OHTL Mitigation Design Options (for electrocution & collision risk reduction).

9.6.2 Pre-Construction

The following outline the mitigation requirements pre-construction:

- Review of Construction Methodology
  - Delineation of construction footprint
  - Site clearance methodology
  - Timing and method of emissions-generating works
  - Lighting Strategy in accordance with Dark Skies Guidance
- Review of Solid Waste Management Strategy
- Preparation and implementation of standalone construction Biodiversity Management Plan with a Biodiversity Monitoring and Evaluation Programme, inclusive of:
  - Habitat Restoration Plan (Seed collection, Bulb relocation and post-construction habitat restoration)
  - Pre-construction survey and relocation of Central Asian Tortoise
  - Ecological Chance Find Procedure
  - Post-Construction Fatality Monitoring Plan (PCFM)
- Preparation of Biodiversity Action Plan (BAP)
- Preparation of CESMP, inclusive of:
  - General Site Controls
  - Solid Waste Control Plan
  - Chance Find Procedure
  - Dust Control Plan
  - Air Quality Control Plan

- Noise Control Plan
- Lighting Control Plan
- Vibration Control Plan
- Hazardous Materials Control Plan
- Emergency Action Plan
- Spill Prevention and Clean-up Procedures

9.6.3 Construction

The following outline the mitigation requirements during construction:

- The EPC will employ a full-time site-based Ecologist to ensure that ecology related measures are carried out in full.
- Implementation of the construction Biodiversity Management Plan with a Biodiversity Monitoring and Evaluation Programme, inclusive of:
  - Ecological Chance Find Procedure
  - Action plan for NNL
  - Adaptive Management Strategy
- Preparation and Implementation of CESMP including:
  - Daily Checklist
  - Weekly Inspection
  - Monthly Reporting
  - Quarterly Auditing

9.6.4 Pre-operation

The following outline the mitigation requirements post-construction:

- Implementation of Post- construction Habitat Restoration
  - Carrying out restoration works
  - Post-restoration survey
- Preparation of standalone operation Biodiversity Management Plan with a Biodiversity Monitoring and Evaluation Programme, inclusive of:
  - Cut-in Speed Curtailment Plan for Bats
  - Bat acoustic monitoring program including deployment of acoustic recorders at nacelle height and lower altitudes
  - Post Construction Fatality Monitoring Plan: Three years of monitoring to be done across turbines and powerlines to capture data on mortalities and provide adaptive management if needed
  - Adaptive Management Strategy inclusive of adaptive mitigation measures for turbine collisions

- Action plan for NNL

9.6.5 Commissioning & Operation

The following outline the mitigation requirements:

- Implementation of Post- construction Habitat Restoration
  - Carrying out restoration works
  - Post-restoration survey
- Preparation and Implementation of OESMP, inclusive of:
  - General Site Controls
  - Noise Control Plan
  - Lighting Control Plan in accordance with Dark Skies Guidance (taking into consideration H&S and security)
  - Solid Waste Control Plan
  - Landscaping Maintenance, if applicable
- Implementation of operational Biodiversity Management Plan with a Biodiversity Monitoring and Evaluation Programme inclusive of:
  - Cut-in Speed Curtailment Plan for Bats
  - Bat acoustic monitoring program including deployment of acoustic recorders at nacelle height and lower altitudes
  - Post Construction Fatality Monitoring Plan: Three years of monitoring to be done across turbines and 1 year of monitoring to be done at powerlines to capture data on mortalities and provide adaptive management if needed
  - Adaptive Management Strategy inclusive of adaptive mitigation measures for turbine collisions
  - Action plan for NNL
- The O&M will employ a full-time site-based Ecologist to ensure that ecology related measures and monitoring are carried out in full.
- Compliance checks and reporting include:
  - Daily Checklist
  - Weekly Inspection
  - Monthly Reporting
  - Quarterly Auditing

10 LANDSCAPE, VISUAL AND SHADOW FLICKER IMPACTS

10.1 Applicable Requirements & Standards

10.1.1 National Regulations

Specific legislation in regard to landscape and visual impacts is not known to exist in Uzbekistan and there are no specific requirements for this linked to lender guidelines. However, any Project activities/design that could impact cultural resources may need to be assessed in the context of that cultural resource.

10.1.2 Lender Requirements

10.1.2.1 ADB

The SPS requires the assessment of physical environmental impacts, including alterations to landscape character or visual intrusion, where these may affect local communities, ecosystems, or valued natural or cultural resources.

10.1.2.2 AIIB

ESS 1 requires assessment of environmental impacts, including those affecting the quality of life, landscape character, and ecosystem services.

10.1.2.3 IFC EHS Guidelines for Wind Energy (2015)

The above EHS Guidelines for Wind Energy outline that '*preparing zones of visual influence maps and preparing wire-frame images and photomontages from key viewpoints is recommended to inform both the assessment and the consultation processes.*'

'*Consideration should also be given to the proximity of turbines to settlements, residential areas, and other visual receptors to minimize visual impacts and impacts on residential amenity, where possible. All relevant viewing angles should be considered when considering turbine locations, including viewpoints from nearby settlements.*'

10.2 Initial Observations and Baseline Conditions

10.2.1 Methodology

During desktop study of the Project area, a Geographic Information System (GIS) was used to conduct a Viewshed or Zone of Theoretical Visibility (ZTV) Assessment of the project site. The assessment provides an accurate geographical representation of the project site and the surrounding areas where visibility may be impacted. With the data collected by the ZTV, it is possible to highlight the areas from which the WTGs are most likely to be visible. Using the ZTV data, four (4) locations, were chosen for a landscape and visual assessment as shown in the table & figure below. The chosen locations represent the view of the proposed site as seen from potential receptors in the area.

The visual amenity of the study area was surveyed from the selected locations (LV1 to LV4) determined using ZTV data to be representative of the varying views and receptor types likely to be impacted by the Project. Views from a variety of distances, aspects, elevations, and extents were considered. Receptor types include individual properties and settlements; main transport routes; and the range of landscape character types within the study area.

Table 10-1 Viewpoint Locations

Viewpoint ID	Coordinates		Description
	Longitude	Latitude	
LV1	64°58.777'	40°32.322'	Located around 20km east the site, this location represents the view from the Kokcha village.
LV 2	64°44.519'	40°32.166'	Located 2km from the eastern boundary of the Project site, this location represents the view from Kuklam community.
LV3	64°33.436'	40°15.477'	Located 17km away from the southern boundary of the site, this location represents the views as seen from the receptor agricultural lands.
LV4	64°34.859'	40°23.544'	Located 2km from the southern boundary of the project site, this location represents the view from the agricultural lands and farms.
Notes: *LV = Landscape and Visual Viewpoint Locations* *Coordinate System = Decimal, Minutes, Degrees*			



Figure 10-1 ZTV Viewpoint Locations

The field survey was undertaken in May 2024 and involved the following:

- Taking photographic record of the landscape character of the Project area.
- Visiting locations determined through the desktop study i.e. viewpoints LV1 to LV4.
- Conducting drive-through around the study area to consider potential effects on the landscape character of the area.

Photographs from the chosen Viewpoints were taken during periods of good weather and clear atmospheric conditions to capture the optimal scenario of the best visibility towards the Project.

The landscape of the study area was analysed for features that contribute to the landscape character using a pre-determined checklist of landscape characteristics typical of the region. The fieldwork data was consolidated and reviewed to determine landscape character types for the study area.

10.2.2 Landscape Character Survey

Landscape character could be defined as "a distinct, recognisable and consistent pattern of elements, be it natural (soil, landform) and/or human (for example settlement and development) in the landscape that makes one landscape different from another, rather than better or worse" (Natural England, 2014).

10.2.2.1 Results

The landscape baseline survey forms the basis for the identification and description of the changes that may occur to the character of the landscape as a result of the construction and operation of the Wind Farm.

The different elements that contribute to the landscape character within the study area are discussed below.

Project Site Land Use and Cover

Based on site observations and review of satellite imagery, the general characteristics of the Project site is predominantly undeveloped open landscape with low lying shrub vegetation spread across the site.

Views are extensive and generally unblocked by topography. Anthropogenic features are mostly linear and include the existing power line crossing the site north to south and an under construction OHTL (for the Bash 500 Wind Farm Project), in addition to the railway line that runs to the north of the Project and intersects the OHTL. In addition, some industrial facilities are

located in the area such as the Vahta Post (gas pipeline department) within the site as well as Transformer Substation, Navoiyuran Chemical Warehouse, Zafarobod Hydrocarbons Storage and Post of Asia Trans Gas (ATG) Pipeline located outside the Project site.

Furthermore, there are several herders' houses, settlements, stables and structures within the Project site.



Figure 10-2 Powerline within the Site

Water Bodies

Two water canals cross the site, and two fish farms are located within the Project site. In addition, Lake Ayakagitma is located more than 6km north the project site as well as a fish farm area and water ponds to the south of the site.



Figure 10-3 Water Canals within the Site



Figure 10-4 Water Ponds and Fish Farms within the Site

Settlements

Other than the structures used by herders, there are no settlements within the project boundary. However, to the east of the project boundary, there is a small settlement, Kuklam community, next to the railway. Kuklam is small and built in a linear pattern along the railway. Within Kuklam, there is only one paved road going past the village with multiple small informal dirt tracks connecting to the various buildings. Most buildings are limited to one story in height.



Plate 10-1 Kuklam Village to the East of the Project

Agricultural Lands

Agricultural lands are located outside the Project area to the south. Several farms are within this agricultural area, located approximately 3 km from the closest WTG. It is understood that these farmers utilise the farmlands outside the Project area for agricultural and farming purposes.



Figure 10-5 Farms South the Project Site

Landform and Topography

The topography in the study area is typical of the Uzbekistan desert region. The Project site is located on a flat terrain with some mountain-ranges trending approximately east west. Maximum elevation for the Project site is around 270 m towards the eastern parts while the minimum elevation is approximately 220 m towards the lake at the northern part (UzAssystem, 2024a).



Figure 2-2 Landform within the Site

Vegetation Distribution

The dominant vegetation within the study area are low-lying small desert shrubs, with little variation in flora diversity. Larger shrubs and trees were not observed within the wind.



Plate 10-2 Typical Shrub Vegetation at Project Site

Transport Route & Site Access Roads/Tracks

Based on the desktop study using google earth and observations made during numerous site visits including the landscape survey, there are several dirt tracks across the site that may serve as access routes. Additionally, some of these tracks intersect the existing water channels via crossing bridges.

The primary dirt access road connects to the railroad and extends northeast to the main road near Kuklam village, linking to the A379 highway.



Plate 10-3 The Main Dirt Access Road and Bridge Crossing the Canal



Plate 10-4 The Main Road Near the Railway and Kuklam Village



Plate 10-5 Railway Tracks

Landscape Character Areas

Through a combination of desktop study and fieldwork surveys, the landscape is classified into units of distinct and broadly homogenous characteristics referred to as Landscape Character Areas (LCAs). Within the study area, there are four (4) distinct LCAs and these are shown in the following table and figure.

Heritage and Culture

There is nothing of known cultural or historic significance recorded or identified within the Project site. However, several graves were observed in the north-western side of the Project area around 2 km from the closets WTG. Based on the inscriptions found on the tombstones, these graves were determined to belong to the 19th and 20th centuries.



Figure 10-6 Examples of the Tombs Observed in the Wind Farm Site

Landscape Character Areas

Through a combination of desktop study and fieldwork surveys, the landscape is classified into units of distinct and broadly homogenous characteristics referred to as Landscape Character Areas (LCAs). Within the study area, there are four (4) distinct LCAs and these are shown in the following table and figure.

Table 10-2 Landscape Character Areas

ID	NAME	DESCRIPTION	VALUE	SENSITIVITY
LCA 1	Undeveloped Desert Landscape	Mostly undeveloped and undisturbed desert landscape with shrubs. It is a relatively featureless desert landscape marked by the presence of pockets of anthropogenic disturbance.	The area lacks any recognised features of local or national value and has no distinctive characteristics. The landscape is untouched and without interesting features hence, it is of low value.	Low
LCA 2	Water Bodies Landscape	Towards the north side of the project site lies the Ayakagitma depression. Two water channels cross the site. Water ponds located within the site and outside the Project boundary to the south-east serving as fish farms.	The Ayakagitma depression is undeveloped and in good, natural condition and an Important Bird Area (IBA) with species of conservative value, however, it is located >6km from the site. The water bodies within the site are man-made have no distinctive characteristics.	Medium
LCA 3	Developed Areas	The site has several small, developed areas that include grazing areas and herders' structures within the site. As well as residential areas (Kuklam Community), industrial facilities and public infrastructure (roads, railway & existing OHTL) outside the site.	The busy roads, herding activities and other activities in this area are notable detracting features. In addition, the area lacks any recognised features of local or national value and has few distinctive characteristics, as such, it is of very low value	Very Low
LCA 4	Agricultural Areas	To the south of the site, the land use across extensive areas relates to agriculture with settlements and farms, from review of satellite imagery the land appears to be well organised with distinct plots.	Being a largely settled area disturbed by agriculture, it is a landscape capable of tolerating substantial change. It is a landscape of low susceptibility in this context.	Very Low

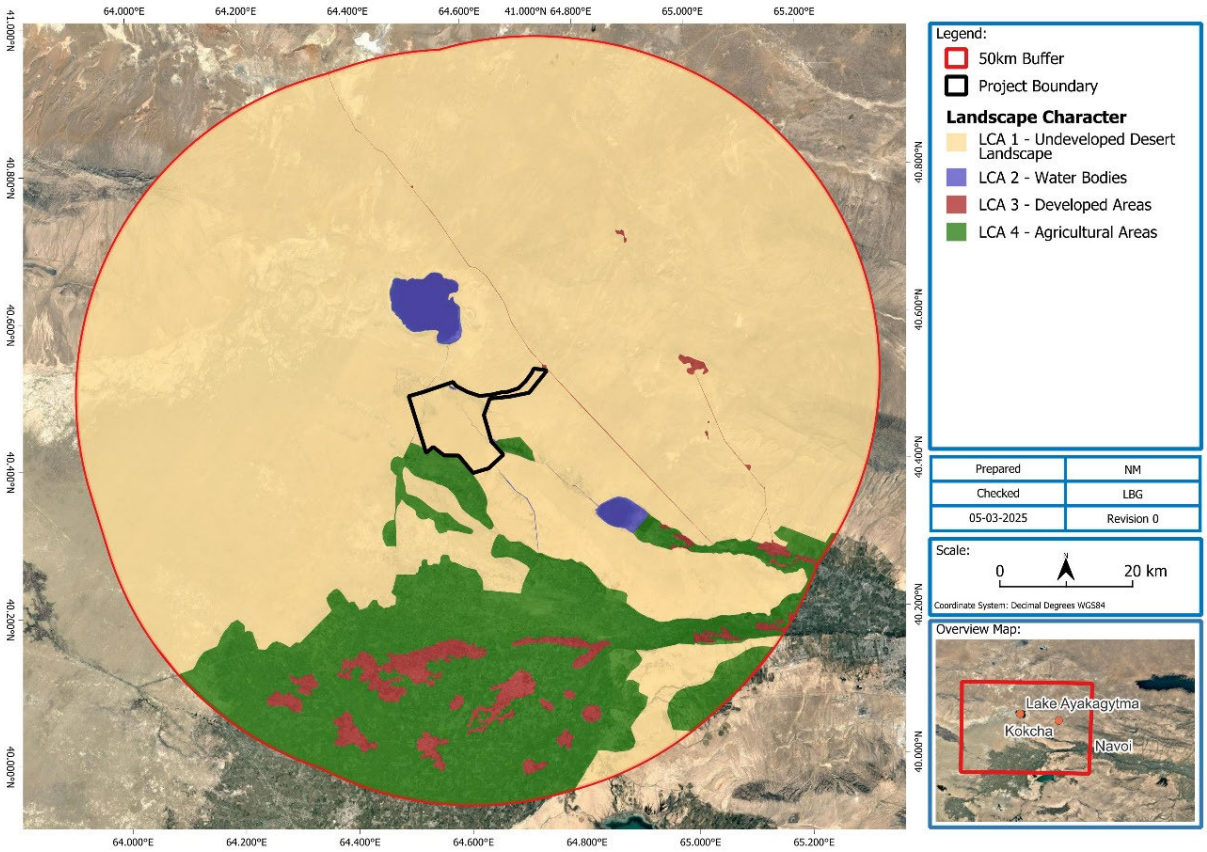


Figure 10-7 Landscape Character Areas

10.2.3 Visual Amenity Survey

When establishing the value of views and visual amenity, the inter-relations between individuals or groups of people and landscape will be considered such as the change of views that people have of the landscape and the effects of change on their visual amenity. The visual baseline has therefore been established by:

- Identifying views, viewpoints and extent of possible visibility;
- Identifying receptors that may be affected.

10.2.3.1 Results

Besides views of some anthropogenic activities which have resulted in an amount of disturbance to the visual envelope of the landscape, views across the Project site are predominantly unobstructed and provide a typical example of desert typology found in Uzbekistan.

The ZTV represents the area over which a development can theoretically be seen, The ZTV was prepared using the specialist WindFarm software and Shuttle Radar Topography Mission (SRTM) elevation data.

The ZTV presents a 'bare ground' scenario, i.e., the visibility of the Project in a landscape without screening structures such as buildings, ground-surface features or vegetation. The ZTV also does not take into account the effects of weather and atmospheric conditions, and therefore can be said to represent a 'worst-case' scenario, that is where the wind farm could potentially be seen given no intervening obstructions and favourable weather conditions.

The ZTV indicates areas from where a wind farm may be visible, but cannot show how it will look, nor indicate the nature or magnitude of visual impacts. The visibility of the turbines will decrease with the distance from which they are viewed, but this is not accounted for in the ZTV. ZTV calculations have been run for the height of the turbine to its hub (representing the nacelle).

The following figure depicts the 50 km ZTV of the Project, determined using turbine locations and specifications. As evident in the following figure and considering the relatively flat and unobstructed nature of the area, there are extensive areas in which all turbines would potentially be visible by the farmers and the residential receptors. Road users will also have views toward the Project at certain locations on the nearby roads. Due to proximity to the Project, herders utilizing areas within the WTG Project site boundaries will have an unobstructed view towards the turbines.

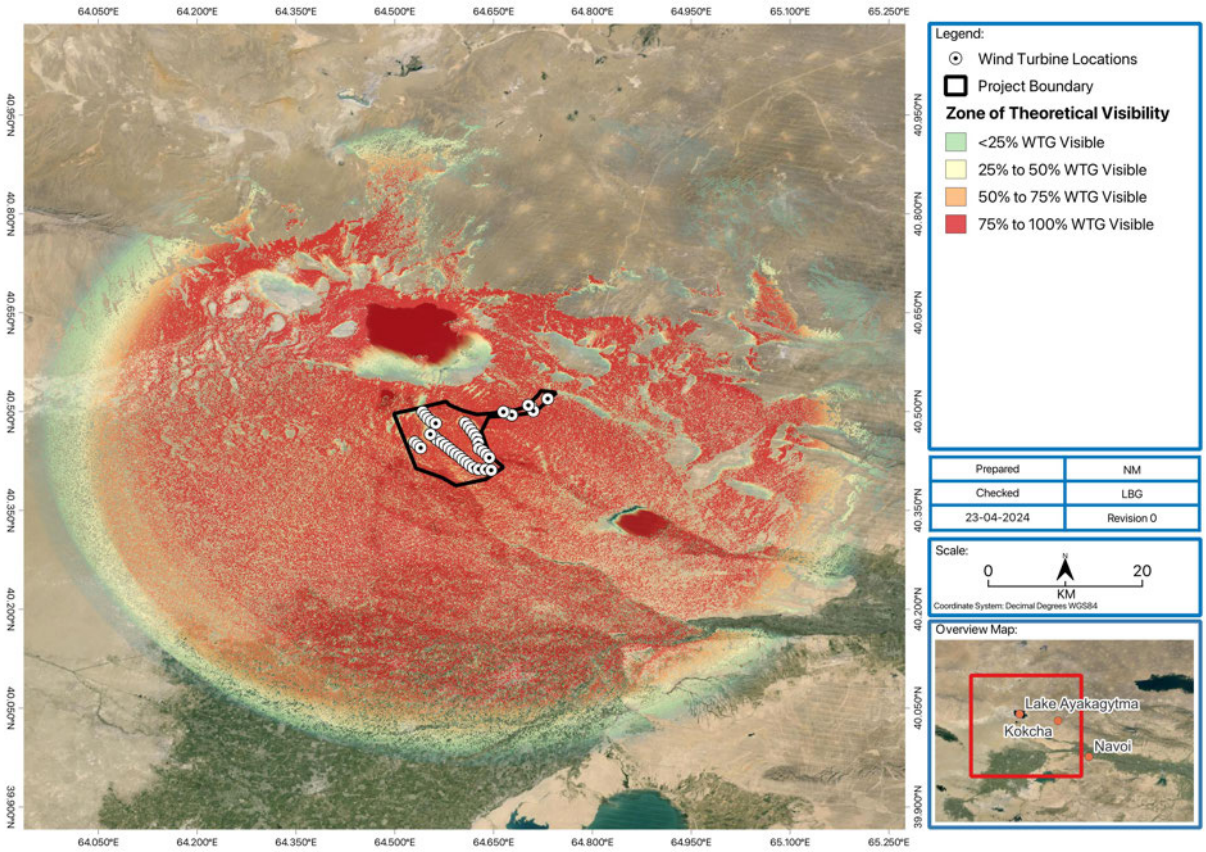


Figure 10-8 Hub Height Zone of Theoretical Visibility

A photographic record of each of the viewpoints (LV1 to LV4) is presented in the table below to illustrate the baseline views. The visual assessment is based on views from external spaces within the public domain and not from inside buildings or private spaces. The camera location and details of each viewpoint were recorded and presented below.

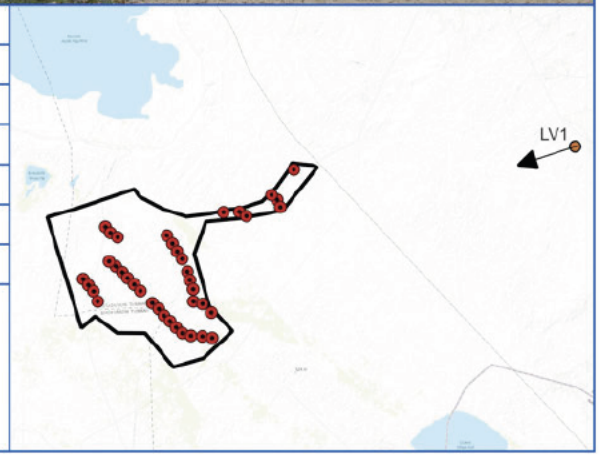
The following table outlines the composition of views from each of the viewpoints and the likely receptors at the viewpoint locations.

Table 10-3 Views from Viewpoint Locations

Visual Receptors and Sensitivity	Description of View
LV1	
View as seen by Kokcha village residents as well as motorists driving on the small dirt track. **Sensitivity:** High	As seen in the photograph below, at a distance of approximately 20 km from the site, the wind turbines will be barely visible. Although no structures, trees, or hills obstruct the view, the topography itself may partially limit visibility.



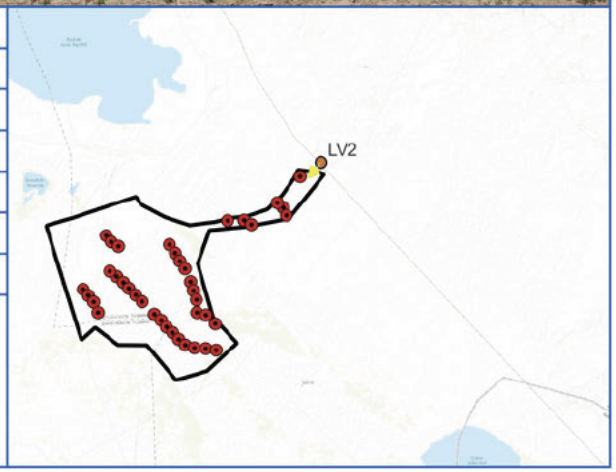
Distance From Nearest Turbine	Approximately 21.75 Km
Survey Date	22 May 2024
Camera and Lens	Xiaomi with 5.40mm Focal Length
Orientation	250 Degrees West
Prepared	NM
Checked	LBG
27-01-2025	Revision 0



Visual Receptors and Sensitivity	Description of View
LV2	
View as seen by Kuklam community residents. A similar view will be observed by train passengers and motorists driving on the main road. **Sensitivity**: High	As shown in the photograph below, there are no structures, trees or hills obstructing the view. At this distance, which is around 20 km from the site, the wind turbines will barely be visible.



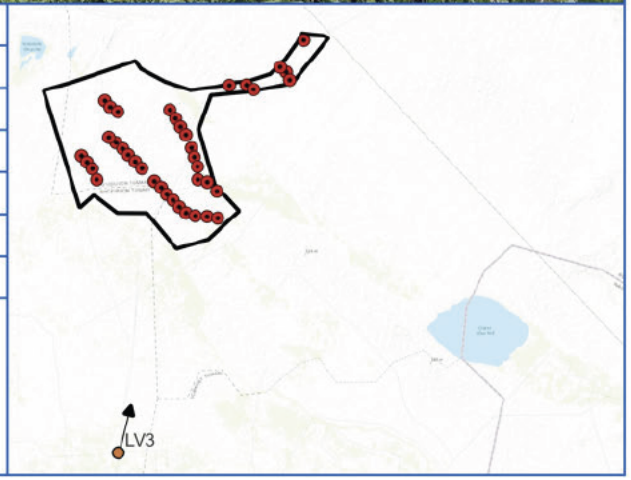
Distance From Nearest Turbine	Approximately 1.9 Km
Survey Date	22 May 2024
Camera and Lens	Xiaomi with 5.40mm Focal Length
Orientation	220 Degrees Southwest
Prepared	NM
Checked	LBG
27-01-2025	Revision 0



Visual Receptors and Sensitivity	Description of View
LV3	
View as seen by the farmers at these agricultural lands and. **Sensitivity**: Low	As shown in the photograph below, with no structures, trees, or hills obstructing the view, the wind turbines will be visible at this distance of approximately 17 km from the site, given the area's flat topography.



Distance From Nearest Turbine	Approximately 18.2 Km
Survey Date	22 May 2024
Camera and Lens	Xiaomi with 5.40mm Focal Length
Orientation	10 Degrees North
Prepared	NM
Checked	LBG
27-01-2025	Revision 0

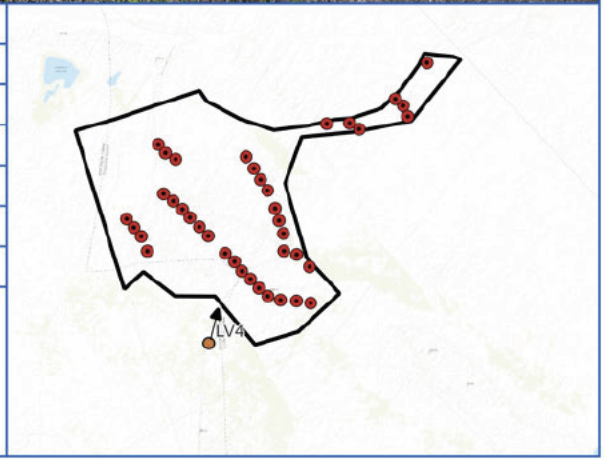


Visual Receptors and Sensitivity	Description of View
LV4	
View as seen by the nearby farmlands and motorists on the access road. **Sensitivity**: Low	As shown in the photograph below, given the site's proximity, only 2 km away, and the absence of structures, trees, or hills obstructing the view, the wind turbines will be clearly visible from this distance.



Distance From Nearest Turbine	Approximately 4.1 Km
Survey Date	22 May 2024
Camera and Lens	Xiaomi with 5.40mm Focal Length
Orientation	20 Degrees North
Prepared	NM
Checked	LBG
27-01-2025	Revision 0

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10.3 Receptors

The potential landscape and visual receptors are presented in the table below.

Table 10-4 Landscape and Visual Impacts – Sensitive Receptors

RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
Landscape Character	Undeveloped Desert Landscape **(LCA 1)**	**Low**	The landscape is that of the typical desert landscape present across Uzbekistan with no features of local or national importance. It is therefore of low or medium importance and rarity on a local scale.
	Water Bodies Landscape **(LCA 2)**	**Medium**	The Ayakagitma depression is undeveloped and in good, natural condition and an Important Bird Area (IBA) with species of conservative value, however, it is located >6km from the site. The water bodies within the site are man-made have no distinctive characteristics.
	Developed Areas **(LCA 3)**	**Very Low**	The landscape in the developed areas lacks any recognised features of local or national value hence it is of low importance on a local scale
	Agricultural Areas **(LCA 4)**	**Very Low**	Being a largely settled area disturbed by agriculture, it is a landscape capable of tolerating substantial change. The landscape value of the mining areas is of very low importance.
Herders' houses	Residential	**High**	If herders are present at the Project site, the herders using the structure will have direct visibility of project activities & the WTGs and as such will be particularly vulnerable to changes on landscape character.
Fish Farm (F1 and F2 and fish farm area outside the Project Boundary)	Residential /Ecological	**High**	Fish farm owners present at the Project site and using the structures will have direct visibility of the WTGs and as such will be particularly vulnerable to changes on landscape character.
Kuklam Village	Residential	**High**	Residents of this village will have direct visibility of the WTGs and as such will be particularly vulnerable to changes on landscape character.
Vahta Post	Industrial	**Low**	Workers will have direct visibility of the WTGs and as such may be vulnerable to changes on landscape character.
Zafarobod Hydrocarbons Storage	Industrial	**Low**	Workers will have direct visibility of the WTGs and as such may be vulnerable to changes on landscape character.
Navoiyuran Chemical Warehouse	Industrial	**Low**	Workers will have direct visibility of the WTGs and as such may be vulnerable to changes on landscape character.

RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
Post of Asia Trans Gas	Industrial	**Low**	Workers will have direct visibility of the WTGs and as such may be vulnerable to changes on landscape character.
Agricultural area (outside the Project Boundary)	Residential	**High**	Farmers in the vicinity of the project site will have direct visibility of the WTGs and as such may be vulnerable to changes on landscape character.
Graves	Cultural	**Medium**	Visitor of the graves in this area will have direct visibility of the WTGs and as such will be vulnerable to changes on landscape character.
Kokcha Village	Residential	**High**	Residents of this village are more than 20km away and will have limited visibility of the WTGs and as such are not expected to be significantly vulnerable to changes on landscape character.

10.4 Potential Impacts, Mitigation, Management and Residual Impacts

10.4.1 Construction Phase

10.4.1.1 Change in Landscape Character

The construction of a new development, particularly those on a large scale have the potential to result in changes to the landscape character of a locality through land use and topographical changes or other factors. In situations where the visual horizon is disturbed by a development, such impacts may include the anthropogenic intrusion of the landscape by buildings/structures where no intrusion previously existed; or the change in the landscape character of an area, which could arise from new/out of place development or from changes in the land use.

One of the first stages of construction activities will result in the levelling, grading and preparation at specific wind turbine locations prior to the commencement of construction. The proliferation of these activities throughout the Project site will eventually result in land use changes at the WTG area that will spread out in the landscape over the construction period. Also, the subsequent construction of administrative buildings and erection of WTGs will transform the landscape into a 'Desert with Wind Turbines' landscape character as large-scale vertical rotating features will be added into the landscape.

10.4.1.2 Reduction in Visual Quality

The movement of heavy construction vehicles such as trailers, dump trucks, graders, excavators, loaders, tower & vehicle cranes, etc. to and from the Project site and earthworks on sandy surfaces can potentially result in dust generation and a resulting temporary haze causing disturbance to the current visual envelope of receptors. However such dust generation will be limited to the WTG area and will be temporary & for a short duration. As such, it is not anticipated to result in changing the visual amenity and/or blocking the views of receptors. The installation of towers, turbines, and the shape or colour will result in visual intrusion at receptor location in proximity to WTG areas.

10.4.1.3 Addition of Lighting

It is understood that nighttime works is not anticipated. However if required at any time during construction, impacts to the visual envelope of receptors within the site and surrounding receptors will also occur at night where the addition of lighting during construction will illuminate the proposed project area that has previously been free of any light sources.

Given the location of the project in an area with little or no artificial lighting, the use of lighting across the site during construction phase will introduce light spill & glare and result in a nighttime light haze likely to be visible for several kilometres from the project area. This will be a temporary impact.

Any impacts from lighting are anticipated to be minimised by limiting works being undertaken during the night and by the implementation of specific controls detailed in the CESMP on-site.

Table 10-5 Landscape and Visual Quality Impact Significance, Mitigation & Management Measures and Residual Impacts- Construction

Potential Impact	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
Changes in Landscape Character	**Minor Negative**	Undeveloped Desert Landscape **(LCA 1)**	**Low**	**Negligible**	• Site clearance, levelling & grading will be limited to the footprint of the WTG pads. • Construction works will be limited to within the Project boundary. • All temporary construction facilities will be removed upon completion of construction activities.	**Negligible**
	Negligible Negative	Water Bodies Landscape **(LCA 2)**	**Medium**	**Negligible**		**Negligible**
	Minor Negative	Developed Areas **(LCA 3)**	**Very Low**	**Negligible**		**Negligible**
	Negligible Negative	Agricultural Areas **(LCA 4)**	**Very Low**	**Negligible**		**Negligible**
Disturbance to Visual Envelope of Receptors and addition of lighting	**Moderate Negative**	Herders' houses	**High**	**Major**	• Where appropriate, construction laydowns and working areas of the site will be screened to reduce the visual intrusion to existing off site receptors. • When not in use, cranes and other construction plant will be lowered, so they are at their minimum height and do not protrude unnecessarily within the visual envelope of local receptors. • Mitigation and management measures relating to the generation of dust (as detailed in the Air Quality Chapter of this ESIA) will be implemented to minimise visual impacts during construction activities. • Minimise construction works at night-time to those strictly required and approved by the relevant authorities through issuance of night permits.	**Major**
	Moderate Negative	Fish Farm (F1 and F2 and fish farm area outside the Project Boundary)	**High**	**Major**		**Major**
	Moderate Negative	Kuklam Village	**High**	**Moderate**		**Minor**
	Minor Negative	Zafarobod Hydrocarbons Storage	**Low**	**Minor**		**Negligible**
	Minor Negative	Navoiyuran Chemical Warehouse	**Low**	**Minor**		**Negligible**

Potential Impact	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
	Minor Negative	Post of Asia Trans Gas	**Low**	**Negligible**	• Any flood lights required during night time construction activities will be directed onto the working areas, with a maximum position angle of 30° from vertical, and back spill shields, therefore minimising any unwanted light spill. • No lights will be installed facing any of the receptor locations including the access roads in the project area.	**Negligible**
	Minor Negative	Agricultural area (outside the Project Boundary)	**High**	**Minor**		**Negligible**
	Minor Negative	Graves	**Medium**	**Minor**		**Negligible**

10.4.2 Operational Phase

10.4.2.1 Landscape Character

The development of the Wind Farm Project will ultimately result in a significant change to the existing landscape as it will include the installation of several wind turbine generators, the construction of substations, administrative facilities, etc. which will alter the existing undeveloped landscape character. A key change will result from the loss of the view of the predominantly undeveloped and open landscape as these will be replaced with a view of tall vertical wind turbines occupying an expansive area and can be seen several kilometres away. The geographical extent of the area that will suffer the change of landscape character or be affected will not only be limited to the Project footprint but will extend to outside the boundary of the Project site as WTGs impose a change on the landscape of the area they are installed. Such change in landscape character type will be for the lifetime of the Wind Farm until decommissioning when all turbines and associated infrastructure will be removed.

Due to the vertical design of the Wind Farm Plant, views across the wider landscape are likely to be impacted. Given the presence of residential receptors (particularly the herders accommodation) within the project site, this visual change from an open, unused landscape to high level infrastructure associated with the project is likely to have a significant visual impact.

10.4.2.2 Reduction in Visual Quality

Following the impacts of construction and establishment of wind farm features, additional operational phase impact as a result of the wind turbine operation will result in changes to the visual envelope of receptors overlooking the Project site. As earlier stated, turbines are tall vertical structures that can be seen several kilometres away and impose a change on the landscape of the area they are installed. The continuous movement of the wind turbine rotors will also result in changes to the visual envelope of receptors overlooking the Project site as there would be loss of static landscape view.

10.4.2.3 Addition of Lighting

Although there is a potential for lighting impacts to occur during the operational phase, it is envisaged that only minimal lighting will be required at night-time for security purposes and this will be similar to the construction phase.

Table 10-6 Landscape and Visual Amenity Impact Significance, Mitigation & Management Measures and Residual Impacts – Operation

Potential Impact	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
Changes in Landscape Character	**Moderate Negative**	Undeveloped Desert Landscape **(LCA 1)**	**Low**	**Minor**	• Efforts will be made to soften the landscape character impacts by planting native trees and vegetation in appropriate areas such as the Project boundary, Health Protection Zone in order to soften the impacts.	**Minor**
	Minor Negative	Water Bodies Landscape **(LCA 2)**	**Medium**	**Minor**		**Minor**
	Moderate Negative	Developed Areas **(LCA 3)**	**Very Low**	**Minor**		**Minor**
	Minor Negative	Agricultural Areas **(LCA 4)**	**Very Low**	**Minor**		**Minor**
Disturbance to Visual Envelope of Receptors and addition of lighting	**Moderate Negative**	Herders' houses	**High**	**Major**	• Lighting provisions will need to comply with Health & Safety, but not be excessive or unnecessary and not result in sky glow, light spill and glare effects. • Light fittings will be directional as deemed appropriate for their use and intended areas of illumination. • Lighting column and lighting head design will be chosen to limit back spill and any unwanted light spill to other site areas or areas off the site.	**Major**
	Moderate Negative	Fish Farm (F1 and F2 and fish farm area outside the Project Boundary)	**High**	**Major**		**Major**
	Moderate Negative	Kuklam Village	**High**	**Moderate**		**Moderate**
	Minor Negative	Zafarobod Hydrocarbons Storage	**Low**	**Minor**		**Minor**
	Minor Negative	Navoiyuran Chemical Warehouse	**Low**	**Minor**		**Minor**

Potential Impact	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
	Minor Negative	Post of Asia Trans Gas	**Low**	**Negligible**		**Negligible**
	Minor Negative	Agricultural area (outside the Project Boundary)	**High**	**Minor**		**Minor**
	Minor Negative	Graves	**Medium**	**Minor**		**Minor**

10.4.3 Cumulative Impacts

As the construction of the nearby Bash 52 MW WF and Bash 500 MW WF projects will be completed before the start of Gijduvon WF construction, cumulative visual impacts during the construction phase are not expected.

During operation, the land in the Project area will change from desert landscape due to the intrusion of vertical turbine structures. While wind turbines are already an existing feature of the landscape, adding more will intensify their visual dominance, potentially altering the region's perceived character. The repetition of turbine structures could extend the visual footprint, affecting local viewpoints, particularly from nearby villages, roads, and grazing and farming lands used by herders and farmers. The contrast between the modern infrastructure and the traditional pastoral environment may become more pronounced.

While herders, farmers and local communities may already be accustomed to the presence of wind energy infrastructure due to the operation of Bash 500 MW and Bash 52 MW wind farms, additional turbines could further fragment visual openness, resulting in a significant change to the visual amenity.

10.4.4 Decommissioning Phase

Decommissioning the wind farm will have both positive and negative landscape and visual impacts. The removal of turbines, substations, and other infrastructure will gradually restore the openness of the pasturelands, reducing the industrial presence and allowing the landscape to return to a more natural or agricultural state. This could improve visual aesthetics for local communities, herders, and farmers who may prefer an unobstructed horizon. However, the process itself, particularly the dismantling of large structures, transportation of materials, and potential ground disturbances may create temporary visual clutter and disruption, especially if heavy machinery and waste materials remain on-site for extended periods.

The mitigation & management measures outlined for the construction phase in relation to landscape and visual impacts at the site, will be applicable to the decommissioning phase as well.

10.5 Monitoring

No monitoring is proposed for landscape and visual impacts.

11 SOLID WASTE AND WASTEWATER MANAGEMENT

11.1 Applicable Requirements & Standards

11.1.1 National Regulations

The Law of the Republic of Uzbekistan "On Wastes" (2002) amended in 2019

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.

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; and
- Class IV: Low hazardous waste.

Other relevant regulations and standards include:

- 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.

11.1.2 Lender Requirements

11.1.2.1 ADB

ADB Safeguard Requirements 1: Environmental provides the requirements on waste management as follow:

- The Project will avoid, or where avoidance is not possible, will minimize or control the generation of hazardous and non-hazardous wastes and the release of hazardous materials resulting from project activities. Where waste cannot be recovered or reused, it will be treated, destroyed, and disposed of in an environmentally sound manner. If the generated waste is considered hazardous, the project will explore reasonable alternatives for its environmentally sound disposal considering the limitations applicable to its transboundary movement. When waste disposal is conducted by third parties, the project will use contractors that are reputable and legitimate enterprises licensed by the relevant regulatory agencies.

Environmental Safeguards policy principle 9 also refers to avoiding and minimising waste generation and Safeguard Requirements 1 paragraph 36 states to: "*avoid the manufacture, trade, and use of hazardous substances and materials subject to international bans or phaseouts*".

11.1.2.2 AIIB

ESS1 – Environmental and Social Assessment and Management: Point 38 states the need to '*Minimize and manage waste generation, including through waste reduction and recycling, and release of hazardous materials from production, transportation, handling and storage.*'

11.1.2.3 IFC

PS3 on Resource Efficiency and Pollution Prevention and Control requires projects to manage waste in a manner that protects human health and the environment. This involves minimizing waste generation where feasible and prioritizing the reuse, recycling, and recovery of waste materials. Hazardous wastes must be handled, transported, treated, and disposed of following recognized international guidelines and applicable national regulations. Projects must also ensure that any third-party waste contractors are licensed and operate according to Good International Practice (GIP), with appropriate documentation and monitoring in place to verify environmentally sound management and disposal. Additionally, the efficient use of water and management of wastewater through reduction, reuse, and treatment measures is encouraged to minimize environmental impacts.

11.1.2.4 EPFIs

Section 1.6 of "the IFC General EHS Guidelines" is entitled Waste Management and is applicable to all projects that generate, store or handle any quantity of waste; whilst Section 1.5 of the IFC EHS Guidelines covers Hazardous Materials Management. The waste management guidelines state that facilities that generate and store wastes should practice the following:

- Establish waste management priorities at the outset of activities;
- Identify EHS risks and impacts and consider waste generation and its consequences;
- Establish a waste management hierarchy that considers prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes;
- Avoid or minimize the generation of waste materials, as far as practicable;
- Identify where waste generation cannot be avoided but can be minimized or where opportunities exist for, recovering and reusing waste; and
- Where waste cannot be recovered or reused, identify means of treating, destroying, and disposing of it in an environmentally sound manner.

The World Bank General EHS Guidelines (2007) establish general requirements for direct or indirect discharge of wastewater from utility operations or storm water to the environment.

'Projects with the potential to generate process wastewater, sanitary (domestic) sewage, or storm water should incorporate the necessary precautions to avoid, minimize, and control adverse impacts to human health, safety, or the environment'.

However, wastewater effluent pollutant limits are only established for sanitary wastewater for discharge to the sanitary sewer systems. World Bank General EHS Guidelines (2007) (ref. Table 1.3.1 of IFC EHS Guidelines), provides indicative values for treated sanitary wastewater effluent.

11.2 Baseline Conditions

In Uzbekistan, waste management is the responsibility of State Committee on Ecology and Environmental Protection. This Committee established environmental legislation and sets standards for the storage of waste and requirements for waste facilities or waste storage areas across the Country.

11.2.1 Desktop Review

11.2.1.1 Solid Waste

The State Unitary Enterprise (Toza hudud translated to "Clean area") is responsible for waste collection, transportation, disposal and management in the Bukhara region. In order to reduce the number of existing waste disposal sites across the region and reduce the environmental risks associated with waste disposal, plans are being developed by Toza hudud to support the transportation of waste directly to landfills and to implement transfer stations and manage landfills.

Waste management in Uzbekistan is an issue as waste is being collected and disposed in dump sites in the absence of proper management practices and infrastructures including sorting facilities or landfills. In 2019, a Solid Waste Management Strategy for the period of 2019 – 2028 was put in force. According to the Resolution of the President of The Republic of Uzbekistan Of April 17, 2019 No. Pp-4291 "*In the absence of sufficient waste management services only 40 - 50% of the municipal solid waste generated in rural settlements is being collected while these services are almost absent in the remote rural areas*". The objective of the strategy is to enhance the waste management services including transportation, storage, disposal and recycling.

In 2018, Toza Hudud collected wastes from approximately 53% of the country's population. This was achieved through the purchase of 210 new garbage trucks in 2018, with an additional 510 vehicles planned for 2019-2021.Toza Hudud is also implementing new waste collection and disposal systems. In 2021, the collection of waste by Toza Hudud is estimated to reach 83%.

The Project area and neighbouring communities do not have any waste collection and disposal facilities.

However, Toza Hadud services do not cover small villages and/or rural areas situated away from local districts due to limited resources as such, the solid waste management in rural areas are in an unsatisfactory state and existing solid waste landfills in these rural areas are in non-compliance with requirements of sanitary and environmental standards.

11.2.1.2 Wastewater

In Uzbekistan wastewater and sewerage systems are only accessible to 38% of the urban population and less than 5% of the rural population. Of Uzbekistan's 119 cities, only 79 have communal sewerage services (66.4%). The total capacity of sewage treatment plants is 4,133,600 m^3 /day.

The sewer system in Bukhara region is a split system with a total length of 189.1 km. There are 16 sewage pumping stations (SPS) all of which are controlled manually. These sewage pumping stations were built in 1960 and are still in operation. Due to the old technology used, these pumping stations have high energy consumption. Two of these pumping stations are considered major SPS.

11.2.2 Consultations

A letter was sent to Toza Hadud on the 19th February 2024 to inform them about the Project and request information on existing waste management facilities in the Project area. A response letter was received on the 26th of March confirming the availability of 15,105.98ha of solid household waste landfills, 413ha construction waste landfills, and 175ha of dangerous chemical substances landfills in the Bukhara region. The department did not confirm the availability of recycling facilities in the region.

A letter was sent to Uzsuvtaminot on the 9th of April 2024 to inform them about the Project and request information on existing wastewater management facilities in the Project area. A response letter was received on the 25th of April confirming there are wastewater treatment facilities in Kazisaid settlement of Kunjikal LC of Bukhara district of Bukhara region, wastewater treatment facilities on the territory of FEZ "Gijduvon" (free economic zone) built on the border of Gijduvon-Shofirkan districts, and wastewater treatment facilities on the territory of New Uzbekistan massif in Karakul district.

- The wastewater treatment facility in Bukhara district, constructed in 1970, covers a land area of 152.7 hectares and has a design capacity of 100,000 m^3/day. Wastewater is discharged into the Sakovich collector, primarily serving consumers in Bukhara city and Kagan district.
- The wastewater treatment facility in Karakul district, located in the New Uzbekistan massif, remains under construction due to the incomplete settlement of the area and the absence of a wastewater source.
- The wastewater treatment plant within the FEZ "Gijduvon" was completed by JSC "Buxorogazsanoatqurilish" just before the conclusion of construction activities.

However, it has not yet been transferred to the balance of JSC "Bukhara Water Supply" for timely operation.

11.2.3 Site Observations

During the site visit, accumulated waste including rubble, plastic bottles, rags, etc. were observed occasionally in the Project area as shown in the figure below.



Figure 11-1 Dumped Waste on Site Encountered during the Site Visit

11.3 Potential Impacts

11.3.1 Construction Phase

11.3.1.1 Solid Waste

During construction, waste will be generated during earthworks, concrete works, construction of the fences, paths, access roads, buildings, electro-mechanical works, tower installation, cable installation, etc.

Typical construction wastes include concrete, asphalt, scrap metal, glass, plastic, wood, packaging materials, excess cables, and domestic waste from construction workers (i.e. relating to food consumption). Concrete may be found in two forms on the construction site; structural elements containing reinforced concrete, and non-reinforced concrete found in foundations (such as surface level concrete slabs).

Solid waste generated from construction activities will include the following:

- Non-hazardous waste such as;

- Waste related to construction processes, including earthworks (such as rubble, soils and potentially rock), installation (such as bolts, rebars, etc);
- Paper/cardboard, plastics, packaging, plastic bottles, glass, scrap metal, excess fill materials, sand, gravel, excess construction materials, concrete, subsoil and rock (not contaminated)
- Domestic waste generated by the construction workforce (e.g. food/organic waste, paper trash, cardboard, aluminium, plastic)

- Hazardous waste such as;
  - Batteries (unused), chemical drums, aerosol cans, contaminated metals, empty containers, expired and unused chemicals, adhesives, machinery lubricants, clean-up materials such as rags, containers and tins with remains of hazardous substances, used spill kits and clean-up materials.
  - Replacement parts from vehicles, plant and equipment such as tyres
  - Residual materials from electrical equipment installation such as Waste Electrical Equipment (WEE)

Given the Project footprint, the amount of solid waste generated will be of a considerable size.

NON-HAZARDOUS SOLID WASTE

Non-hazardous construction waste is typically inert and does not pose a threat to human health or the environment. However, proper management is required in order to reduce associated secondary impacts such as unnecessary resource use, dust emissions, etc. Non-hazardous waste generated by the Project will be collected by a licensed waste contractor and transported to a licensed waste management facility.

HAZARDOUS SOLID WASTE

Due to the nature of the project and the construction works being undertaken, there will be a few hazardous materials used. Although the hazardous fraction of construction waste is expected to represent a relatively small portion of the total amount of construction waste likely to be generated, its management requires careful consideration as the impacts associated with hazardous waste can potentially result in contamination to soils, groundwater and surface water, as assessed in the section 8.4.1 of this ESIA.

Inappropriate management, storage, handling, transfer or transportation through lack of personnel training on site may lead to accidental spills or leaks to the soil or groundwater resulting in environmental impacts and potential health risk to workers. Contamination events may also arise as a result of transportation by unlicensed waste contractors or disposal to unlicensed/unauthorised landfills. Waste management strategy and planning is therefore critical in order to minimise potential significant effects on sensitive receptors such as soil and groundwater.

There are no licensed hazardous waste disposal facilities currently available in the Project area. Therefore, waste generated by the Project will most likely be transported by road vehicles to a licensed hazardous waste facility outside the project are or outside the region. Therefore, it will be particularly important to properly store the waste in designated and secured hazardous waste storage areas at the site until collection to final disposal. These areas will include bunds to contain spillages, secure fencing to control access, proper safety signage, a roof structure to prevent rainwater entering, etc.

In addition, the EPC Contractor will be required to coordinate with the local government to identify licensed waste disposal sites and licensed waste collectors.

11.3.1.2 Liquid Waste/Wastewater

Wastewater generated from construction activities at the Wind Farm and along the OHTL route will include the following:

- Sanitary and domestic wastewater generation;
- Wastewater from any vehicles or equipment washing/cleaning;
- Liquid hazardous waste such as fuels, chemicals, paints, lubricants, solvents, waste oil, hydraulic fluid, resins, waste solvents and thinners, etc.; and.
- Concrete washout.

For sanitary and domestic wastewater, it is anticipated that there will be a significant number of workers at the peak period of construction. The quantities of sanitary & domestic wastewater, including at accommodation areas anticipated to be located at within the Project site, can be estimated as an average of 0.1m^3/person/day (100 litres). Assuming the estimated number of construction workers during peak periods will be between 700 - 1,000 personnel, daily sanitary wastewater is estimated to total 70m^3 - 100m^3 at peak periods of construction.

Such wastewater will be stored within septic tanks on-site, prior to removal by a licensed contractor. Improper handling, storage and transportation of sanitary and domestic wastewater could potentially cause contamination to soil, groundwater, or surface water resources as assessed in section 8.4.1 of this ESIA.

It is understood that the licensed contractor Toza Hudud located at Gijduvon district will be engaged for the collection, transportation and disposal of wastes generated at the site. At this stage, the licensed facility where solid and liquid waste will be disposed of by licensed contractor has not yet been determined. This will be determined by the EPC Contractor prior to commencement of construction activities.

11.3.2 Operational Phase

The operational phase of the Wind Farm will result in the production of few waste streams from the maintenance activities, with the vast majority of these streams being non-hazardous. During operations of the OHTL, waste that will be generated will be limited to the operation and maintenance activities by NEGU. Similar to the Wind Farm, such waste will be generated in minimal quantity.

Nevertheless, if these waste streams are not managed and disposed of effectively, they could result in significant impacts upon the surrounding environment (i.e. soil and groundwater resources).

11.3.2.1 Solid Waste

Solid waste is not expected to be generated in significant quantities during the operational phase of the wind farm besides maintenance for transformers, and general day-to-day maintenance activities of administration facilities.

NON-HAZARDOUS SOLID WASTE

The operation of the proposed Project will generate small amounts of non-hazardous domestic waste from the operation of the administration facilities and from activities of the employees.

This waste can be classified as both recyclable and non-recyclable. Recyclable waste includes paper, tin cans, plastics, cartons, rubber, and glass, while non-recyclables will consist mainly of food residues and other organic wastes. The quantity of domestic waste will be small given the few anticipated personnel required to operate the wind farm. Other solid non-hazardous waste generated during operation will be landscaping waste and uncontaminated replacement parts and packaging. Replacement of significant component of the wind turbines such as blades, nacelle and associated electrical components may be required in the event of major failure. However, such components are expected to be given to the turbine supplier for repair or recycling.

The type of non-hazardous solid waste that will be generated by O&M personnel include packaging waste (plastics, cardboard) and domestic wastes mainly food residues and other organic wastes

HAZARDOUS SOLID WASTE

This fraction of the waste streams can potentially cause significant adverse impacts on human health and the environment if inadequately managed. However, only very small quantities of hazardous materials (and waste) are expected during the operational phase of the Project.

Examples of possible hazardous waste streams that may arise during the operation of the Project include the following:

- Used chemical containers and drums;
- Soil contaminated by potential spills and leaks of hazardous materials/liquids and used spill kits and clean up materials;
- Miscellaneous wastes such as waste cables, oily rags, etc.;
- General clean-up materials and solvents from general maintenance of on-site plant and machinery; and
- Electrical waste (spare parts, obsolete equipment).

Inappropriate handling of hazardous waste streams through lack of personnel training on site may lead to accidental release of hazardous waste contaminating soil or groundwater. Contamination may also arise as a result of poor-quality waste transporters and waste management facilities, or lacking capacity of these services locally. These risks may consequently result in illicit waste disposals (e.g. fly-tipping, or waste disposal at unlicensed locations), or the engagement of unlicensed contractors/facilities.

11.3.2.2 Liquid Waste/ Wastewater

Liquid waste generated from operational activities at the Wind Farm site will include the following:

- Sanitary and domestic wastewater generation from operation and maintenance staff working in the Wind Farm;
- Oily Water (to collect spills/leaks from transformer areas) will be in very small quantities; and
- Liquid hazardous waste (if any) such as fuels, chemicals, paints, lubricants, solvents, waste oil, hydraulic fluid, resins, waste solvents and thinners, etc.

Sanitary and domestic wastewater will be generated directly from site toilets and kitchen facilities. All sanitary streams will be directed to the septic tank for collection and disposal by a licensed contractor.

Oily wastes from the transformer area, or other floor drains in oily areas, will be collected in a sump and will be treated in an oil separator for settlement of solids. The residual oil and solids will be collected for recycling and/or disposal by a licensed contractor.

The improper handling, transport and disposal of hazardous wastes could lead to potential localised contamination of soil, groundwater or surface water resources, which have been assessed for significance in section 8.4.1 of this ESIA.

11.3.3 Cumulative Impacts

The project's waste and wastewater management impacts primarily relate to increased pressure on existing waste management facilities, particularly due to the generation of recyclable and hazardous waste that cannot be processed/recycled locally and may have to be sent to landfills. This is not ideal, as it reduces landfill capacity and poses environmental risks. Additionally, improper handling, storage, transport, or disposal of waste during construction and operation could lead to soil and groundwater contamination.

However, since the nearby Bash 52 MW and Bash 500 MW wind farms will be completed before the start of Gijduvon's construction, no significant cumulative waste impacts are expected during the construction phase.

Additionally, given the relatively small waste volumes generated during operation, cumulative impacts with other projects are also not anticipated to be significant.

11.3.4 Decommissioning Phase

During decommissioning, there is a potential for inert demolition waste and materials such as steel reinforced bars, broken concrete, cabling, transformer oils etc. to contaminate soils.

Prior to decommissioning, it is expected that all oils will be drained. This will minimize the risk for accidental spills and leaks during removal from equipment from the site. As transformer oil & other oils are classified as hazardous liquid waste they will be collected for recycling and/or disposal by a licensed contractor.

Decommissioning turbines and disposing of blades remains a challenge, however, the decommissioning of the wind farm provides significant opportunity for resource efficiency and material re-use/recycling. All demolition work will be carried out with reference to IFC EHS Guidelines 1.6 Waste Management, IFC EHS Guidelines 1.5 Hazardous Materials Management, IFC PS3 on Resource Efficiency and Pollution Prevention.

11.4 Mitigation and Management Measures

11.4.1 Waste Characterization

Waste can exhibit certain characteristics according to the process stream from which it is generated and any pre-treatment processes that are undertaken. Different types of waste require different management and disposal techniques according to the potential risk that the material poses to human health or the environment. For this Project, waste has been classified into three (3) main categories below.

Table 11-1 Waste Characterization

Waste Classification	Description
Domestic Waste	Household, commercial, agricultural, governmental, industrial and institutional wastes, which have chemical and physical characteristics similar to those of household such as garbage, paper, cardboard, plastic, cans, etc. Disposal of such waste can generally be routed to municipal recycling or disposal facilities
Non-Hazardous Industrial Waste	Non-hazardous wastes that have physical and chemical characteristics that are different from domestic wastes such as construction waste, glass, scrap metal, wood, used containers, tyres etc. This waste generally poses little risk to the environment and can be disposed to normal municipal facilities after waste minimisation options are exhausted and before obtaining approval
Hazardous Waste	Waste is classified as being hazardous because of its concentration; physical, chemical or infectious characteristics, which may pose a present or potential threat to human health or the environment and/or may cause an increase in serious irreversible or incapacitating reversible illness or contribute to an increase in mortality. Under DM guidelines and the Basel Convention, hazardous waste is as any waste (i.e. solid, liquid or gaseous) having the following properties: Explosive; Radioactive (which includes NORM (LSA) scale); Ignitable or flammable substances; Poisons with acute and chronic (delayed) toxicity; or Substances that by interaction with water might become spontaneously flammable or give off flammable gases. Hazardous waste must be segregated, stored, transported and ultimately treated and disposed of by an approved waste services provider.

11.4.2 Waste Management Hierarchy

The waste hierarchy illustrates good practice for waste management by prioritising the available sustainable waste management methods over disposal and eventual contribution to adverse environmental and economic impacts associated with landfill. The hierarchy as illustrated below should form a key element of any waste management strategy, and if implemented effectively will achieve maximum reductions on waste quantities combined with the limited use of resources and fill space. The waste management hierarchy also has the potential to reduce costs that may be incurred by the main contractor or the proponent for handling, transportation and the disposal of waste.

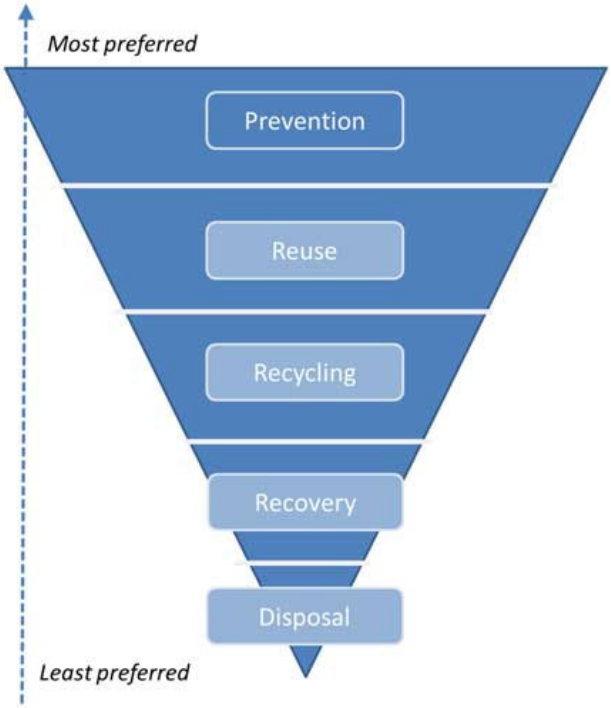


Figure 11-2 Waste Hierarchy

Source: *United Nations Environment Programme*

Initially, options to prevent or reduce waste should be considered. Where waste generation cannot be avoided or further reduced at source, opportunities for reuse of materials should be explored, either for use for the same or a different purpose. Disposal to landfill is the least favoured option in the waste hierarchy and is the last resort after all other options have been considered.

Such an approach is also used in other areas of the world. US-EPA's Waste Minimisation Program presents the following objectives:

- Complete elimination of, or substitution for priority chemicals, wherever possible;
- Minimising the number of priority chemicals used whenever elimination or substitution is not possible;
- Maximising recycling whenever elimination, substitution, or minimisation is not possible, creating closed-loop materials management systems that eliminate or constrict release pathways; and
- Promoting cradle-to-cradle waste management instead of cradle-to-grave waste management.

11.4.3 Construction Phase

Table 11-2 Construction Waste and Wastewater Mitigation and Management Measures

Impact/Source	Mitigation and Management Measures
Inappropriate handling, storage, transport and disposal of solid non-hazardous waste	• The project will develop and implement a Project specific Construction Waste Management Plan (CWMP) in line with committed mitigation measures in this ESIA report and the provisions of the CESMP. • Domestic solid wastes to be segregated and identified from the other waste streams into separate waste containers/skips clearly to facilitate recycling and reuse. • Waste containers/skips will be clearly labelled and placed in designated waste storage locations. Labels will be waterproof, securely attached, and written in English and other languages (such as Uzbek and Russian) as required for the workforce. • For litter (food waste, domestic waste), an adequate number of covered bins will be strategically placed throughout the site at locations where construction workers and staff consume food. These will be regularly collected and taken to the main waste storage area. • Food waste must be stored within a sealed metal or plastic skip or bin, in order to prevent pests gaining access. • On-going housekeeping training will be provided to all staff on the importance of the need to avoid littering. • Heavy waste may be contained within an open skip, provided that segregation occurs effectively enough to remove all lightweight material that could be blown away. • Waste generated during construction will be recycled and reused until reduced to as low as practicable prior to collection for disposal by an appropriately licensed waste contractor. • Only licensed waste transporters and waste management facilities will be engaged. • Develop and maintain a waste inventory to document and track domestic solid wastes generated, segregated, reused and consignments • Completed waste manifests are required to show the chain of custody of the waste generated on site, its transportation and treatment/disposal. All records will be maintained on site. • Mandatory training program for employees to increase their awareness of waste management protocols including proper handling and storage of waste, recycling waste, reusing plastics, rebar, wood & other reusable non-hazardous materials. • EPC Contractor will identify recycling companies in Gijduvon district or Bukhara region in order to promote the recycling of waste especially packaging materials, wood and metal waste etc.
Inappropriate/uncontrolled handling, storage, transport and/or disposal of solid hazardous waste	• Develop and maintain a hazardous waste inventory to document and track hazardous wastes generated, segregated, reused and consignments. • Segregate and identify hazardous waste from the other waste streams into separate signed and labelled waste containers/skips. • Store hazardous waste in allocated impervious hard standing areas in sealed containers stored with impermeable bases, sufficient containment and separation capacity, sun/rain shelter, separate drainage system, good ventilation and equipped with spill kits & spill

Impact/Source	Mitigation and Management Measures
	response procedures. This area must be placed away from any sources of ignition. • Hazardous waste storage area will be constructed away from drainage system and a rain shelter will be provided to avoid any potential instance of runoff, or leakage of runoff. • Waste containers will be clearly marked with appropriate warning labels to accurately describe their contents and detailed safety precautions. Labels will be waterproof, securely attached, and written in English and other languages as required for the workforce (such as Uzbek and Russian). Wherever possible, chemicals will be kept in their original container. • Hazardous waste storage areas will be located away from any ignition sources or fire hazards. • Used face masks will be stored in designated bins and disposed of as medical waste.
Inappropriate/uncontrolled handling, storage, transport and/or disposal of sanitary wastewater	• Contractor to develop and implement a Project Specific Construction Waste Management Plan (CWMP) in accordance with committed mitigations measures in this ESIA report and provisions of the CESMP. • Develop and maintain a hazardous waste inventory to document and track sanitary waste generated and segregated. • Sanitary wastewater tanks will be placed in allocated impervious hard standing areas with bonding capacity to hold 110% volume of the maximum volume stored. • Sanitary wastewater tanks to be properly maintained and inspected to ensure tanks do not overflow. • Site inspections will be carried out regularly by the EPC contractor to ensure that all wastewater generated is properly managed, and no leakages or spill occur. In the event of a spill or overflow, immediate action will be taken in accordance with spill containment procedures and clean up procedures (to be developed in line with the CESMP). • Engage a licensed waste contractor for the periodic removal of septic tanks. • In common with the IFC EHS Guidelines, effort will be made in training construction personnel to minimise water consumption for ablutions and to ensure an understanding of water resource and wastewater issues.
Inappropriate handling and disposal of contaminated soil from clearing and excavation works causing cross-contamination of soils	• In-situ testing of soil to ensure it is not contaminated and can be re-used or disposed into land. • Training –Contractor staff to be able to identify signs of potential contamination (smell of HC, staining). • If contamination is found, develop and implement a Contaminated Soil Management Plan for appropriate handling, treatment and disposal of soil.
Inappropriate handling of concrete washout	• Concrete washout will only be undertaken in designated and signed areas to prevent leaks or spread of wastewater. • The concrete washout area will be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations. • The concrete washout area will have an impermeable surface with dedicated drainage systems that lead to separate sumps or treatment facility.

Impact/Source	Mitigation and Management Measures
	• The removal of any sludge residues as solid hazardous waste will be undertaken by a licensed waste contractor and handled as a hazardous waste.
Medical Waste	• Any generated medical waste (i.e. form on-site clinics) will be stored in appropriate medical waste containers. • All medical waste will only be handled by trained personnel. • Removal of any medical waste from the site for appropriate treatment, disposal/incineration will only be conducted by a licensed contractor.

11.4.4 Operation Phase

Table 11-3 Operation Waste and Wastewater Mitigation and Management Measures-Operations

Source	Mitigation and Management Measures
Inappropriate handling, storage, transport and disposal of non-hazardous solid waste	• Contractor to develop and implement a Project specific Operational Waste Management Plan (OWMP) in line with committed mitigation measures in this ESIA report and the provisions of the OESMP. • Domestic solid wastes to be segregated and identified from the other waste streams into separate waste containers/skips clearly to facilitate recycling. • Waste containers/skips will be clearly labelled and placed in designated waste storage locations. Labels will be waterproof, securely attached, and written in English and other languages as required for the workforce such as Uzbek and Russian. • For litter (food waste, domestic waste), an adequate number of covered bins will be strategically placed throughout the site at locations where construction workers and staff consume food. These will be regularly collected and taken to the main waste storage area. • Food waste must be stored within a sealed metal or plastic skip or bin, in order to prevent pests gaining access. • Heavy waste may be contained within an open skip, provided that segregation occurs effectively enough to remove all lightweight material that could be blown away. • Paper cardboard, metal cans, plastic, glass to be collected for recycling by a licensed waste contractor. • Only licensed waste transporters and waste management facilities will be engaged. • The Contractor will maintain copies of the waste management licensed on site. • Develop and maintain a waste inventory to document and track domestic solid wastes generated, segregated, reused and consignments • Completed waste manifests are required to show the chain of custody of the waste generated on site, its transportation and treatment/disposal. All records will be maintained on site.
Inappropriate/ uncontrolled handling, storage, transport and/or disposal of sanitary wastewater	• Sanitary facilities will be provided with adequately designed underground storage tanks. • Sanitary wastewater tanks to be properly maintained and inspected to ensure tanks do not overflow. • Sanitary wastewater tanks in allocated impervious hard standing areas with bunding capacity of 110% volume of the maximum volume stored.

Source	Mitigation and Management Measures
	• Sanitary wastewater treated at the onsite sewage treatment plant must meet established limit for landscaping. • Where there are no onsite sewage treatment plant, a licensed waste contractor will be engaged for the periodic removal of tank.
Inappropriate/un controlled handling, storage, transport and/or disposal of solid hazardous waste	• Develop and maintain a hazardous waste inventory to document and track hazardous wastes generated, segregated, reused and consignments. • Segregate and identify hazardous waste from the other waste streams into separate waste containers/skips clearly signed and labelled. • Store hazardous waste in allocated impervious hard standing areas in sealed containers stored with impermeable bases, sufficient containment and separation capacity, sun/rain shelter, separate drainage system, good ventilation and equipped with spill kits & spill response procedures. This area must be placed away from any sources of ignition. • Waste containers will be clearly marked with appropriate warning labels to accurately describe their contents and detailed safety precautions. Labels will be waterproof, securely attached, and written in English and other languages as required by the workforce such Uzbek & Russian. Wherever possible, chemicals will be kept in their original container. • Used face masks will be stored in designated bins and disposed of as medical waste.

11.5 Monitoring

The final monitoring methodology with specific monitoring details (i.e. locations, frequencies, durations, parameters etc.) will be developed in the specific 'Environmental and Social Monitoring Plan'.

Table 11-4 Waste Management Monitoring Requirements - Construction and Operations

Monitoring	Parameter	Frequency	Monitoring Location	Responsibility
Inspect and monitor proper handling and storing of waste materials	Check storage areas containment and control procedures as per CESMP/OESMP	Daily	Storage areas at the site	- EPC Contractor E&S Manager during the Construction Phase - O&M Contractor E&S Manager during the Operation Phase
Inspect and monitor third party waste contractors and disposal facilities	Ensuring engaged contractors, their vehicles and waste management facilities have applicable registrations/licenses at time of procurement	At procurement and annually thereafter	Contractors, transport vehicles and waste management facilities	
Waste Transfers	Record keeping of waste transfer notes	On-going	As waste is transferred during construction and operational phases.	

12 TRAFFIC AND TRANSPORTATION

12.1 Applicable Requirements & Standards

12.1.1 National Regulations

The Ministry of Transportation is responsible for all transport related activities and their requirements should be fully complied with in terms of routing of HGVs and site vehicles, licensing, road diversions, heavy/wide loads etc. Some of the relevant national requirements for the Project include:

- Law "About traffic safety" of the Republic of Uzbekistan August 19, 1999 No. 818-I (as amended on 29-12-2015): The main objective of this law is to ensure protection of life and health of citizens and their protection.
- Regulations on road safety during transportation of large and heavy loads by road transport (Annex No.2 to the Decree of Cabinet of Ministers No. 342 of December 26, 2011): This law determines the requirements of ensuring and coordinating traffic safety during the transportation of large size and heavy loads on public roads on the territory of the Uzbekistan. It also details the basic requirements for the technical condition equipment and furnishing of vehicles used for the transport of large and heavy loads as well as safety.
- Criteria and Procedure for Determining International Road Transportation of Loads (approved by the Decree of Ministry of Transport of the Republic of Uzbekistan and State Customs Committee of the Republic of Uzbekistan dated October 31, 2019, No. 6).
- Regulations on transport of loads by road in the Republic of Uzbekistan (Annex to Decree of Cabinet of Ministers No. 213 of 01.08.2014).

12.1.2 Lender Requirements

12.1.2.1 EPFIs

The assessment will be undertaken with due consideration of the recommendations set out within the IFC/World Bank General EHS Guidelines (2007) Section 3.4 Traffic Safety, within Section 3: Community Health and Safety.

Separate considerations regarding Community Health and Safety are also provided in the IFC EHS Guideline for Wind Energy (2015). This includes relevant items for 'Abnormal Load Transportation'.

12.2 Baseline Conditions

12.2.1 Site Observations

The closest highway to the Project site is the A379 which is located approximately 20 km to the north-east of the site and connects Navoi to Zarafshan. There is also the A380 highway which is located approximately 52km south-west of the site that connects Bukhara to Nukus. This road also connects Uzbekistan to Turkmenistan. Both highways are single carriage ways with dual lanes.

It is noted that the Project is connected to the main highways in the area through a road connecting the site to highway A379 from the east and an asphalted road traversing through the farmlands in the south connecting the site to highway A380. Portions of the asphalt road exhibit signs of wear, including visible potholes and cracks.

Several bridges were observed crossing over the water channels intersecting the site. These bridges primarily comprise aged concrete structure consisting of horizontal slabs supported by vertical foundations above the streams. The state of these bridges implies that they were not constructed to endure heavy loads, but rather to accommodate small vehicles and pedestrian traffic typical of rural or semi-rural regions. They exhibit signs of wear and are in somewhat deteriorated conditions.

The Project will utilize the 17.7 km unpaved dirt road extending from the main road near the railway to the Project site for transporting construction materials and workers. This main road, located near the highway, provides access to the area from the east via the A379 highway. During site visits, the proposed access road was observed to have minimal traffic.

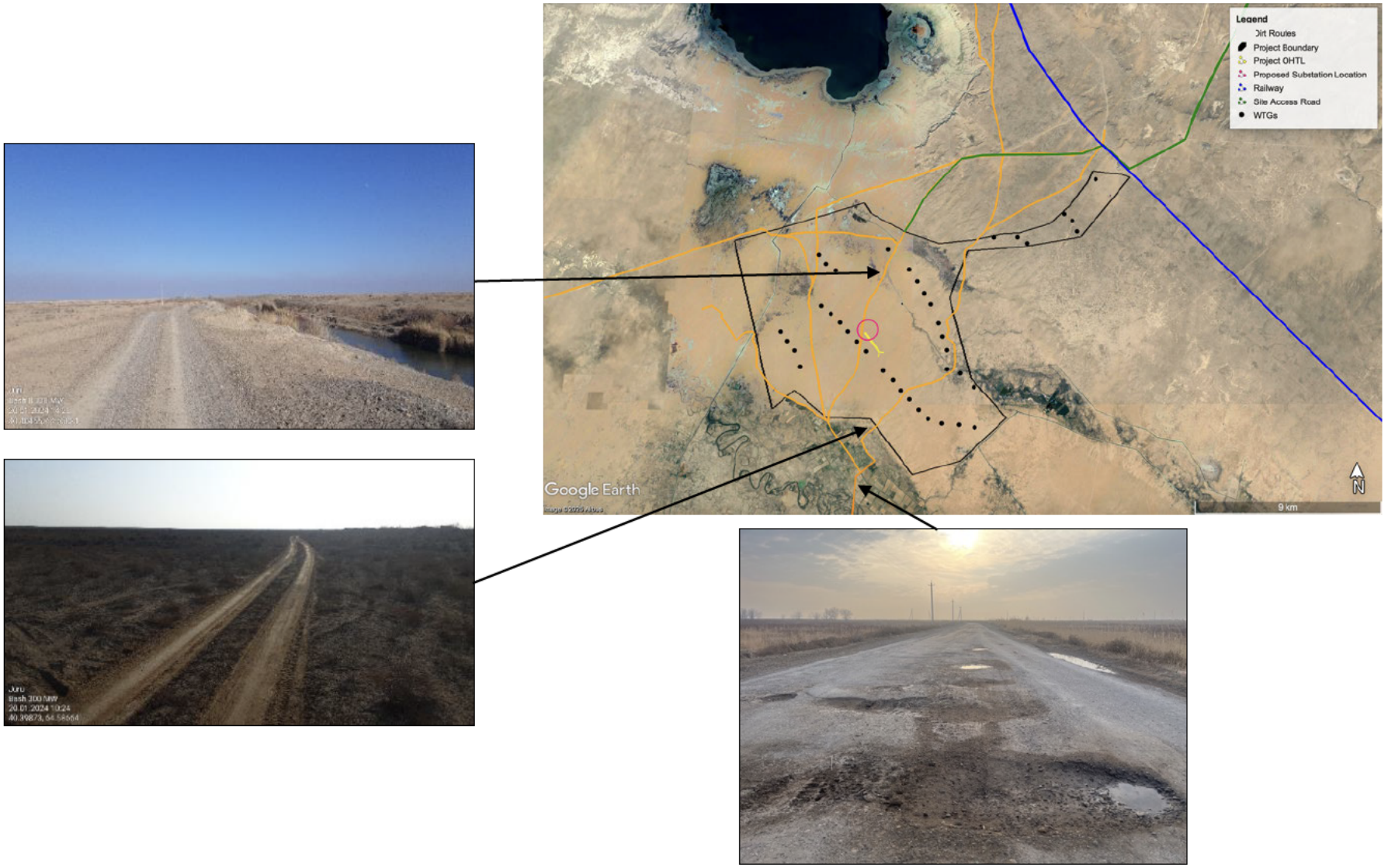


Figure 12-1 Site Access Roads and Dirt Routes in the Project Area





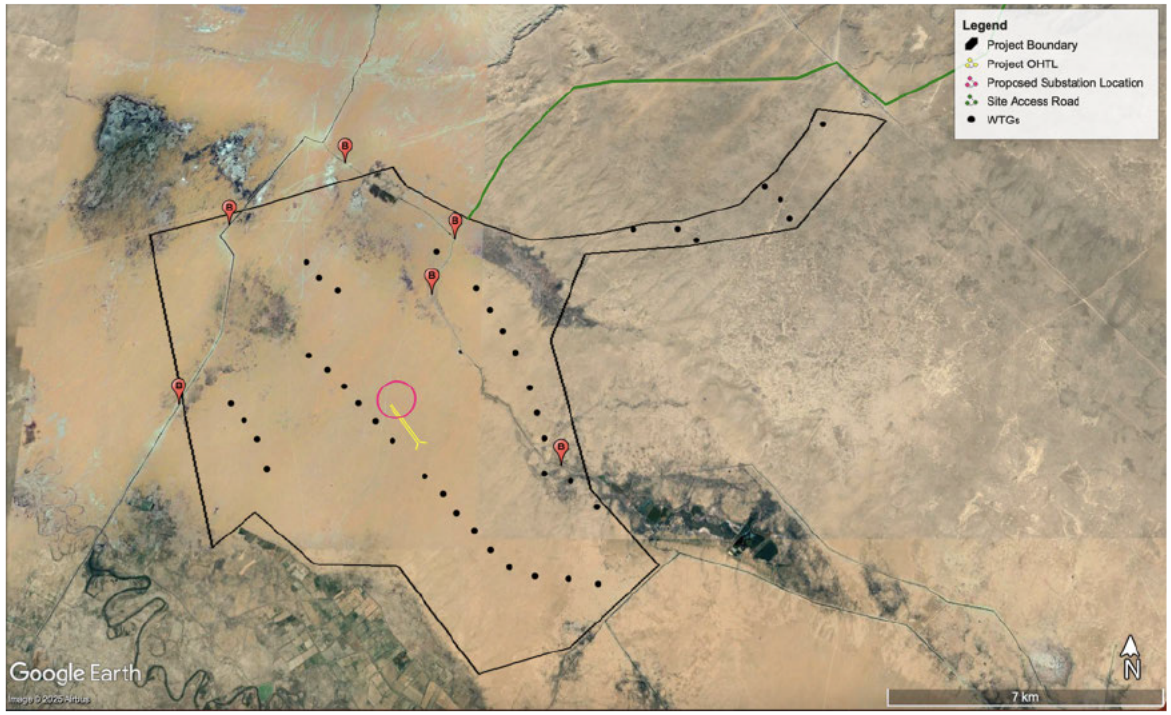




Figure 12-2 Bridges Crossing the Water Channels in the Project Area

12.2.2 Project Logistics

12.2.2.1 Transportation Route from the China – Kazakhstan -Uzbekistan Border

Transportation route surveys were undertaken by ACWA Power in August 2021 and by the EPC Contractor in May 2022 for the transportation of heavy project component for the Bash 500 MW Project. Considering the same routes will be used, the same survey results are presented here for reference. The table below provides a list of the most critical WTG components considered during the Route Survey.

Table 12-1 WTG Components Considered During Route Survey

WTG Components	Length (mm)	Width (mm)	Height (mm)	Net Weight (kg)	Gross Weight (kg)	Volume (m^3)
Generator	5,500	5,500	4,180	123,000	126,000	12,645
Nacelle	8,768	5,450	4,190	44,500	46,000	20,022
Hub	5,220	4,640	4,186	59,900	62,900	10,139
Blade	81,000	4,800	3,600	24,720	24,720	139,968

The Project anticipates transporting the project components from either Khorgos border in China to custom points at Kolzhat in Kazakhstan. From Kolzhat in Kazakhstan, project components will be transported to custom points at Yallama (KZ-UZ border) to route M-39 in Uzbekistan and from rout M-39 to the Wind Farm project site.

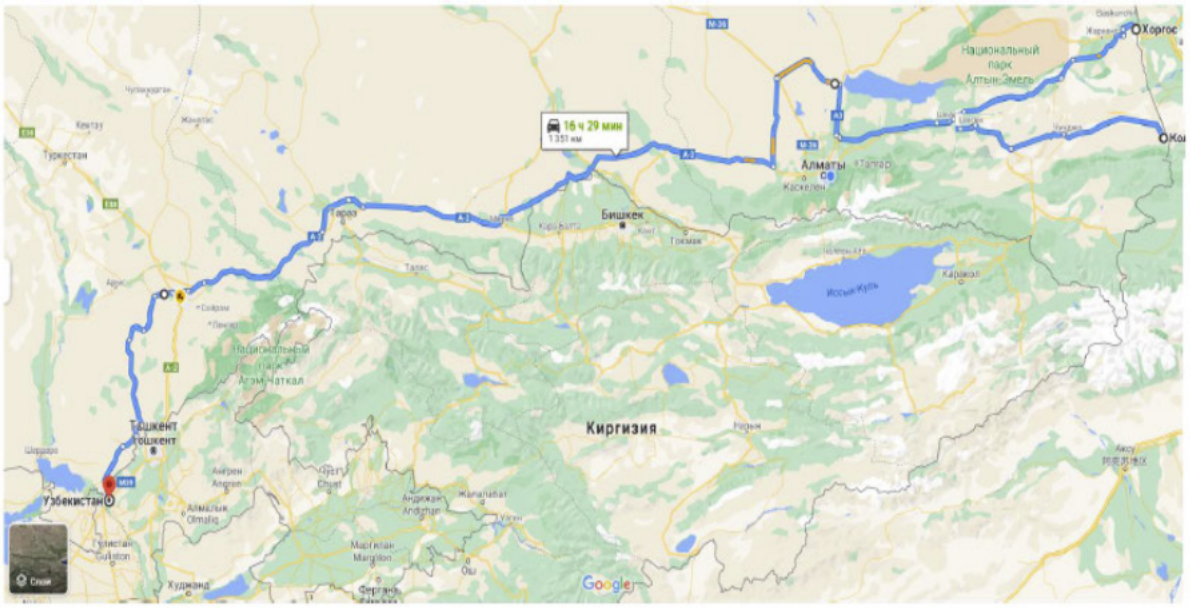


Figure 12-3 General Transportation Route Surveyed

Source: *Route Survey Report for ACWA Power Wind PP Project*

Based on the findings from the Bash 500 route survey & EPC report, the roads in Kazakhstan will be used to transport both heavy & oversized cargos from the Kolzhat border in Kazakhstan to custom points at Yallama (KZ-UZ border). From the KZ-UZ border, route M-39 will be used within Uzbekistan. The total distance from the Kazakhstan to route M-39 is approximately 1,391km. Based on the preliminary transportation report prepared by the Bash 500 EPC Contractor, modifications required along the route include but not limited to:

- Temporary removal of traffic signs, lamppost;
- Reconstruction of roundabout with drive through lanes;
- Construction of turning areas;
- Construction of storage, loading and access sites;
- Road widening, etc.

At the border crossing in Kalzhat, permission will be obtained, there will be construction of storage, loading and access sites in the neutral zone. At the border crossing in Yallama, to pass the territory of the Republic of Kazakhstan, a platform is required for turning the blade truck by 90 degrees. Necessary permits will be obtained by the EPC Contractor.

It should be noted that modification works required along the route are not anticipated to impact land users and other road users or lead to Involuntary Resettlement impact.

12.2.2.2 Transportation Route from the Yallama (Kazakhstan – Uzbekistan Border) to the Project Site

The total distance from Yallama to the Project site is approximately 519km with a total number of 37 bridges and 15 overhead structures. The route from Yallama to the project site passes through Karmana place and continues from Karmana via route A-379.

Based on the preliminary transportation report prepared by the Bash 500 EPC Contractor, the following modification work was required:

- Upgrading works of the roadway along the route;
- Arrangement of bypass;
- Dismantling of signs;
- Strengthening of Islet for passage;
- Pothole repair and levelling;
- Road construction (21km)
- Road widening, etc.

Considering Bash 500 MW construction is almost completed, it is anticipated that road upgrades and modifications would have been completed before the Gijduvon Wind Farm construction commences. Therefore, additional modifications to the transportation routes are not expected. However, the Project EPC Contractor and the different suppliers will be required to adhere to the custom procedures in the countries of origin, transit (Kazakhstan) and in Uzbekistan as applicable. The Route Survey report prepared in August 2021 and the Planned Civil Works for Transportation of WTG Equipment from China to Uzbekistan. Kazakhstan & Uzbekistan (Preliminary Report) is presented in **Appendix I.**

12.2.3 Consultations with the Ministry of Transportation

A consultation letter was sent to the Ministry of Transportation on 19th February 2024 informing them about the Project and enquiring on whether the Ministry had any specific requirements relating to the transportation of Wind Farm Project components such as blades, transformers, hazardous materials as well as anticipated 700 to 1000 project workforce.

A response from the Ministry of Transportation was received on 5th April 2024 stating that the Project is required to secure a special permit for the transportation of bulky and heavy cargo in accordance with Decision No. 86, and the Cabinet of Ministers *'Uniform Regulation on the Procedures for Issuing Certain Documents with the Character of Permit Through a Special Electronic System'* dated February 22, 2022. According to the Ministry of Transportation, the application for the special permit can be applied for online through https://license.gov.uz/.

Reference **Appendix J** for consultation with the Ministry of Transportation.

12.3 Receptors

Table 12-2 Traffic & Transportation – Receptor Sensitivity

Receptor	Sensitivity	Justification
Highways A379, railway crossing and access road to the Project site	**High**	The majority of roads near the Project site are narrow and may present a challenge to other road users during the transportation of wide loads. The access road from the railway crossing leading to the site and some bridges crossing the water channels will potentially require infrastructure improvement, etc. This will increase the pressure on the road infrastructure and the railway schedule when conducting the improvements and shutdowns. Additionally, the access road from A379 to the Project site is used by other vehicles from the nearby communities and facilities. Even though the access road is not considered to be busy, there is a risk to the existing road users who are not used to the increased traffic.
Residents of nearby villages and herders near the Project site	**High**	Given that residents including children and vulnerable groups, herders together with livestock will use the dirt road when

Receptor	Sensitivity	Justification
and along the access road including children and vulnerable groups		moving back and forth, they are particularly vulnerable to an increase in vehicular flow on the dirt road.

12.4 Potential Impacts, Mitigation, Management & Residual Impact

12.4.1 Construction Phase

12.4.1.1 Transportation of Project Components, Construction Materials and Equipment

The major components for the construction of the Project are the WTG components (blades, heavy turbine tower sections, transformers, nacelle, etc.) as well as the OHTL pylons/towers, wires, conductors etc. that can only be assembled at the site and as such they have to be transported to the site individually. Turbine components are likely to be transported by specialised turbine transportation vehicles that will be oversize.

It is understood from the route survey that all WTG components as well as equipment and construction materials will arrive by road from China to Kazakhstan and then to the Kazakhstan-Uzbekistan border. The transportation route survey carried out for Bash 500 in 2021 and 2022 indicated that the road infrastructure had some limitations which may hinder the transportation of the Project materials and therefore, modifications were required. It is expected that these modifications would have been completed prior to the Gijduvon Wind Farm Construction.

In addition, a separate study will be required to assess the need for upgrading the access road from the railway crossing to the site, as well as the bridges over the water channels, to accommodate heavy vehicles and the transportation of large equipment and WTG parts. This study was not available at the time of writing but will be conducted before work begins on site.

It is expected that a significant portion of the OHTL components will arrive by road, but that an amount of equipment may also require shipping, prior to final delivery by road. Where materials and equipment are shipped, they will go via different international ports, airports and will then require road hauling to the site via the national/international highway network.

If routes are not carefully planned and managed, the trailers hauling the heavy Project components may potentially damage or cause structural faults on existing highways, bridges, utilities such as electricity, storm water etc. and other road infrastructure such as signages. In addition, some sections of the road especially from Yallama (KZ-UZ border) to the Project site will likely require to be paved or compacted in order to allow easy access.

The EPC Contractor will be required to apply for the relevant permits from road transport authorities in Kazakhstan and Uzbekistan to transport Project components, equipment and machinery across borders and on local roads.

12.4.1.2 Increased Vehicular Flow and Traffic Congestion

Construction activities will likely result in an increase vehicular flow on local roads and highways and this may result in road traffic associated with the transportation of materials and project components to the Project site, project staff transportation and Heavy Goods Vehicle (HGV) movements. Findings from the Bash 500 transport survey of 2021/2022 and numerous site visits undertaken till date indicates that the local road infrastructure and highway are operating below their respective design capacity and as such have sufficient capacity for increase in traffic flow and will not be significantly impacted by vehicles carrying normal loads.

Although the highway infrastructure has sufficient capacity for increase in traffic flow, the movement of specialised turbine transportation vehicles will likely require temporary road closures and diversions and this will result in disruption, delay and in some instances traffic congestion to local commuters & road users. Given the narrow road infrastructure, the transportation of oversized loads is likely to slow down traffic with little chance for other vehicles to overtake resulting to traffic congestion and delays. In addition, vehicular transportation will be noticeable along the A379 to the Project site access road.

12.4.1.3 Safety of Residents

The highways to be used for the Project in both Kazakhstan and Uzbekistan are frequented by residents from cities and towns stretching from the Mangistau region in Kazakhstan to the Navoi region in Uzbekistan. Additionally, the road from Navoi to the Project site is primarily used by local communities and herders. Observations suggest that the local communities in the Project area may not have been accustomed to heavy traffic, however, considering the recent development of the Bash 500 MW WF and Bash 52 MW WF projects, it is expected that the local communities are somewhat familiar with the increased traffic associated with similar projects and may have adapted to the anticipated increase in vehicle flow

On the other hand, the increase in vehicular flow in the highways and the local road(s) as a result of the Project development has the potential to result in an increase in the number of road accidents involving humans and even livestock.

12.4.1.4 Loss of Access Route/Tracks through the Project Site

There are several vehicle tracks in the proposed Project site used by herders and other local communities. Due to the movement of machinery and vehicles, access to the track routes

within the site may temporarily be disrupted especially during the construction phase of the Project. This will mostly be in order to ensure the safety of the local herders and their livestock.

In case of any temporary access restrictions, it is anticipated that road users will likely use alternative routes in the Project's vicinity. These alternative routes are unpaved and will provide access to other areas outside the project site, such as grazing areas and nearby communities.

Consultations with residents of Kuklam Community revealed that they typically use the road crossing the project site to travel to Shofirkon district. However, it was noted that they have an alternative road available to access the neighbouring district in case there are restrictions within the Project site.

12.4.1.5 Risks of Access Road Crossing the Railway

It is noted that access to the site will be through the railway crossing. Heavy construction vehicles crossing the railway can potentially damage tracks or signalling systems, leading to operational interruptions or accidents.

In addition, access to the Project site through the railway passage may be restricted or delayed during train passage, and waiting times at the crossing could slow down the transportation of construction materials and personnel. Increased movement of heavy vehicles at railway crossings could also lead to congestion, causing delays and creating risks for local road users.

The primary safety risk associated with the Project access road crossing the railway is collisions between construction vehicles and trains. This can occur due to poor visibility, inadequate signalling, or lack of awareness by drivers or train operators.

The EPC Contractor will be required to coordinate closely with the railway authority and apply for the relevant permits.

Table 12-3 Traffic & Transportation Impact Significance, Mitigation & Management Measures and Residual Impacts – Construction

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
Impact on Road Infrastructure	**Moderate Negative**	Highway A379 and access road to the Project site, crossing the railway	High	**Moderate**	• A separate study will be conducted to assess the need for upgrading the access road, especially from the railway crossing to the site, as well as the bridges over the water channels, to ensure they can accommodate heavy vehicles and the transportation of large equipment and WTG parts. • The Project will ensure close coordination with the Port authorities in order to obtain relevant permits for storage of Project materials/equipment and vehicle access to the port. • All necessary permits required for the modification/upgrading of the road infrastructure, transportation of oversized equipment/materials and electricity shutdown etc. will be obtained from relevant Kazakhstan and Uzbekistan authorities. • Transportation of materials over railroad crossing must be organised according to the train schedule and coordinated with relevant authorities as required by law. • Final road condition of the selected transportation route will be checked before transportation of any oversized loads to determine that the required improvements have been put in place. • Where transportation of equipment/materials is to be undertaken during the winter season or on wet or windy periods, additional safety and precaution measures will be implemented in order to ensure the safety of other road users and integrity of the road infrastructure and materials being transported. • Ensure that any equipment/materials transported across the Kazakhstan-Uzbekistan border meet all the legal requirements including those relating to customs. • The Project Company will ensure that the EPC Contractor post construction route surveys (especially for local roads) in order to establish their condition. Based on the outcome of the post construction route survey, the EPC Contractor will rehabilitate any roads and local access routes that have been damaged as a result	**Minor**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					of project traffic. This will include obtaining relevant approvals/permits to undertake such works.	
Increased vehicle flow on highway and local roads	**Moderate Negative**	Users of Highway A379 and access road to the Project site	High	**Major**	• A Traffic & Transportation Management Plan will be developed by the EPC Contractor. The plan will be prepared in accordance with IFC General EHS Guideline, outline how turbine components will be delivered to the site and outline how construction traffic will be managed to limit impacts upon local communities, personnel, and other road users. • The plan will include information on the designated access routes, site entrance points, speed limits, waiting, parking areas and map out accident and traffic hotspots for project access vehicles etc. • The local police and other relevant authorities will be consulted during the development of the Traffic & Transportation Management Plan; • The Project CLO will undertake awareness campaigns with schools, kindergartens and within the community to create awareness on potential risks associated with movement of vehicles and machinery and basic safety precautions they can take. • The Project Company will ensure that the EPC Contractor has undertaken road safety campaigns especially targeting vulnerable groups in impacted communities including children, illiterate community members and the elderly so they are aware of potential risks involved with the increased traffic and movement of machinery as a result of the Project and safety measures in place. • Construction access road into the site will be clearly signposted. • Buses will be used to transport labourers and carpooling among staff encouraged (social distancing due to COVID-19 will be considered). • Route directions and speeds limit will be placed along the access road into the project site in relevant local languages i.e., Kazakh, Uzbek etc • Deliveries of construction materials will be coordinated to reduce congestion on local roads and to reduce the waiting time for the drivers.	**Moderate**
Safety of Residents of nearby villages & herders	**Minor Negative**	Residents of nearby villages and herders (near the WF and along the access road) including children and vulnerable groups	High	**Moderate**		**Minor**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					• Where applicable the EPC Contractor will obtain the relevant permits to transport heavy loads into the project site and adhere to the stipulated conditions (i.e. delivery routes and timings). • Where applicable, the EPC Contractor will notify the local communities on delivery of wide/heavy loads and how it could potentially impact their road use. • Road closures and diversions as a result of project component transportation will be kept to a minimum and wherever practicable peak transportation hours must be avoided to reduce impacts on commuters & road user. • Oversize & heavy load vehicle's drivers will be competent and legally authorised to operate such vehicles in the Uzbekistan and across borders where applicable. • The EPC Contractor will provide awareness training on traffic safety to the local people in collaboration with local police office. • All traffic incidents and near misses will be recorded and investigated with any necessary corrective actions taken including reporting to local police. • A grievance mechanism will be established to allow local communities to make complaints relating to Project drivers. • Compensation of any livestock injured by Project vehicles will be conducted in coordination with community leaders and local officials. • Project drivers will not be permitted to transport any unauthorised personnel or goods.	
Loss of access routes/tracks through the Project site	**Moderate Negative**	Residents of nearby villages and herders (near the Project and along the	High	**Moderate**	• An alternative route with shorter travel time or the same travel time as existing route will be provided before the commencement of construction activities or material delivery. • The alternative route(s) provided will be clearly marked in local languages and easily understandable signals to prevent local communities and herder from wandering into construction areas.	**Minor**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
		access road)			• Project activities will not encroach on any land or access routes outside the Project boundary.	
Risks associated with the Project access road crossing the railway	**Moderate Negative**	Railway and railway crossing users	High	**Major**	• In coordination with the railway authority, assess the need for upgrading the railway crossing to ensure they can safely accommodate heavy vehicles and the transportation of large equipment and WTG parts. • Visual alerts should be strategically placed to ensure visibility from a distance. • Develop a delivery and transport schedule, coordinating with the railway authority to avoid peak train hours. Traffic controllers should be deployed to manage vehicle flow during critical times. • Provide specialized training for construction vehicle drivers on railway crossing protocols. Awareness programs should focus on railway safety measures, speed limits, and response actions in case of emergencies. • Set and enforce low speed limits for vehicles approaching the railway crossing to prevent potential collisions. • Create and train all relevant personnel on an emergency response plan to manage incidents at the crossing efficiently. The plan should include communication channels, evacuation protocols, and designated emergency response teams. • Establish clear communication protocols with railway operators to notify them of construction activities and ensure both parties have up-to-date schedules and emergency contacts.	**Minor**

12.4.2 Operational Phase

12.4.2.1 Increased Vehicle Flows

Transportation impacts during operations are not expected to be significant, as the operation of the Project will not require continuous delivery of materials, or other equipment.

Operation and maintenance of the wind farm will require vehicle movement; however, this will be restricted to security and maintenance teams using light-vehicles, pick-ups, small vans, etc. As such, the limited vehicle movement for maintenance or waste removals are not expected to result in noticeable impact on existing road infrastructure.

Staff movements will also contribute to a minimal additional vehicle flows on the local roads and internal site roads.

Table 12-4 Traffic and Transportation Impact Significance, Mitigation & Management Measures and Residual Impacts

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
Increased vehicle flows local roads	**Negligible Negative**	Local roads	High	**Minor**	Operational phase workers will be encouraged to carpool wherever possible to limit the number of vehicles along the local roads.	**Negligible**

12.4.3 Cumulative Impacts

As the Bash 500 MW and Bash 52 MW Projects will be operational during the construction phase of the Project, cumulative construction impacts are not expected. During the operational phase, transportation requirements will be minimal, primarily for workers, and as such, cumulative impacts during operation are not anticipated.

12.4.4 Decommissioning Phase

Potential impacts during decommissioning phase of the Project are anticipated to be similar to those encountered during construction. As such, it is assumed that risk of transportation of turbine components associated with the construction phase will be expected for the decommissioning phase. Likewise, the mitigation & management measures outlined for the construction phase in relation to transportation of project components, increase in vehicle flow on highway and increased risk of road traffic accidents will be applicable to the decommissioning phase as well. It is also expected that consultations will be undertaken with relevant authorities i.e., Ministry of Transport, Railway Authority etc. and relevant permits

obtained before any materials/equipment can be transported, stored or disposed out of the Project site.

12.5 Monitoring

The final monitoring methodology with specific monitoring details (i.e. locations etc.) will be developed in the specific 'Environmental and Social Monitoring Plan'. The monitoring requirements below relate to construction phase and no specific monitoring requirements are proposed for the operational phase.

Table 12-5 Traffic and Transportation Monitoring Requirements (Construction)

Monitoring	Parameter	Frequency	Monitoring Location	Responsibility
Safety of drivers, residents and local herders in the Project area	Record keeping in case of accidents or incidents or in case of any complaints from local communities. Incidents involving livestock and wildlife will also be recorded.	Daily	Roads used by the Project vehicles (including railway crossing)	EPC Contractor HSE Manager
Grievances received	Record of grievances received, response period, close-outs	On-going	Roads used by Project vehicles (including railway crossing)	EPC Contractor HSE Manager
Permits & licenses	Validity and renewal of permits & licenses	As required by law	Document control office – EPC Contractor	EPC Contractor HSE Manager
Raising of awareness with local communities	Proof of awareness campaigns conducted by the EPC Contractor with local communities on road safety	Before the delivery of project materials/equipment can start and thereafter if there is a considerable change to the delivery schedule	Communities near the access road and in local schools and kindergartens	EPC Contractor HSE Manager
Condition of roads (including local access roads and railway crossing)	Proof that pre/post construction road surveys were undertaken and that rehabilitation of any roads damaged as a result of the Project has been undertaken.	Before and after construction	Roads used to transport project materials including local access roads.	EPC Contractor HSE Manager

13 ARCHAEOLOGY AND CULTURAL HERITAGE

13.1 Applicable Requirements & Standards

13.1.1 National Regulations

Relevant legislation in Uzbekistan relating to archaeology and cultural heritage include:

- 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).
- Resolution of the President of the Republic of Uzbekistan № RP-4068 dated December 19, 2018 "On measures for improving actions for protection of material cultural heritage objects".
- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan № 846 dated October 4 2019 "On approval of the national list of real state sites and objects of material cultural heritage".

The above laws seek to protect and sites and objects of cultural heritage which are considered as part of the national heritage for all the people in Uzbekistan.

In addition, the Criminal Code of the Republic of Uzbekistan includes provisions that prohibit the intentional destruction or damage of objects of tangible cultural heritage under state protection, with further protections in place to protect cultural property in PAs, in particular protected historical and cultural territories, without first obtaining permission.

13.1.2 Lender Requirements

13.1.2.1 ADB

ADB's Safeguard Policy Statement and related Safeguards, include various requirements for cultural resources, both physical (and assumed to include intangible resources) – of importance locally, provincially, nationally and internationally. Where such resources are identified the ADB safeguards highlight the importance of consulting with the communities who use such facilities, as well as the regulatory agencies entrusted with protecting such resources.

13.1.2.2 AIIB

AIIB's ESF outlines the requirement to conserve and avoid impacts on cultural resources. The Framework further states "*when avoidance of impacts on cultural resources is not feasible, prepare a cultural resources management plan to mitigate and monitor these impacts*."

13.1.2.3 EPFIs

In accordance with the Equator Principles, the assessment will refer to applicable IFC Performance Standards on Social and Environmental Sustainability, specifically with due consideration of Performance Standard 8 – Cultural Heritage. PS8 aims to protect the adverse impacts of project activities and support its preservation and to promote equitable sharing of benefits from the use of cultural heritage. Cultural heritage in this standard refers to:

- Tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values;
- Unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls; and
- Certain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.

13.2 Baseline Conditions

13.2.1 Desktop Review

In Uzbekistan, the inclusion of objects/elements of tangible or intangible cultural heritage is undertaken by the Ministry of Cultural Heritage based on proposals from local state bodies, legal entities and individuals. As presented in the following table and shown on the figure, currently Uzbekistan has five cultural heritage sites and two natural heritage sites.

Table 13-1 UNESCO Registered Cultural and Natural Heritage Sites in Uzbekistan

ID	NAME	NATURE	DISTANCE FROM THE PROJECT SITE (KM)
1	Historic Centre of Bukhara (1993)	Cultural Heritage Site	72
2	Itchan Kala (1990)		346
3	Historic Center of Shakhrisyabz (2000)		230
4	Samarkand – Crossroad of Cultures (2001)		207
-	Silk Roads: Zarafshan-Karakum Corridor (2023)		30
5	Western Tiern – Shan (2016)	Natural Heritage Site	458
6	Cold Winter Desert of Turan		427

None of the tangible cultural and natural heritage sites are within the Project area of influence. The Silk Roads - Zarafshan-Karakum Corridor is the nearest cultural heritage site to the Project site with its closest landmark located 30km away. The site is a key section of the Silk Roads in Central Asia, spanning 866km from the Zarafshan River to the Merv Oasis. This corridor, running through rugged mountains, fertile valleys, and desert, facilitated extensive east-west trade and cultural exchange from the 2nd century BCE to the 16th century CE. People travelled, settled, conquered, or were defeated here, making it a melting pot of ethnicities, cultures, religions, sciences, and technologies.

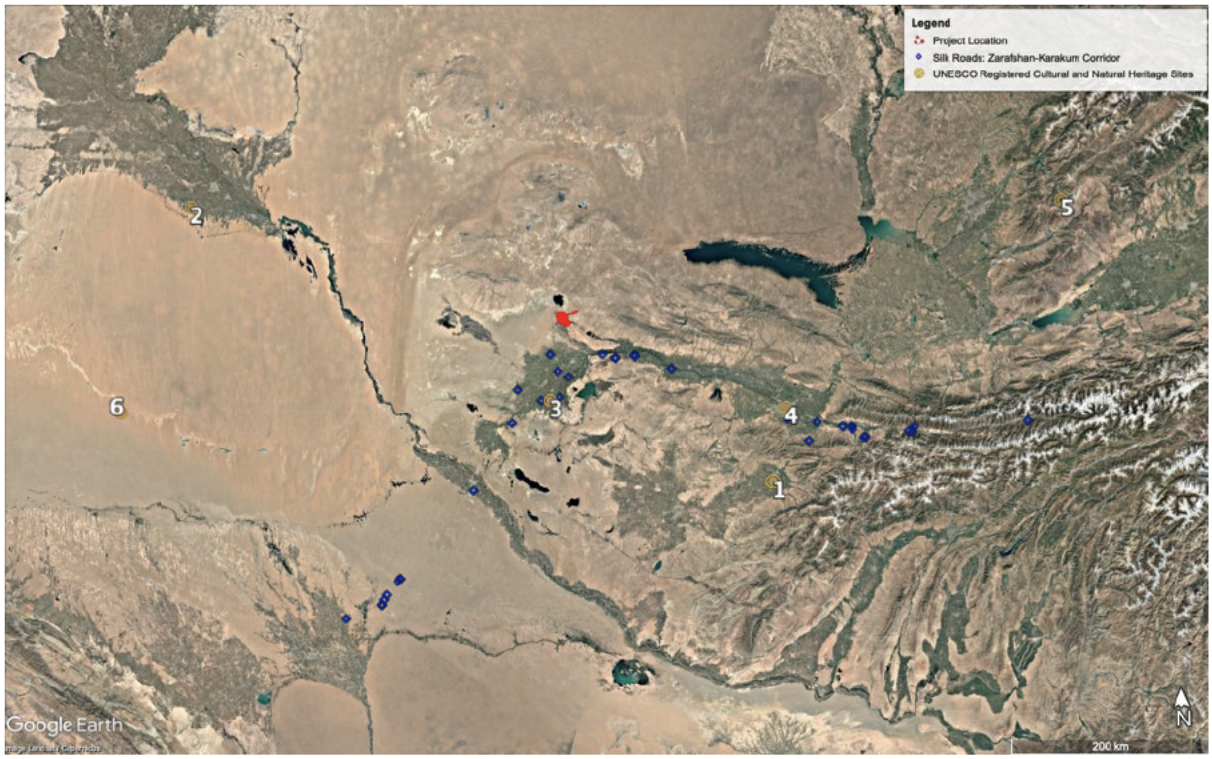


Figure 13-1 UNESCO Registered Cultural and Natural Heritage Sites in Uzbekistan

Uzbekistan has 15 elements of intangible cultural heritage listed by UNESCO, these are presented in the following table. Elements of intangible cultural heritage occurring across Uzbekistan such as Palov culture, Nawrouz and Iftar and within Bukhara region such as Sericulture, Telling Tradition of Nasreddin Hodja, Ceramic Arts, and the Art of Illumination are practiced by communities living in the Project region.

Table 13-2 UNESCO Registered Intangible Cultural Heritage in Uzbekistan

ELEMENT	DESCRIPTION (SUMMARY)	REGION WHERE IT IS COMMONLY PRACTICED
Art of illumination: Təzhib/Tazhib/ Zarhalkori/Tezhip/ Naqqoshlik (2023)	Illumination is a centuries-old decorative art practised on the pages of manuscripts, calligraphic texts and miniatures. The practice is closely tied to the beliefs and cultural practices of communities. This practice	Widely known across the country but mainly practices in Tashkent,

ELEMENT	DESCRIPTION (SUMMARY)	REGION WHERE IT IS COMMONLY PRACTICED
	also contributes to the preservation of historical and cultural objects and to their safeguarding for future generations.	Bukhara, Samarkand, and Khiva regions.
Iftar/Eftari/Iftar/Iftor and its socio-cultural traditions (2023)	Iftar is observed by Muslims at sunset in the month of Ramadan, upon completion of all religious and ceremonial rites. Iftar gatherings strengthen family and community bonds, promote charity and social exchange, and include people who may not fast.	Across Uzbekistan
Ceramic arts in Uzbekistan (2023)	Ceramic art in Uzbekistan, one of the oldest forms of applied art, utilizes loess clay to create essential household items like storage containers, tandoor ovens, jugs, and toys. Uzbek ceramic art holds historical and cultural significance, enriching creativity and supporting community livelihoods through its production and sale.	Ferghana (Rishton, Gurumsaray, Andijan); Tashkent school of ceramics; Samarkand (Samarkand, Kattakurghan, Urgut); Bukhara (Bukhara, Ghijduvon); Khoresm (Khiva and Chimboy as well as Madyr and Kattabog); Qashqadaryo (Kasbi, Shakhrisabz, Kitob); Surkhandaryo (Denau).
Telling tradition of Nasreddin Hodja/ Molla Nesreddin/ Molla Ependi/ Apendi/ Afendi Kozhanasyr Anecdotes (2022)	The Telling Tradition of Nasreddin Anecdotes encompasses social practices and festivals centered on humorous and wise tales attributed to Nasreddin, a philosopher known for witty analyses of society and life. Shared as a common heritage across several countries, these anecdotes are passed down through oral traditions, written sources, media as well as events and festivals at various levels.	Ferghana, Andijan, Namangan, Tashkent, Navoi, Bukhara, Kashkadarya, Jizzakh, Surkhandarya, and Khorezm regions
Sericulture and traditional production of silk for weaving (2022)	Sericulture involves farmers raising silkworms through their lifecycle, growing mulberry trees to feed them, and reeling silk fibres from the cocoons. Rooted in Great Silk Road traditions, sericulture embodies cultural identity and centuries-old practices. The silk trade also symbolized social cohesion, facilitating cultural and scientific exchange among participating countries.	Ferghana, Samarkand, Shahrisybz, Bukhara, Turkestan, Andijan, Namangan, Navoi, and Khorezm regions
Bakshi art (2021)	Bashki refers to the performance of traditional centuries old poems based on myths, legends, folk tales and legendary chants with the accompaniment of musical instruments including dombra and kobuz. The practice is passed on within families of through formal bakhshi schools.	Republic of Karakalpakstan, Surkhandarya region
Art of miniature (2020)	Type of two-dimensional artwork that involves the design and creation of small paintings on books, papier mache, rugs, textiles, walls, ceramics etc.	Bukhra region and Samarkand region

ELEMENT	DESCRIPTION (SUMMARY)	REGION WHERE IT IS COMMONLY PRACTICED
	The patterns art represents beliefs, world views and lifestyles in a pictorial fashion and has also been influenced by Islam.	
Khorazm dance, Lagzi (2019)	This dance reflects the sound and phenomena of surrounding nature, feelings of love and happiness. Lagzi is transmitted across generations through creation of new versions of performances. It is performed through national holidays and folk festivities as well as in the daily-based interpretation during family events.	Mainly in Khorazm Region but it has also spread to other regions in Uzbekistan.
Margilan Crafts Development Center, safeguarding of the atlas and adras making traditional technologies (2017)	Historically, Margilan was the centre for making atlas and adras – vivid and fine traditional fabrics. The goal of the Center is to safeguard, develop and promote the method of Uzbek traditional atlas and adras through innovative training, exhibitions etc.	Ferghana Valley in Uzbekistan, Margilan city
Nawrouz, Novruz, Nowrouz, Nowrouz, Nawrouz, Nauryz, Nooruz, Nowruz, Navruz, Nevruz, Nowruz, Navruz (2016)	This marks the beginning of new year on 21st March when a variety of rituals, ceremonies and other cultural events take place for a period of about two weeks. It includes spending time with family, friends, exchanging gifts, street perfomances, public rituals, traditional sports etc. These practices are transmitted from older to younger generations through observation and participation.	Across Uzbekistan
Palov culture and tradition (2016)	Polav is a traditional dish made and shared throughout rural and urban communities across Uzbekistan. It is served as a gesture of hospitality, to celebrate special occasions such as weddings and new year. Knowledge and skills associated with the practice are handed down from older to younger generations formally and informally using a master-apprentice model or by demonstration within families, peer groups or community organistaions.	Across Uzbekistan
Askiya, the art of wit (2014)	It is a gene of Uzbek verbak folk art that takes the form of a dialogue between two or more participants who eloquently debate and exchange witticisms around a particular theme. The bearers and practitioners (mainly men) must master the peculiarities of Uzbek language and be skilful and humorous, At present there are more than 30 forms of Askiya some professionals and others amateurs.	Ferghana Valley in Uzbekistan and Tashkent region
Katta Ashula (2009)	A type of traditional song that forms part of the identity of various people of the Ferghana valley in Uzbekistan. It is transmitted orally from master to pupil from one generation to another during a demanding	Ferghana Valley in Uzbekistan

ELEMENT	DESCRIPTION (SUMMARY)	REGION WHERE IT IS COMMONLY PRACTICED
	apprenticeship and it is interpreted by a minimum of two and a maximum of five singers.	
Cultural space of Boysun District (2008	Boysun district is located in south-eastern Uzbekistan on the route from Asia to Minor India and is one of the oldest inhabited areas of Central Asia. Numerous traditions and rituals are still present here. Ancient practices are used of conduct wedding ceremonies, funeral rights, shamanistic rituals etc. Other popular traditions are ritual chants linked to annual festivals, epic legends & dances.	Surkhandarya region
Shashmaqom music (2008)	Shashmaqom means "six maqoms" and constitutes a fusion of vocals and instrumental music, melodic and rhythmic idoms and poetry. It dates back to pre-Islamic era and is continuously influenced by developments in musicology, poetry, mathematics and sufism. Numerous schools were founded by Jewish communities in the ninth and tenth centuries especially in the city of Bukhara, the historical and spiritual centre of Shashmaqom. Oral transmission from master to student remains the principle means of preserving the music and its spiritual values. From the 1970s, many of the best-known Shashmaqom performers emigrated from Uzbekistan to the diaspora communities in Israel and the United States. With the passing of many Shashmaqom masters, the overwhelming majority of present-day performers in Uzbekistan are graduates of the Tashkent Conservatory, which offers training in Shashmaqom composition	Few of these performers are found in Bukhara City

13.2.2 Site Observations

During the site visit, approximately 10-15 graves were observed in the north-western side of the Project area around 2 km from the closets WTG. Based on the inscriptions found on the tombstones, these graves were determined to belong to the 19th and 20th centuries. Notably, one of the graves had water nearby and appeared to be cleaned and well-maintained, suggesting regular visits in accordance with Islamic tradition. No other cultural heritage objects were identified during the site visit besides these small, unfenced graves.

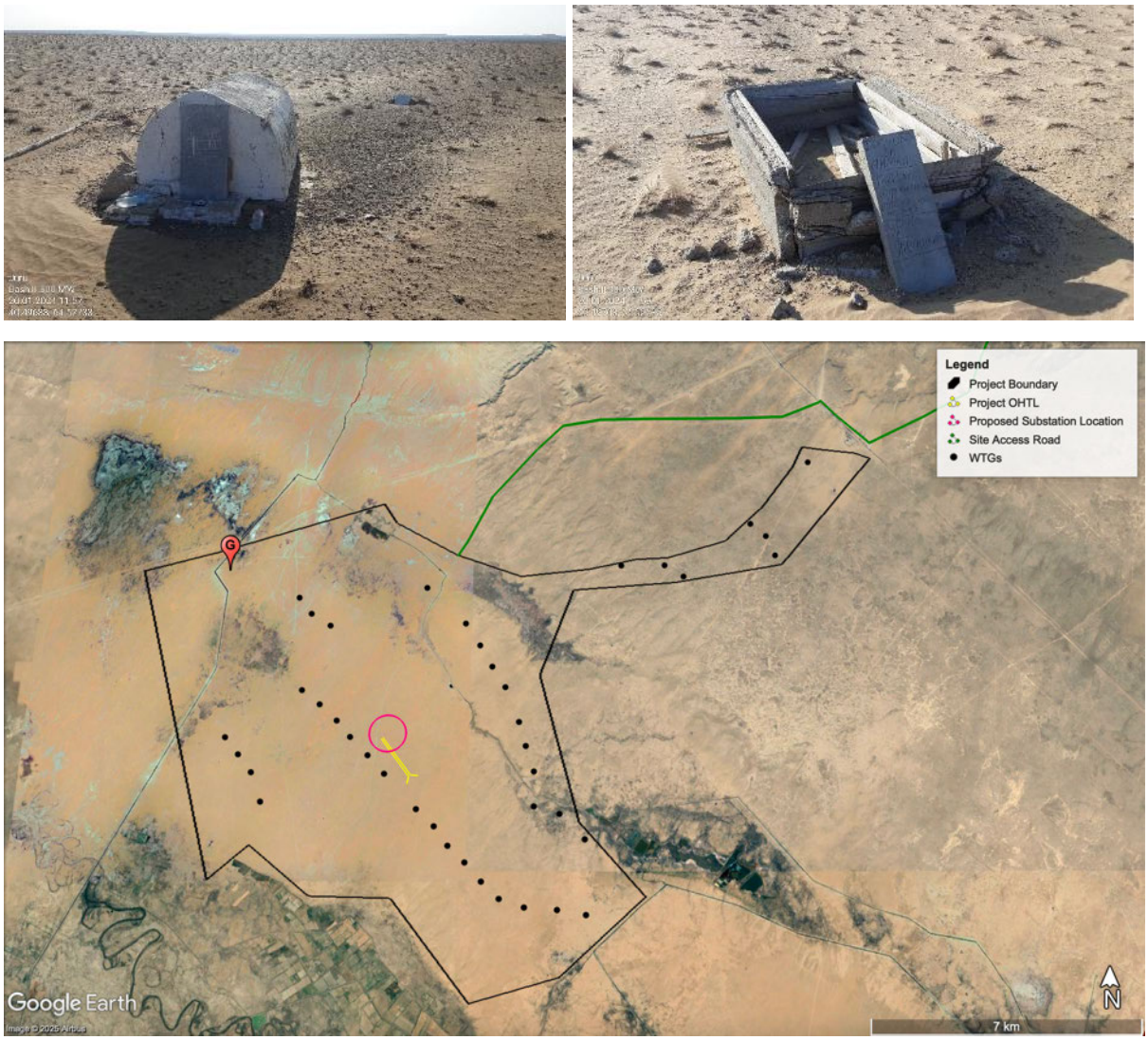


Figure 13-2 Examples and Location of the Tombs Observed in the Wind Farm Site

13.2.3 Consultations

13.2.3.1 Cultural Heritage Agency

A letter was sent to the Cultural Heritage Agency on 15th January 2024 requesting for details regarding the archaeological and cultural objects/items within the Project area. A letter of response was received on the 22nd January 2024 (**Appendix J**). The letter confirmed the absence of known state-protected cultural heritage sites and archaeological research within a radius of 2 kilometres.

According to the Agency, archaeological research in the Ayakagitma Lake area was conducted in 1995 under an agreement between the Institute of Archaeology of the Academy of Sciences of Uzbekistan, named after Ya. Gulomov, and the University of Warsaw, Poland.

Additionally, the Agency referred to the field research carried out by an expedition team comprising specialists from the National Archaeological Centre of the Academy of Sciences of Uzbekistan, the Samarkand Archaeological Institute, and Samarkand State University for the Bash 500 Wind Farm Project by ACWA Power. Taking into account the findings from that expedition, the Agency recommended conducting an archaeological investigation for the Project area.

13.2.3.2 Institute of Archaeology

The Institute of Archaeology also known as the National Centre of Archaeology of Academy of Sciences of the Republic of Uzbekistan is the scientific and methodological orientation of archaeological research in the country. This institute organises complex archaeological expeditions using innovative technologies in connection with educational practice. This Institute is also responsible for establishing international cooperation in the field of archaeological research, systematic organization of joint archaeological expeditions with foreign researchers working in the field of archaeology.

A consultation letter was sent to the Institute of Archaeology under the Academy of Sciences of the Republic of Uzbekistan on 15th of January 2024 requesting for clarifications on the following:

- Clarification on whether any archaeological or cultural surveys have been completed or are planned/ongoing within or nearby the Project site (within 2km), requesting copies of the survey reports, and seeking information on survey locations, timelines, and relevant details.
- Requesting information about any identified locations or objects of archaeological and cultural importance within 2 kilometers of the Project area and their designation.
- Requesting further requirements or recommendations regarding the development of the proposed Project.

A letter of response was received on 30th of January 2024 (**Appendix J**) stating that the planned project area in the south-eastern Kyzylkum region encompasses ancient deltas of the Zarafshan River, extensively studied since the early 20th century by expeditions like the Khorezm archaeological-ethnographic expedition led by S. P. Tolstov. In addition, recent collaborations with the Academy of Sciences of Uzbekistan in 2021 for the Bash 500 MW Wind Farm uncovered significant sites, including Neolithic monuments and Paleolithic workshops. The letter highlighted that the Project area comprises diverse geographical features such as ancient riverbeds, tributaries, depressions, and small mountain massifs, which could potentially harbor archaeological sites spanning from the Stone Age to the late Middle Ages.

Currently, there are no active archaeological research investigations in the vicinity of the planned project area. As such, the Institute stated that comprehensive archaeological investigations will be required prior to project commencement. This will be carried out by experts from the National Centre of Archaeology who will evaluate the presence of such sites and provide guidance for subsequent actions.

13.2.4 Project Site Archaeological Surveys

ACWA Power and the National Archaeological Centre of the Academy of the Republic of Uzbekistan signed an agreement on conducting archaeological research in the Project site on March 5, 2024. The agreement outlined the terms of engagement between the two parties and required the immediate mobilisation of the Archaeology Team to site.

The archaeological expedition conducted as part of the project took place in March-April 2024 and uncovered a number of findings in the study area.

Near the northern boundary of the project area, close to a region known locally as "Kattagan," a stone grave-fortress was discovered (coordinates: 40°29'59.29" N, 64°33'12.65" E). This is located more than 1 km away from the nearest WTG. It consists of a stone box placed within a circular mound. In addition, six gravestones dating from the late 19th to early 20th century were identified as shown in the following figure.



Figure 13-3 Gravestones Placed on Graves Dating Back to the late 19th and early 20th Centuries

An archaeological survey was carried out within the project area, resulting in the discovery of artifacts spanning from the Stone Age to the Middle Ages. The majority of Stone Age artifacts were found in the northeastern, northern, and northwestern parts of the site, while numerous pottery fragments from the medieval period were uncovered in the central, southern, and southeastern areas.

The findings included a large quantity of pottery fragments, both glazed and unglazed, with unglazed pottery scattered throughout the area. Common fragments included shards from jars, pots, and small bowls.

The jar fragments were typically egg-shaped, made on a fast-spinning wheel with fine-quality clay containing small limestone inclusions. Similar jars were found in Paykent, dating back to the late 9th and 10th centuries. Most jar fragments consisted of handles and belly pieces.

Some grey clay jar fragments featured embossed geometric rhombus patterns, common in pottery from the developed medieval period (9th-17th centuries) across Central Asia, symbolizing the sun, fertility, and protection from evil.

The small bowls had a Gray cross-section and were made from dense clay with crushed chamotte, sand, and gypsum additives. Their outer surface was decorated with dark red slip coatings, a design typically seen on vessels used to store milk and butter, symbolizing abundance and prosperity.

Examples of the investigations and the findings are shown in the following figures.



Figure 13-4 ***Site Where Stone Artefacts Were Discovered***



Figure 13-5 *Archaeological Discoveries in the Project Area*

During the exploratory excavation in the northwestern part of the project area, near an ancient archaeological site locally known as "Kattagan," one stone tomb (kurgan) and six gravestones from the late 19th to early 20th century were discovered. Additionally, 13 locations

revealed Neolithic (VI millennium BCE) stone artifacts, and 19 locations yielded pottery fragments from the medieval period (9th-17th centuries).

The boundaries of these sites were identified, and protective zones were established around them in accordance with the regulations of the 2019 Resolution No. 265 of the Cabinet of Ministers.

- A protective radius of 100 meters was established around the stone tomb (kurgan) and the six gravestones.
- Protective zones of 100 meters were also established around each of the 13 points with stone artifacts.
- Similarly, a 100-meter protection zone was designated around the 19 points where pottery fragments were found.

The distance from the identified artefacts to the nearest WTGs are presented in the following table. As shown below, all the findings are outside the required buffer zones, with the exception of archaeology point 17 which is located 61 m away from WTG Bsh2-11, therefore, falling within the 100 m buffer zone.

Table 13-3 Distance from the Identified Artefacts to the Nearest WTGs

Archaeology Point	Latitude	Longitude	Nearest WTG	Distance (m)
1	40°24'14.90"	64°37'5.86"	BSH2-33	1,179
2	40°24'8.03"	64°35'50.97"	BSH2-32	2,287
3	40°24'44.03"	64°36'32.87"	BSH2-32	816
4	40°25'23.48"	64°35'52.40"	BSH2-30	610
5	40°27'20.93"	64°32'31.02"	BSH2-38	952
6	40°27'11.08"	64°31'54.19"	BSH2-37	153
7	40°27'10.64"	64°31'57.15"	BSH2-37	223
8	40°28'49.78"	64°32'55.86"	BSH2-20	770
9	40°29'8.97"	64°33'14.29"	BSH2-20	143
10	40°29'12.81"	64°33'18.49"	BSH2-20	186
11	40°29'13.23"	64°33'19.69"	BSH2-20	196
12	40°29'13.71"	64°33'20.58"	BSH2-20	212
13	40°29'14.26"	64°33'21.75"	BSH2-20	233
14	40°29'43.39"	64°32'40.51"	BSH2-19	856
15	40°29'55.05"	64°31'59.62"	BSH2-19	1,823
16	40°30'7.38"	64°31'55.04"	BSH2-19	2,139
17	40°28'15.92"	64°36'59.07"	BSH2-11	61

Archaeology Point	Latitude	Longitude	Nearest WTG	Distance (m)
18	40°28'27.22"	64°36'54.93"	BSH2-11	314
19	40°28'28.15"	64°36'49.16"	BSH2-10	317
20	40°29'5.23"	64°36'32.32"	BSH2-09	298
21	40°29'5.69"	64°36'34.09"	BSH2-09	335
22	40°29'6.57"	64°36'31.41"	BSH2-09	320
23	40°29'40.52"	64°38'32.27"	BSH2-07	1,434
24	40°29'53.03"	64°40'30.95"	BSH2-06	182
25	40°30'1.51"	64°41'30.22"	BSH2-05	1,198
26	40°30'21.40"	64°42'4.36"	BSH2-04	410
27	40°31'34.04"	64°43'41.79"	BSH2-01	421
28	40°27'2.91"	64°34'53.63"	BSH2-26	486
29	40°27'9.53"	64°33'47.31"	BSH2-24	607
30	40°28'1.96"	64°33'31.22"	BSH2-22	451
31	40°28'45.84"	64°34'47.97"	BSH2-21	1,557
32	40°33'29.03"	64°41'5.67"	BSH2-01	4,765

After laboratory analysis of the archaeological finds, a detailed archaeological survey report was received from the Institute of Archaeology and the report is presented in **Appendix K**.

In December 2024, a letter was submitted to the CHA requesting approval to apply the same approach used in the previous BASH 500 Project, where a reduced buffer of 25 meters was permitted for small, movable stone finds, provided that constant archaeological supervision was in place. In response, the CHA confirmed in January 2025 that, under Cabinet of Ministers Decision No. 295 (dated 20 May 2024), the Scientific Expert Council is responsible for reviewing and issuing conclusions on projects involving land preparation, construction, and other economic activities within protected heritage zones. Paragraph 39 of the Decision outlines that such projects require expert review and the payment of a fee equal to 10 times the basic settlement amount. The CHA also requested the submission of the project design and archaeological findings to the Bukhara Regional Department of Cultural Heritage in accordance with this regulation.

A follow-up meeting was held on 14 March 2025 with the Head of the Council Activities Coordination Department to discuss the buffer zone reduction. It was agreed that construction may be allowed within the 100-meter buffer zone if site-specific assessments confirm the absence of cultural layers. Subsequently, we submitted the archaeological survey, project layout, coordinates, and distances to nearby archaeological finds. The request was reviewed

during the Agency's Academic Council meeting, and in May 2025, official approval was granted to reduce the buffer zones to between 20 m and 100 m around the archaeological finds. The approval stipulates that continuous archaeological supervision must be maintained during all excavation works related to the project.

13.3 Intangible and Tangible Cultural Heritage

Since Kuklam is the only community located near the Project site, the information below is based on the Bash 500 MW Wind Farm, as it reflects the consultation outcomes from multiple villages in the area.

13.3.1 Intangible Cultural Heritage

In order to verify the elements within the communities near the Wind Farm, consultations were undertaken with a history teacher from Ayakagitma village on 12th May 2022 for Bash 500 MW WF who confirmed that Palov culture, Nawrouz, Art of Miniature and Bakshi art are present in his community. These elements are practiced in community setting as well as within family groups.

13.3.2 Tangible Cultural Heritage

During the public disclosure of the Bash 500 MW WF ESIA, community members from Ayakagitma village, Chulobod village and Kuklam village were asked about the tangible cultural heritage and some of the participants of the disclosure meeting stated that the main tangible cultural heritage item in the project area is Malikajdar (Xazonur bobo) burial place located 9km from Ayakagitma village. This is a holy place that is visited once or twice a year by locals for pilgrimage. This holy place is 22km from Chulobod village and 35km from Kuklam village.

13.4 Receptors

Table 13-4 Archaeology & Cultural Heritage – Receptors

Receptor	Sensitivity	Justification
Known items of cultural or archaeological significance	**High**	Archaeological finds including stone artifacts from the Neolithic (VI millennium BCE), and pottery fragments from the medieval period (9th -17th centuries) have been found within the Project site and vulnerable to damage that may result from project activities.
Unknown items of cultural or archaeological significance	**High**	Given the location of the Project in an area of known archaeological & cultural importance as identified during the archaeological surveys, unknown items of cultural & archaeological importance are likely to be present especially because only surface excavations

Receptor	Sensitivity	Justification
		were conducted during the surveys conducted by the Institute of Archaeology.
Intangible cultural heritage	**High**	The Proposed project site is located in an area that practices the Palov culture, Nawrouz., Art of Miniature & Bakshi art. These are important elements and part of a national identity that has also been recognised by UNESCO.
Graves	**High**	The archaeology survey identified stone tomb (kurgan) and six gravestones from the late 19th to early 20th century. The Graves are of cultural importance and vulnerable to damage that may result from project activities.

13.5 Potential Impacts, Mitigation, Management and Residual Impacts

13.5.1 Construction Phase

13.5.1.1 Indirect Impact to Existing Finds of Archaeological or Cultural Importance

The surveys undertaken on the Project site identified the presence of archaeological finds including stone artifacts from the Neolithic (VI millennium BCE), and pottery fragments from the medieval period (9th-17th centuries). Only one finding is located within the 100 m buffer zone. In addition, the exact location of the Project facilities such as the substation, internal access roads and cable routes, and temporary construction facilities etc. has not been finalised. All these facilities and associated infrastructure will require careful consideration in terms of siting taking into account the following:

- Archaeological sites identified during the surveys.
- The buffer zone/distance requirements that will be set by the Cultural Heritage Agency.

Archaeological finds are present and scattered at the Project and construction activities undertaken at the Project site have the potential to damage or impact these sites. To prevent damage during construction phase, these areas will be clearly marked by the EPC Contractor under the supervision of an Archaeologist from the Institute of Archaeology to ensure that equipment and construction activities do not encroach on the buffer zones and known archaeological sites.

An archaeological watching brief will be implemented throughout the construction phase, so that appropriate action can be taken in the event that any archaeological sites are discovered during construction.

As required by the National Centre of Archaeology, one of their archaeologists will be available on site during the excavation works to monitor the work being undertaken. The

archaeologist on site will also be included in conducting induction sessions and toolbox talks for the workers.

In addition to the above, unauthorised construction activities or movement of machinery/equipment in unauthorised areas outside the footprint boundaries have the potential to impact the Graves identified within the Project area. However, it is expected that internal roads and underground cabling will avoid these Graves and construction activities will be limited to designated areas and movement of equipment/machinery within the dedicated routes. However, in the event that the graves will be impacted, it will be moved in consultations with the relevant authorities and the next of kin where they are identifiable.

13.5.1.2 Direct Impact to Unknown Buried Archaeology

In addition to the above, excavation and earthwork activities can result in damage and/or destruction of undiscovered archaeological artefacts within the Project site. Given the location of the Project near Bash 500 MW which was identified as an area of archaeological significance and taking into consideration the findings within the Project site, there is the potential of encountering unknown buried archaeological remains or artefacts during excavation and earthwork activities. This could lead to damage, destruction and loss of archaeological artefacts of conservation value.

A "Chance Find Procedure" will however be incorporated within the project CESMP such that if any items of archaeological significance are discovered, these can be appropriately managed by archaeological experts, identified, recovered and preserved in coordination with the relevant government authorities.

Unauthorised construction activities or movement of machinery/equipment in unauthorised areas outside the Project boundaries have the potential to impact archaeological or cultural items in proximity to the site. However, it is expected that all construction activities will be limited to the Project site and movement of equipment/machinery within the designated routes.

13.5.1.3 Impact on Intangible cultural Heritage

Elements of intangible cultural heritage in Uzbekistan are identified in section 13.2.1. Intangible cultural heritage does not have a fixed location, or discrete boundaries and it is embedded in traditional residential and economic patterns and widely shared. Intangible culture can also be subject to loss under changing socio-economic conditions and if there is an influence from another culture. In consideration of this, the Project could potentially induce social change and introduce new cultural influences especially from the workforce recruited from outside of Uzbekistan. This could result into tensions between the workers and locals.

However, this impact is expected to be minor because the interaction between the workers and local communities will be very limited and a code of conduct will be implemented to guide worker interaction with the local communities. In addition, the intangible culture elements are practiced across several areas of Uzbekistan and for many generations and the construction period will unlikely change this. The Project will also employ 60% of its workforce from Uzbekistan who will most highly likely also practice some of these elements within their communities.

Table 13-5 Archaeology and Intangible Cultural Heritage Impact Significance, Mitigation & Management Measures and Residual Impacts – Construction

Impacts	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
Impact to existing archaeology and/cultural items	**Moderate Negative**	Known items of cultural or archaeological significance	**High**	**Major**	**Design:** • The siting of WTGs, cable routes, roads and other associated infrastructure and temporary construction facilities will avoid archaeological sites identified during the surveys; and take into consideration the required buffer zones as set by the Cultural Heritage Agency. • The design Team will also consider that additional archaeological sites may potentially be discovered during the construction phase which may require further change in the siting of some facilities. **Construction:** • An archaeological 'Chance Find Procedure' will be developed prior to construction and the start of site and access road earthworks, as part of the CESMP. This will include protocols and procedures to stop work and methods preserve potential finds, as well as reporting requirements and co-ordination with the Institute of Archaeology, National Centre of Archaeology and the Cultural Heritage Agency. • A Cultural Management Plan will be developed to include locations and procedures to ensure protection of these archaeological sites. • An archaeologist from the Cultural heritage Agency will be present to supervise the works. • The EPC and sub-contractors will receive induction training on the importance of the cultural heritage and archaeology of the Project area from an archaeologist from the Institute of Archaeology before any site mobilisation work can start. Workers will also receive tool-box talks before the start of site clearance or excavation works.	**Minor**
	Moderate Negative	Unknown items of cultural or archaeological significance	**High**	**Moderate**		**Minor**

Impacts	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					• The Project workforce will be instructed not to interact, disturb or vandalise any sites of archaeological or cultural importance. • Sites of archaeological or cultural importance will be clearly demarcated, fenced (if approval to fence is obtained from National Centre of Archaeology) and have appropriate signage in place. • An archaeological watching brief will be implemented throughout the construction phase. • Construction works and movement of equipment/machinery will be within the designated areas and unauthorised work, movement or storage of equipment/materials outside the Project site is strictly prohibited. • Any damage to archaeological sites (known or unknown) will be recorded (including photos) and reported to the Cultural Heritage Agency and Institute of Archaeology immediately. • The Project Company and EPC Contractor will adhere to any additional requirements or mitigation measures required by the Institute of Archaeology, National Centre of Archaeology and the Cultural Heritage Agency.	
Impact on Graves	**Minor Negative**	Graves	**High**	**Moderate**	• All drivers will be notified of the Graves sites and its location during induction including its importance. • Install clear markings along the road to notify drivers about the Graves. • Include the Graves into the drivers' training program (highlight the location of the Graves, width clearance available near it, measures to be taken in case it got affected etc.) • If required, the relocation of the Graves will be conducted through consultation in coordination and	**Minor**

Impacts	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					agreement with the relevant local authorities and family members of the deceased. • Any complaints regarding the status of the Graves will be addressed in accordance with SEP requirements.	
Impact on intangible and tangible cultural heritage	**Minor Negative**	Communities who practice the elements of Palov & Nawrouz, Art of Miniature & Bakshi art and visit the Malikajdar (Xazonur bobo) burial place	**High**	**Minor**	• The workers Code of Conduct will include measures regarding respect of beliefs, customs, rituals of local communities. • Interaction between the workers and the local communities will be kept to a minimum in order to avoid misunderstandings or conflict. • The EPC Contractor will demonstrate that all efforts have been put in place to recruit workers from local communities and Bukhara region i.e., advertising job opportunities locally, using local registered employment agencies etc.	**Minor**

13.5.2 Operational Phase

The operational phase will not result in further impacts to archaeology, as the site will be static and further excavations will not be required. However, during maintenance and operation activities, it will be important to ensure that archaeological sites are not damaged by the O&M staff. This includes run over of archaeological sites by vehicles in the event of off-roading. As such, a cultural management plan will be developed as part of the operational ESMS to include locations and procedures to be implemented in ensuring protection of the archaeological sites.

Table 13-6 Archaeology and Cultural Heritage Impact Significance, Mitigation & Management Measures and Residual Impacts – Operational Phase

Impacts	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
Impact on existing archaeology and cultural items	**Minor**	Archaeological sites	**High**	**Minor**	• A Cultural Management Plan will be developed to include locations and procedures to ensure protection of these archaeological sites. • To ensure unnecessary damage during O&M, the archaeological sites will be marked (upon consultations with the Institute of Archaeology to ensure marked areas are not vandalized by the public) to ensure that commuting within the WTGs impact or damage these sites. • The O&M staff will be instructed not to interact or disturb any sites of archaeological or cultural importance. • The O&M staff will receive induction training on the importance of the archaeological sites in the Project area from an archeologist from the Institute of Archaeology. • Strict speed controls will be implemented and driving outside designated roads will be strictly forbidden. • In the event, of any damage, the Institute of Archaeology and National Centre of Archaeology will be notified immediately.	**Negligible**

13.5.3 Cumulative Impacts

Project related impacts in relation to archaeology and cultural heritage would mainly be those related to the excavation, earthworks and clearance of the Project site and the potential for encountering unknown buried archaeological remains. The risk is considered low as it is limited to the Project area and OHTL tower construction area. Therefore, it is not envisaged that cumulative impacts will take place.

13.5.4 Decommissioning Phase

In general, it is anticipated that direct impacts during the decommissioning phase will be limited to occur only if new ground works are required beyond the areas disturbed during the construction phase of the Project. However, known archaeological sites (if they will not be removed by the Institute of Archaeology) may potentially be damaged during movement of equipment, machinery and demolitions.

As such, at the time of decommissioning, further consultations will be conducted with the Institute of Archaeology and the National Centre of Archaeology in order to determine the mitigation measures to be implemented. If further groundworks are required during the decommissioning phase or if machinery/equipment movement is required beyond areas comprising the wind turbine infrastructure, all known archaeological sites will be clearly marked with visible buffer zones. A cultural management plan will also be prepared prior to decommissioning in order to avoid accidental damage by heavy machinery/equipment movement.

13.6 Monitoring

The final monitoring methodology with specific monitoring details (i.e. locations, frequencies, durations, parameters etc.) will be developed in the specific 'Environmental and Social Monitoring Plan'.

Table 13-7 Cultural Heritage and Archaeology - Monitoring Requirements

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION	RESPONSIBILITY
Construction				
Archaeological Resources & Artefacts	Existing archaeology sites	Daily continued visual observations by site staff involved in excavations and	Archaeological sites within the project site as identified by the Institute of Archaeology	- Designated Archaeologist (from Institute of Archaeology)

Monitoring	Parameter	Frequency & Durations	Monitoring Location	Responsibility
		the archaeologist on site.	during the site surveys.	- EPC Contractor E&S Manager
	Archaeological buffer zones		Archaeological buffer zones to ensure compliance.	
	Undiscovered archaeological remains within the Project site		The Project area requiring excavations, earthworks or grading during construction.	
Status of the graves	Graves	Resolution of any complaints received regarding the memorial site. Monthly visual inspection of the site	Graves	EPC Contractor E&S Manager
Operation				
Archaeological Resources & Artefacts	Archaeological sites within the Project site	Visual observations by O&M staff while carrying out any maintenance activities near archaeological buffer zones.	Known archaeological sites within 100m from the Project components.	O&M Contractor E&S Manager

14 SOCIO-ECONOMICS

14.1 Applicable Requirements & Standards

14.1.1 National Regulations

CONSTITUTION OF UZBEKISTAN (1992, AS AMENDED IN 2023)

The Constitution of Uzbekistan guarantees fundamental rights and freedoms in various domains:

SOCIAL INFRASTRUCTURE:

Articles 48, 49, and 50 ensure:

- The right to health care and education.
- The right to a favourable environment and access to reliable environmental information.

LAND TENURE:

- Article 41 affirms the right to property ownership.
- Article 47 guarantees the right to housing and compensation in case of deprivation.
- Article 65 protects private property and ensures its legal equality.

LIVELIHOODS AND POVERTY ALLEVIATION:

- Article 43 mandates government measures for employment, protection against unemployment, and poverty reduction.
- Article 57 directs improvements in the quality of life for vulnerable groups to enhance their social participation and self-sufficiency.
- Article 67 grants entrepreneurs the right to conduct business activities independently.

HUMAN RIGHTS:

- Article 4 promotes respect for languages, customs, and traditions of all ethnic groups.
- Article 19 ensures equal rights and freedoms for all citizens without discrimination.
- Articles 25 and 26 protect the right to life and prohibit torture and cruel treatment.
- Article 27 specifies conditions for lawful restriction of freedom.
- Article 34 guarantees access to information related to rights and legitimate interests.
- Article 55 guarantees access to a competent, independent court.
- Article 58 mandates gender equality.

These provisions establish a comprehensive framework for rights, liberties, and duties in Uzbekistan.

THE LAND CODE (1998, AMENDED IN 2022)

The Land Code outlines land classification, allocation, use, and protection in Uzbekistan, including individual and collective land tenure and various land categories.

Key Provisions:

- **Article 16**: States all land is a national treasure and must be managed sustainably to support life, economy, and welfare.
- **Article 19**: Grants lifelong inheritable rights for dekhan/peasant farms, individual residences, and collective gardening.
- **Article 24**: Allows short-term and long-term (up to 50 years) leaseholds for agricultural and foreign investment enterprises, prohibiting sub-leases.
- **Article 28**: Requires initial and annual rent payments for leased land, based on its quality, location, and water supply.
- **Article 33**: Identifies legal tenure documents as state certificates and land-use agreements.
- **Articles 59 & 60**: Categorize land use for urban building, common use, agriculture, forestry, industry, transport, military, restricted use (wildlife, hazardous, cultural, recreational), water supply, and reserves.

Land administration framework

In addition, the Land Code establishes the institutional framework for the administration of land in Uzbekistan. The main governmental entities involved in the management of land resources include (but are not limited to):

- The Cabinet of Ministers of the Republic of Uzbekistan (as relevant)
- Council of Ministers of the Republic of Karakalpakstan (as relevant)
- State Assets Management Agency
- State Tax Committee
- Chamber of State Cadastres of the Cadastre Agency
- Regional Khokimiyats

THE CIVIL CODE (1996, AMENDED IN 2022)

The Civil Code comprehensively addresses civil relations, property rights, and contractual obligations in Uzbekistan:

- It defines the legal status of participants in civil relations, outlines procedures for property rights, and regulates contractual obligations.

- The code establishes rules for property withdrawal, value determination, compensation rights, and conditions for rights deprivation.
- It ensures full compensation for losses incurred due to rights violations, covering expenses to restore rights, property damage (real damage), and lost profits from normal civil activity.
- Article 8 stipulates that property rights subject to state registration arise upon registration, unless specified otherwise by law.
- Article 14 allows for compensation, including lost profits, if rights are violated and income is lost as a result.
- Article 83 defines immovable property as land, subsoil, buildings, and other fixtures firmly connected to the land.
- Article 84 mandates state registration for ownership and real property rights, making them legally effective only upon registration.

PRESIDENTIAL DECREE № DP-6243, DATED JUNE 8, 2021 "ON MEASURES TO ENSURE EQUALITY AND TRANSPARENCY IN LAND RELATIONS, RELIABLE PROTECTION OF RIGHTS TO LAND AND THEIR TRANSFORMATION INTO MARKET ASSETS"

Changes in procedure of land allocation were made on June 8th, 2021 through the Presidential Decree "On measures to ensure equality and transparency in land relations, reliable protection of rights to land and their transformation into market assets". Based on this PD, the authority of district governors to allocate land directly is abolished. It is also prohibited to seize, reserve, or transfer land with any document. This means, from August 1, 2021, some rights on land of local governors were restricted, and such restrictions will also affect the process of purchasing and leasing land. This is now forbidden for local governors to transfer land to citizens, businesses, organizations through immediate decision.

Instead, all types of land, including agricultural, commercial as well as for residential purposes will be allocated through an open electronic tender to winning bidder granting lease or ownership rights (depending on type of land and tender conditions).

The "E-AUCTION" is the platform that uses a software for online auctions, allowing participation via the internet and ensuring no interference during processing and the selection process of the winner. Initially, from September 1, 2017, it was used for property sales related to court documents. Due to its success, the platform was expanded to other sectors by government decisions.

The platform enables citizens to participate in fair and transparent auctions for a range of assets, including state properties, real estate, vehicles, land plots, mineral extraction rights, cleaning services, advertising installation rights, and more.

The aim is to ensure legality, transparency, and fairness in auctions, prevent price manipulation, and protect the integrity and confidentiality of information. The organization of

these auctions is managed by JSC "Organization of electronic online auctions" for individuals and legal entities. All land acquisition for private leasehold is managed through State Asset Management Agency via an online auction process. Locally these auctions are managed by regional/district departments of cadastral agencies.

The process of obtaining Land Lease Agreement is as follows:

- UZSAMA posts notification on e-auction website indicating tender with details on the size, location, leasehold or freehold allocation, rent and/or initial prices of the plots.
- Candidates select and submit application suitable lot with type of land needed published at e-auction. Application must be submitted before the deadline indicted for selected lot/tender.
- Summitted applications are reviewed separately before auction take place. Selected candidates for auction process make pre-payment established for biding tender.
- Winning bidder is selected at auction process with a participation of selected candidates.
- Once auction is completed, winning bidder is awarded with certificate which will be a basis for issuing and signing LLA with relevant local municipalities (depending on location of land plot).
- Pre-payment done for tender is returned to all unsuccessful candidates.

These auctions are open to public bidders nationwide and are highly competitive, with land awarded based on the best price and performance on income-related criteria (e.g., agricultural performance and liabilities history). There is no fixed auction schedule, and land parcels of various sizes are auctioned as they become available, making it difficult to predict the availability and location of land. To participate, bidders must pay a bidding fee equivalent to 15% of the starting price, and depending on the leasehold type, the full cost of the land may need to be settled upfront.

LAW NO 781 ON PROCEDURES FOR THE WITHDRAWAL OF LAND PLOTS FOR PUBLIC NEEDS WITH COMPENSATION (2022)

This law outlines the expropriation of private land for public purposes, specifying conditions, procedures, and compensation for legally registered landholders.

Land Withdrawal Provisions:

- **Article 4**: Defines 'public need' developments justifying land withdrawal, including infrastructure projects like roads, railways, airports, bridges, energy lines, and irrigation systems.
- **Article 13**: Requires project initiators to identify the most suitable land with minimal pre-existing priority assets and present documentation to the Regional Khokimiyat.

- **Article 14**: Stipulates that land expropriation initiatives and supporting materials must be reviewed by the Cabinet of Ministers, resulting in a resolution for the project. The relevant khokimiyat is responsible for fulfilling obligations related to land withdrawal as per the resolution.

Compensation Provisions:

- **Article 23**: Specifies compensation for legal landholders, including market value for immovable property, compensation for lifelong/inheritable ownership, perennial plantations, and transitional expenses.
- **Articles 24 & 25**: Legalize monetary and in-kind compensation, requiring replacement assets of equal value and compensation for immovable assets within 24 months of eviction.
- **Article 25**: States that compensation for common property must be distributed according to ownership shares and paid within six months of the agreement or one month if monetary. Compensation amounts are subject to inflation indexation.

OTHER LEGISLATION

The following legislation provides for relevant socioeconomic aspects, including land access:

- Law of the Republic of Uzbekistan on State Land Cadastre No.666-I of 28.08.1998
- Urban Planning Code of the Republic of Uzbekistan (2021)
- Presidential Decree No. UP-5495 on measures on cardinal improvement of investment climate in the republic of Uzbekistan
- Resolution of the Cabinet of Ministers No.146 (2011), Appendix No. 2 to the regulation on the procedure for compensation for losses of landowners, users, tenants, and owners, as well as losses of agricultural and forestry production
- Resolution No. 911 of the Cabinet of Ministers (2019) on the procedure for withdrawal of land plots and compensation to owners of immovable property located on the land plot
- Law on Guarantees with Respect to Equal Rights and Opportunities for Women and Men (2019).

14.1.2 Lender Requirements

14.1.2.1 ADB

The ADB Environmental Safeguards include the need to assess socio-economic project impacts in ESIA (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues).

Specifically, 'The borrower/client will identify and assess the risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and

decommissioning of the project, and will establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.'

ADB's Safeguard Requirement 2 on Involuntary Resettlement safeguard requires socio-economic surveys and census to be undertaken to identify all persons who will be displaced by the project and to assess the project's socioeconomic impacts on them.

ADB SPS Safeguard Requirement on Involuntary Resettlement requires meaningful consultation to be undertaken with affected persons, their host communities and civil society for every project with the potential for involuntary resettlement impacts. Consultation should be undertaken in a manner commensurate with the impacts on affected communities paying particular attention to the need of disadvantaged or vulnerable groups. This Safeguard Requirement also requires the establishment of a grievance redress mechanism to receive and facilitate the resolution of concerns and grievances from affected persons about physical and economic displacement and other project impacts, paying particular attention to the impacts on vulnerable groups.

ADB's SR2 also aims to avoid involuntary resettlement where possible; to minimise involuntary resettlement by exploring project and design alternatives; to enhance at least restore, the livelihoods of all displaced persons in real terms relative to pre-project levels; and to improve the standards of living of the displaced poor and other vulnerable groups.

The safeguard also requires adverse economic, social, or environmental impacts from project activities other than land acquisition such as loss of access to assets or resources or restrictions on land use to be avoided, or at least minimized, mitigated or compensated for through the environmental assessment process. Where such impacts are found to be adverse, the borrower/client is required to develop and implement a management plan to restore the livelihood of affected persons to at least pre-project level or better.

14.1.2.2 AIIB

ESS2 addresses impacts of Project-related land acquisition, including restrictions on land use and access to assets and natural resources, which may cause physical displacement (relocation, loss of land or shelter), and/or economic displacement (loss of land or assets, or restrictions on land use, assets and natural resources leading to loss of income sources or other means of livelihood)

Section D 'Social Coverage' outlines the requirement for social assessment, including, but not limited to, vulnerable groups and discrimination, gender, gender based violence, land and natural resource access, loss of access to assets or resources or restrictions on land use.

14.1.2.3 EPFIs

Several of the IFC Performance Standards have elements that relate to socio-economics. Key requirements for the assessment of socio-economic impacts are outlined in PS1, whilst PS5 on Land Acquisition and Involuntary Resettlement has important requirements relating to projects that acquire land or will necessitate physical or economic displacement to PAPs, including compensatory measures.

14.2 Baseline conditions

14.2.1 Background and Methodology

The Project site is located in Gijduvon and Shofirkon districts of Bukhara region. The nearest inhabited community is Kuklam village, situated approximately 600 m north-east of the Project site (1.8 km from the nearest WTG), followed by Kokcha community, approximately 20 km east the Project site. Kuklam village is considered the project-affected community (PAC) in the Project's area of influence. The Wind Farm site is bordered by farmlands located to the south. Grazing and fishing is practiced within the Project site. The project-affected persons (PAPs) consist of 24 herders, two fishery owners, 57 temporary workers, and one farmer. Existing structures within the Project site are water wells, fishing ponds, herders' houses, and animal stables. No receptors were found within the OHTL route or 30 m buffer.

This baseline presents socioeconomic survey findings and secondary data analysis of the Project area at national, regional, and local levels. Kuklam community members do not use the Project site for any activities and therefore will not experience adverse land or livelihood impacts. A comprehensive profile of the PAPs and PAHs, including additional information on land use activities in and around the Project site is presented in the Resettlement Action Plan (RAP).

14.2.2 Political and Administrative Structure

There are 12 provinces (viloyatlar) in Uzbekistan, one autonomous republic (avtonom respublikasi) and one city (Toshkent Shahri). Uzbekistan is a unitary state with a presidential system. The constitution of Uzbekistan is the framework for political institutions and governance. Uzbekistan's government consists of the Executive and Legislative branches, complemented by the Judicial branch. The Judicial branch hosts the Uzbekistan Supreme Court of 67 judges, and the Constitutional Court of seven judges, in addition to subordinate courts. The Prime Minister assists the President and is responsible for the activities of the Cabinet of Ministers. The Cabinet of Ministers consists of the Prime Minister, deputy prime ministers, chairpersons of state

committees, and the Chairperson of the Council of Ministers of the Republic of Karakalpakstan. Cabinet members are proposed by the Prime Minister and appointed by the President, with approval from the Senate chamber of the Supreme Assembly (Oliy Majlis).

Bukhara region is in the western part of Uzbekistan on the left bank of the Amu Darya River. It borders Turkmenistan, the Navoiy region, the Kashkadaryo region, a small part of the Khorezm Region, and the Karakalpakstan Republic. The territory of the Bukhara region is 40,32286 thousand sq. km. The administrative centre is Bukhara city. Bukhara region is divided into 11 administrative districts, and two district-level cities, namely; Bukhara and Kogon.

Gijduvon district was established on the 29th of September 1926. Its total area is 3,95 thousand km2. Living settlements are mainly represented by 75 villages, and the district capital is Gijduvon. Shofirkon district was established on the 29th of September 1926. Its total area is 3,72 thousand km^2. Living settlements are represented by 50 villages, and the district capital is Shofirkon



Figure 14-1 Administrative Structure of Bukhara Region

14.2.3 Population and Demographics

Population and demographic data inform the labour force and productivity potential, social dynamics, and population growth trends.

14.2.3.1.1 Gijduvon district

The district population increased by 5% to 322,500 since 2021. The largest age group is between 8-15 years, followed by the 40-49, and 50-59 age groups. Gijduvon district had a predominantly young and middle-aged population, with a relatively elderly population. A significant proportion dwell in rural areas (70.7%), whereas the urban population accounted for 29.3%. The population was nearly evenly distributed by gender, with men making up 51% and women 49%.

14.2.3.1.2 Shofirkon district

The district population increased by 4% to 186,500 since 2021. The largest age group was between 8-15 years, followed by the 40-49, and 50-59 age groups. Like Gijduvon district, Shofirkon district had a high youth and adult population, whilst the elderly population was low. A significant proportion dwell in rural areas (62.3%), whereas the urban population accounted for 37.7%. The population was almost evenly distributed by gender, with men representing 50.5% and women 49.5%.

Figure 14-2 Population Data by District, 2024

	GIJDUVON	SHOFIRKON
Total population	322,500 (2024) 317,100 (2023) 311,800 (2022) 307,200 (2021)	186,500 (2024) 184,300 (2023) 181,700 (2022) 179,000 (2021)
Male	165,000 - 51%	94,100 - 50.5%
Female	157,500 - 49%	92,400 - 49.5%
Urban	93,600 – 29.3%	43,100 – 37.7%
Rural	228,900 – 70.7%	143,400 – 62%
No. of villages	75	50
No. of households	60,100	35,697

Source: Bukhara Regional Administration, 2024. *Bukhara region and its districts*. https://www.buxstat.uz/

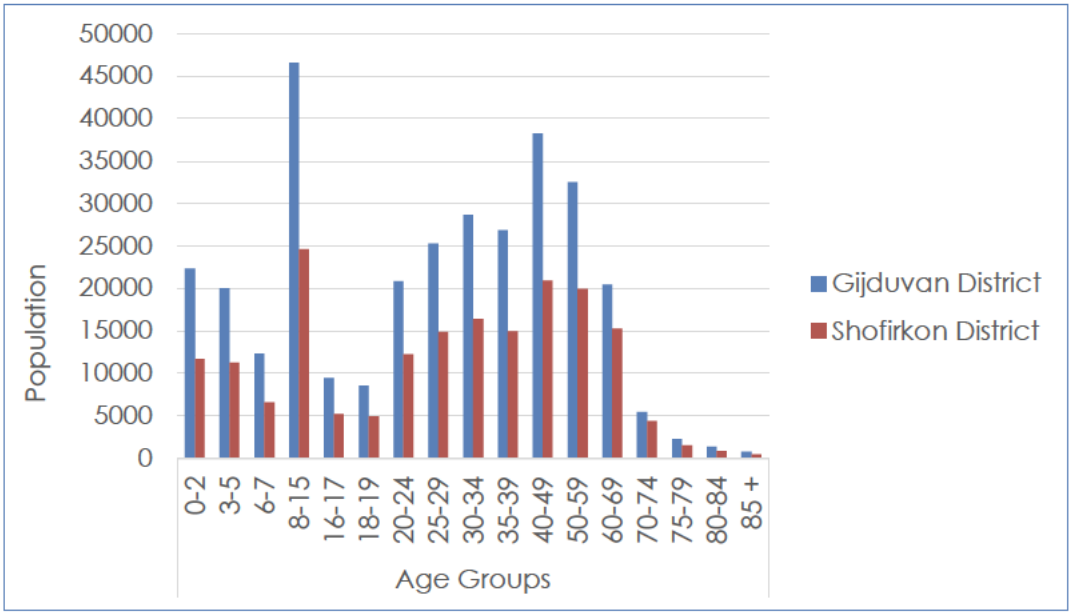


Figure 14-3 Population by Age Group

Source: Bukhara Regional Statistics Department, 2024. *Age composition as of 1 January 2024*. https://www.buxstat.uz/

14.2.3.1.3 Kuklam village

There are 12 family members (six males and six females) in the three surveyed households, each having an average of four household members. The surveyed households are male-headed households (MHHs) and are married. The HHs are adults, including one in the 41-50 age group and two in the 51-60 age group.

14.2.4 Accommodation, Living Conditions and Household Amenities

Accommodation, living conditions, and household amenities influence the community health and wellbeing, social dynamics, and overall quality of life. Private ownership is the predominant form of tenure in Uzbekistan[21]. In 2018, there were slightly fewer housing units than households (with 943 units for every 1,000 households) in the country.

There were 946 units for every 1,000 households in Bukhara region. Housing was more affordable in rural areas compared in urban areas and accounted for less than 30% of the total household expenditure.

Figure 14-4 Housing units by population in Bukhara region

Bukhara region	Housing Units	Population	Households	Units per Household

[21] United Nations Economic Commission for Europe, 2015. *Country profiles on housing and land management: Uzbekistan*. United Nations.

	Thsnds	%	Thsnds	%	Thsnds	%	
	378	6.2	1875	5.7	400	6.2	0.946

Source: Seitz, W. 2018. *Free movement and affordable housing: public preferences for reform in Uzbekistan.* Policy research working paper No. 9107

Local authorities are responsible for delivering public services, such as water, sewerage systems, heating, and electricity. Most citizens view piped gas, central heating, drinking water, and paved roads as priorities for government attention than other infrastructure and services (World Bank, 2019). By the end of 2023, 34.8% of the houses in Bukhara region were connected to a sewerage system, and 58.3% had access to drinking water[22].

Water supply and sewerage systems in Uzbekistan are in urgent need of reconstruction due to aging infrastructure, unstable financial conditions, and weak institutional capacity (Ministry of Housing and Communal Services, 2020). Approximately 68% of the total population had access to water supply, while in the Bukhara region, the coverage was 52%[23]. Water is supplied to the network three to four times a week for several hours a day, and as a result, the households in the region experienced difficulties with access to water. The government of Uzbekistan, through the Ministry of Housing and Communal Service will initiate the Bukhara Region Water Supply and Sewerage Project to provide safely managed water and sanitation services to the region. Gidjuvon and Shofirkon districts will benefit from this project through the provision of clean water supply and construction of sewage networks, sewage pumping stations and sewage treatment plants.

Families cope with low temperatures at home in winter by residing in one room; wearing warm clothes, covering windows, doors and floors; and moving to temporary living quarters. Some low-income households go into debt to pay for centralised energy services or to avoid disconnection and repayment of a connection fee (World Bank, 2019).

The World Bank 2019 survey titled "energy vulnerability in female-headed households: findings from the Listening to Citizens of Uzbekistan" highlighted that female-led households (FHHs) struggled to pay for utilities, with Bukhara region included amongst the districts showing higher percentages of such challenges. Tariff levels that do not account for FHH's challenges in

[22] Statistics Agency under the President of the Republic of Uzbekistan, 2024. *Sustainable Development Goals in the Republic of Uzbekistan – Tashkent 2024.*

[23] Ministry of Housing and Communal Services, 2020. Bukhara region water supply and sewerage project: Environmental and Social Management Planning Framework. Government of Uzbekistan. [online] https://www.aiib.org/en/projects/details/2020/approved/_download/Uzbekistan/Uz_BRWSSP_ESMPF-2-April_clean.pdf

affording utilities will constrain their access to energy (World Bank, 2019). A greater percentage of FHHs in Bukhara region had access to heating than of MHHs.

Critical gender equality aspects of demand-side energy access include:

- access to (and quality of) energy services;
- energy affordability, tariffs, and pricing;
- environment, health and safety (exposure to energy hazards);
- energy conservation decisions;
- coping strategies for poor energy access and quality; and
- user knowledge, access to information, and interaction with energy providers[24].

Energy scarcity has a disproportionate effect on women and girls, who rely on labour saving appliances (e.g., washing machines, electric stoves) to perform traditional household duties. Without reliable energy sources, women must perform these jobs by hand which leaves little time to engage in other income earning activities (World Bank, 2019).

14.2.4.1.1 Gijduvon district

There is electricity supply for lighting, heating, and other essential needs. Sixty-six percent of households had access to centralized natural gas, offering a convenient and efficient energy source for cooking and heating purposes. Currently 60% of households have access to safe and reliable drinking water infrastructure. The district lacks a sewage and centralized waste management system.

14.2.4.1.2 Shofirkon district

There is electricity supply for lighting, heating, and other essential needs. Forty percent of households have access to centralized natural gas supply. Clean drinking water is available to only 35% of residents. The district lacks a sewage and centralized waste management system.

14.2.4.1.3 Kuklam village

All respondents in Kuklam stated that their houses are constructed from bricks. All surveyed households have access to electricity, and only one household had centralized water supply.

Potable water is hauled through rail and supplied to the community free of charge. The survey data revealed that households consume relatively more water in Spring and Summer than

[24] World Bank, 2019. Energy vulnerability in female-headed households: findings from the *Listening to Citizens of Ubekistan Survey*.

they do in Winter. There is no waste management system within, near, or outside the Project site, including in Kuklam. Waste is disposed in special pits in tomorkas and buried when full.

The figure below illustrates the types of household amenities owned by surveyed respondents. All surveyed respondents have a television, gas cylinder, and refrigerator. Two survey respondents access veterinary services located 45 kms away.

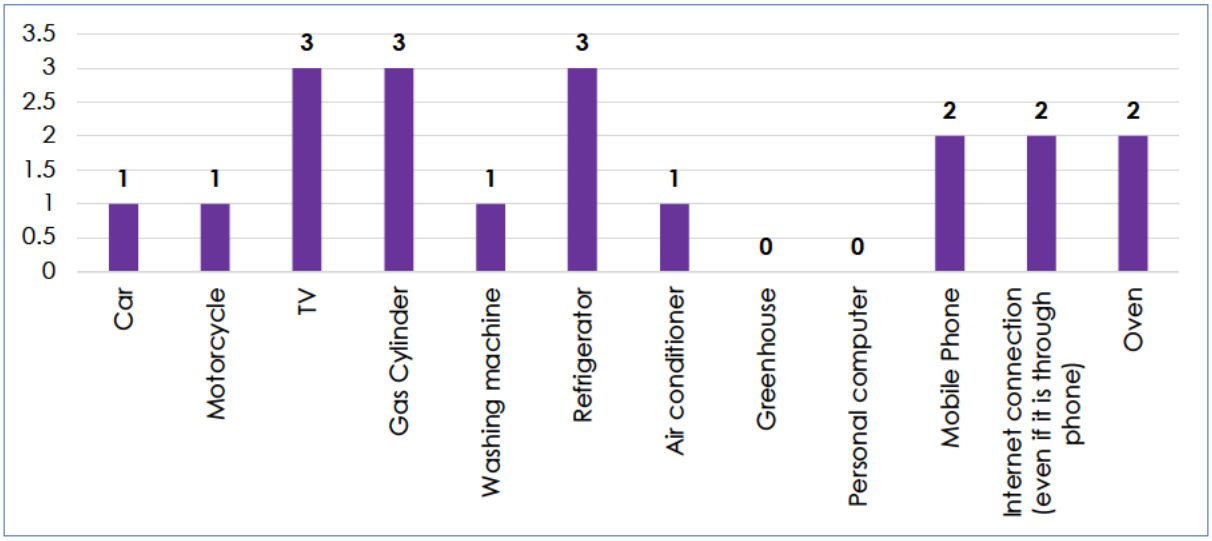


Figure 14-5 Household Amenities Owned by Kuklam Survey Respondents

14.2.5 Education

Education is essential in achieving gender equality, economic development, improved health and, addressing gender-based violence and harassment (GBVH). The Constitution of the Republic of Uzbekistan guarantees the right to education for all citizens, declaring that "every person has a right to education." The State provides 11 years of free education divided into three phases - primary education (grades 1 to 4); basic secondary education (grades 5 to 9); and secondary education (grades 10 and 11).

Through The National Program for the Development of School Education in 2022-2026, preschool, public and specialized education have been combined into a single system of preschool and school education[25]. Presently, the national education system has 30,792 preschool educational organizations, 10,160 secondary schools, 14 Presidential schools, nine creative schools, and 182 specialized schools.

Seven hundred thousand teachers and mentors provide education and training to 8.5 million students in Uzbekistan. Women and girls' access to education has improved significantly in

[25] https://gov.uz/en/activity_page/education

recent years. In 2022, 82.6% of children aged three to five were developmentally on track in health, learning, and psychosocial wellbeing[26]. Tertiary education enrolment experienced notable growth between 2017 and 2022, with male enrolment tripling to 29% and female enrolment quadrupling to 27.4%. The number of students who graduated from higher institutions significantly increased for both males and females between 2021 and 2023.

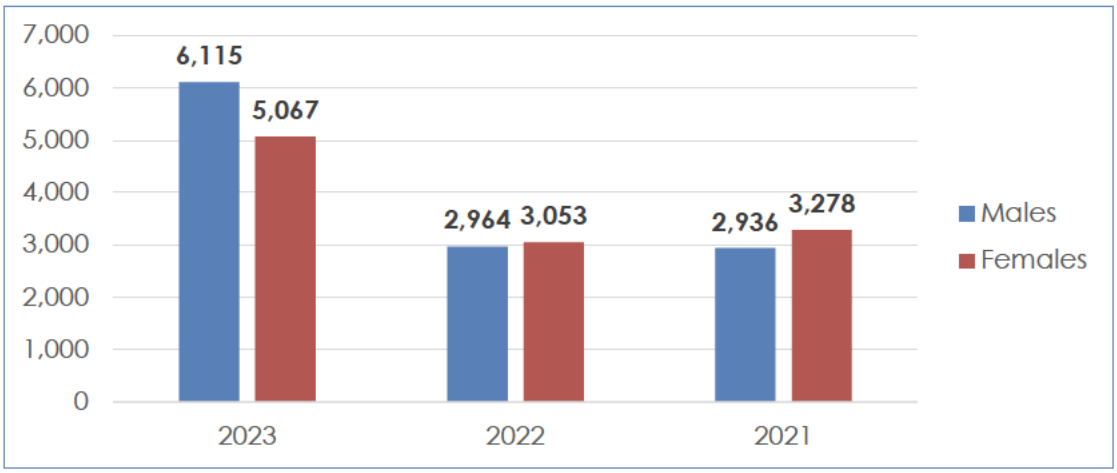


Figure 14-6 Number of Students Who Graduated from Higher Institutions by Gender

Source: Statistics Agency under the President of the Republic of Uzbekistan, 2024

14.2.5.1.1 Kuklam village

Available educational facilities include kindergartens and schools, which takes 10 to 30 minutes to reach. There are no higher education centres, only academic lyceums and colleges, located 10 minutes by car. According to respondents, the educational facilities are in good condition.

All surveyed household head's highest completed education is secondary school. One of their spouses, has attained secondary special education, while the remaining two spouses have completed secondary school, like their male counterparts. These results align with national education statistics by gender, which show insignificant gendered differences in access to education.

14.2.6 Healthcare

Uzbekistan provides a basic health service package free of charge to all citizens through taxation, in line with the 1996 Law on Health Protection. The package includes primary care, emergency care, and specialized care for groups of the population classified by the

[26] Statistics Agency under the President of the Republic of Uzbekistan, 2024. *Sustainable Development Goals in the Republic of Uzbekistan – Tashkent 2024.*

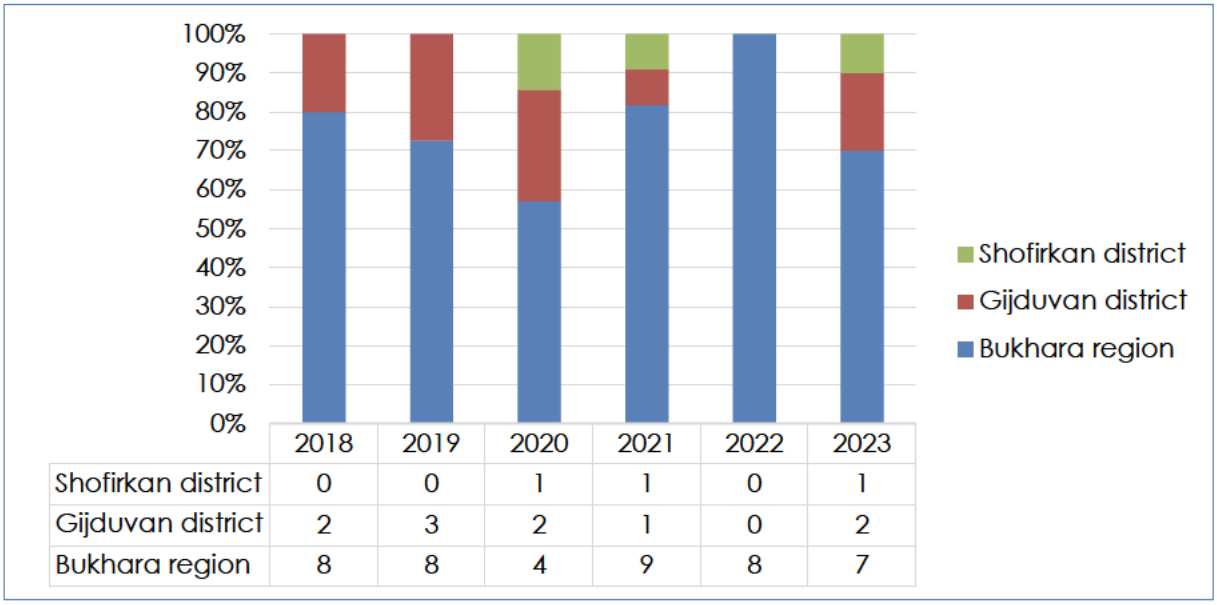
government as vulnerable. It also includes care for certain "socially significant and hazardous conditions", including diseases such as poliomyelitis, tuberculosis (TB), leprosy, HIV/AIDS, and syphilis, and certain noncommunicable diseases (NCDs) such as cancer.

There are major gaps in coverage as the package excludes secondary and tertiary care, as well as outpatient pharmaceuticals. Vulnerable households such as low-income households and those living with health conditions not covered by the state experience poor access to healthcare services due to unaffordability. Disparities in the distribution of healthcare professionals exist, with urban areas having a concentration of professionals, and rural areas experiencing shortages. As half of Uzbekistan's population lives in rural area, this disparity affects a significant proportion of the population. As previously mentioned, Uzbekistan's water services and sanitation infrastructure require extensive rehabilitation, causing the declining quality of water services in many areas. Poor access to safe water and sanitation poses preventable health risks.

The population is at risk from poor diet, high blood pressure, smoking, and air pollution, with men more likely to engage in behavioural risk factors such as smoking[27]. Noncommunicable diseases are the main cause of mortality and morbidity, with female mortality rates from noncommunicable diseases the highest in the WHO European Region. Recent statistics indicate that state of women's health is better than men's health In Uzbekistan. The national life expectancy at birth by gender in 2023 was higher for males compared to females (72.5 years and 76.9 year for males and females respectively)[28]. In the same year, Bukhara region's life expectancy at birth by gender was lower for males compared to females (75.2 years and 78.5 years for males and females respectively).

Maternal mortality statistics have been consistently low in both districts but are higher in Gijduvon district.

[27] Robinson, S. 2022. Health Systems In Action: Uzbekistan. 2022 Edition. World Health Organisation: European Region.
[28] Statistics Agency under the President of the Republic of Uzbekistan, 2024. https://stat.uz/en/official-statistics/demography

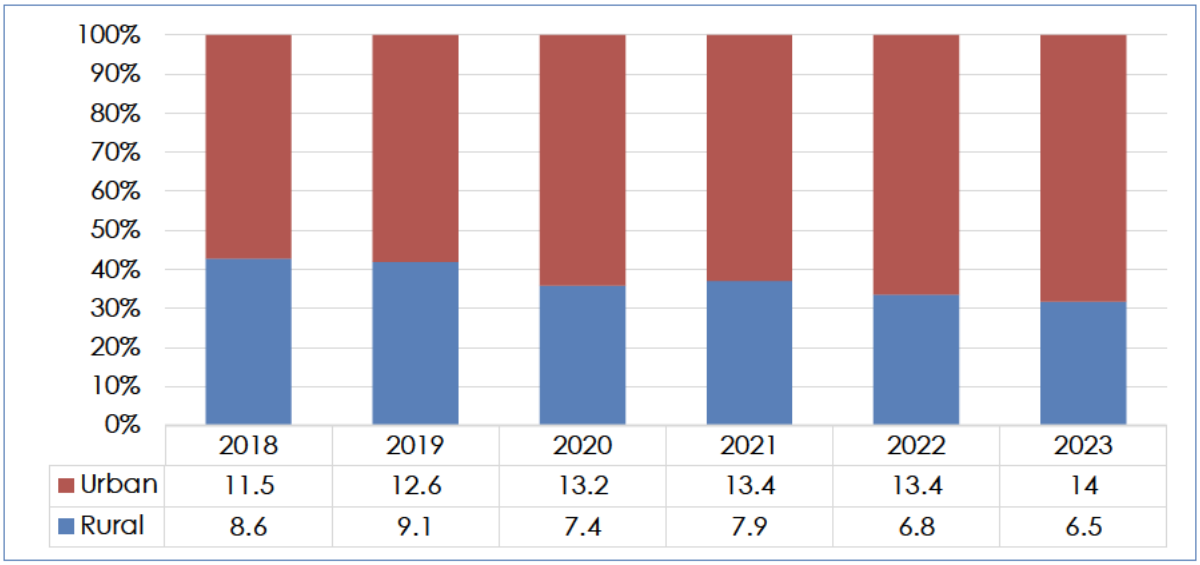


	2018	2019	2020	2021	2022	2023
Shofirkan district	0	0	1	1	0	1
Gijduvan district	2	3	2	1	0	2
Bukhara region	8	8	4	9	8	7

Figure 14-7 Maternal Mortality for the Period 2018-2023

Source: Statistics Agency under the President of the Republic of Uzbekistan, 2024

The child mortality rate for under-fives is higher in urban areas of Bukhara region than in rural areas. Child mortality rates increased by 3.6% in urban areas between 2018 and 2023, whereas it decreased by 4% in rural areas.



	2018	2019	2020	2021	2022	2023
Urban	11.5	12.6	13.2	13.4	13.4	14
Rural	8.6	9.1	7.4	7.9	6.8	6.5

Figure 14-8 Under 5 Child Mortality in Bukhara Region by Urban-Rural Categories

Source: Statistics Agency under the President of the Republic of Uzbekistan, 2024

14.2.6.1.1 Kuklam village

There is one household member with a disability, while two have a chronic illness. Respondents stated that they walk nearly 15 minutes to access the nearest public medical centre, which is

one kilometre away. Health facilities are well equipped, however there is a shortage of professionals who can visit the project site frequently. In case of an emergency, only an ambulance could be sent to provide first aid assistance. Most households reported that they did not go to hospitals often, except in case of necessity. Community members travel to specialized medical centres in the cities of Bukhara and Tashkent for health cases that require a highly qualified specialist.

14.2.7 Language and Ethnicity

Uzbek is the official language in Uzbekistan. Approximately 22 million of the national population speak Uzbek as their first language[29]. Minority populations residing in rural Uzbekistan speak Uzbek as their second language. Other spoken languages include Russian and Tadjik.

14.2.7.1.1 Kuklam village

The survey data shows that all respondents in Kuklam are Kazakh.

14.2.8 Religion

The question of religion was not included in the socio-economic survey due to its sensitivity in the Project area. However, through secondary data, it is estimated that most people in these villages are Muslims.

14.2.9 Indigenous Peoples

The policy framework and legislation of the Government of Uzbekistan do not recognize any section of the national population that can be considered 'Indigenous Peoples' (IPs). The ADB Safeguard Requirements 3, and IFC PS 7 prescribe the following qualification criteria for IPs in the characterization of project-affected communities:

- 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 mainstream society or culture.
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

[29] https://celcar.indiana.edu/materials/language-portal/uzbek.html

According to this guidance, all the above criteria must be met for any project-affected groupings to be identified as IPs requiring avoidance, mitigation and off-setting measures specified in the ADB PR 2, and IFC PS7. These guidelines recognize IPs as particularly vulnerable to disproportionate adverse impacts and exclusion from benefits associated with development projects, in comparison with other ethnic minorities and mainstream demographics within project-affected communities.

A review of the national policies and legislation (including customary law) of Uzbekistan, literature survey and consultation with the community development (makhalla) departments of the district- and regional khokimiyats indicated that no IPs are presented within the project-affected districts and communities.

On the community level, the ESIA-stage FGDs with the project-affected communities did not identify any ethnic residents and groupings that qualify as IPs.

14.2.10 Economy and Employment

Uzbekistan is classified as a lower-middle-income country, with plans to be an upper-middle income country by 2030. The agriculture, forestry, and fisheries sectors were the major contributors to the country's GDP in the first quarter of 2024. Uzbekistan is the world's fifth-largest exporter of cotton and seventh-largest producer of cotton.

Cotton employs a large part of the workforce and contributes 18% to the GDP[30]. The Asian Development Outlook[31] forecasted a 6 % GDP growth in September 2024, an increase from their April 2024 forecast (5.5%). A 5.6% growth is projected in April 2025, while a notable expansion to 6.2% is projected for September 2025.

Industrial growth exceeded expectations in the first half of 2024, driven by significant gains in both industry and construction. Rising remittance inflows, increased wages, and pensions have contributed to the steady increase in consumption.

Table 14-2 Summary of Uzbekistan Economic Data

CRITERIA	DATA (2024 ESTIMATES UNLESS OTHERWISE STATED)
GDP (Official Exchange)	US$112.70bn
GDP (Purchasing Power Parity)	US$8765.55
GDP per Capita	US$3.16k

[30] https://www.giz.de/en/worldwide/151181.html
[31] https://www.adb.org/news/adb-raises-economic-growth-forecast-uzbekistan#:~:text=The%20Asian%20Development%20Outlook%20(ADO,5.5%25%20forecast%20in%20April%202024

Criteria	Data (2024 Estimates unless otherwise stated)
GDP Real Growth Rate	6.2% (2023) 6.4% (2024)
Industrial Production Growth Rate	7%
Labour Force	14.51m
Employment Rate	47.54%
Unemployment Rate	7.14%
Exports	2.0 USD bn (Oct 2024)
Imports	3.1 USD bn (Oct 2024)

Source: Statistica, 2024. Socioeconomic (Accessed 18th December 2024) https://www.statista.com/outlook/co/socioeconomic-indicators/uzbekistan

The number of people at labour age in Bukhara region is 858,000. The employed population is high, at 803,200, while the unemployment rate is lower than the national rate, at 6.5%. The unemployment rate is also low for both districts but is highest in Shofirkon district.

Table 14-1 Employment by Region and District, 2024

	Population at labour age	Employed population	Unemployed population	Unemployment rate (%)
Bukara region	858,000	803,200	55,600	6.5
Gijduvon district	131,800	123,500	8,300	6.3
Shofirkon district	77,000	71,900	5,100	6.6

Source: Statistics Agency under the President of the Republic of Uzbekistan, 2024. https://www.buxstat.uz/

In the first quarter of 2024, the Gross Regional Product (GRP) of Bukhara region amounted to 10.2 trillion soums, representing a 6.9% increase compared to the same period last year. Additionally, the region's share in the gross domestic product (GDP) was 4.2%. The per capita GRP amounted to 4,970.9 thousand soums, showing a 5.1% increase compared to the corresponding period of the previous year. In the sectoral structure of GRP, the share of industry was 23.5% (23.1% in 2023), construction accounted for 8.7% (8.8% in 2023), agriculture contributed 24.8% (26.8% in 2023), and services made up 43.0% (41.3% in 2023).

In January-March 2024, small businesses generated 6,118.6 billion soums (compared to 5,399.4 billion soums in January-March 2023), accounting for 62.2% of the GRP (65.7% in January-March

2023). The decrease in the share of small businesses in GRP compared to the same period last year is linked to an increase in the share of large enterprises.

Monthly salaries provide an insight of economic conditions, inequality, and social welfare of the population. The figure below illustrates the average monthly salaries by region and district between January to September 2024. The average monthly salary in Bukhara region amounted to 4,004,923.70 between January and March and slightly increased to 4,199,272.90 thousand UZS in September.

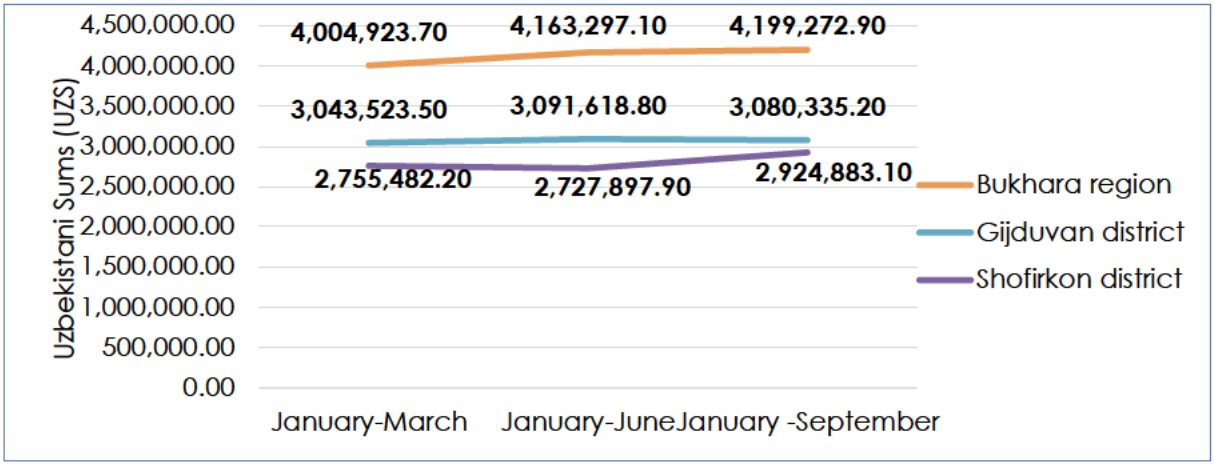


Table 14-2 Average monthly salaries by Region and District, 2024

Source: Statistics Agency under the President of the Republic of Uzbekistan, 2024. https://www.buxstat.uz/

14.2.10.1.1 Gijduvon District

Most of the district's population is employed in trade and agriculture, with 29,721 and 26,138 people respectively. The industry and construction sectors follow, employing 12,176 and 10,916 people respectively. In addition to the sectors previously mentioned, there are 9,013 people employed in transportation and storage. Furthermore, 7,871 people are employed in the education sector, and 5,020 people engaged in providing healthcare and social services.

The average monthly salary in the district amounted to 3,043,523.50 between January and March and slightly increased to 3,080,335.20 thousand UZS in September 2024.

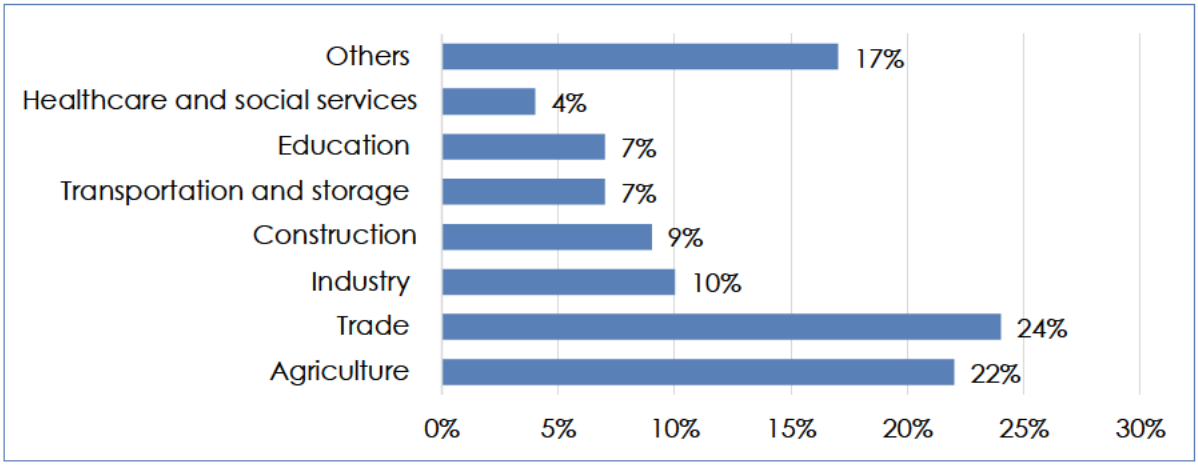


Figure 14-9 Employment by Sector in Gijduvon District, 2023

Source: Gijduvon District Passport, 2023.

14.2.10.1.2 Shofirkon District

The number of economically active people in 2024 was 77,129. The number of employed individuals stood at 70,762, whereas 6,367 people were unemployed. This resulted in an unemployment rate of 8.3%.

The average monthly salary in the district amounted to 2,755,482.20 between January and March and increased to 2,924,883.10 thousand UZS in September.

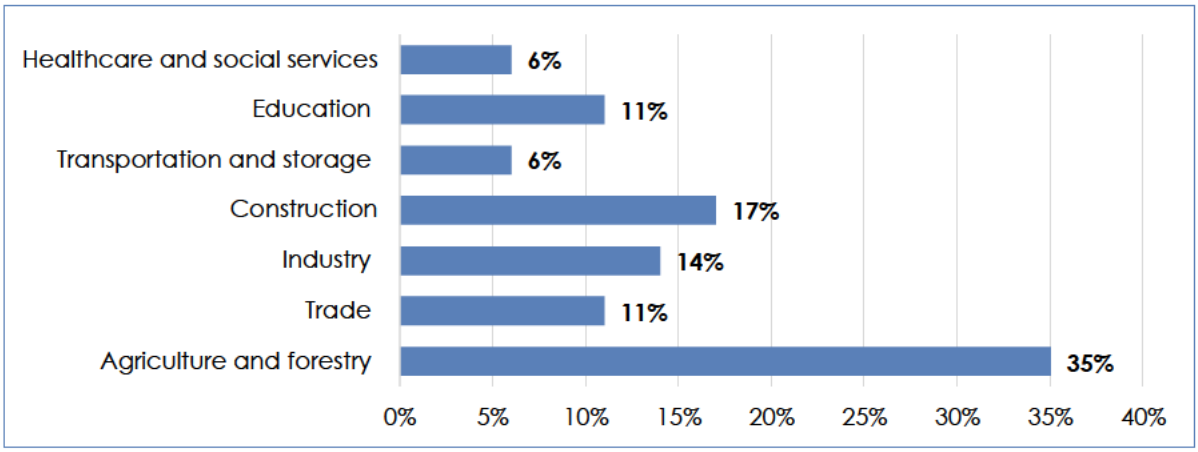


Figure 14-10 Employment by Sector, 2023

Source: Shofirkon District Passport, 2023.

14.2.10.1.3 Kuklam village

All surveyed HHs are employed in the government sector. One of the HH's spouse is a business owner and two spouses are unemployed and not searching for job opportunities. Women's entrepreneurship has been prioritized nationally, over women's access to wage employment.

Women's businesses are often informal, in sectors like women's unpaid work, such as agriculture, cooking, making clothes, handicrafts, etc. These women are likely to live in precarity without social protection[32].

None of the surveyed households have a secondary source of income. In 2024, the national minimum wage was set to 1,155,000 UZS per month. Respondent's average monthly salary was higher than the national minimum wage, at 5,633,333 UZS. Respondents found their monthly income to only be sufficient for basic needs.

The average monthly household expenses amounted to 6,995,833 UZS/545.43 USD. The top three expenses are food supplies (4,000,000 UZS/311.86 USD), followed by clothing and shoes (1,166,666 UZS/90.96 USD), and utility costs (670,000 UZS/54.24 USD). Only one household has a loan.

14.2.11 Poverty and Equity

Poverty and equity data are essential for identifying vulnerable populations. Poverty not only refers to income or consumption; it also encompasses interconnected deprivations such as limited access to education, healthcare, clean water, sanitation, and other aspects of well-being.

Uzbekistan utilizes the minimum consumption expenditure index to determine its poverty line. The national minimum monthly consumer expenditure per person was 621 thousand soums. As of 2023, there were 1,307.8 thousand impoverished families in the country, alongside a poverty rate of 14.1% (down from 17% in 2022). Around 18.4% of the adult population (4.2 million) are multidimensionally poor[33]. Rural poverty rates have been higher than urban rates, however, poverty reduction occurs at a faster pace in rural areas compared to urban areas[34].

In November 2024, the President led a meeting focused on unemployment and poverty reduction in Bukhara region35. It was noted that the region's economic indicators do not match its potential, and efforts reduce unemployment and poverty have been inadequate. Bukhara region's poverty rate stands at 11.9%. Although poverty rates in Uzbekistan had been

[32] International Labour Organization, 2023. *Women and the World of Work in Uzbekistan: Towards Gender Equality for All* [online]. Available at: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@europe/@ro-geneva/@sro-moscow/documents/publication/wcms_907344.pdf.

[33] https://www.undp.org/sites/g/files/zskgke326/files/202407/eng_UNDP_UZB_Analytical%20report_ICM.pdf

[34] Uochi, I. 2024. *Poverty and equity brief, Europe, and Central Asia: Uzbekistan. April 2024*. https://documents1.worldbank.org/curated/en/099062824104017042/pdf/P1746031dfc05b0d31b699103096082711c.pdf

[35] President of the Republic of Uzbekistan, 2025. *Investments' implementation, poverty and unemployment reduction set as priority tasks in Bukhara.* https://president.uz/en/lists/view/7737.

declining, the COVID-19 pandemic adversely affected this trend. It was estimated that 1.3% of the population (around 448,000 people) in 2020 may have slipped into poverty owing to the pandemic. One million people have been lifted out of poverty through vocational training and the promotion of entrepreneurship. Poverty reduction progress is also attributed to pensions and increased wage income especially in the services sectors that have a higher share of high-skilled workers, such as telecommunications and information technology. Hokims, deputies and sector heads are currently placed on a six-months' emergency duty to improve unemployment and poverty rates through implementation of 70 projects estimated to provide income to 150,000 people and lift 40,000 people out of poverty.

In 2021, 6.5% of the workforce were earning less than $1.90 per day, using the purchasing power parity poverty measure. The country experiences rising income inequality levels (from 0.31 in 2022 to 0.35 in 2023). Between 2022 and 2023, 10% of the poorest population's incomes grew by 6 percent, while the richest 10% segment's incomes grew by more than 30%. Food security and informal employment are considered the significant regional problems[36]. The table below presents prices of basic food products, as stated by survey respondents.

Table 14-3 The Prices of Basic Food Products

Basic Item	Kuklam community (UZS)
Bakery products (traditional and locally made items such as homemade bread)	2,666.7
Meat/beef per kg	80,000
Potato per kg	5,000
Onion per kg	5,000
Carrot per kg	5,000
Tomato per kg	30,000
Milk per litre	5,000
Diary product (kefir, butter, cream) per litre	5,000
Eggs	1,500
Rice per kg	16,666.7
Oil per litre	28,333.3
Flour per kg	3,333.3
Sugar per kg	18,333.3

[36] CERR and UNDP Country Office in Uzbekistan, 2023. *Uzbekistan Pilot Multidimensional Poverty Index Report: 2023*. https://www.undp.org/sites/g/files/zskgke326/files/2024-03/en_Pilot%20MPI%20report%202023.pdf.

14.2.12 Vulnerable People

The following criteria is applied for the identification of persons or groups of people:

- Those that may be disproportionally affected by project impacts or are more limited than others in their ability to access project benefits, due to being discriminated against, marginalized and/or excluded on the basis of characteristics such as, but not limited to, their sex or gender, sexual orientation, gender identity, gender expression and/or sex characteristics, religion, national origin, race, ethnicity, indigenous status, age (including children, youths and older persons), physical or mental disability, literacy, political views and affiliations, or socioeconomic status[37];
- People in situations of vulnerability such as people living below the poverty line, the landless, single-headed households, natural resource-dependent communities, migrant workers, refugees or internally displaced people, as well as people affected by conflict or natural disasters;
- People or households with informal land-use potentially impacted by the project;
- Female-headed households;
- Child-headed households; and
- PAPs that will experience a loss of more than 10% of the land they use whether on a permanent or temporary basis.

The National Agency for Social Protection serves nine million vulnerable people nationally. In 2021, Uzbekistan's total expenditure on social protection (including healthcare) was 9.4. The old age population had the highest expenditure on social protection systems (4.5%), followed by working age population and lastly children, at 1% and 0.8% respectively[38]. There are 4,600 social workers, with 13 social workers per 100,000 people[39]. The ratio of social service workforce with child protection functions is much lower, at 3 per 100,000 children. People living with disabilities are four times less likely to be employed than people without disabilities. In 2019, United Nations (UN) country office in Uzbekistan found that there are fewer females (4.4%) living with disabilities in the workforce compared to males (8.9%).

The 2018 *Listening to the Citizens of Uzbekistan Survey* (L2CU) interviewed over 4,000 households across the country and revealed that approximately 55% of the population is

[37] European Bank of Reconstruction and Development, 2024. *Environmental and Social Policy*. https://www.ebrd.com/environmental-and-social-policy-esp-2024
[38] International Labour Organization, 2024. *World Social Protection Report: 2024-2026: Universal social protection for climate action and a just transition* [online]. https://www.ilo.org/sites/default/files/2024-09/WSPR_2024_EN_WEB_1.pdf
[39] UNICEF 2024. *Social work is a driving force in solving social problems of vulnerable groups of the population* [online]. https://www.unicef.org/uzbekistan/en/press-releases/social-work-driving-force-solving-social-problems-vulnerable-groups-population

supported by the Social Protection programme[40]. It was noted that households with many children are more likely to be poor, as childcare prevents mothers to work. Such households move out of poverty and vulnerability when children grow up, get married and move out of the home[41]. Results of the *Population Risk and Vulnerability Assessment* also highlighted other vulnerable households, including those with members who have disabilities or chronic illnesses, single-earner households, households with working-age members who are unemployed and rely on causal work, and those without have land or gardens, limiting their ability to generate additional income. Additionally, households are considered vulnerable if they lack resilience to cope with various shocks, such as high inflation, the loss of their job, or extreme weather events.

14.2.12.1.1 Gijduvon district

The table below shows numbers of households that are dependent on various social protection programmes. The highest registered vulnerable group is pensioners, followed by households receiving childcare allowance, and people with disabilities. There are no sex-aggregated data on social assistance recipients.

Table 14-4 Vulnerable groups in Gijduvon District

VULNERABLE GROUPS	NUMBER
Those receiving childcare allowance for children up to two years old and low-income families	15,937
Low-income families receiving financial assistance	1,220
Pensioners	37,500
People with disabilities	7,496

14.2.12.1.2 Shofirkon District

The highest registered vulnerable group in Shofirkon district are pensioners, followed by households receiving childcare allowance, and people with disabilities. There are no sex-aggregated data on social assistance recipients.

Table 14-5 Vulnerable Groups in Shofirkon District

VULNERABLE GROUPS	AMOUNT
Those receiving childcare allowance for children up to 18 years old and low-income families	7,220
Low-income families receiving financial assistance	290

[40] International Labour Organization, 2024. *Uzbekistan: Accelerating progress on SDG target 1.3 Building Social Protection Floors for All* [online]. https://www.ilo.org/projects-and-partnerships/projects/uzbekistan-accelerating-progress-sdg-target-13-building-social-protection

[41] World Bank, 2018. *Uzbek Population Risk and Vulnerability Assessment* [online]. https://documents1.worldbank.org/curated/en/845111577685772330/text/Uzbek-Population-Risk-and-Vulnerability-Assessment.txt

Pensioners	24,095
People with disabilities	6,939

14.2.12.1.3Kuklam village

All surveyed households in Kuklam village have one member considered vulnerable as they are living with a disability or chronic illness.

Table 14-6 Vulnerable Households in Kuklam

No	Element of Vulnerability	Kuklam
1	Physical and/or mental disability	1
2	Chronic illness	2
3	Female household headship	0
4	Child-headed households	N/A
5	Informal tenure of affected land use/ resources	N/A
6	Extreme poverty	N/A
7	IP	N/A
8	Household that are reliant on natural based resources (herding activities)	N/A
9	Household that are reliant on natural based resources (agricultural activities)	N/A
10	Households with members above 60	N/A

14.2.13 Gender Equality

Uzbekistan is systematically working to achieve gender equality. Forty-nine percent of students who enrolled in universities in 2023 were female. For the first time, the share of women in public administration reached 35%[42]. A statement from Uzbekistan's 2024 *Country Gender Assessment* underscored that "if working women were simply to catch up to the wages earned by men, the increased income would pull more than 700,000 people out of poverty." In 2021, the gender pay gap in monthly earnings was recorded at 36%[43].

According to UNICEF (2019) and ILO (2023), the labour market in Uzbekistan is characterised by visible gender segregation by industry where women are well represented in the public sector such as education, healthcare and in culture and arts, while men dominate technical fields such as construction, finance, manufacturing etc., which tend to pay more. Women in rural and urban areas are likely to be employed in the informal sector which is associated with

[42] UNDP Uzbekistan, 2024. *Empowering women in Uzbekistan to fight against corruption* [online]. https://www.undp.org/uzbekistan/news/empowering-women-uzbekistan-fight-against-corruption#:~:text=For%20the%20first%20time%2C%20the,the%20field%20of%20gender%20equality.

[43] UNECE, 2022.*Uzbekistan Statistical Database* [online]. https://w3.unece.org/CountriesInFigures/en/Home/Index?countryCode=860

lower wages. Most women are involved in unpaid household work while men participate in productive paid labour work.

Male breadwinner bias significantly impacts legislation, public policy and employer practices[44]. In 2011, 56% of women and 67% men thought that when jobs are scarce, men should have the greater right to a job than women. Income generated by women is assumed to be a secondary income to that generated by men. Regarding decision-making, women are under-represented in the decision-making process at all levels in the public and private sector.

Table 14-7 Gender Equality Indicators Benchmarking

Index	Uzbekistan Score	Europe and Central Asia	Global
Gender Development Index (UNDP 2022)	0.94	0.96	0.96
Gender Inequality Index (UNDP 2022)	0.23	0.25	0.47
Women, Business, and the Law (World Bank 2023)	70.6	84.1	76.5

Source: The World Bank, 2024. *Country Gender Assessment for Uzbekistan*.

The table above presents the gender equality indicators benchmarking. In the Gender Development Index, a higher score indicates greater gender balance. In the Gender Inequality Index, a higher score indicates less equality. In the Women, Business, and the Law assessment, a higher score indicates more supportive legal environment for women. Uzbekistan performed strongly in the Gender Inequality Index, whilst more effort is required to support women in the legal environment and supporting women's and girl children's achievements in three basic dimensions of human development namely, health, life expectancy at birth and education.

The adolescent fertility rate has worsened since 2010, rising to 34 births per 1000 girls aged 15-19 in 2021(World Bank, 2024). Early pregnancies often result in a decrease in women's future participation in the labour market. Consequently, women and girls fall short of their human development potential.

The Gender Assessment Report by ADB (2018) confirms that traditional gender contracts (which are not formal laws or policies), prescribe the role of women and men in the family and society and assign different jobs, values, responsibilities, and obligations to both men and women. The report notes that gender norms in rural areas are more conservative especially

[44] International Labour Organization, 2020. [online]. Available at: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@europe/@ro-geneva/@sro-moscow/documents/publication/wcms_907344.pdf

regarding the role or women and their marriageable age. Women are bound by traditional notions of motherhood, children and taking care of the family and even those with professional careers are expected to balance work and family life. "When women choose to work, they disproportionately face discrimination in terms of the jobs that are considered appropriate for them, and the wages that are deemed sufficient for their work are systematically lower than that of men regardless of qualifications" (Muradova & Seitz 2022). As a result, the gender stereotypes relating to female behaviour and social roles have an influence on the choices men and women make in exploiting education opportunities and towards their future career ambitions and development (ADB, 2018). Traditional gender roles influence household chores performed in Kuklam households. All survey respondents mentioned that cooking and cleaning duties predominately fall under the responsibility of adult females.

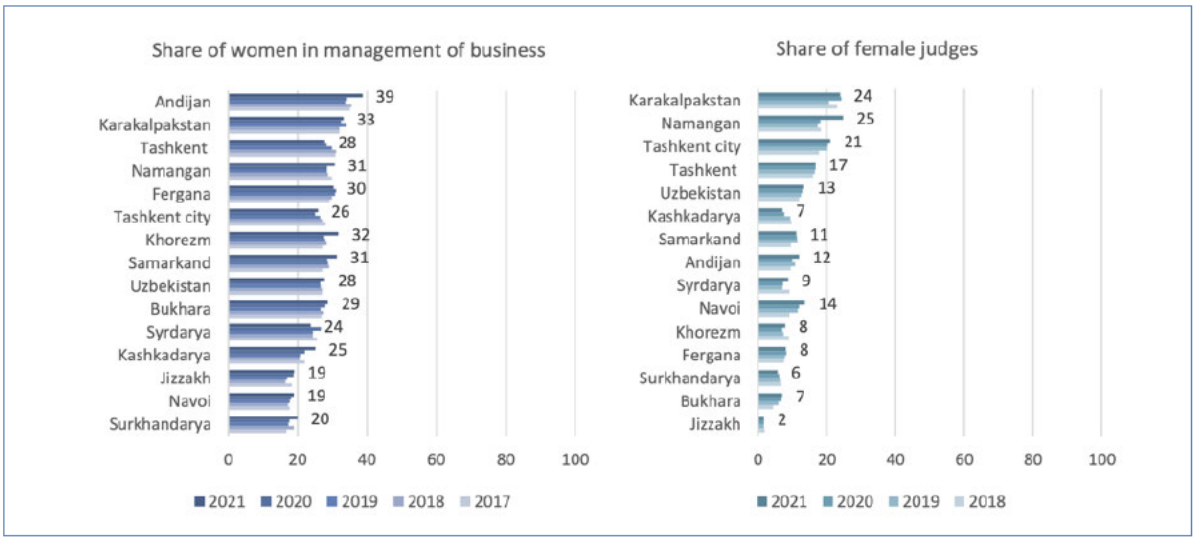


Table 14-8 Share of Women in Management Positions and Judgeships by Region, 2021
Source: Agency for Statistics, 2021

The national share of women holding seats in the senate increased from 20% in 2018 to 25% in 2022 (World Bank, 2024). Bukhara region is among the higher performing regions with a 29% share of women in the management of business. The national share of female judges rose from 12% to 13%, with notable differences between higher performing regions where one in every four judges is a woman, compared to less well performing regions (Bukhara amongst them) where as few as 1 in 50 judges is a woman.

14.2.13.1.1 Gender-based Violence and Harassment

Gender-based violence and harassment (GBVH) is the "umbrella term for violence and harassment directed at persons because of their sex or gender, or affecting persons of a particular sex or gender disproportionately, and includes sexual harassment" (Social

Development Direct, 2020). Although GBVH can affect any gender, global data shows that it mostly affects women and girls. Children are more vulnerable to many forms of GBVH than adults. Acts of GBVH are violations to women and girls' human rights to life, liberty and security. Risks and impacts of GBVH on companies can be severe, leading to financial and reputational costs.

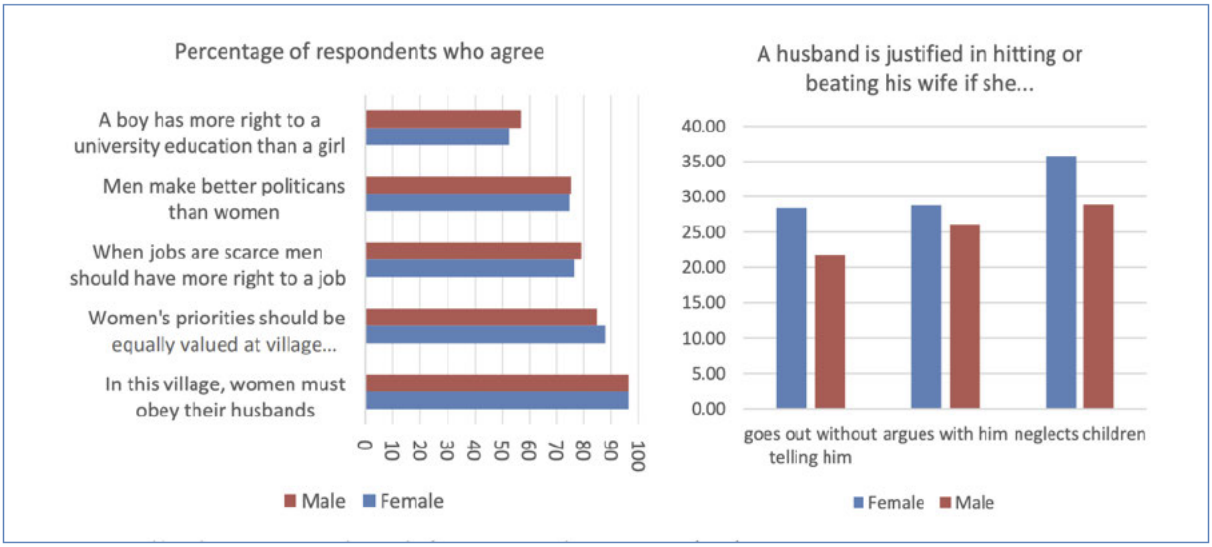


Figure 14-11 Views on Women's Roles, Rights, and Treatment, 2021

Source: World Bank, 2021. *Rural Infrastructure Development Project (RIDP) survey*

The figure above illustrates the gendered views on women's roles, rights, and treatment, collected through the RIDP survey which covers 4,012 households. An equal share of men and women are of the view that "women must obey their husbands". Surprisingly, more women than men are of the view that "a husband is justified in beating his wife if she goes out without telling him, argues with him, and neglects children".

The most prevalent type of GBVH in Uzbekistan is domestic violence with 21,871 women applying for protection orders within the first seven months of 2023; where 84.7% required protection from family members such as from the husband and mother-in-law[45]. GBVH contributes to negative impacts on physical, mental, and sexual and reproductive health, including on financial wellbeing[46]. The national income would be about 29 percent higher if

[45] https://www.undp.org/uzbekistan/blog/why-legal-aid-provision-needs-be-gender-sensitive-case-uzbekistan

[46] Social Development Direct, 2020. *Addressing Gender-Based Violence and Harassment: emerging good practice for the private sector.* https://documents1.worldbank.org/curated/en/761561614599416933/pdf/Main-Report.pdf

women were to participate in equal measure to men[47]. Women living in abusive households experience reduced productivity levels. GBVH has potential indirect impacts of GBVH on family members such as the children of GBVH victims.

It should be noted that GBVH and workplace protections have been introduced in the country's new labour code. The Law (December 2022 ORQ-809) introduced the "gender audit" requirement. The Law dated 11.04.23 aimed at reliably protecting the rights, freedoms and legal interests of women and children, introduced amendments and additions to 5 codes and 10 laws (ORQ-829, 31.10.2023). This Law introduced concepts such as "family (domestic) violence", "harassment", "sexual harassment" in the relevant legal documents, also administrative and criminal liability was established for these violations. In addition, interest-free educational loans were introduced to pay the educational contracts of women studying in higher education institutions, vocational schools and colleges. In addition, the Code of Administrative Liability amended eliminates discrimination based on gender, including establishment of a liability responsibility for openly denying the equal rights of women and men (ORQ-874, 31.10.2023).

KUKLAM VILLAGE

It is important to acknowledge the barriers and risks associated with collecting survey data on GBVH. Talking about the past or current GBVH experiences can be difficult and traumatic for GBVH victims. Additionally, survey respondents may face further risk of further violence if data is not handled with care and confidentiality. When asked about the challenges that the female members of the household encounter in Kuklam, all the surveyed respondents stated that women do not experience any challenges, and that there are no cases of GBVH.

There is no "one-size-fits-all" solution to GBVH. As such, cognizance of a country's context and national legislation is imperative.

14.2.14 Cultural Heritage

Kuklam community respondents indicated that they have no specific intangible cultural heritage, only those that are widely celebrated in Uzbekistan. According to mahalla leaders, the communities value their national traditions and rituals especially those connected to their Kazakh culture. Rituals such as "Alyp Kashu" and "Bet ashar", "Jar-Jar" are common in the area. *Alyp Kashu* – Kidnapping of the bride- is one of the most common ancient customs of the Kazakh people. Unlike in the past, "kidnapping" of the bride takes place after prior

[47] International Bank for Reconstruction and Development/The World Bank, 2024. https://openknowledge.worldbank.org/server/api/core/bitstreams/9f44b336-d1e2-4aac-8e18-0984203a68c7/content

agreement of the families of the bide & groom. However, cases of "real kidnapping without the consent of the bride" occur but such cases are very rare.

The *bet ashar* (revealing of the face) includes gathering the relatives of the bride and groom to acquaint themselves with each other. This occurs one to two days before the wedding. The bride's head and face are covered with a headscarf which is removed by a young boy (usually 6-8yrs old) from the groom's family using a stick.

The "revealing" of the bride's face means that the bride has become a member of the groom's family, and she receives "*Kalyn mal*" which includes different gifts.

Other customs still practiced by the Kazakh people include:

- *Tusau Keser*: When a child takes their first steps, their legs are tied with a thread and that thread is cut by someone they would want their child to emulate (like a role model). Various items such as money, books, whip are placed in front of the child and their choice is believed to determine their future.
- *Shildehana:* This is an event organized when the newborn leaves the hospital as a celebration of the birth.

14.2.15 Agricultural and Livestock Grazing Activities

Farmers and herders use the land allocated for the Wind Farm for grazing purposes. Livestock grazing is conducted by male members of the family in the open desert fields during spring, summer, and autumn. During winter, the livestock is kept in stables near the house. More information on agricultural and livestock grazing activities is presented in the RAP report.

Of the surveyed respondents in Kuklam, there are none whose livelihoods depend on agricultural activities.

14.2.15.1.1 Kuklam village

The most reared livestock among the three surveyed households in Kuklam is goats, as shown in the figure below. None of the surveyed households keep cattle or hens.

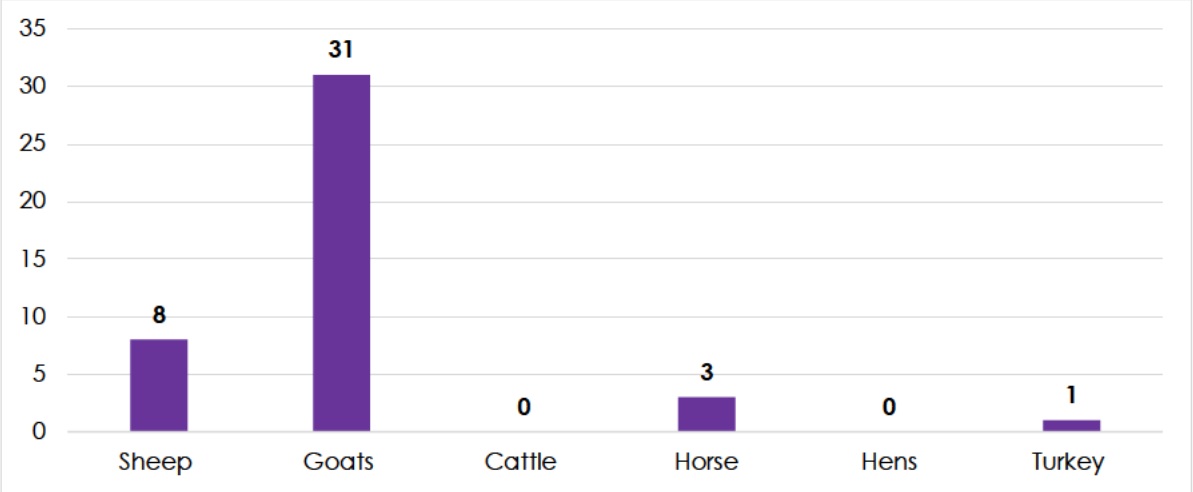


Figure 14-12 Number of livestock by type owned by Kuklam respondents

Two respondents mentioned the lack of water sources as the main challenge associated with livestock rearing.

14.2.16 Land Use and Resettlement

Land use is controlled by the State at central and local levels to ensure productivity of crops essential to the national economy. Farmers have land use rights granted by khokimiyat officials based on highest bids and tied to successful productivity[48]. Land allocated to Wind Farm is owned by State Committee on Sericulture and Wool Development Industry.

Some land within the Project site is used for infrastructure (i.e., power lines and gas pipeline corridors) while other land is used seasonally by herders as previously mentioned.

All herders use the lands on the project site for grazing purposes, while two PAPs (one is a herder, and one is a fishery owner) use the project site for both herding and fish farming activities. Workers who own livestock use the project site only for grazing purposes and herd their livestock alongside their employers.

Out of 24 herders, four have lands outside the Project site, but they use the Project area with verbal agreements with those who have official agreement with Kukcha LLC. Out of 24 herders 22 have structures in the Project site, a farmer has a stable, and the fishery owner has several structures including a workers' house, livestock stable and fishponds. Workers ordinarily use structures belonging to herders/fishery owners as they do not own any structures. Nobody lives in those structures permanently.

[48] UNECE, 2015. *Country Profiles On Housing and Land Management: Uzbekistan* [online].https://unece.org/DAM/hlm/documents/Publications/CP_Uzbekistan_withCorr.EN.pdf.

Kuklam community members use other sites located close to their community and outside the Project area for grazing purposes. Additionally, Kuklam community members use the Project site as an access road to reach Shofirkon district in some cases. It was also noted that community members have access to an alternative road to reach the neighbouring district in case commuting within the Project site will be restricted.

OHTL

The proposed OHTL is a 1.5 km LILO OHTL connecting to the Bash – Karakul 500 KV OHTL. No residential houses are located within the OHTL HPZ, hence physical displacement will not be triggered. However, owners of affected residential plots will have restrictions in areas within the HPZ, in which structures (e.g., toilets, barn, etc.) should not be placed within this area.

The impacts of land acquisition on PAPs are comprehensively discussed in the RAP report.

14.2.17 Knowledge About the Project

According to survey results, four herders reported that they do not have previous knowledge about the Project, and the remaining PAHs indicated that they are aware of the upcoming Project. 56 PAHs indicated that they were informed about the Project from Project representatives (JURU), 12 from makhalla, 10 from their next of kin. All workers are aware of the upcoming project, having been informed by project representatives.

14.2.18 Preferred Information Source on the Project

A total of 35 respondents prefer to receive information on the implementation progress and the results of the Project through public consultations, 19 PAHs through the television, 18 prefer the makhalla committee, while the remaining minority prefer social networks, khokimiyats etc.

14.2.19 Anticipated Negative Impacts

One of the primary concerns indicated by 36% of respondents is the impact on grazing areas. Additionally, 11% of the respondents shared the potential impacts on housing and property. On the other hand, 29% respondents believe that the Project will not harm anyone. Concerns about ecological/environmental impairment were expressed by 11% of the respondents.

14.2.20 Anticipated Positive Impacts

Seventy-one respondents look forward to an improvement in power supply, the decrease in the cost of electricity (20 respondents), and an improvement in ecology (13 respondents). 5 PAHs believe that Project will be beneficial for low-income families, while one worker believe

that only State will benefit from the Project. All other respondents indicated that the Project would be beneficial for everyone.

14.2.21 Proposed Mitigation Measures

According to the survey, 65 PAHs prefer appropriate compensation for damages as a measure to mitigate the negative effects of the Project, while 14 respondents stated that public control over the progress of the project, through the involvement of local community representatives, should be organized as a measure to mitigate the negative impacts of the project.

14.3 Receptors

The following table provides an overview of E&S impact receptors in the context of potential impacts on livelihoods and social infrastructure within the Project's AoI. A sensitivity rating and corresponding description is further provided for each relevant receptor.

Receptor	Sensitivity	Justification
Welfare of local population	High	Any change to infrastructure, population or regional inputs is likely to have effects on the welfare of the local population in the villages close to the Project site.
Local/Regional Economy	High	The proposed Project is likely to influence regional businesses. Not only local contractors and those directly involved in the construction but also local commercial operations such as food suppliers.
Employment Market	Medium	The development of the Project will result in the creation of employment opportunities and will offer an opportunity for greater dissemination of skills especially during the construction phase of the Project.
Water resources	Medium	Given the scarcity of water in the project area, the Project demand for water can potentially create a shortage for surrounding local communities or lead to an increase in the price of water in the absence of proper management particularly if water is sourced from the same water supply network used by the local communities
Vulnerable groups & women	High	Vulnerable groups & women are particularly vulnerable and can experience disproportionate impacts from the Project compared to other groups.
Herders using & Living at the Project site	Very High	Herders living and/or using the Project site will face access restrictions during the construction phase of the Project. There will also be reduction in the land available for grazing once Project facilities have been constructed as such, they are highly vulnerable.
Fishermen	Very High	The fishermen living and/or using the Project site may face access restrictions during the construction phase of the Project.
Workers working within the supply chain	High	Workers working within the supply chain are highly likely to be exposed to risks relating to labour & working conditions.

14.4 Potential Impacts, Mitigation, Management and Residual Impacts

14.4.1 Construction Phase

14.4.1.1 Employment and Economics

The primary economic impact during construction is likely to result from limited project timeline centric employment creation during this phase. This Project is expected to create employment opportunities during the construction phase for unskilled and applicably skilled workers. Local workers will be hired to reduce risk of socio-cultural conflict due to influx of people to the Project area based on their skill set and Project requirements. In addition to the direct monetary uplift to the families of those employed, money paid to workers will also stimulate the local economy via the multiplier effect, whereby money earned on the Project expended locally will re-circulate within the local economy.

Some of the workforce will come from other countries and this could result in the repatriation of wages and a reduction in the benefit to the local economy of wage expenditure.

14.4.1.2 Training and Dissemination of Skills

In addition to the direct monetary impact of employment created during construction, there also exists the potential for the Project to promote the dissemination of construction and construction support skills from expatriate workers into the local labour force. This will open job opportunities to the unemployed and increase their probability of securing similar jobs after completion of the Project construction phase.

Exposure to these advanced standards and techniques through collaboration with expatriate workers will enhance the local labor force's competencies. This skill dissemination is expected to significantly boost the employability of local workers, equipping them with qualifications and experience that increase their chances of securing similar employment opportunities after the project's construction phase concludes. This capacity building can contribute to long-term economic development by expanding the local talent pool and improving workforce readiness for future projects.

14.4.1.3 Purchase of Construction Materials and Food Products Locally

The construction phase is expected to generate secondary economic impacts through the procurement of both local and international goods and services. While specialized materials required for the development are likely to be sourced internationally, essential construction materials such as concrete and aggregate will be procured locally. This local sourcing is expected to benefit local suppliers and contribute positively to the regional economy.

Furthermore, there is potential for an economic boost through the purchase of locally produced food products. Workers' demand for fresh vegetables and daily consumables can provide local farmers and vendors with additional sales opportunities, thereby stimulating local agriculture and retail sectors.

However, this increased demand may have a downside. If the purchasing power of the workforce drives up prices at local shops, it could lead to inflationary pressure on basic commodities. This price increase could negatively impact local households, particularly those with fixed or lower incomes, by making essential goods more expensive and less accessible.

14.4.1.4 Consumption of Water

The key uses of water during the construction phase are expected to be for personal consumption, domestic use, dust control, civil works and concrete works at the batching plant. At this stage it is understood that the EPC Contractor will potentially establish boreholes at the project site to abstract groundwater for concrete works and other water requirements at the batching plant. Given the scarcity of water in the Project area, a water supply assessment will be undertaken to assess the availability of water for the Project and if there will be significant impacts to local community users. This assessment will also include cumulative impacts of other proposed development projects that may also depend on similar water sources and the potential impacts of climate change. In addition, the EPC Contractor will be required to obtain water abstraction permits from the relevant authorities before drilling of any wells can commence.

14.4.1.5 Impacts to Vulnerable Groups and Women

Vulnerable groups and women are more likely to be impacted differently compared to other groups in the local communities. This means that they may not be able to enjoy all the benefits of the Project. For instance, women and people living with disabilities in the local communities may experience challenges and unequal opportunities during the recruitment process due to existing gender biases. They may also be exposed to GBVH due to the presence of new workers in their communities including other labour violations (Reference Chapter 18 Community Health, Safety and Security, Chapter 30 Labour & Working Conditions).

Children and vulnerable groups may also be more impacted, and their safety put at risk due to increased traffic in the project area and movement of machinery. Such risks will be addressed in line with mitigation and management measures identified in Chapter 12 Traffic & Transportation.

14.4.1.6 Land Use Change

Reference the project specific RAP for impacts relating to land use change.

14.4.1.7 Disruption of Local Custom

The arrival of workers and migrants to the Project site may introduce new habits and practices that differ from the established local culture. This cultural divergence could potentially lead to conflicts between incoming workers and local residents, or a decline in social cohesion within the community.

However, this risk is mitigated by several factors. The construction workforce is relatively small, with a peak workforce estimated at 200 individuals. Moreover, the Project site is situated at a considerable distance from local communities. These conditions significantly reduce the likelihood of meaningful disruption to local customs and social dynamics. Therefore, the anticipated impact on local customs and social cohesion is expected to be negligible.

To further minimize any potential disruption, the Project will implement cultural sensitivity training for incoming workers and encourage practices that respect local customs and traditions.

14.4.1.8 Supply Chain Risks

The engagement of suppliers will present potential risks relating to labour and working conditions such as:

- Child labour, forced labour, GBVH and sexual abuse, exploitation and harassment
- Lack of written contracts for workers;
- Labour rights violations including poor working conditions and poor terms of agreement for female employees, overtime work without pay etc;
- Health, safety and security issues for workers and local communities;
- Risks associated with the employment of migrant labour and ethnic minorities;
- Risks to freedom of movement e.g. being able to leave worker accommodation; and
- Environmental impacts relating to pollution of water supplies, soil and air.

ACWA Power will request to assess these risks from their suppliers by undertaking supply risk assessment.

Table 14-9 Socio-Economics Impact Significance, Mitigation & Management Measures and Residual Impacts-Construction

Potential Impact	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
Employment Opportunities	**Minor Positive**	Employment Market	Medium	**Minor Positive**	• Local employment/recruitment management plan will be prepared and implemented. This plan will include clear targets for employment under EPC and sub-contractors. • Contractor will seek to employ local workers where possible including women. This will be done in consultation with the local administration and Makhalla leaders in the communities near the Project site. • The EPC Contractor will give priority to the local people while employing unskilled and semiskilled labor forces from the Project area. • The EPC and Sub-Contractors HR Policy will be prepared to ensure consistency in line with local labour laws and international ILO and UN conventions. The EPC Contractor is to ensure that this is applied as an overarching policy for all sub-contractor company HR policy as part of their contractual arrangements. • EPC Contractor to undertake local community consultation during recruitment process in order to consider equitable job opportunity distribution among the locals to avoid conflict between the local people • The EPC Contractor will provide equal employment opportunities to women and preferences will be given to local women for unskilled and semi-skilled labour positions.	**Minor Positive**
Training and dissemination of construction skills	**Minor Positive**	Welfare of Local Population	High	**Minor Positive**	• All Project workers will receive induction training at the Project, as well as vocational specific training for on-site construction works.	**Minor Positive**

Potential Impact	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					• All workers will receive training in regard to health and safety, as well as environmental and social awareness. • Toolbox talks will be conducted before work on each day to ensure workers are reminded of key topics. • Cultural awareness training for all foreign workers and those coming from other regions in Uzbekistan.	
Purchase of construction materials and food resources locally	**Minor Positive**	Local/Regional Economy	High	**Minor Positive**	• EPC Contractor will purchase goods and materials from the local/regional economy where possible. • The EPC Contractor will purchase some of the food products such as meat, milk from the suppliers. • EPC Contractor will ensure that the influx in workers does not lead to an increase in retail prices of basic commodities by providing the workers with food or giving them transportation to larger towns where they can buy food and non-food items. • Establish market network between the Project workers and the local people where possible in consultation with the community leaders. • Water supply to the Project site will not be sourced from the village springs/wells, local ponds or water channels, or from Lake Ayakagitma, (unless a license is obtained to draw water from the lake).	**Minor Positive**
Consumption of water	**Moderate Negative**	Water resources	Medium	**Moderate Negative**	• A water supply assessment will be undertaken by the EPC Contractor to assess availability of water prior to establishing boreholes and abstracting water from the site. • The EPC Contractor will obtain water abstraction permits before drilling any wells/boreholes at the project site. • EPC Contractor will obtain relevant permits and engage a licensed water tanker trucks for the supply of potable water.	**Minor Negative**

Potential Impact	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					• Prior to engaging a licensed potable water supply company, the EPC Contractor will determine the source of the water to be used for the project. • Where water is sourced from the same water supplier that nearby villagers use, the EPC Contractor will undertake water sustainability assessment to ensure that the projects water demand does not create a shortage to local communities or drive up the price of water. • If the water is sourced from the pump station at the village, the EPC Contractor will engage with local authorities and obtain relevant permits to ensure that it does not create a shortage to the villagers. • The use of water from the pump station at the village will be within the quantities stipulated in the permit. • The Project workers will be trained on ways to minimise water consumption and to ensure they have an understanding of water resources and resource efficiency. • The EPC Contractor will have a grievance mechanism in place that will allow villagers to lodge their complaints or concerns regarding any water issues related to the Project. • Water storage tanks, pipes, taps etc. will be inspected for leakage and repaired immediately once identified. • Where feasible, wastewater generated at the batching plant will be recycled and reused to reduce water requirements for concrete works and hence reduce pressure on existing water sources.	
Disproportionate impacts on	**Minor Negative**	Vulnerable groups & women	High	**Minor to Moderate Negative**	• The CLO will regularly undertake informal meetings including with women focus groups & vulnerable	**Minor Negative**

Potential Impact	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
vulnerable groups					groups to ensure that on-going stakeholder engagement is gender inclusive. • The Project Company will ensure that the EPC Contractor employs a female within the social experts who will support the CLO in addressing potential Gender based violence and harassment issues. • Implementation of mitigation and management measures provided under Traffic & Transportation, Community Health, Safety & Security and Labour & Working Conditions Chapters. • Implementation of the Project specific RAP to ensure that herders livelihoods are not impacted.	
Disruption of Local Custom	**Minor Negative**	Welfare of Local Communities	High	**Moderate Negative**	• EPC Contractor to provide adequate training to the non-local workers in the Project, especially in terms of interaction with the local community members. • Allow local residents to report concerns associated with loss of cultural values through the grievance mechanism. • EPC Contractor and its sub-contractor will develop and implement a Code of Conduct. This will include an overview of culturally and religious appropriate measures and etiquette to bear in mind. • The code of conduct will also guide staff interaction with local communities. It will ensure workers and non-locals' behaviour are managed suitably to minimise upset in local community through anti-social behaviours • EPC Contractor will provide adequate training (cultural sensitization training) to the non-local workers in the Project. • EPC Contractor will adopt a zero-tolerance policy towards unacceptable workforce behaviors towards	**Minor Negative**

Potential Impact	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					females or any community members i.e., sexual harassment or violence. • The grievance mechanism will be made available to the local communities i.e., community members can make verbal or written complaints at the Project security gate or request to speak to the HSE/Environmental Manager	
Social risks related to supply chain	**Moderate Negative**	Workers working within the supply chain	High	**Major Negative**	• ACWA Power & the Project Company will develop a Supply chain Management Plan and an E&S Supplier & Vendor Management Plan. • ACWA Power & the Project Company will carry out a supply chain risk assessment in relation to Sany's supply chain management system. • ACWA Power & Project Company will establish a responsible sourcing policy to ensure traceability from wind turbine suppliers. • ACWA Power and the Project Company will ensure that Sany and its core suppliers adopt self-covenants and codes to the loan agreement mandating the suppliers to map and complete risk assessment of the core WTG components. • Sany must provide a Letter of Commitment to the Project Company which states that the suppliers involved in production/assembly of turbines will be locked contractually and any new or replacement supplier will go through a separate due diligence process to confirm no association with child and forced labour risks. • A Corrective Action Plan (CAP) will be developed and implemented to address any gaps identified during the supply chain assessment and to address any non-compliances that that will be identified in future audits	**Moderate Negative**

Potential Impact	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					• ACWA Power & the Project Company will notify the lenders when labour risks such as forced/child labour or allegations are raised in relation to their core suppliers. • A dis-engagement clause will be added to the loan agreement in case of material non-compliance with the measures listed above. • ACWA Power and the Project Company will ensure that Sany and its core suppliers keep all records, rules and policies in relation to workers protection and the provision of safe working conditions.	

14.4.2 Operational Phase

At a strategic level the operation of the Wind Farm is a proactive measure towards a low carbon transition for Uzbekistan's economy harnessing the wind resources in the country. This project will reduce Uzbekistan's dependency on fossil fuel generated power and will reduce atmospheric pollution in line with the Uzbekistan 2030 Energy Strategy. It will also support the continued growth of the national economy through the provision of sufficient power supply.

As with the construction phase, an economic impact during operation will result from any local employment created by the Project. The operational phase will however require significantly less staff than during construction. Besides management and technical operator positions, the majority of staff will be security teams and other office-based support staff. Such non-technical staff will likely be sourced locally based on ACWA Power's typical processes and observed track record of other projects.

Whilst the size of the required workforce is significantly smaller, the type of work and the increased timescales involved offer an opportunity for greater dissemination of skills. A targeted system of local recruitment and investment in the human capital of the local workforce will enhance this process and consequently increase the benefit to the local economy.

Impacts relating to operational phase such as labour issues, security are discussed under Community Health, Safety & Security and Labour & Working Conditions chapters.

Table 14-10 Socio-Economics Impact Significance, Mitigation & Management Measures and Residual Impacts-Operation

Potential Impact	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
Sustainable supply of energy	**Moderate Positive**	JSC National Electric Grid of Uzbekistan	High	**Moderate Positive**	• Ensure the appropriate operation and maintenance of the Wind Farm to enable a secure supply of renewable energy	**Moderate Positive**
Employment Opportunities	**Minor Positive**	Employment Market	Medium	**Negligible Positive**	• The Projects recruitment policy will ensure a preference for employing workers from the local population especially women where appropriately skilled workers are available locally (or if unskilled positions are available). • The HR Policy will be prepared to ensure consistency with the ACWA Power's Environmental & Social Management System Implementation Manual which will ensure compliance with local labour laws and international ILO and UN conventions. • Workers will be encouraged to develop their careers and may be provided with opportunities to attend training courses and other career development processes. • Training plans to be developed and implemented to facilitate career development and advancement within the local workforce.	**Negligible Positive**

14.4.3 Cumulative Impacts

Given that the Bash 500 MW and Bash 52 MW Projects would be operational at the time of the Project's construction, cumulative construction impacts are not envisaged.

At a strategic level the operation of the three Wind Farms will result in a positive cumulative impact by supporting the county's low carbon transition and reducing Uzbekistan's dependency on fossil fuel generated power and will reduce atmospheric pollution in line with the Uzbekistan 2030 Energy Strategy. It will also support the continued growth of the national economy through the provision of sufficient power supply.

14.4.4 Decommissioning Impacts

Potential impacts relating to decommissioning will be similar to those encountered during the construction phase. As such, the mitigation & management measures outlined for the construction phase, will be applicable to the decommissioning phase as well.

14.5 Monitoring

The final monitoring methodology with specific monitoring details (i.e. locations, frequencies, durations, parameters etc.) will be developed in the specific 'Environmental and Social Monitoring Plan'.

Table 14-1 Socio-Economic Monitoring Requirements (Construction and Operations)

Monitoring	Parameter	Frequency	Responsiblety
Employment	Number of persons employed from the villages near the Project site	On-going	Project CLO
Third Party Grievances	Issues concerning socio-economic factors or land use/ownership	Ref. to Grievance Mechanisms section in Stakeholder Engagement Plan (SEP)	Project CLO
Water Supply	Source of water supplied and proof that it has been sourced from government licensed sources. Licenses for any boreholes operated on the Project site including the requirements for groundwater exploitation	Ongoing	EPC Contractor E&S Manager
Supply chain	Risks associated with the supply chain	As per the Supply Chain Management Plan	EPC Contractor E&S Manager O&M Contractor E&S Manager

15 COMMUNITY HEALTH, SAFETY & SECURITY

15.1 Applicable Requirements & Standards

15.1.1 National Regulations

CONSTITUTION OF THE REPUBLIC OF UZBEKISTAN (1992, AS AMENDED IN 2023)

The constitution of the Republic of Uzbekistan lays out an array of constitutional rights, entitlements and duties pertaining to public health and safety, and access to judicial remedies for criminal offences. Key articles in this connection include the following:

- Article 25 states "The right to life is an inalienable right of every human being and shall be protected by law".
- Article 26 states "Human honour and dignity are inviolable. Nothing may be a basis for their derogation. No one shall be subjected to torture, violence or other cruel, inhumane, or degrading treatment or punishment.
- Article 27 states "Arrest, commitment, and confinement are allowed only by a court decision. Without a court decision, a person may not be detained for more than forty-eight hours".
- Article 40 states "Everyone shall have the right to a favourable environment, reliable information about its condition.
- Article 48 states "Everyone shall have the right to health and qualified medical care".
- Article 55 states "Everyone shall be entitled to legally defend his/her rights and freedoms and shall have the right to appeal any unlawful decisions, acts and omissions of State bodies and other organizations, their officials".

RESOLUTION OF CABINET OF MINISTERS OF REPUBLIC OF UZBEKISTAN NO.95 ON THE APPROVAL OF GENERAL TECHNICAL REGULATIONS OF ENVIRONMENTAL SAFETY (2020)

Provides for the establishment of health protection zones and isolation measures for energized national grid components, including electrical sub-stations and powerlines. These exclusion zones and safeguards are intended to prevent negative impacts on human health and ecological receptors, including exposure to hazardous levels of electromagnetic radiation, electrocution, and collision-related avian mortality.

DECREE OF THE CABINET OF MINISTERS OF THE REPUBLIC OF UZBEKISTAN NO.1050 ON APPROVAL OF RULES FOR PROTECTION OF POWER GRID FACILITIES (2018)

This decree establishes the procedure for mandating Grid Security Zones (GSZ) for power grid facilities, as well as special conditions for using land located within these exclusion zones, to

ensure sustainable operation of the said facilities, with minimum risk to public health and safety, as well as vulnerable wildlife.

Grid Security Zones for power grid facilities shall be established on both sides of the power transmission line from the outermost wires and along the perimeter of substations at the following distances for voltages:

- 110kV – 20 meters from each outer-most conductor
- 220kV – 25 meters from each outer-most conductor
- 500kV – 30 meters from each outer-most conductor

The Health Protection Zone for the WTGs has been established by the Agency for Sanitary and Epidemiology as 250 meters and for the OHTL as 30 meters.

SAN RULES & NORMS NO. 0236-07 – SANITARY NORMS AND RULES TO ENSURE SAFETY FOR PEOPLE LIVING NEAR HIGH VOLTAGE POWER TRANSMISSION LINES (2007)

This regulation prescribes the Health Protection Zone (HPZ) for overhead transmission lines planned within areas including human settlements and establishments. The extent of mandatory HPZ is commensurate with the voltage rating of overhead powerlines. The HPZ serves to safeguard the public from hazardous exposure to electromagnetic fields radiating from high-voltage powerlines.

The lateral extent of the HPZ is measures from the outermost conductors along a given overhead transmission line alignment, as follows:

- Up to 110kV/m – 10 meters from each outer-most conductor
- Up to 220kV/m – 15 meters from each outer-most conductor
- Up to 330kV/m – 20 meters from each outer-most conductor
- Up to 500kV/m – 30 meters from each outer-most conductor
- Up to 570kV/m – 40 meters from each outer-most conductor

LAW ON PROTECTION OF WOMEN FROM HARASSMENT AND ABUSE (2019)

The national law provides for the protection of women from all forms of harassment and abuse. While violence against women is recognized in the Criminal Code of Uzbekistan, provisions for the registration, investigation, and prosecution of GBV are not prescribed in the Code.

In furtherance of the Code, the Act established specific procedures for the management of GBV cases for relevant law enforcement authorities and mandates the provision of medical, psychological, legal, economic, and humanitarian support to victims of GBV. In 2020, systems for the issuance of protection orders for victims of GBV were fully instituted across the country.

RESOLUTION ON MEASURES TO IMPROVE THE SYSTEM OF SOCIAL REHABILITATION AND ADAPTATION, AND THE PREVENTION OF DOMESTIC VIOLENCE (2018)

The Resolution No. PP-3827 of the Head of the State dated 07.02.2018 "On measures to improve the system of social rehabilitation and adaptation, as well as the prevention of domestic violence" identifies priority areas for improving the system of social rehabilitation and adaptation, prevention of family and domestic violence, and approved the program of practical measures to improve the system of social rehabilitation and adaptation, as well as the prevention of domestic violence.

The Resolution provides for the following key measures:

- Priority areas include improving the social system of rehabilitation, adaptation and preventative measures against domestic violence.
- A program of practical measures to improve the system of social rehabilitation, adaptation and prevention of domestic violence.
- A Center for Rehabilitation and Adaptation for victims of violence, as well as the prevention of suicides in territorial divisions of the Women's Committee of Uzbekistan.
- Public "hot line" on number "1146", for provision of emergency psychological, psycho-therapeutic and legal support and information about organizations that may provide additional assistance.

OTHER RELEVANT LEGISLATION

The list of laws and decrees with broad provisions for the protection of public health, safety and security, and other human rights in the context of public wellbeing, includes:

- Decree No. 964 of 5 December 2017 on measures for improvement of the activity of self-government bodies aimed at ensuring employment, firstly for the youth and women
- The National Human Rights Strategy was approved by Presidential Decree on 22 June 2020. No. PD-6012
- Law on guaranteeing equal rights and opportunities for women and men (2019)
- The Law on mediation (2018)
- Law on public control (2018)
- Law on administrative procedures (2018)

HUMAN RIGHTS

As a member of the United Nations, Uzbekistan supports and implements all the main international instruments of the United Nations relating to the protection of human rights and freedoms, including 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.

Uzbekistan's State Policy on human rights is aimed at preventing violations or any restriction on human rights and freedoms and at establishing the necessary organizational, legal, social, economic, spiritual and moral foundations for the protection of human rights.

GENDER-BASED VIOLENCE, HARASSMENT, AND EXPLOITATION

Over the past decade, the Government of Uzbekistan has implemented a number of legal reforms and interventions geared towards the protection of women's rights and the elimination of GBV. An overview of the key executed initiatives to this end is provided in the table below.

Table 15-1 Reforms and Initiatives for Protection of Women's Rights and Support for GBV Victims

INTERVENTION	OBJECTIVES
Establishment of the Law on Protection of Women from Harassment and Abuse (2019)	The national law provides for the protection of women from all forms of harassment and abuse. While violence against women is recognized in the Criminal Code of Uzbekistan, provisions for the registration, investigation, and prosecution of GBV are not prescribed in the Code. In furtherance of the Code, the Act established specific procedures for the management of GBV cases for relevant law enforcement authorities and mandates the provision of medical, psychological, legal, economic, and humanitarian support to victims of GBV. In 2020, systems for the issuance of protection orders for victims of GBV were fully instituted across the country.
Establishment of the Resolution on Measures to Improve the System of Social Rehabilitation and Adaptation, and the Prevention of Domestic Violence (2018)	The Resolution No. PP-3827 of the Head of the State dated 07.02.2018 "On measures to improve the system of social rehabilitation and adaptation, as well as the prevention of domestic violence" identifies priority areas for improving the system of social rehabilitation and adaptation, prevention of family and domestic violence, and approved the program of practical measures to improve the system of social rehabilitation and adaptation, as well as the prevention of domestic violence. The Resolution provides for the following key measures: 1. Priority areas include improving the social system of rehabilitation, adaptation and preventative measures against domestic violence. 2. A program of practical measures to improve the system of social rehabilitation, adaptation and prevention of domestic violence. 3. A Centre for Rehabilitation and Adaptation for victims of violence, as well as the prevention of suicides in territorial divisions of the Women's Committee of Uzbekistan. 4. Public "hot line" on number "1146", for provision of emergency psychological, psycho-therapeutic and legal support and information about organizations that may provide additional assistance.

15.1.2 Lenders Requirement

15.1.2.1 ADB

Under ADB Safeguard Requirement 1: Environment, the assessment of community health and safety is required in ESIA.

Specifically, 'The borrower/client will identify and assess the risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and

decommissioning of the project, and will establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.'

This includes reasonably foreseeable incidents, accidents and natural impacts (due to the Project) and requires affected communities to be informed. Preparation is also required to be made to plan for such events.

15.1.2.2 AIIB

ESS1 – Environmental and Social Assessment and Management: Point 8.1 outlines the need to consider community health and safety in the impact assessment, further stating "*this would include, as appropriate, risks related to pandemics and other forms of transmission of communicable diseases.*"

The Social Coverage section outlines the requirement for social assessment, including, but not limited to, vulnerable groups and discrimination, gender, gender-based violence, etc.

15.1.2.3 EPFIs

IFC Performance Standard 4 establishes requirements to safeguard local communities from potential risks associated with the Project including impacts associated with introduction of communicable disease, site access and operation, material use etc. The key objectives of PS4 are:

- To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances.
- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

15.1.2.4 World Bank Good Practice Note

ADDRESSING SEXUAL EXPLOITATION AND ABUSE AND SEXUAL HARASSMENT (SEA/SH) IN INVESTMENT PROJECT FINANCING INVOLVING MAJOR CIVIL WORKS

The World Bank GPN is structured around three key steps that cover project preparation and implementation. These steps include:

- Identifying and assessing the risks of SEA/SH, including social and capacity assessments.
  - Undertaking social risk assessment of community-level risks.
  - Assess capacity and availability, safe and ethical services of survivors.
  - Review ability of the client to respond to SEA/SH risks.

- Rate project for overall risk using several Bank tools including the SEA/SH Risk Assessment Tool.
- Establish procedures to review and update risk assessment during the project implementation.

- Establishment of mitigation, reporting and monitoring measures.
  - Based on risks identified, identify the corresponding mitigation measures and implement actions suggested to mitigate project related risks of GBV in the project area.
  - Monitor effectiveness of the mitigation measures and adapt as appropriate.
- Project response actions for GBV cases.
  - Provide essential services for survivors.
  - Report case through the GM as appropriate keeping survivor information confidential and anonymous.
  - Document and close cases brought through the GM.

15.1.2.5 Equator Principles Guidance

IMPLEMENTATION OF THE EQUATOR PRINCIPLES DURING THE COVID-19 PANDEMIC

The guidance recommends that the borrower should:

- Review potential risks on local communities, including direct and indirect impacts of COVID-19 and other impacts relating to worker interfaces and how any Project changes during this period might affect the community.
- Assess its mitigation approach to Project related impacts.
- Identify opportunities to support communities mitigate wider COVID-19 risks/impacts either through new initiatives or building on existing programmes i.e. provision of food for vulnerable people in isolation, test kits medical facilities and equipment etc.

15.1.3 Observation and Baseline Conditions

The nearest inhabited community to the Project area is Kuklam situated approximately 1.8 km north-east the nearest WTG, followed by Kokcha community located approximately 20 km east the Project site. The Project is located approximately 6.5 km south of Lake Ayakagitma and is bordered by farmlands expanding to the south the Project site.

There are several herders' structures and stables on the Project site that are used by local herders, who use the land for grazing of animals. Several industrial facilities are located in the Project area (outside the Project boundary). The receptors are presented in section 0 of this ESIA.

Dirt access roads and bridges, water channels, existing power lines, under construction OHTL and a gas pipeline corridor also run across the Project site. These are described in section 2.3.2 of this ESIA.

As a result, Project activities may pose health, safety and security risks to these receptors.

15.1.4 Health Protection Zone

A consultation letter was sent to the Agency for Sanitary and Epidemiological Welfare under the Ministry of Health on 4th March 2024 regarding the requirements for establishment of a Health Protection Zone for the Wind Farm Project.

The following response was received on 9th March 2024 from the Agency:

- We have been asked to define the sanitary-protection zone in accordance with the 'Living Near High-Voltage Power Lines Sanitary Rules and Norms to Ensure Public Safety No. 0236-07.'
- According to the SanQvaN norms for electricity transmission networks with a capacity greater than 750 kV, the sanitary-protection zone for transmission networks should not be less than 250 meters to account for network capacity.
- For an electrical energy storage system with a capacity of 500 kV, 30 m sanitary protection zone should be provided.
- According to this SanQvaN, in residential buildings and structures the electric field voltage should be 0.5 kV/m and in residential areas 1.0 kV/m also magnetic field strength in residential areas is not intended to be higher than 80 A/m (100 μTl).

On 27th May 2024, a letter was sent to the Agency for Sanitary and Epidemiological Welfare was contacted to verify the health protection zone (HPZ) for the WTGs and the stated HPZ for the OHTL as this was different from what is stated in the SanPiN № 0236- 07 and SanPiN № 0350-17. A response letter was received on 10th June stating the following:

- In consideration of the potential impact of wind turbines on the surrounding environment, it has been determined that a 250-meter sanitary protection zone will be established.
- Furthermore, the level of noise generated by wind turbines in residential areas must not exceed the standards specified in sanitary rules, norms and hygiene regulations No. 0008-20.
- A 30 m protection zone is intended to safeguard overhead power lines with a voltage of 500 kV.
- In residential buildings and structures, the electric field voltage is 0.5 kV/m, while in residential areas, it is 1.0 kV/m. Furthermore, the magnetic field voltage is not permitted to exceed 80 A/m (100 μTl) in residential areas.

Based on the response provided by the Sanitary Epidemiological Welfare, the Project will be required to establish these HPZs which will be registered with the Agency for Sanitary and

Epidemiological Welfare under the Ministry of Health before the commencement of operations.

Consultations letters are provided in **Appendix J**.

15.2 Potential Impacts

15.2.1 Construction Phase

15.2.1.1 Influx, Community Health & Crime

The construction phase of the Project will require a dedicated workforce of permanent staff, contractors, as well as the use of specialist and sub-contractors. This will therefore lead to an increase in the population on-site during construction.

The Project's construction phase will involve a workforce of permanent staff, contractors, and specialist sub-contractors, increasing the on-site and local population. With an estimated workforce of 700-1000, staff accommodations will be required. Additionally, sub-contractors may also need off-site housing in nearby communities. Around 40% of these workers, including international experts, will come from outside the Project area, possibly leading to cultural or religious conflicts with local populations due to differing practices and ideals.

Interaction among workers from different regions and the proximity of on-site and accommodation facilities may lead to the spread of communicable diseases, including STIs, skin infections, affecting both workers and nearby communities. Additionally, construction activities could create breeding grounds for bacteria and parasites, and potential site contamination, such as sewage or hazardous material spills, might lead to waterborne diseases through surface and groundwater contamination. However, due to the location of workers accommodation facilities within the Project site, it is expected that workers and community interaction will be minimal.

The arrival of construction workers, including those from different regions of Uzbekistan and international locations, presents health risks to both workers and local communities. Consequently, the EPC Contractor must implement a sexual health and HIV awareness campaign, producing information leaflets for distribution in the local communities in partnership with local health authorities, and providing awareness training for Project workers.

15.2.1.2 Public/Community Safety

All construction Projects have potential risks relating to public safety that could arise, particularly in regard to the use of high-powered equipment, heavy construction machinery, excavations, transportation amongst others, including fire and pollution releases.

Public risks during construction have the potential to result in isolated incidents, which could be of a devastating magnitude to a person or group of people in the wrong place at the wrong time. In addition, the absence of proper management, receptors along the access road and motorists are subject to impacts from traffic accidents.

Risks associated with hazardous material or chemical storage will be suitably managed in the construction phase through the implementation of a robust CESMP and an Emergency Preparedness and Response Plan. The Emergency Preparedness and Response Plan will cover works on the project site and along the access road.

In addition, there will be an increased safety risk associated with the increased traffic due to transportation of Project materials and equipment.

15.2.1.3 Public/ Community Security

The construction phase of the project will require site-based security at the gates and on patrol around the site and access road during construction in order to prevent the public from trespassing to the construction areas. This is so as to minimize the potential for construction site incidents or damage of construction machinery. The site-based security will not be armed.

There is also a risk that the security personnel who are mandated with providing protection to the workers can abuse their position of power and status and become perpetrators of GBVH either to the members of the workforce or the community thus violating their human rights.

Following suitable security risk assessment by the EPC Contractor, the security arrangements will require to be guided by UN Code of Conducts for law enforcement officials, the IFC's Good Practice Handbook on the Use of Security Forces: Assessing and Managing Risks and Impacts IFC's and the Voluntary Principles on Security and Human Rights In addition to this, security personnel will receive internal training in regard to receiving grievances, reporting such grievances and conduct for dialogue with any members of the local community. The workers on the project site will additionally receive cultural awareness training with regard to local customs as such guidance can provide a ready resource on the do's and don'ts of culture centred behaviour.

Economic and Physical Displacement of Herders

The Project will lead to economic and physical displacement of herders with accommodation facilities within the Project site and temporarily disrupt of grazing activities. Due to the influx of construction workers and health & safety risks associated with the development of the Project, some of the herders living within the site will need to be resettled.

In addition, during construction the project will also cause temporary restriction on use of land and access by other herders who only graze livestock at the project site thereby impacting herders right to access resources that support their livelihoods.

The Project will be required to implement the project-specific RAP and comply with IFC PS 5, and ADB Involuntary Resettlement Safeguards in order to ensure that the impacts of the Project to PAPs are minimised and managed.

15.2.1.4 Risks to Vulnerable Groups

Vulnerable groups can be impacted by the Project impacts more disproportionately than other groups. In addition, they can experience barriers to participate in project consultations processes and access to information. As such ACWA Power/Project Company and the EPC Company will ensure that these groups are engaged in consultations and provided with relevant information in a format and medium that is easily understood i.e., through one-on-one groups, door to door for the disabled or elderly etc.

Impact on Ethnic Minorities

ESIA consultation process, socio-economic surveys and background research shows that the communities living near the Project site and those using the Project site for grazing belong to the Kazakh ethnic minority. The proposed Project is expected to have socio-economic impacts on these communities who are particularly vulnerable especially because of their natural resource-based livelihoods.

The Project will ensure that the right to information and participation for these communities is maintained through the implementation of the SEP and awareness creation of the Grievance Mechanism. In addition, all Project information will be made easily accessible and in appropriate languages (such as Uzbek & Russian) and the EPC Contractor will hire translators where necessary.

Gender Based Violence & Harassment, Sexual Exploitation & Abuse and Sexual Harassment

The proposed project will lead to an influx of workers during the construction phase majority of whom will be young men who will be away from their families. This may increase the demand for sex workers and put women and children from other regions in Uzbekistan at the risk of being trafficked to the Project area for the purposes of sex work.

Influx of workers could pose a risk to young adolescent girls who may be at risk of being forced into early marriages to project workers who are perceived to have better wages. It could also increase the risk of GBV/SEA/SH against the children in the community who have no ability to give consent, are not empowered to refuse any sexual advances made towards them or anticipate the implications of any actions against them. Exposure to GBVH/SEA/SH has the

potential to have profound, long-term impacts on the health and mental well-being of the victims.

In addition, the presence of young men in the project area could also lead to shift in the community's power dynamics and within households. This may be manifested through male jealousy if the workers are believed to be interacting with the women in the community triggering violence towards the women

In January 2020, the Uzbek authorities approved measures to establish protection orders for victims of gender-based violence, enabling the respective state agencies to provide police and other support to those in need (Mantovanelli, 2021). Additionally, a women's rehabilitation and adaptation centre at "Madad" NGO is available for incidents related to GBVH and/or SEA/SH. This centre provides support to women and their children who have experienced GBVH and/or SEA/SH, and is located in Nukus city, Republic of Karakalpakstan. The centre is registered under the National Agency of Social Protection, operating under the President of the Republic of Uzbekistan. The centre can also support GBVH victims through its hotline at 1169. Additionally, the Ministry of Support of Mahalla and Elderly People offer hotline assistance via 1146. Victims of GBVH can also report incidents to the police inspector within their community.

The EPC Contractor will be required to conduct a GBVH/SEA/SH risk assessment and conduct training among all Project workers regarding these risks and on the rights of women. In addition, a GBVH Policy will be put in place detailing the list of unacceptable behaviour among workers, provisions for reporting, sanctions for perpetrators and available resources and support systems and contacts for the victims.

15.2.2 Operational Phase

The project will carry various risks that could result in impacts to public safety and security. Such reasonably foreseeable situations are discussed below.

15.2.2.1 Public/Community Safety

WTG Blade and Ice Throw

In the event that a wind turbine fails this can result in a blade becoming detached and falling resulting in safety risk to local communities (including herders). During cold weather conditions such as snow, ice can accumulate on the blades and pieces of this ice can be thrown to surrounding areas while the blade is rotating or dropped on the ground if the turbine is idle.

The Project has set a minimum distance of 250m in accordance with Agency for Sanitary and Epidemiological Welfare requirement.

According to the IFC EHS Guideline on Wind Energy a minimum setback requirement of 1.5 X turbine height (tower + rotor radius) is required for blade throw. This indicates a minimum setback of 341 m is required for blade throw. A minimum setback requirement of 1.5 (rotor diameter + hub height) is required for ice throw as established in International Energy Agency on Wind Energy Projects in Cold Climates and referenced in the IFC EHS Guideline on Wind Energy. This indicates a minimum setback of 486.25 m is required for ice throw. Considering the later is more stringent, the receptors located within the 500 m buffer will be relocated to ensure health and safety.

With Kuklam, the nearest local community, located 1.8 km away, and herders' structures within the 500 m buffer set for relocation, the likelihood and risk of blade and ice throw are expected to be negligible. Additionally, the wind turbines will be continuously monitored and regularly maintained to ensure safety.

OHTL Risks

With regards to the operation of the OHTL, there is often concern about the potential health effects associated with exposure to Electromagnetic fields (EMF). As the OHTL is of 500kV rating, a 30m minimum buffer zone will apply on each side from the conductors in line with SanPiN No 0236-07 Health Protection Zone requirements for single circuit OHTLs with 500kV rating.

The figure below shows the mean magnetic field around a typical 500kV transmission line up to a distance of 91m (NIEHS, 2002). The application of a 30m buffer zone is sufficient as EMF outside this area is below the requirements set in the SanPin 0236-07, which state that EMF in population living areas shall not exceed 1.0kV/m and magnetic fields 80 A/m (equivalent to 100μT).

It is also worth noting that electric field may be shielded and further weakened by buildings, trees and other objects that conduct electricity, thereby increasing the attenuation of electric fields with distance from the OHTL.

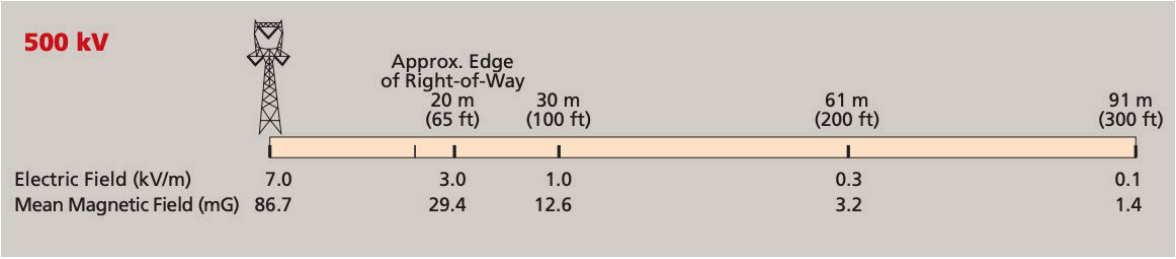


Figure 15-1 Typical EMF levels for Power Transmission Lines

Source: *National Institute of Environmental Health Sciences, 2002*

In the context of the Project's OHTL, the closest residential receptor is a herder's house located more than 1 km east of the OHTL, which is well outside the HPZ. This represents a negligible impact to these receptors.

It is expected that some grazing activities may continue directly under the OHTL where the EMF may exceed the national and lenders requirements. However, these activities under the OHTL are expected to be spaced out, thus limiting the period of exposure to workers and animals.

In the event that OHTL tower collapses due to faulty foundation, there is a potential for collapse to result in shock & burns to unauthorized users or visitors of the OHTL corridor/ROW. This can lead to serious injuries of affected persons.

Additional hazards to the communities found near the OHTLs will include electrocution from direct contact with high-voltage electricity or contact with tolls, vehicles, ladders or other devices with high voltage electricity. However, this is considered negligible as the OHTL will be built to the applicable Uzbekistan standards and regularly maintained.

Risks to public safety will be appropriately addressed and prepared for in the operational phase 'Emergency Preparedness and Response Plan' and via appropriate training of staff.

SECURITY & SAFETY CONCERNS

Children and young people are curious in nature and may potentially want to explore the WTGs on site and the substation. They might attempt to climb on the WTG towers or over the substation fence which present a real risk of injury and in the worst-case result to fatalities. By the time this Project is operational, it will not be the first Wind Farm in their communities, and therefore, families may be aware of the potential risks. Nevertheless, to help the local communities understand the risks and dangers involved, the Project Company and O&M Company will conduct on-going awareness campaigns targeting children and their parents.

Some members of the public may also potentially want to vandalise Project equipment and facilities which would also pose safety risks to them and others. Information on the consequences of vandalism will be provided to local communities by the CLO in order to ensure co-existence between the Project and the communities.

VOC RELEASES AND OTHERS

The extent of some impacts such as fire, explosions, etc. may range outside of the projects boundaries and require the involvement of outside agencies to help manage and abate such impacts (e.g. police, fire department etc).

Public risks during operation have the potential to result in incidents, which could have a significant impact upon neighbouring communities and populations. Risks to public safety will be appropriately addressed and prepared for in the operational phase 'Emergency Preparedness and Response Plan' and via appropriate training of staff.

TRAFFIC

Traffic along the access road could potentially impact receptors along the access road in case of accidents. However, traffic impacts are expected to be negligible considering that during operation limited number of trips will be required for maintenance, as well as transporting operation employees and waste.

15.2.2.2 Public/Community Security

The project constitutes a facility of high importance due to the generation of electricity. The project will also include site-based security at the project main entrance and on patrol around the site. The site-based security will not be armed.

As is consistent with the construction phase, the O&M Contractor will undertake a security risk assessment to determine the appropriate level of security required at the facility. Security arrangements should be guided by UN Code of conducts for law enforcement officials and the Voluntary Principles on Security and Human Rights. In addition to this, security personnel will receive internal training in regard to grievances, reporting such grievances and dialogue with any members of the local community.

Gender Based Violence & Harassment, Sexual Exploitation & Abuse and Sexual Harassment

Even though there will be reduced workforce during the operational phase of the Project, the risk of GBVH/SEA/SH will remain especially towards women, girls and boys. There will still be a limited level of interaction between the operational phase team and the host communities. As a result, measures will be put in place to ensure that exploitative sexual relationships and unwanted aggressive advances and harassment are prevented and addressed.

15.2.3 Cumulative Impacts

Given that the Bash 500 MW and Bash 52 MW Projects would be operational at the time of the Project's construction, it is not envisaged that cumulative construction impacts with other projects will be significant.

Considering the distance between the Project and the other two WFs, during Operation, the cumulative impact from blade throw and ice throw is not anticipated. Impacts related to operations will mainly be new workers, public trespassing, as well as incidents, however these will be Project specific impacts.

15.2.4 Decommissioning Phase

The community health, safety and security impacts associated with the decommissioning of the Project are anticipated to be similar to those encountered during the construction phase. As such, no new impacts are predicted.

15.3 Mitigation and Management Measures

15.3.1 Construction Phase

Table 15-2 Community Health, Safety and Security Mitigation & Management Measures

Potential Impact	Mitigation and Management Measures
Worker Influx	• Where suitably skilled workers are available, the EPC Contractor will aim to engage 50% of the workforce from Uzbekistan and local communities. • Worker accommodation areas will be managed in accordance with the EBRD and IFC Workers' Accommodation: Processes and Standards. The provision of good quality living accommodation, services and amenities will likely reduce the need for mixing with local communities. Gender aspects will be considered in the worker accommodation. • Project induction training will include a section on code of conduct when engaging with local community members. This will include an overview of culturally and religious appropriate measures and etiquette to bear in mind. • Sexual harassment or violence in and out of the Project site will not be tolerated and the EPC Contractor will work with local community leaders, gender-based organisations and government officials to ensure that any complaints are addressed in accordance with the law. • The EPC Contractor will develop a Worker Influx Management Plan to provide a clear set of actions that will be undertaken for the management and mitigation, monitoring and evaluation of impacts related to worker influx in the Project area. • Additional management and mitigation measures will be in accordance with the World Bank guidance note on Managing the Risks of Adverse Impacts on Communities from Temporary Project Induced Labour Influx (2016).
Public/Community Health	• The Health and Safety teams on site will provide advice during training/inductions on exposure to disease including preventative measures e.g., TB, STDs and HIV/AIDS. • During construction, staff will have access to medical professionals and suitable medical facilities, which will aim to prevent the spread of diseases internally and externally. Site personnel will only be cleared for work with a medical fitness certificate from an authorised medical centre. • The EPC Contractor will prepare a medical evacuation emergency plan with contact details for local ambulance services. • Any reportable disease will be diagnosed by the authorised occupation health centre doctor. Diagnosis includes identifying any new symptoms, or any significant worsening of existing symptoms. • Any external and internal spreading diseases will be diagnosed and precautions will be taken as per the instructions from the national/ local medical authority. • The potential for exposure to water-borne, water-based, vector-borne diseases and communicable diseases as a result from project activities will be avoided or minimised. • Potholes will be filled immediately to prevent the breeding of bacteria and parasites that may pose a risk to the health of the communities near the site. • The EPC Contractor, in coordination with the local authorities, will conduct awareness campaigns regarding the transmission of STIs in the communities near the Project site. • Workers will be provided with free condoms and advice will be given on how to access testing in public hospitals.

Potential Impact	Mitigation and Management Measures
	• Information regarding the transmission of HIV/AIDS will be prepared and disclosed in a culturally sensitive manner and targeted towards young adults of consenting age.
Public/ Community Safety	• The EPC Contractor will prepare and implement a Community Health & Safety Management Plan which will include measures to avoid or limit risks to, and impacts on health, safety and security of the community during the construction phase of the Project. • The employees (including the drivers) during the construction phase will undergo a Code of Conduct training to ensure smooth coordination with the neighbouring community. • Risks to public safety will be appropriately addressed and prepared for in the construction phase 'Emergency Preparedness and Response Plan' and training. • The plan will include the appropriate procedure to respond to any such incidents, as well as site specific contact details and details of external agencies who may be required. • Project induction training will include a section on code of conduct when engaging with local community members. This will include an overview of culturally appropriate measures and etiquette to bear in mind. • Vulnerable groups particularly children will be specifically trained/informed about the dangers in active construction areas or climbing of poles so that they understand the risks of trespassing to the project site, OHTL construction areas and/or fenced off areas. Such training or engagement can be undertaken at local schools. • All high-risk areas including fuel storage areas will be secured with internal fencing and will be patrolled by security throughout the day. • Smoking will be prohibited at chemical and fuel storage areas. • Appropriate mechanisms for emergency control (e.g. well-equipped firefighting equipment) will be placed at suitable positions around the site.
Public/Community Security	• The Project will employ its own security staff who will provide 24/7 security control across the Project site and dedicated security staff at gatehouses. • The EPC will prepare a Security Plan consistent with its Security Risk Assessment. • Security arrangements will be guided by UN Code of conducts for law enforcement officials and UN basic principles on the use of Force and Firearms by law enforcement officials (where firearms are in use). Security personnel will follow a strict code of conduct and will be trained in weapons handling, human rights and receipt of grievances. • Any use of firearms will be in accordance with the Uzbekistan legal requirements. • The Project will be fenced during enabling works stage. • All vehicles entering the site will require pre-approved clearance and will need to be registered. Project security will record all instances of incoming vehicles. • CCTV will be installed at key locations around the site and at gatehouses. • Appropriate lighting will be provided at gatehouses for security personnel to prevent unauthorized access. • Project personnel will only be provided access to the construction site with valid ID cards and permits to work in line with HSE requirements. • People trying to gain unauthorized access to the site without appropriate permits and PPE will not be permitted, or will be removed from site if identified and an investigation carried out on how they were able to access the site and corrective action taken.

Potential Impact	Mitigation and Management Measures
	• The security personnel will be regularly trained on GBVH/SEA/SH code of conduct including how to handle grievances related to GBVH/SEA/SH from the community.
Economic & physical displacement of PAPs	• Implementation of the Project specific RAP. • Compensation will be provided to all herders that will be economically and/or physically displaced as a result of the project's development • The Project will also ensure that the following rights of the herders are adhered to: - Access to information; - Ability of impacted PAPs to participate in decision making consistent with the principle of equality and non-discrimination; - Freedom of expression and opinion without fear of retribution; - Right to remedy through an operational grievance mechanism that is also accessible to vulnerable groups; and - Right to an adequate standard of living and continuous improvement in living conditions by ensuring a full and fair compensation in accordance with Uzbek and lender's requirements
Impacts on vulnerable groups	• Prioritisation of vulnerable groups in job opportunities and any community investment projects. • Consultations and project information will be provided in areas that are easily accessible to vulnerable groups. • Timing of consultations meetings will consider the time these groups are available i.e., meetings should not be held during busy planting or lambing/breeding seasons. • The Project Company and EPC Contractor will provide alternative means of communication and access to information for those without access to digital platforms. • Information will be provided and disclosed in local languages i.e., Uzbek, Russian etc. • EPC Contractor to provide adequate training to the non-local workers in the Project, especially in terms of interaction with the local ethnic minority; • Allow locals including residents to report concerns through the grievance mechanism; • EPC Contractor will adopt a zero-tolerance policy towards unacceptable workforce behaviour towards females or any community member. • The Project Company and EPC Contractor will disclose their zero-tolerance policy on retaliation and GBVH against affected people and will ensure these are implemented carefully with a specific focus on vulnerable groups. • Implementation of the Project specific RAP measures relating to vulnerable groups such as provision of additional support and prioritisation during recruitment.
GBV, SEA & SH	• ACWA Power/Project Company will develop a GBVH reporting procedure and train its Project staff, EPC Contractor and the sub-contractors. • The Project Company will communicate its GBVH policy to stakeholders and impacted communities. • The Project Company and EPC Contractor will assign and train focal point staff to deal with GBVH related incidents at the Wind Farm and along the OHTL. • The Project Company and EPC Contractor with support from the CLEO will identify and include a female member of the community to support in addressing GBVH issues.

Potential Impact	Mitigation and Management Measures
	• Training and awareness campaigns will be undertaken to raise awareness of both project personnel and community members including women on GBVH issues. Information will also be provided on how to report and deal with any GBV/SEA/SH related cases and the services that will be made available to offer support to any of the victims • The Project Company and the EPC Contractor will conduct a GBV/SEA/SH risk assessment in consultation with relevant stakeholders including women leaders and those working with young adolescent girls and boys. This will also include the identification of potential interventions and risk mitigation measures. • The EPC Contractor will develop and implement a Project specific GBVH Policy detailing the list of unacceptable behaviour among workers, provisions for reporting, sanctions for perpetrators and available resources & support systems for the victims in accordance with lenders and Uzbek requirements including ACWA Power's Environmental & Social Management System Implementation Manual. • Awareness training will be mandatory for all Project workers regarding the GBV/SE/SH risks and the workers responsibilities and the legal consequences of being a perpetrator. • Approach towards GBV/SEA/SH prevention, mitigation and response will be survivor centered and ensure confidentiality, dignity and respect to them. • The Project staff will be trained on how to preserve the safety of the women, girls, boys when interviewing them and collecting information about their experiences on GBV/SEA/SH. • The project will provide essential services for survivors such as access to counselling services, support groups, legal support etc. at no cost to them. • All determined cases of GBV/SEA/SH will be referred to relevant legal entities in the Project area for further investigation and prosecution. • The Project grievance mechanism will be made available to project workers and community members and will ensure that survivors' information is confidential and kept anonymous. • All cases relating to GBV/SEA/SH will be documented and closed. • The EPC Contractor will prepare and implement a GBV/SEA & SH Prevention and Response Action Plan which will put necessary protocols and mechanisms to address the risks of GBV/SEA/SH and how to address any allegations that may arise in accordance with the World Bank Good Practice Note on Addressing SEA/SH in Investment Project Financing involving Major Civil Works.
Grievance Mechanism	• The project will implement an appropriate system to allow external parties to raise grievances in regard to the Project. • The Grievance Mechanism will be clearly defined, transparent and accessible to identified stakeholders. • EPC Contractor will appoint a community liaison officer preferably from the local community who will maintain communication with the local leaders and community members. • The grievance mechanism will be confidential and provide referral and support system for any workers reporting cases of GBVH.
Human Rights	In addition to adhering to the national human rights requirements, ACWA Power and the EPC Contractor will each develop a human rights policy. The policy will be in line with the UN Guiding Principles on Business and Human Rights. The statement policy will: • Be approved at the most senior level of the company; • Informed by relevant internal and external expertise;

Potential Impact	Mitigation and Management Measures
	• Stipulate the EPC's human rights expectations of personnel, local communities, sub-contractors and other suppliers directly linked to the construction of the project; • Be publicly available and communicated internally and to the relevant stakeholders; • Be reflected in the other policies and procedures to embed it throughout their construction phase activities.

15.3.2 Operation Phase

Table 15-3 Community Health, Safety and Security Mitigation & Management Measures

Potential Impact	Mitigation and Management Measures
Public/Community Safety	**Wind Farm – Blade and Ice Throw** • In order to minimize the likelihood of blade failure, wind turbines that have been subject to independent design verification/certification (e.g., IEC 61400-1), and surveillance of manufacturing quality will be selected in accordance with IFC EHS Guideline on Wind Energy. • In accordance with IFC EHS Guideline on Wind Energy, the final selected WTG specification will ensure a minimum setback distance of ~500m between the turbines and local population. • Periodic blade inspections will be carried out and any defects that could affect blade integrity will be repaired immediately. • Wind turbines will be equipped with vibration sensors that can react to any imbalance in the rotor blades and shut down the turbine if necessary • In accordance with IFC EHS Guideline on Wind Energy, wind turbines will be equipped with ice detectors that shut down the turbine to an idling state when ice is present. • Where wind turbines are required to operate in icing conditions, warning signs will be posted at least one rotor diameter from each wind turbine in all directions. • Training to be provided on procedures for shutting down wind turbines before O&M personnel access the site during icing conditions • Wind turbines will be equipped with ice detectors to control blade-heating systems, which are designed to release ice from the blade surface, thereby maintaining the efficiency of the turbine; the blade surface finish may also affect the efficiency of heating systems. **OHTL** • The OHTL towers will be installed in accordance with international best practice. • Automatic fault/damage detection system will be installed to enable early detection of any faults with OHTL installation. • Safety signals and warning signs will be posted along the OHTL (these will indicate the HZP). • The tower will be tested for collapse to ensure design and installation is in line with National Electric Grid Uzbekistan (NEGU) & international best practice. **Project** • All risks to public safety will be appropriately addressed and prepared for in the operational phase 'Emergency Preparedness and Response Plan' and training.

Potential Impact	Mitigation and Management Measures
	• The plan will include the appropriate procedure to respond to any such incidents, as well as site specific contact details and details of external agencies who may be required. • The employees during the operational phase will undergo a Code of Conduct training to ensure smooth coordination with the neighboring community. • Appropriate mechanisms for emergency control (e.g. firefighting equipment) will be placed at suitable positions around the site. • Grievance Redressal Mechanism will be made accessible to the community to ensure that community members raise grievances to the Project leadership. • Sexual harassment or violence in and out of the Project site will not be tolerated and the O&M Company will work with local community leaders and government officials to ensure that any complaints are addressed in accordance with the law. • The Health and Safety teams on site will provide advice during training/inductions on exposure to disease including preventative measures e.g., TB, STDs and HIV/AIDS. • The Project Company and O&M Company will conduct on-going awareness campaigns targeted to children and young adults about the risks and dangers of trying to access, play or vandalise any project facilities.
Public/Community Security	• The project will employ its own security staff who will provide 24/7 security control across the Project site and dedicated security staff at gatehouses. • The security personnel will be regularly trained on GBVH code of conduct including how to handle grievances related to GBVH from the community. • All vehicles entering the site will require pre-approved clearance and will need to be registered. Project security will record all instances of incoming vehicles. • CCTV will be installed at key locations around the site and at gatehouses. • Appropriate lighting will be provided at gatehouses for security personnel to prevent unauthorised access. • Project personnel will only be provided access to the construction site with valid ID cards and permits to work in line with HSE requirements.
GBV/SEA/SH	• The Project Company and the O&M Company will conduct a GBV/SEA/SH risk assessment in consultation with relevant stakeholders including women leaders and those working with young adolescent girls and boys. This will also include the identification of potential interventions and risk mitigation measures. • ACWA Power will develop a GBVH policy and disclose it to the EPC Contractor and its employees. • The O&M Company will develop and implement a Project specific GBVH Policy detailing the list of unacceptable behaviour among workers, provisions for reporting, sanctions for perpetrators and available resources & support systems for the victims in accordance with lenders and Uzbek requirements including ACWA Power's Environmental & Social Management System Implementation Manual. • Awareness training will be mandatory for all Project workers regarding the GBV/SE/SH risks and the workers responsibilities and the legal consequences of being a perpetrator.

Potential Impact	Mitigation and Management Measures
	• Training will be provided to GBVH focal point on the risks of GBV/SEA/SH and information provided on how to deal with any GBV/SEA/SH related cases. • GBVH policy will be communicated to community members and training provided to the community members particularly women on the risks of GBV/SEA/SH. Information will be provided on how to report and deal with any GBV/SEA/SH related cases and the services that will be made available to offer support to any of the victims. • Approach towards GBV/SEA/SH prevention, mitigation and response will be survivor centered and ensure confidentiality, dignity and respect to them. • The Project staff will be trained on how to preserve the safety of the women, girls, boys when interviewing them and collecting information about their experiences on GBV/SEA/SH. • The Project will provide essential services for survivors such as access to counselling services, support groups, legal support etc. at no cost to them. • All determined cases of GBV/SEA/SH will be referred to relevant legal entities in the Project area for further investigation and prosecution. • The project grievance mechanism will be made available to project workers and community members and will ensure that survivors' information is confidential and kept anonymous. • All cases relating to GBV/SEA/SH will be documented and closed. • The O&M Company will prepare and implement a GBV/SEA & SH Prevention and Response Action Plan which will put necessary protocols and mechanisms to address the risks of SEA/SH and how to address any allegations that may arise in accordance with the World Bank Good Practice Note on Addressing SEA/SH in Investment Project Financing involving Major Civil Works.
Grievance Mechanism	• The project will implement an appropriate system to allow external parties to raise grievances in regard to the Project. • The Grievance Mechanism will be clearly defined, transparent and accessible to identified stakeholders. • EPC Contractor will appoint a community liaison officer preferably from the local community who will maintain communication with the local leaders and community members. • The grievance mechanism will be confidential and provide referral and support system for any workers reporting cases of GBVH.
Human Rights Policy	In addition to adhering to the national human rights requirements, ACWA Power and the O&M Company will each develop a human rights policy. The policy will be in line with the UN Guiding Principles on Business and Human Rights and it will: Be approved at the most senior level of the company; • Informed by relevant internal and external expertise; • Stipulate the O&M's human rights expectations of personnel, local communities and other suppliers directly linked to the operational phase of the project; • Be publicly available and communicated internally and to the relevant stakeholders; • Be reflected in the other policies and procedures to embed it throughout the operational phase activities.

15.4 Monitoring

Monitoring of Community Health and Safety will be undertaken as required via the management measures outlined above. For instance, monitoring of the security plan will form part of the wider Environmental and Social Management System internal audits to be undertaken monthly during construction and quarterly during operations.

Table 15-4 Community Health, Safety and Security Monitoring Measures - Construction & Operation

Indicator	Parameter	Frequency	Responsibility
Record of any conflict between the workers and community members including any cases relating to sexual harassment	Complaints filed by community members or Project workers	Daily during construction and quarterly during operation	Project CLO
Number of SEA/SH grievances handled through a survivor centred approach	Number of grievances handled and how many cases are referred to legal entities for redress.	Ongoing	Project CLO
Record of average period taken to handle SEA/SH grievances in accordance with lenders requirements and referral to legal entities	Complaints received and the period of time it takes to close them.	Ongoing	Project CLO
Discharging of firearms by security personnel on site	Security personnel/local police	Ongoing in the event the security personnel are armed	Project CLO
Record of human rights violation/complaints from the local communities	Complaints filed by community members in relation to the Project	Ongoing	Project CLO
Record of incidents/accidents and near misses (involving external parties)	Records from daily monitoring procedures on site	Ongoing	Project CLO
Record of any communicable diseases on site that could pose a risk to the local communities	Project site clinic or HSE personnel	Ongoing	Project CLO
Number of grievances closed out	Grievance Management System	Quarterly / bi-yearly	Project CLO
Average time for grievance processing and close out and trends	Grievance Management System	Quarterly / bi-yearly	Project CLO
Number of grievances open, method to submit the grievance and trends	Grievance Management System	Quarterly / bi-yearly	Project CLO
Topics raised in grievances and trends	Grievance Management System	Quarterly / bi-yearly	Project CLO

16 LABOUR & WORKING CONDITIONS

The Project workforce will be one of the Project's most valuable asset and good human resources management and a sound worker-management relationship based on respect for workers' rights must be guaranteed. The Project has a responsibility to respect human rights, including by identifying, avoiding, mitigating and remediating the human rights impacts with which they are involved.

This chapter will address the following key issues:

- Occupational health & safety;
- Human rights risks to workers; and
- Gender risks.

16.1 Applicable Requirements & Standards

16.1.1 National Regulations

CONSTITUTION OF THE REPUBLIC OF UZBEKISTAN (1992, AS AMENDED IN 2023)

Key constitutional provisions in regard to labour rights include:

- Everyone shall have the right to decent work, to free choice of profession and occupation, favourable working conditions that meet the requirements of safety and hygiene, to fair remuneration for work without any discrimination and not below the established minimum wage, as well as the right to unemployment protection in the manner prescribed by law.
- The minimum wage shall be determined considering the need to ensure a decent standard of living for a person.
- It shall be prohibited to refuse to hire women, dismiss them from work and reduce their wages on the basis of pregnancy or having a child.
- Any forced labour shall be prohibited, except as punishment under the court decision, or in some other Instances specified by law.
- Any form of child labour that poses a threat to the health, safety, morality, mental and physical development of the child, including those that prevent him or her from getting an education, shall be prohibited.
- The amount of pensions, allowances and other types of social welfare established by law, may not be set lower than the officially fixed minimum consumer expenditure.
- Trade unions express and protect the social and economic rights and interests of workers.

- Membership in trade unions is voluntary.

With regards to human rights, the constitution asserts that "democracy in the Republic of Uzbekistan shall be based upon common human principles, according to which the highest values shall be the human being, his life, freedom, honour, dignity and other inalienable rights."

LABOUR CODE OF THE REPUBLIC OF UZBEKISTAN (1995, AMENDED IN 2021)

The principal law on labour rights and welfare in Uzbekistan sets out the following requirements:

The main health and safety provisions in the labour law include H&S requirements, employees' obligation to comply with H&S standards, procedures and use of PPE, additional H&S measures for disabled employees, reporting and investigating accidents etc.

The labour code also specifies collective bargaining through collective contracts and agreements as a way of regulating labour relations and harmonising social and economic interests of both the employer and the employees.

OCCUPATIONAL HEALTH AND SAFETY (OHS) LEGISLATION

The legislation comprises the Labor Code, the Law on Occupational Health and Safety, the decrees of the President of the Republic of Uzbekistan, Occupational Health and Safety standards, decisions of executive government agencies taken within their competence in the form of decrees, executive orders, regulations, directives, rules, etc.

THE LAW ON OCCUPATIONAL SAFETY IN HAZARDOUS PRODUCTION FACILITIES (2006)

The Law stipulates the legal, economic and social terms of ensuring safe exploitation of hazardous production facilities, with the aim of building enterprise capacity and preventing accidents.

In addition to the main legislation, the Republic also has national normative documents addressing the issues of occupational health and safety. These include (i) Sanitary Rules and Norms (SanR&N), (ii) State Occupational Safety Standards (GOST, SSBT), (iii) Construction Norms and Rules (CR&N (SNiPs)), (iv) standards of the content of harmful substances (maximum allowable concentrations and levels), and (v) normative methodological documents on individual issues setting forth requirements for occupational safety in hazardous facilities, when manufacturing or applying various products. In addition to state normative documents, various sectors of industry enforce departmental and interdepartmental norms, requirements and rules of occupational safety and health.

The main state bodies responsible for the implementation of OHS policy are:

- Ministry of Employment and Labor Relations of the Republic of Uzbekistan, including the State Labor Inspection under the Ministry with territorial branches distributed throughout the Republic;
- State Committee for Industrial Safety of the Republic of Uzbekistan (Goskomprombez);
- Sanitary and Epidemiological Welfare and Public Health Committee of the Republic of Uzbekistan under the Ministry of Health of the Republic of Uzbekistan.

The Ministry of Employment and Poverty Reduction has an OHS directorate and the State Labor Inspection and its regional branches in the Republic of Karakalpakstan, viloyats (provinces), and the Tashkent city and district directorates and branches on labor, employment and social security. They constitute a single system of supervision and monitoring compliance with OHS requirements for ministries and agencies, institutions, organizations, and industrial and agricultural enterprises, with the exception of hazardous facilities that are under the jurisdiction of the State Inspection on Safety in Industry, Mining and the Housing and Utilities Sector.

OTHER PERTINENT LEGISLATION

The list of other laws and regulations providing for fair and safe working conditions and benefits include the following:

- Law "On the Employment of the Population" No. 642 of 20.10.2020
- Joint Decree of the Ministry of Labour and Social Protection of the Population (No. 7) and the Ministry of Healthcare (No. 13) "On approval of the list of jobs with unfavorable working conditions, where the employment of persons under 18 years is prohibited" registered by the Ministry of Justice of the Republic Uzbekistan, dated July 29 2009, No. 1990
- Decree of the Cabinet No. 133 of 11 March 1997 to approve normative acts necessary for the realization of the Labour Code of the Republic of Uzbekistan.
- 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".
- Decree of the Cabinet of the Ministers No. 965 of 5 December 2017 "On the Measures for 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".
- Decree No. 964 of 5 December 2017 "On the measures for Improvement of the Activity of Self-Government Bodies Aimed at Ensuring Employment, firstly for the Youth and Women".
- The Protection of Women Against Harassment and Violence Act (2019).

- The National Human Rights Strategy was approved by Presidential Decree on 22 June 2020. No. PD-6012.
- Law on guaranteeing equal rights and opportunities for women and men (2019).
- The Law on Mediation (2018).
- Law on Public Control (2018).
- Law on Administrative Procedures (2018)

HUMAN RIGHTS

As a member of the United Nations, Uzbekistan supports and implements all the main international instruments of the United Nations relating to the protection of human rights and freedoms, including 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.

Uzbekistan's State Policy on human rights is aimed at preventing violations or any restriction on human rights and freedoms and at establishing the necessary organizational, legal, social, economic, spiritual and moral foundations for the protection of human rights.

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.

THE PROTECTION OF WOMEN AGAINST HARASSMENT AND VIOLENCE ACT (2019)

The Act defines the various forms of violence - sexual, physical, economic, psychological against women. Protection from harassment and violence is defined as a system of urgent measures of economic, social, legal, organizational, psychological and other nature in order to eliminate the danger to women's life and health, to ensure their safety and to prevent repeated illegal actions against them.

Other relevant legislations include:

- The National Human Rights Strategy was approved by Presidential Decree on 22 June 2020. No. PD-6012;
- Law on guaranteeing equal rights and opportunities for women and men (2019);
- The Law on Mediation (2018);
- Law on Public Control (2018); and
- Law on Administrative Procedures (2018)

16.1.2 Lenders Requirement

16.1.2.1 ADB

The Environmental Safeguard requirements necessitate The Borrower/client to, '*provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities.*'

The ADB Social Protection Strategy requires client to promote efficient labour markets, diminish people's exposure to risks and comply with core labour standards which includes: (a) freedom of association and the effective recognition of the right to collective bargaining, (b) the abolition of all forms of forced or compulsory labour, (c) the elimination of discrimination in respect of employment and occupation and (d) the elimination of child labour.

AIIB

ESS1 – Environmental and Social Assessment and Management: Point 8.1 outlines the need to consider worker health and safety in the impact assessment. Section F covers Labour and Working Conditions, including labour management relationships, child and forced labour.

16.1.2.2 EPFIs

United Nations Guiding Principles on Business and Human Rights

In line with EP IV requirements, the United Nations Human Rights Guiding Principles (HRGP) apply to the Project. HRGP Section II on "The corporate responsibility to respect human rights" recognises that it is the responsibility of businesses and corporations to respect human rights. It is a global standard of expected conduct for all business enterprises wherever they operate. It exists independently of a states' ability and/or willingness to fulfil their human rights obligations and does not diminish those obligations. The Foundational principles to take into consideration are:

- Principle-11: Business enterprises should avoid infringing on the human rights of others and should address adverse human rights impacts with which they are involved.
- Principle-12: The responsibility of business enterprises to respect human rights refers to internationally recognized human rights – understood, at a minimum, as those expressed in the International Bill of Human Rights and the principles concerning fundamental rights set out in the International Labour Organization's Declaration on Fundamental Principles and Rights at Work

- Principle-13: The responsibility to respect human rights requires that business enterprises avoid causing or contributing to adverse human rights impacts through their activities, and address such impacts when they occur;
- Principle-14: The responsibility of business enterprises to respect human rights applies to all enterprises regardless of their size, sector, operational context, ownership and structure. Nevertheless, the scale and complexity of the means through which enterprises meet that responsibility may vary according to these factors and with the severity of the enterprise's adverse human rights impacts
- Principle-15: Business enterprises should have policies and processes appropriate to their size and circumstances in place, including:

The following Operational principles should also be taken into consideration.

- Principle-16: Policy commitment
- Principle-17 to 21: Human rights due diligence
- Principle-22: Remediation

16.1.2.3 IFC

The following applicable IFC Performance Standards aim to identify and ensure that social and economic impacts of a project are addressed in the relevant areas, in particular:

- Performance Standard 2: Labour and Working Conditions;

IFC Performance Standard 2 relates to Labour and Working Conditions, in accordance with the Standard there is a requirement to align with the following conventions:

- ILO Convention 29 on Forced Labor;
- ILO Convention 87 on Freedom of Association and Protection of the Right to Organize;
- ILO Convention 98 on the Right to Organise and Collective Bargaining;
- ILO Convention 100 on Equal Remuneration;
- ILO Convention 105 on the Abolition of Forced Labor;
- ILO Convention 111 on Discrimination (Employment and Occupation);
- ILO Convention 138 on Minimum Age (of Employment) (Minimum age specified as 15 years);
- ILO Convention 182 on the Worst Forms of Child Labor;
- UN Convention on the Rights of the Child, Article 32.1; and
- UN Convention on the Protection of the Rights of all Migrant Workers and Members of their Families.

In regard to human rights:

- In line with EP IV requirements, the United Nations Human Rights Guiding Principles (HRGP) apply to the Project. HRGP II on "The corporate responsibility to respect human rights" recognises that it is the responsibility of businesses and corporations to respect human rights. It is a global standard of expected conduct for all business enterprises wherever they operate. It exists independently of a States' ability and/or willingness to fulfil their human rights obligations and does not diminish those obligations.

IFC Guidance on Gender Based Violence and Harassment (GBVH) in the Construction Sector:

The assessment, prevention, monitoring and response measures in regards to GBVH should be underpinned by the following principles:

- *Survivor Centred:* The rights of GBVH survivors need to be consistently prioritised and used as the starting point for all decisions on efforts to assess, prevent, monitor and respond to GBVH.
- *Safe:* Survivors, witnesses and those who report and seek to address GBVH can be at risk of retaliation, including threatening and violent behaviour, often from those who do not like their position of power being challenged. Companies should prioritise the safety of those who have experienced, witnessed and reported GBVH.
- *Context specific:* All measures need to be rooted in a thorough understanding of the local context. Investors and companies should understand the legal and social context and identify the support mechanisms that are in place.
- *Collaborative:* Companies should seek inputs from a range of internal and external stakeholders to increase the likelihood of broader buy-in and make GBVH prevention more effective.
- *Inclusive:* Companies should recognise the heightened risks of GBVH faced by certain groups who are subject to discrimination and marginalisation. High risk groups often include people with disabilities, single parents, migrants and ethnic minorities and sexual and gender minorities. The system should also account for illiterate or non-literate people who may not be able to access written information on GBVH reporting mechanisms.
- *Integrated:* Processes, efforts to assess, prevent, monitor and respond to GBVH needs to be integrated as much as possible into existing processes and management systems, such as occupational health safety, security management systems, environmental and social management systems (ESMS) and human resources (HR) policies and procedures.
- *Non-discriminatory:* All survivors need to be listened to and treated equally and promote diversity in the work place.
- *Well-informed:* Companies should draw on relevant expertise when developing prevention and response measures. The grievance mechanism and investigation procedures should be set up to ensure they are appropriate, relevant and safe in the local context.

According to the guidance, the benefits of addressing GBVH include:

- Improves workers' physical and emotional wellbeing and strengthens occupational health and safety.
- Avoids reputational damage, financial risks and legal liabilities for companies, investors and construction contractors.
- Builds relationships and social license to operate in communities. This can result from regular dialogue to understand and track project GBVH risks as well as the effective use of measures to prevent and respond to GBVH.
- Broadens the pool of potential workers that companies can draw upon, including women workers from nearby communities because of lower perceived risk of GBVH.

Equator Principles Guidance on Implementation of the Equator Principles During the Covid-19 Pandemic:

The guidance recommends that the borrower should consider the following in the engagement of workforce and management of risks:

Engagement of Workforce

- Communicate its approach to COVID-19 management to its workforce (including contractors) and provide information and advice about the virus.
- Engagement methods should ensure the ability to provide frequent updates with a central information communication network that allows workers to access all the latest information and guidance.
- Consider the need for a 24-hr hotline.
- Design communication in a way that avoids risks of stigma associated with infection in line within available good practice.

Managing Health Risks

It is recommended that the borrower shall develop a range of actions/procedures to manage workers risks. These procedures must align with the latest guidance/requirements at national/regional levels and WHO guidelines. It should also ensure that up to date information is maintained at the Project level and liaise with national/local authorities as applicable.

Welfare and Livelihoods

Where travel restrictions lead to workers remaining on site for longer rotations, fatigue management procedures are recommended. The following measures are also recommended in instances where workforce reduction maybe required:

- Consultation with workers/representatives during the entire process of evaluating viable options.
- Options for avoiding redundancy should be considered in the first instance (e.g. paid/unpaid leave, reduced hours/pay) with retrenchment taken as the last option.

- Reduction in workforce should be undertaken incrementally where possible and regularly reviewed.

Consideration should also be given to risks posed to vulnerable workers i.e. casual workers, woman, workers with childcare issues, supply-chain workers and their needs and support provided as required.

16.2 Observation and Baseline Conditions

16.2.1 Consultations with the Ministry of Labour

A consultation letter was sent to the Ministry of Employment on 4th March 2024 informing them of the Project and establishing whether the Ministry had any specific employment and labour requirements for the Project beyond the existing Uzbek labour regulations and standards.

A response from the Ministry of Employment was received on 4th March 2024 stating that the labour relations between employees and employers in the Republic of Uzbekistan are regulated by the Labour Code, which covers employment of the population and labour protection.

These regulations are further supported by laws on mandatory civil liability insurance for employers and other legal documents related to labour. No cases of forced labour or child labour have been observed in Bukhara region in 2024. The letter confirmed that the labour and labour protection in Bukhara region is carried out by the State labour control inspection of the main department of poverty reduction and employment of Bukhara region.

Consultations letters are provided in **Appendix J**.

16.3 Potential Impacts

16.3.1 Construction Phase

The nature of construction work means that construction workers (especially unskilled, semi-skilled workers) can be exposed to certain working conditions that could potentially impact their human rights. Risks that construction workers may be exposed to have been assessed in the following sections.

16.3.1.1 Occupational Health and Safety

Common activities undertaken during construction such as the movement of heavy machinery, excavation, handling of chemicals, works undertaken at height etc. can introduce

significant risk to the health and safety for the associated workforce. Risks are more likely for those who are not familiar with the type of works undertaken and the associated hazards.

In addition, occupational safety hazards may occur during possible blasting activities in the WTG area resulting in accidental explosions, or accidental exposure to controlled explosions.

The type of hazards attributable to a construction site will vary significantly depending on the construction methods employed and the degree of control implemented by the EPC and affiliated sub-contractors. It is therefore of the utmost importance that the EPC and sub-contractors demonstrate consideration of health and safety risks as part of their chosen construction methods and that these risks are appropriately mitigated.

As occupational health and safety is a risk rather than a potentially defined impact, its significance has not been assessed further in this ESIA. Health and safety risks to the site workforce will be managed through effective risk assessment, and the development and implementation of an Occupational Health & Safety Plan.

16.3.1.2 Right to Work, Forced Labour, Right to Adequate Standard of Living, Non-Discrimination

According to Article 14 of the Uzbekistan Labour Code, every citizen of the Country as well as foreign citizens and stateless persons that have reached working age are eligible for employment and signing of employment contract with an employer. Article 16 of the Labour Code and Article 37 of the Constitution states that everyone has the right to work, including the right to choose their occupation, to fair working conditions and to the protection against unemployment. Resolution No. PP-3913 dated August 20th 2018, requires reforms in the labour sector in order to protect labour rights, prevent and eradicate forced labour in Uzbekistan. In addition, the Resolution provides for enhancement of national labour legislation in line with conventions and recommendations of the ILO which Uzbekistan has ratified.

In relation to the Project, there will be approximately 700-1000 workers during the construction phase of which 60% will consist of local workforce and the rest will be recruited from outside Uzbekistan. The local workforce will be encouraged to apply for different jobs available depending on skills and qualifications of the local people. During recruitment, there shall be no discrimination based on a person's gender, race, religion, disability, political opinion, etc. and every person will be given equal opportunity and treated fairly.

Forced labour may potentially occur within the workforce where people (including migrants & women) are forced to work or where their recruitment agencies put them under financial debt by requiring payment of recruitment fee etc. upon their start of work. In addition, foreign

workers could potentially have their passport confiscated which would prevent them from leaving their jobs and impede their freedom of movement.

In order to mitigate this impacts, ACWA Power and the Project Company will ensure that the EPC Contractor is contractually obligated to recruit workers through registered recruitment agencies, undertake audits and inspections on the suppliers.

The EPC Contractor shall adhere to good practice measures regarding worker welfare on and off site.

Risks associated with worker condition and worker welfare during construction will be managed through effective Project planning, and the enforcement of fair and just treatment throughout the construction phase.

16.3.1.3 Child Labour

The Project's construction phase will introduce a multiplicity of work openings, some of which will require minimum skill and wages. Jobs of this nature, particularly those offered on an informal basis are likely to attract and qualify unemployed and out-of-school minors (i.e., individuals below the age of 18 years). According to PR2, young people below the age of 18 years should not be employed for hazardous work. ACWA Power's Policy which requires all workers to be 18 years and above aligns with the PR2 requirement.

In regard to the risk of employing children at the Project site, the EPC Contractor will implement controls via various Human Resources Policies and Processes that will ensure proper vetting and document verification is undertaken during the recruitment process and when issuing site passes.

Note: *regarding data gathered from workers, this will be treated with confidentiality and privacy and will be stored in locked storage cabinets/rooms or password protected in case it is stored digitally where only authorised personnel have access.*

16.3.1.4 Lack of Worker Representation & Restrictions on Trade Unions

Workers shall be allowed to be involved in collective bargaining in accordance with Article 30 of the Labour Code as far as they comply with the established requirements for collective bargaining and agreements. In Uzbekistan, trade unions are more common for state owned companies and not very common in private companies.

In the absence of trade unions, the Project Company and the EPC Contractor will not discourage workers from electing worker representatives at the workplace to engage and discuss workers' issues and concerns through worker representatives/committees.

In order to ensure that the right to form and/or join trade unions or elect representatives is guaranteed, the Project Company and the EPC Contractor will include a clause in their Human Resources Policies and Procedures that allow workers to form or join a union and/or elect worker representatives without discrimination or risk of retaliation. It will also be permissible for workers to raise collective grievances via the Project's grievance mechanism.

16.3.1.5 Compulsory Overtime, Excessive Working Hours & Job Security

Although not expected, there is a risk that workers may be requested to work excessive hours and possibly without overtime pay. It is noted that Article 115 of the Labour Code states that normal working hours should not exceed forty-hours per week in a six-day working week duration. In addition, overtime may only be allowed with the consent of the worker and compensation provided.

The Project Company and EPC Contractor will ensure that all workers, regardless of rank, gender or religious affiliation etc. are paid a fair wage and equal remuneration for work of equal value without discrimination. In addition, remuneration must be enough for workers to be able to live a decent life.

Job security for construction workers will only be for the period when construction is undertaken and workers will be employed on contractual basis and as such no retrenchment is expected to occur. The Project Company and the EPC Contractor will ensure that all workers are informed on the nature of their contracts, duration so that they understand the start and end period.

16.3.1.6 Provision of Inadequate Accommodation Facilities

The EPC Contractor will provide accommodation facilities to workers at the Project site and it is noted that there will be requirements for workers to be accommodated in alignment with the benchmarks outlined in the IFC & EBRD Workers Accommodation: Processes & Standards (2009). The location and details of the temporary accommodation camp for the construction workers were not available at the time of writing.

Due to the remote location of the Project site, there is a risk that accommodation facilities may be inadequate compared to the aforementioned guidelines. Key risk areas are likely to be during the commencement of construction where accommodation camps may not be fully established and all amenities may not be in place at the camp(s). This has the potential to include a lack of relevant facilities, welfare provisions on-site such as clean drinking water, hygienic and ample toilet facilities, hand basins (with soaps/hand wash), temporary rest areas, food and other amenities necessary to the workers. In the event that there are female workers,

there are also risks that accommodation areas may not be suitably equipped to cater for separate sex living and welfare provisions, which will need to be ensured.

In order to avoid such a scenario and to ensure the wellbeing of all staff associated with the Project, the EPC Contractor and associated sub-contractors will be required to plan for necessary provisions relative to the requirements of the workforce and the timing of the construction of camps. This includes carefully safeguarding risks through policy and internal processes (including monitoring and audit), the provision of appropriate labour accommodation plans and mechanism for inspections and corrective actions.

16.3.1.7 Lack of Access to a Grievance Mechanism

Workers contracted by the EPC Contractor and sub-contractors may not be able to freely express their opinions or seek remedy. This could be due to a lack of awareness about the available grievance mechanism, uncertainty about how it works, or fear of potential retribution.

As such, the EPC Contractor will provide information about the grievance mechanism to all the workers during their site induction sessions, in employee handbooks and on posters across the site and in accommodation areas. The implementation of the Workers Grievance Mechanism will be in accordance with the Project specific SEP.

In order for the grievance mechanism to be successfully implemented, it will be necessary to ensure that competent and trained staff are in place who can fully implement provisions, whilst ensuring compliance with the procedures and maintaining full integrity and privacy to the grievant.

16.3.1.8 Potential Gender Risks Associated with the Project

GENDER BASED VIOLENCE & HARASSMENT

Influx in workers from outside the Project region will increase the likelihood of Gender Based Violence and Harassment (GBVH), Sexual Exploitation & Abuse (SEA) and Sexual Harassment (SH). The construction workers are likely to be predominantly young male coming from other regions of Uzbekistan and outside the country. These workers will be away from their families and removed from their normal social spheres. This could potentially result in peer pressure and involvement in unlawful behaviour such as harassment of local women, young girls and boys or women within the Project workforce. Such behaviour can lead to increase in exploitative sexual relationships and unwanted aggressive advances and harassment. This could also lead to disintegration of relationships in local households impacted by GBVH/SEA/SH. Due to the remote location of the Project site with few local communities, the associated community risks are likely to be relatively low.

During the construction phase, workers will also be vulnerable to various forms of harassment, exploitation and abuse, aggravated by a traditionally male working environment. GBVH/SEA/SH is likely to be committed by co-workers or construction supervisors and can be attributed to gender stereotypes about the sexual availability of female construction workers. In addition, income earning opportunities for women through direct employment during the construction phase or through indirect employment may have the potential to increase household tensions and expose women to harassment and violence in their homes or communities. This is because some men may feel threatened when the women in their lives are more economically empowered and independent.

Some of the male workers who will be transporting Project machinery and equipment and goods will also be involved in long distance travel which in some cases will be between different countries. There is a risk that they can also be involved in GBVH/SEA/SH on the routes they use and at track stops associated with the Project even if it is outside the Project boundary.

Note: Additional potential impacts as a result of influx of workers & in-migrants are discussed in the Influx Impact Assessment.

GBVH/SEA/SH IN ACCOMMODATION FACILITIES

The EPC Contractor (and possibly the sub-contractors) will provide accommodation facilities for their workers on site. This presents a safety risk especially for women who may be working at the Project and living within the designated accommodation areas and their use of common areas such as the cafeteria.

In order to address such risks, the EPC Contractor will be required to provide safeguards such as locating women accommodation facilities in a separate compound from the men, provision of locks on doors, separate sanitation facilities, adequate lighting etc. In addition, since majority of the population in Uzbekistan is Muslim, the EPC Contractor will provide separate religious and social facilities for the men and women.

WAGE DISCRIMINATION BASED ON GENDER

In an effort to promote wage parity between men and women, the government of Uzbekistan ratified ILO's Convention No. 100 (Equal Renumeration for Men and Women Workers for Work of Equal Value). However, the problem is that women tend to be concentrated in low-status sectors which leads to low-wage jobs. In addition, the construction industry is predominantly male, and women may only be offered low-paying jobs such as cooks, cleaners etc.

As such, the EPC Contractor will be required to provide equal access to recruitment opportunities for women based on their qualifications and equal salaries as their male

counterparts undertaking work of the same value. In addition, a policy of equal pay will be included in the EPC Contractor's HR Policy or as a stand-alone.

DISCRIMINATION BASED ON EMPLOYMENT BENEFITS & GUARANTEES

Traditional norms in Uzbekistan associate women roles to care givers especially in rural areas. Women who intend to pursue a career are still expected to balance between their job obligations and family life, which ultimately affects their career paths. In addition, employers may potentially prefer to employ men over women because most of the employment family benefits and guarantees are associated to women. For instance, according to article 233 of the Labour Code women employees are entitled to paid maternity leave for a period of 126 days and in some cases childcare allowances are also provided. This includes 70 days given before the expected birth of the child and 56 after the birth. In case of complications, maternity leave can be extended by an additional 14 days. Even though men can also claim similar benefits in paternity leave, childcare (especially in rural areas) is still seen as a woman's job.

As such, women of childbearing age may face potential discrimination during the recruitment process because the EPC Contractor may want to avoid providing the benefits and guarantees relating to maternity or childcare. To mitigate this, the EPC Contractor will be required to include the benefits and guarantees for both men and women in the HR policy with a clear commitment to non-discrimination during the recruitment process.

16.3.2 Operational Phase

16.3.2.1 Occupational Health and Safety

The risks associated with the operational phase of the project are anticipated to be significantly less than during the construction phase due to reduced site activity and requirements for heavy plant and machinery.

There will be occupational health and safety risks attributable to the operational phase associated with maintenance and inspection requirements. Maintenance and inspection will also require the use of site vehicles and activities that pose risks to human health and safety.

During operation of the wind farm, there is the risk of working at height to undertake maintenance works. Workers may also be required to work in confined spaces such as the nacelle (the wind turbine component that contains the electrical components) and other sections of the tower in other to conduct inspection, maintenance, replacement or repairs. As such, there is a risk that O&M workers will be exposed to electrical hazard (electrical shock & fire) during maintenance works.

With regards to the operation of the OHTL, there is a risk of electrocution of O&M personnel due to direct contact or indirect contact via tools, ladders or vehicles with high voltage electricity. There is also a risk of falling while working at height. O&M personnel will ensure deactivation of transmission line prior to work on these lines and where live work will be undertaken, this would be conducted by trained workers only. Fall protection equipment and adequate training will also be provided to maintenance workers to reduce the risk of falling from height. In addition, OHTL maintenance workers typically have a higher exposure to EMF than the general public due to working in proximity to power lines (IFC guidelines on Electric Power Transmission & Distribution). As such, occupational EMF exposure will be prevented and minimised through the preparation and implementation of an EMF safety program.

A structured Grievance Redress Mechanism (GRM) will be implemented at the plant level in multiple languages anonymously (online and hardcopy) so that workers have access to express their concerns. The human resources department will be responsible for implementing the GRM for the facility.

The severity and likelihood of risks during the operational phase will be dependent on the frequency and requirements for planned and unplanned maintenance. The operation and maintenance team will need to ensure that a robust plan is in place to appropriately manage these risks.

16.3.2.2 Labour Risk to Workers

FORCED LABOUR AND CHILD LABOUR

As the vast majority of staff will be direct employees of the Project Company or O&M Company the potential risks associated with worker exploitation are expected to be limited due to consistent processes in place as part of the respective HR management systems, assuming they are appropriately designed and have adequate resources.

However, where there is an agency/contract staff the risks of exploitation (particularly forced and child labour) may be more prevalent.

PROVISION OF INADEQUATE ACCOMMODATION FACILITIES

No long-term accommodation requirements are anticipated for the operational phase of the project. However, as with construction, operational activities will need to plan for and enforce just and fair treatment of operation and maintenance staff (including any engaged sub-contractors) in accordance with lender requirements and relevant Uzbekistan national requirements. Allowance will also need to be made for site staff welfare facilities including sanitation, rest, recreational and medical facilities.

16.3.2.3 Potential Gender Risks

Even though there will be reduced workforce during the operational phase of the Project, the risk of gender issues relating to GBHV/SEA/SH, wage discrimination and access to employment benefits etc will remain. However, as with construction, operational activities will need to plan for and enforce just and fair treatment of operation and maintenance staff (including any engaged sub-contractors) in accordance with lender requirements and relevant Uzbekistan national requirements. Gender needs will be considered for welfare facilities including sanitation, rest, recreational and medical facilities. All the mitigation and management for gender risks during the construction phase will also be applicable for the operational phase of the project.

In addition, the O&M Company will also be required to have a HR policy with clear provisions for non-discrimination, code-of conduct and a GBVH policy.

16.3.3 Cumulative Impacts

Project related impacts with regards to worker conditions and occupational health and safety would mainly be those associated with construction and will depend on conditions within the Project site as well as depending on Project-specific construction activities. Significant cumulative impacts with other projects are therefore not envisaged.

16.3.4 Decommissioning Phase

The labour and working conditions impacts associated with the decommissioning of the Project are anticipated to be similar to those encountered during the construction phase. As such, no new impacts are predicted.

16.4 Mitigation and Management Measures

16.4.1 Construction Phase

Table 16-1 Labour and Working Conditions Mitigation and Management Measures

Potential Impact	Mitigation and Management Measures
All Impacts	• The Project Company and EPC Contractor will ensure that the following plans/policies are prepared and implemented. - Occupational Health & Safety Plan - Emergency Preparedness & Response Plan - Supply Chain Management Plan - Labour Management Plan - Human Resource Policies & Procedures - Worker Accommodation Plan

Potential Impact	Mitigation and Management Measures
	- Stakeholder Engagement Plan (including implementation of the Grievance Mechanism) - Human Rights Policy - GBVH Policy - Worker Code of Conduct
Occupational Health and Safety	• Workers will be provided with a safe and healthy work environment, taking into account inherent risks and specific classes of hazards associated with the project. • The EPC Contractor will implement and maintain an OHS management system taking into account specific risks associated with the project, legal requirements and duty of care. • The EPC Contractor will be responsible for ensuring that all affiliated sub-contractors comply with the OHS management system. The OHS management system will be in-line with recognised international best practice and as a minimum, this plan will include: - Means of identifying and minimising, so far as reasonably practicable, the causes of potential H&S hazards to workers. - Provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances. - Provision of appropriate equipment to minimise risks and requiring and enforcing its use. - Training of workers, and provision of appropriate incentives for them to use and comply with H&S procedures and protective equipment. - Documentation and reporting of occupational accidents, diseases and incidents. - Emergency prevention, preparedness and response arrangements • The Project Company will ensure that regular labour audits are undertaken on the EPC Contractor and sub-contractors including suppliers.
Human Right Risk to Workers - Workers Right to Health	• During construction, workers will have access to medical professionals and suitable medical facilities, which will aim to prevent the spread of diseases internally. Site personnel will only be cleared for work after with a medical fitness certificate from an authorized medical centre; • Any reportable disease will be diagnosed by the authorized occupation health centre doctor. Diagnosis includes identifying any new symptoms, or any significant worsening of existing symptoms; • Any internal spreading diseases will be diagnosed and precautions will be taken as per the instructions from the national/ local medical authority; • The potential for exposure to water-borne, water-based, vector-borne diseases and communicable diseases as a result from project activities will be avoided or minimized; • EPC Contractor will comply with Uzbek sick leave requirements.
Forced Labour	• Local workers will be considered for available positions depending on skills & qualifications. • The Project's process for employment will consider the availability of local talent. • The EPC contractor will not make employment decisions on the basis of personal characteristics, such as gender, race, nationality, ethnic origin, religion or belief, disability, age or sexual orientation, unrelated to inherent job requirements. • The EPC contractor will not employ forced labour, which consists of any work or service not voluntarily performed that is exacted from an individual under threat of force or penalty. This covers any kind of involuntary or compulsory

Potential Impact	Mitigation and Management Measures
	labour, such as indentured labour, bonded labour or similar labour-contracting arrangements. • Workers will be provided with easily understandable contracts that include details of their benefits, deductions (if any and within the limits of the law) and obligations. In addition to the copy signed for the EPC records, the employees will also be provided with a copy for their records. • Employees will be free to terminate their employment in accordance with the Uzbekistan Labour Code • The EPC contractor will provide a plan detailing how working conditions and terms of employment are compliant with national labour, social security and occupational health and safety laws. • Employees will be provided with suitable accommodation and worker accommodation areas will be managed in accordance with the EBRD and IFC Workers' Accommodation: Processes and Standards. The provision of good quality living accommodation, services and amenities will likely reduce the need for mixing with local communities. • Employment relationship will be on the principle of equal opportunity and fair treatment and will not discriminate with respect to any aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment including provisions for maternity/paternity leave, accommodation, access to training, promotion, termination of employment or retirement, and discipline. • *Special measures of protection or assistance to promote local employment opportunities or selection for a particular job based on the inherent requirements of the job, which are in accordance with national law, will not be deemed discrimination.*
Child Labour	• The EPC contractor will comply with all relevant national laws, lenders requirements and ILO provisions related to the employment of minors. This will include compliance with ACWA Power's policy that does not allow the employment of any workers under the age of 18 years. • The EPC Contractor will devise a management procedure to ensure that all workers are above the minimum legal age of employment at the time of hiring. This will include the verification of official personal registration documents i.e., national ID, passport etc. • Young people below the age of 18 years will not be employed in hazardous work and all work of persons under the age of 18 will be subject to an appropriate risk assessment. • Where workers under the age of 18 are employed, the EPC Contractor will establish a system to regularly monitor the working conditions and working hours of such young workers in line with Uzbek Labour Code.
Lack of Worker Representation & Restrictions on Trade Unions	• HR Policies will include the ability of workers to form or join all types of associations. • HR Policies will include the ability of workers to join a Trade Union; as well as ensure collective bargaining rights of workers. • Trade unions must be permitted to function freely subject only to limitations that are in line with the Uzbekistan Labour Code and the International Human Right standards.
Compulsory Overtime, Excessive Hours & Job Security	• HR policies and procedures will be adapted appropriately to the size of the workforce required for the Project. Policies and procedures must be prepared to demonstrate consistency with the requirements of national legislation and IFC PS 2 and include a code of conduct on GBVH/SEA/SH. • The EPC contractor will document and communicate to all workers their working conditions and terms of employment including their entitlement to

Potential Impact	Mitigation and Management Measures
	wages, hours of work, overtime arrangements and overtime compensation, and any benefits (such as leave for illness, maternity/paternity, or holiday). • The workers will be informed and understand the nature of their contracts, duration • Wages, benefits, leave days and other conditions of work offered will, overall, be comparable to those offered by equivalent employers in the relevant region of that country/region and sector concerned. • The wages to all the workers (skilled and unskilled) will be enough to guarantee a living wage for all the workers (i.e. adequate food, clothing and housing). • Workers will be provided equal remuneration for work of equal value. • Workers will receive their pay on time and in full for ordinary and overtime hours, as well as paid leave. • Wages will be paid regularly based on the agreed pay-day and adequate notice provided where exceptional circumstances necessitate change in the regular pay day. • Where required, workers will be provided with the option of flexible work schedule in order to manage personal obligations while adequately fulfilling their employment duties. • If the EPC contractor anticipates collective dismissals associated with the proposed project, the EPC contractor will develop a plan to mitigate the adverse impacts of retrenchment, in line with national law and good industry practice and based on the principles of non-discrimination and consultation. Without prejudice to more stringent provisions in national law, such consultation will involve reasonable notice of employment changes to the workers' representatives and, where appropriate, relevant public authorities so that the retrenchment plan may be examined jointly in order to mitigate adverse effects of job losses on the workers concerned. The outcome of the consultations will be reflected in the final retrenchment plan.
Provision of Inadequate Accommodation Facilities	• Worker accommodation areas will be managed in accordance with the EBRD and IFC Workers' Accommodation: Processes and Standards. • Implementation of the Worker Accommodation Plan.
Gender Risk - Gender Based Violence and Harassment	• The workers will be provided with information regarding worker code of conduct in local languages as part of their employment contract which will include provisions for reporting, investigations, termination and disciplinary action against those who perpetrate gender violence and harassment. • ACWA Power will develop a GBVH policy and disclose it to the EPC Contractor and its employees. • The EPC Contractor will develop and implement a Project specific GBVH Policy detailing the list of unacceptable behaviour among workers, provisions for reporting, sanctions for perpetrators and available resources & support systems for the victims in accordance with lenders and Uzbek requirements including ACWA Power's Environmental & Social Management System Implementation Manual. • The EPC Contractor will conduct mandatory regular training and awareness raising for the workforce about gender-based violence and harassment towards local community members and their colleagues especially women and the availability of a grievance mechanism to report any GBVH/SEA/SH cases. • Training will be provided to GBVH focal point on the risks of GBV/SEA/SH and information provided on how to deal with any GBV/SEA/SH related cases. • The workers will be made aware of the laws and regulations that make sexual harassment and gender-based violence a punishable offence which is prosecuted.

Potential Impact	Mitigation and Management Measures
	• Ensure inclusion of a balanced representation of women on the HSE team who will be easily relatable and approachable to female workers. • Project personnel in charge of receiving GBVH/SEA/SH grievances will be provided with appropriate training on how to handle such complaints. It is recommended that the personnel are trained in coordination with any GBVH organisations working in the Project area where available. • Female workers will be included in the grievance redress committee to help female workers and host community female members raise their grievances. • Regular consultations will be undertaken with women on their concerns about the project • The EPC Contractor will work to identify a suitable labour pool locally in order to minimize the need for bringing large number of workers from other regions or countries. This could also help the EPC Contractor in cutting cost associated with provision of accommodation facilities if the majority of the workers are sourced locally. • Provision of opportunities for the workers to regularly return to their families who may be located far from the Project site. • The EPC Contractor will provide opportunities for workers to have access to entertainment opportunities away from the host communities. • EPC Contractor will allow submission and investigation of anonymous sexual harassment complaints by workers and host community members and protect the confidentiality of the complainants. • The EPC Contractor will work in close coordination with the local authorities in investigating any complaints relating to gender violence and harassment in the host communities where it relates to Project workers. • The EPC Contractor will provide targeted training (including in life skills such as leadership and decision-making) and awareness raising to vulnerable workers such as women. • The EPC Contractor will prepare a Gender Equality and GBVH/SEA/SH Policy in line with Uzbek and lenders requirements. This will include provision of training to workers, subcontractors and suppliers on GBVH associated risks.
Gender Risk - GBVH/SEA/SH in Accommodation Facilities	• The EPC will provide safe, secure and separate accommodation facilities and sanitary facilities for the male and female workers (lockable sanitary facilities will be mandatory for women). • The EPC Contractor will provide separate social facilities for the men and women. • Worker accommodation areas will be managed in accordance with the EBRD and IFC Workers' Accommodation: Processes and Standards.
Gender Risk - Wage discrimination based on Gender	• EPC Contractor to provide access to recruitment opportunities for women based on their qualifications. • EPC Contractor will develop a Local Recruitment Plan that ensures equal opportunities are provided to women in the employment process, training and promotions • The EPC Contractor will implement an equal wage policy for women employees. • Women will be provided equal remuneration as their male counterparts for work of equal value.
Gender Risk- Discrimination based on employment benefits & Guarantees	• The EPC Contractor will include the benefits and guarantees for both men and women in the HR policy with a clear commitment to non-discrimination during the recruitment process.

Potential Impact	Mitigation and Management Measures
	• EPC Contractor to improve employment opportunities by developing guidelines to ensure that discrimination against women on the basis of their marital or reproductive status is avoided. • The EPC Contractor will implement a zero-tolerance process for discrimination against women.
Grievance Mechanism	• The EPC contractor will provide a grievance mechanism for workers to raise reasonable workplace concerns. The client will inform the workers of the grievance mechanism at the time of hiring and make it easily accessible to them. The mechanism should involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides feedback to those concerned, without any retribution. The mechanism should not impede access to other judicial or administrative remedies that might be available under law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements. • The grievance mechanism shall provide for confidential reporting and a support system for any workers reporting issues relating to GBVH/SEA/SH. The grievance mechanism will also allow for reporting through word of mouth for those who cannot write. • Female workers will be included in the grievance redress committee to help female workers and host community female members raise their grievances.
Human Rights Policy	In addition to adhering to the national human rights requirements, ACWA Power and the EPC Contractor will each develop a human rights policy. The policy will be in line with the UN Guiding Principles on Business and Human Rights and will: • Be approved at the most senior level of the company; • Informed by relevant internal and external expertise; • Stipulate the EPC's human rights expectations of personnel, local communities, sub-contractors and other suppliers directly linked to the construction of the project; • Be publicly available and communicated internally and to the relevant stakeholders; • Be reflected in the other policies and procedures to embed it throughout their construction phase activities.

16.4.2 Operation Phase

Table 16-2 Labour and Working Conditions Mitigation & Management Measures

Potential Impact	Mitigation and Management Measures
All Impacts	The Project Company & O&M Company will ensure that the following plans/procedures/policies are in prepared and implemented: - Emergency Preparedness & Response Plan - Worker Code of Conduct - Labour Management Plan - Human Resources Policies & Procedures - Human Rights Policy - GBVH Policy - Stakeholder Engagement Plan (including the implementation of the Grievance Mechanism).

Potential Impact	Mitigation and Management Measures
Occupational Health and Safety	• Workers will be provided with a safe and healthy work environment, taking into account inherent risks and specific classes of hazards associated with the project. • The Project's Operator will implement and maintain an OHS management system specific to the operational phase taking into account specific risks associated with the project, legal requirements and duty of care. • The Operator of the OHTL will ensure that adequate training with regards to electrocution, working at height and other risks is provided to O&M personnel responsible for maintenance works along the transmission line. • EMF safety program for Project workers will be managed through the development of a robust Operational phase Occupational Health & Safety Plan in line with best industrial practices. • Identification of potential exposure levels in the work area including surveys of exposure levels and establishment of safety zones. • Access and maintenance of the OHTL will be limited to trained workers who are equipped with suitable PPE. • Utilization of personal monitors during work activities in high EMF zones. • The Project's Operator will ensure that adequately rated equipment such as hoisting/lifting equipment, tool bags and power tools are given to O&M personnel. • The Project's Operator will be responsible for ensuring that all affiliated sub-contractors comply with the OHS management system. The OHS management system will be in-line with recognised international best practice and as a minimum, this plan will include: - Means of identifying and minimising, so far as reasonably practicable, the causes of potential H&S hazards to workers. - Provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances. - Provision of appropriate equipment to minimise risks and requiring and enforcing its use. - Training of workers, and provision of appropriate incentives for them to use and comply with H&S procedures and protective equipment. - Documentation and reporting of occupational accidents, diseases and incidents. - Emergency prevention, preparedness and response measures
Forced Labour	• The O&M Company will not employ forced labour, which consists of any work or service not voluntarily performed that is exacted from an individual under threat of force or penalty. This covers any kind of involuntary or compulsory labour, such as indentured labour, bonded labour or similar labour-contracting arrangements. • The O&M Company will not make employment decisions on the basis of personal characteristics, such as gender, race, nationality, ethnic origin, religion or belief, disability, age or sexual orientation, unrelated to inherent job requirements. • Employment relationship will be on the principle of equal opportunity and fair treatment and will not discriminate with respect to any aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment including provisions for maternity/paternity leave, accommodation, access to training, promotion, termination of employment or retirement, and discipline. *Special measures of protection or assistance to promote local employment opportunities or selection for a particular job based on the inherent requirements*

Potential Impact	Mitigation and Management Measures
	of the job, which are in accordance with national law, will not be deemed discrimination.
Child Labour	• The O&M Company will comply with all relevant national laws, lenders requirements and ILO provisions related to the employment of minors. • Young people below the age of 18 years will not be employed in hazardous work and all work of persons under the age of 18 will be subject to an appropriate risk assessment
Wages, working hours, right to rest, benefits, and retrenchment	• Wages, benefits, leave days and other conditions of work offered will, overall, be comparable to those offered by equivalent employers in the relevant region of that country/region and sector concerned. The wages to all the workers including to any unskilled workers will be enough to constitute for a living wage. • If the O&M Company anticipates collective dismissals associated with the proposed project, the O&M Company will develop a plan to mitigate the adverse impacts of retrenchment, in line with national law and good industry practice and based on the principles of non-discrimination and consultation. Without prejudice to more stringent provisions in national law, such consultation will involve reasonable notice of employment changes to the workers' representatives and, where appropriate, relevant public authorities so that the retrenchment plan may be examined jointly in order to mitigate adverse effects of job losses on the workers concerned. The outcome of the consultations will be reflected in the final retrenchment plan. • The workers/representatives will be involved on any labour reduction measures including those relating to COVID-19. The O&M Company will document and communicate to all workers their working conditions and terms of employment including their entitlement to wages, hours of work, overtime arrangements and overtime compensation, and any benefits (such as leave for illness, maternity/paternity, or holiday).
Gender Risk- Gender Based Violence and Harassment	• The workers will be provided with information regarding worker code of conduct in local languages as part of their employment contract which will include provisions for reporting GBVH (either in person or anonymously), investigation procedure, termination and disciplinary action against those who perpetrate gender violence and harassment. • The O&M Company will develop and implement a Project specific GBVH Policy detailing the list of unacceptable behaviour among workers, provisions for reporting, sanctions for perpetrators and available resources & support systems for the victims in accordance with lenders and Uzbek requirements including ACWA Power's Environmental & Social Management System Implementation Manual. • The O&M Company will conduct mandatory regular training and awareness raising for the workforce about gender-based violence and harassment towards local community members and their colleagues especially women. • The workers will be made aware of the laws and regulations that make sexual harassment and gender-based violence a punishable offence which is prosecuted. • Mandatory and regular training for workers on required lawful conduct in host communities and legal consequences for failure to comply including dismissal. • O&M will provide safe, secure and separate living spaces and sanitary facilities for the male and female workers (lockable sanitary facilities will be mandatory for women). • Provision of opportunities for the workers to regularly return to their families. • O&M Company will allow submission and investigation of anonymous sexual harassment complaints by workers and host community members and protect the confidentiality of the complainants.

Potential Impact	Mitigation and Management Measures
	• The O&M Company will work in close coordination with the local authorities in investigating any complaints relating to gender violence and harassment in the host communities where it relates to Project workers. • O&M will identify local based GBVH/SEA/SH organizations that can offer support to those who experience violence or harassment. • The O&M's HR policy will include a non-discrimination policy and a code of conduct. • The O&M's HR policy will include GBVH policy applicable to all employees and sub-contractors.
Grievance Mechanism	• The O&M Company will provide a Grievance Mechanism for workers to raise reasonable workplace concerns including GBVH. The client will inform the workers of the grievance mechanism at the time of hiring and make it easily accessible to them. The mechanism should involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides feedback to those concerned, without any retribution. The mechanism should not impede access to other judicial or administrative remedies that might be available under law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.
Human Rights Policy	In addition to adhering to the national human rights requirements, ACWA Power and the EPC Contractor will each develop a human rights policy. The policy will be in line with the UN Guiding Principles on Business and Human Rights and will be: • Be approved at the most senior level of the company; • Informed by relevant internal and external expertise; • Stipulate the O&M's human rights expectations of personnel, local communities and other suppliers directly linked to the operational phase of the project; • Be publicly available and communicated internally and to the relevant stakeholders; • Be reflected in the other policies and procedures to embed it throughout the operational phase activities.

16.5 Monitoring

The final monitoring methodology with specific monitoring details (i.e. locations, frequencies, durations, parameters etc.) will be developed in the specific 'Environmental and Social Monitoring Plan'.

Table 16-3 Labour and Working Conditions Key Monitoring indicators - Construction & Operation

Monitoring	Parameter	Frequency & Durations	Monitoring Locations	Responsibility
Worker Contracts & HR	Records of contracts, payments, receipt of benefits, leave entitlements, retrenchment etc.	On-going	For all Project workers (direct staff) and oversight of sub-contractor staff dedicated to the project	- EPC Contractor HR Manager - Project Company HR Manager

Monitoring	Parameter	Frequency & Durations	Monitoring Locations	Responsibility
Women employed in the Project	Number of women employed in the project including their rank and renumeration compared to men occupying the same positions.	On-going	For all female Project personnel including those employed by the sub-contractors.	- EPC Contractor HR Manager - Project Company HR Manager
Worker Welfare	Sanitation Facilities, Office Spaces, Welfare and Rest Areas	On-going	At all such facilities on-site	- EPC Contractor HR Manager - O&M Contractor HR Manager
Quality of Accommodation	Inspection/internal audit of worker accommodation facilities vs. IFC & EBRD standards	Monthly	All accommodation facilities provided to direct and full time sub-contracted labour.	- EPC Contractor HR Manager - O&M Contractor HR Manager
OH&S Near Misses (involving external parties)	Any classified near miss	On-going	n/a	- EPC Contractor HR Manager - O&M Contractor HR Manager
OH&S Emergency Situations and Incidents	Any classified emergency situation or incident	On-going	n/a	- EPC Contractor HR Manager - O&M Contractor HR Manager
Grievances including those relating to gender-based violence and harassment, sexual exploitation & abuse and sexual harassment	Grievances received	On-going	Project site and any other grievances received from communities in reference to Project workforce including suppliers.	Project CLO
Health of the workers	Records of the illnesses the workers are suffering from and an analysis of top diseases.	On-going	Project site clinic or first aid facility	- EPC Contractor HR Manager - O&M Contractor HR Manager
	COVID-19	Daily	All Project site workers including those under different sub-contractors, suppliers etc.	- EPC Contractor HR Manager - O&M Contractor HR Manager
Human rights complaints/violations as reported by	Grievances received	On-going	As defined in the Stakeholder	- EPC Contractor HR Manager

Monitoring	Parameter	Frequency & Durations	Monitoring Locations	Responsibility
Project workers including workers hired through third-parties or in the supply chain			Engagement Plan (SEP)	- O&M Contractor HR Manager

17 CLIMATE CHANGE RISK ASSESSMENT (CCRA)

17.1 Applicable Requirements & Standards

17.1.1 National Requirements

Uzbekistan submitted its Third National Communication to the UNFCCC and it ratified the Paris Agreement in November 2018 which brought its Intended Nationally Determined Contribution (INDC) into effect for the period up to 2030. The long-term objective of the INDC is to decrease specific emissions of greenhouse gases per unit of GDP by 10% by 2030 from level of 2010. This envisages the support from the international organisations and financial, ensuring access to advanced energy saving and environmentally sound technologies and resource allocation for climate financing.

The ratification of the Paris Climate Agreement committed Uzbekistan to transitioning to a green economy, and adoption of the following normative documents:

- Decree of the President of the Republic of Uzbekistan. № PD-4477, dated October 4, 2019 "On approval of the Strategy on transition of the Republic of Uzbekistan to the "green" economy for the period 2019-2030".,
- Decree of the President of the Republic of Uzbekistan, № PD-5863, dated October 30, 2019, "On approval of the Concept of environmental protection of the Republic of Uzbekistan until 2030".

Priority areas of "The Strategy on transition of the Republic of Uzbekistan to the "green" economy for the period 2019-2030" regarding to the electricity producing industry are:

- Reconstruction and modernization of generating capacities of existing power plants with implementation of highly efficient technologies based on combined cycle gas and gas turbine units;
- Improvement of configurations and modernization of main power networks to increase the stability of the power system;
- Implementation of organizational and technical measures, including optimization of modes;
- Increasing the level of automatization of technological processes; and
- Full equipment of power consumption systems with automatic control and metering devices.

17.1.2 Lender Requirements

17.1.2.1 ADB

ADB Environment Safeguards state that the borrower/client is required to promote the reduction of project related GHG emissions in a manner appropriate to the nature and scale of the project operations and impacts. During the development or operation of projects that are expected to or currently emit significant quantitates of greenhouse gases, defined as amounting to 100,000 $_{t}CO_2e$ per annum or more aggregate direct and indirect emissions, the borrower should quantify:

- Direct emissions from the facilities within the physical project boundary; and
- Indirect emissions associated with the off-site production of power used by the project.

The borrower should also evaluate technically and financially feasible and cost-effective options to reduce or offset project related GHG emissions during project design and operation.

In 2017, ADB instituted a Climate Change Operational Framework for the target period 2017 – 2030. The overall objective of the framework is to instrumentally align the Bank's operations in Developing Member Countries with collective and country-specific climate performance targets set out in the Paris Agreement. In furtherance of the Paris accord, the framework establishes principles and systems for mainstreaming climate action into the Bank's policy-, strategy- and project-level undertakings.

The Climate Change Operational Framework places particular emphasis on proactive and collaborative incorporation of decarbonization and climate resilience foci into the broader appraisal and management framework for sustainability-related risks, across ADB's investment portfolio. The framework is therefore intended to ensure material progress towards Nationally Determined Contribution targets, through a systemic delivery of technical and financial assistance to this end.

17.1.2.2 AIIB

AIIB's comprehensive Environmental and Social Framework integrates climate change considerations into its policies and operations. The ESF aims to ensure that the projects financed by AIIB are environmentally and socially sustainable, and it reflects the Bank's commitment to addressing climate change.

- The Environmental and Social Policy requires projects to undergo a climate risk and vulnerability assessment to identify potential climate-related risks and ensure resilience. This includes evaluating the impact of climate change on project performance and longevity. The policy requires the estimation and reporting of

GHG emissions for relevant projects. It encourages the implementation of measures to reduce emissions and enhance carbon sequestration.

- The Environmental and Social Standards also requires the assessment of climate change risks and the integration of appropriate mitigation and adaptation measures into project design and implementation. In addition, it focuses on resource efficiency, including energy use, and the reduction of pollution, including GHG emissions. It promotes the use of clean and renewable energy sources.

17.1.2.3 IFC

The IFC Performance Standards acknowledge that climate change is a topic that can be addressed across multiple Performance Standards and there is an expectation under IFC PS1 for relevant risks associated with climate change to be identified.

With regard to 'Greenhouse Gases', IFC PS3 requires consideration of alternatives and for Project's to implement, '*technically and financially feasible and cost-effective options to reduce project-related GHG emissions during the design and operation of the project.*

PS3 further states '*for projects that are expected to or currently produce more than 25,000 tonnes of CO_2-equivalent annually, the client will quantify direct emissions from the facilities owned or controlled within the physical project boundary, as well as indirect emissions associated with the off-site production of energy used by the project. Quantification of GHG emissions will be conducted by the client annually in accordance with internationally recognized methodologies and good practice*.'

17.1.2.4 Equator Principles IV (Good Practice)

Equator Principles volume IV establishes that impacts on the climate should be avoided where possible, and in support of the 2015 Paris Agreement recognises that EPFIs have a role to play in improving the availability of climate-related information, such as the recommendation by the Task Force on Climate-related Financial Disclosures (TCFD).

More specifically, Principle 1 states that factors such as climate change are required for the project categorisation based on the International Finance Corporation's (IFC) environmental and social categorisation process.

Principle 2 outlines the need for a climate change risk assessment, stating a requirement to "*include assessments of potential adverse […] climate change risks as part of the ESIA or other Assessment*". It further states that "*The Climate Change Risk Assessment should be aligned with the Climate Physical Risk and Climate Transition Risk categories of the TCFD*". These are (TCFD, 2017):

- ***Physical Risk:*** Risks related to the physical impacts of climate change; and

  - Acute Physical Risk: those that are event-driven, including increased severity of extreme weather events, such as cyclones, hurricanes, or floods etc; and
  - Chronic Physical Risk: longer-term shifts in climate patterns (e.g., sustained higher temperatures) that may cause sea level rise or chronic heat waves.
- ***Transition Risk:*** Risks related with a transition to a lower-carbon economy.

EP 2 delineates emissions into two scopes:

- ***Scope 1 Emissions***: direct emissions from the project owned facilities, or facilities controlled within the physical project boundary; and
- ***Scope 2 Emissions***: indirect emissions associated with the off-site production of energy used by the project, such as connection to the grid.

For projects with combined scope 1 & 2 Greenhouse Gas (GHG) emissions of over 100,000 tonnes $CO_{2\text{-eq}}$ per annum, Principle 2 states requirements for analysis of alternatives which evaluates low GHG intense alternatives, and Principle 10 states that projects should report their GHG emissions annually.

IFC PSs underpin EP 2. PS 1 states that the clients "*risks and impacts identification process will consider the emissions of greenhouse gases, the relevant risks associated with a changing climate and the adaptation opportunities, and potential transboundary effects*."

PS 3 continues that clients should "*consider alternatives and implement technically and financially feasible and cost-effective options to reduce Project-related GHG emissions during the design and operation of the Project*". For projects producing in excess of 25,000 tonnes $CO_{2\text{-eq}}$ per annum, PS3 states a requirement for the client to quantify scope 1 and 2 emissions.

In addition to the above, a Guidance Note on Climate Change Risk Assessment was published by the Equator Principles in May 2023. This note provides guidance to support the understanding and implementation of the *Climate Change Risk Assessment* requirements under Principle 2 of EP4[49].

17.2 Baseline Conditions

17.2.1 National Context

Uzbekistan is one of the countries most vulnerable to climate change, with key sectors such as agriculture, the economy, public health, energy, water resource management, and disaster risk reduction identified as particularly at risk (WBG, 2021). Over the past century, average annual air temperatures have steadily and significantly increased. From 1950 to 2013,

[49] https://equator-principles.com/app/uploads/Guidance-CCRA_May-2023.pdf

temperatures rose at an average rate of 0.27°C per decade, with little variation from year to year. Climate observations indicate that the number of extremely hot days (over 40°C) has risen since the 1950s, while the number of extremely cold days (below -15°C or -20°C) has decreased.

In addition to rising temperatures, there has been a slight downward trend in precipitation between 1950 and 2013, although the changes are minimal. Climate change is projected to intensify drought conditions, particularly due to reduced river runoff from the Amudarya and Syrdarya rivers. Regions like Navoi, Bukhara, Kashkadarya, and Surkhandarya already experience more than 40 days of drought annually, and this number is expected to rise. Water shortages and increased droughts will be exacerbated by declining river flows, higher water consumption across all sectors, and population growth. This will particularly affect regions in the lower reaches of the Amudarya basin, such as Bukhara Province.

Uzbekistan's climate is largely arid and continental, with significant seasonal and regional temperature variations. Summers are long, hot, and dry, especially in the southern regions near Afghanistan and Turkmenistan. In contrast, winters are cold, with average temperatures ranging from -1°C to -3°C, particularly in the western regions. Most of the country receives less than 50 mm of annual rainfall, though mountainous areas in the east and southeast, like the Tien Shan range, can receive up to 400 mm. The Bukhara region, where the project is located, is one of the driest in the country, with annual precipitation typically below 150 mm. This diversity in climate, from arid deserts in the west to temperate mountains in the east, highlights the country's vulnerability to climate change impacts (WBG & ADB, 2021).

17.2.2 Regional Context

As per the World Bank Group's Climate Change Knowledge Portal (CCKP), in the hottest months of June and July, average temperatures in the Bukhara region typically reach around 29°C, while the average in Uzbekistan during the same period reaches only 27 °C. During winter (December to February), the Bukhara region experiences average temperatures of about 1.5°C to 4°C, whereas the overall temperatures in Uzbekistan are lower between 0°C to -1.5°C. Rainfall in Uzbekistan is very varied with peak precipitation occurring in March and April where it can exceed 100 mm per month (CCKP, 2024).

The following figure presents the Project area's average monthly temperature and precipitation from 1991 to 2020. The highest average maximum temperature of 35.83°C and the lowest average minimum temperature of -5.8°C were recorded in July and January respectively. The annual mean temperature in the Project area was recorded at 15.58°C in 1991, increasing to 17.44°C in 2022. The highest precipitation levels of 28.47mm were recorded in March compared to the lowest of 0.24mm in August (CCKP, 2024).

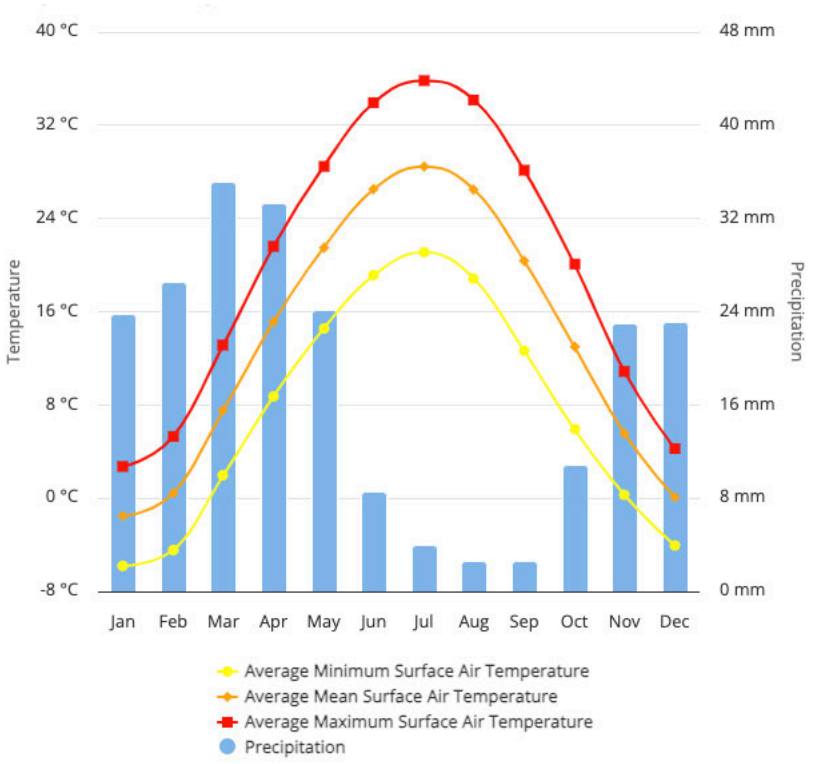


Figure 17-1 1 Average Monthly Climate Conditions in the Project Area for 1991-2022 (CCKP, 2024)

Summer temperatures peak with an average July maximum of 34.9°C in Uzbekistan. The historic climatology showing the number of hot days with maximum temperature above 35°C in the Project area (Ref. Period: 1995-2014) is shown in the graph below. In 1950, the median number of hot days with a maximum temperature above 35°C was approximately 69 days annually (10th percentile of 53.88 days and 90th percentile of 76.93 days). The median number of hot days with a maximum temperature above 35°C has increased in 2014 to a 50th percentile average of approximately 85 days per year (10th percentile of 72.90 days and 90th percentile of 96.82 days) (CCKP, 2024).

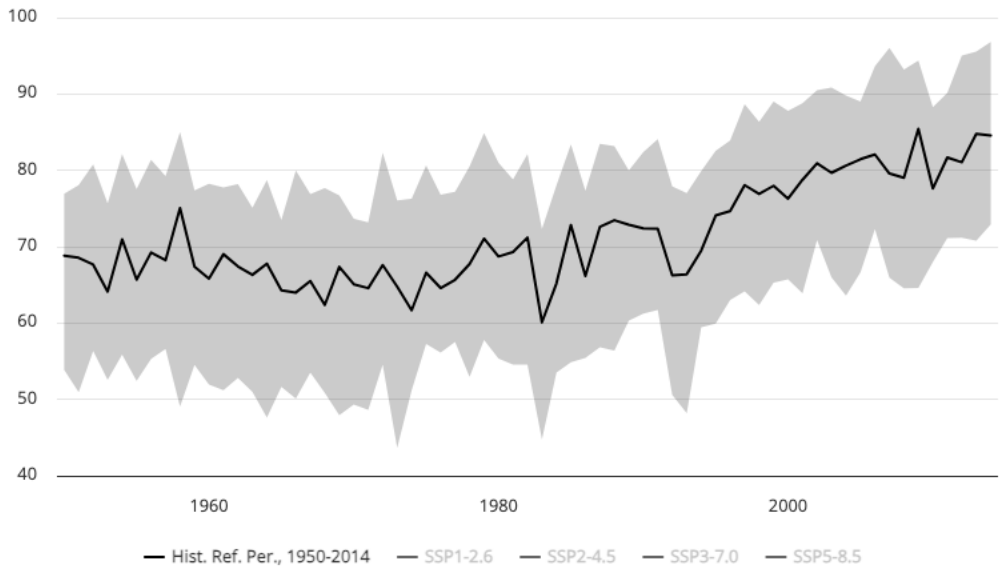


Figure 17-2 Historical Climatology of Number of Hot Days (Tmax > 35°C) per Year for 1950-2014 in the Project Area, Multi-Model Ensemble

The historic climatology showing the number of ice days with maximum temperature below 0°C in the Project area (Ref. Period: 1995-2014) is shown in the graph below. In 1950, the median number of ice days with maximum temperature below 0°C was approximately 12.54 days annually (10th % of 6.66 days and 90th % of 19.67 days). The median number of ice days with a maximum temperature below 0°C has decreased in 2014 to the 50th percentile of 8.92 days per year (10th % of 3.56 days and 90th % of 18.11 days) (CCKP, 2024).

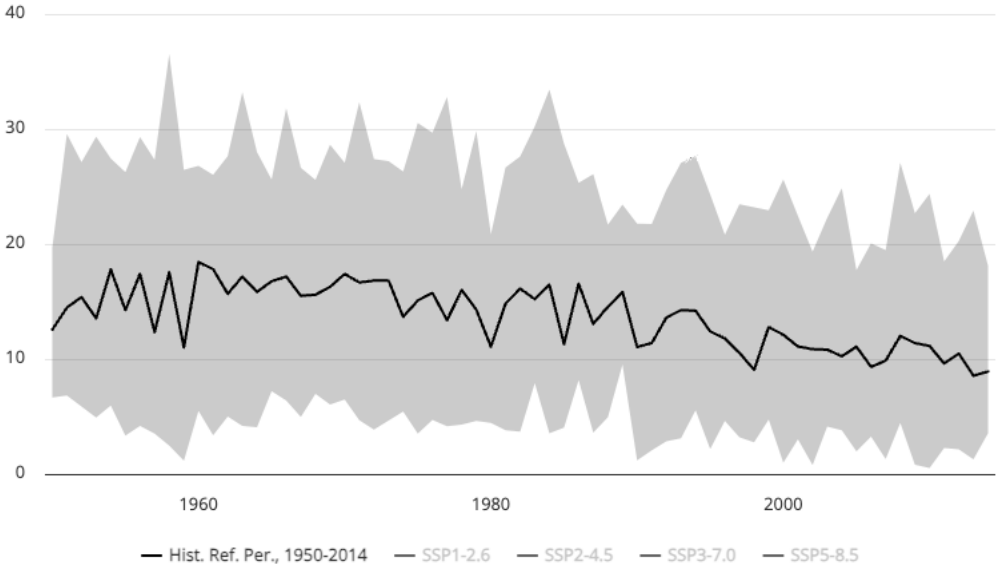


Figure 17-3 Historical Climatology of Number of Ice Days (Tmax < 0°C) in the Project Area for 1950-2014

17.3 Climate Change Projections

The primary data source for the World Bank Group's CCKP is the Coupled Model Intercomparison Project Phase 5 (CMIP5) models, which are used within the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). These models provide estimates for future temperature and precipitation patterns.

In the portal, climate projections are developed based on societal development narratives under the Shared Socioeconomic Pathways (SSPs). These pathways consider various societal factors, including demographics, human development, economic growth, inequality, governance, technological change, and policy orientations. These variables are commonly used as inputs for emissions and impact models due to their interrelated nature. The portal presents several SSP scenarios, including SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5.

The SSP2-4.5and SSP5-8.5 will be used for this assessment to determine future trends and apply these to the Project:

- SSP2-4.5 is approximately in line with the upper end of aggregate Nationally Determined Contribution (NDC) emission levels by 2030. It represents assessed temperature projections for NDCs to be between 2.7 and 3.4°C by 2100, corresponding to the upper half of projected warming under SSP2-4.5. New or updated NDCs by the end of 2020 did not significantly change the emissions projections up to 2030, although more countries adopted 2050 net zero targets in line with SSP1-1.9 or SSP1-2.6. The SSP2-4.5 scenario deviates mildly from a 'no-additional- climate-policy' reference scenario, resulting in a best-estimate warming of around 2.7°C by the end of the 21st century relative to 1850-1900.
- SSP5-8.5 is a high reference scenario with no additional climate policy. Emission levels as high as SSP5-8.5 are not obtained by Integrated Assessment Models (IAMs) under any of the SSPs other than fossil-fueled SSP5 socioeconomic development pathway.

The Project commercial operation date (COD) is expected in September 2027, therefore, the potential climate change scenarios under the Coupled Model Inter-comparison Projects 6 (CMIP6) during the Project's lifetime till 2052 were obtained from CCKP. The applicable parameters are discussed in detail in the sections below.

17.3.1 Temperature Projections

Under scenario SSP2-4.5, for the time-period 2020-2039, the average mean surface air temperature in the Project area is projected to be the highest in July where the 10-90th percentile range is 31.74°C to 33.29°C (median 31.14°C). The lowest temperature is expected

in January where the 10-90th percentile range is expected at 1.03°C to 2.76°C (median 1.71°C). The 50th percentile for the projected annual average mean surface air temperature anomaly for 2020-2039 for the Project area (Ref. Period: 1995-2014), is highest in July at a 1.32°C increase.

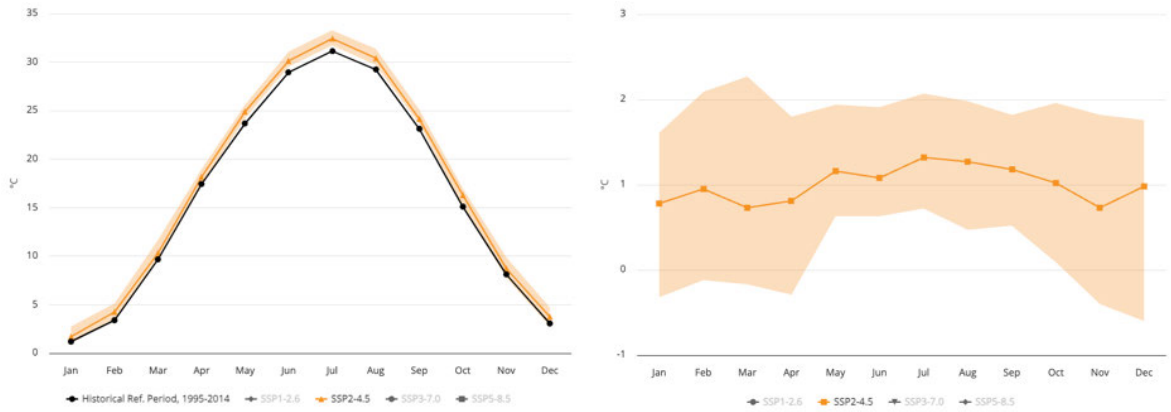


Figure 17-4 Projected Climatology (Left) and Anomaly (Right) of Average Mean Surface Air Temperature for 2020-2039 (Annual) for the Project Region; (Ref. Period: 1995-2014), SSP2-4.5, Multi-Model Ensemble

Under scenario SSP2-4.5, for the time-period 2040-2059, the average mean surface air temperature in the Project area is projected to be the highest in July where the 10-90th percentile ranges between 32.48°C to 34.26°C (median 31.14°C). The lowest temperature is expected in January where the 10-90th percentile range is 1.35°C to 3.51°C (median 2.51°C). The 50th percentile for the projected annual average mean surface air temperature anomaly for 2040-2059 for the Project area (Ref. Period: 1995-2014), is highest in August at 2.13°C.

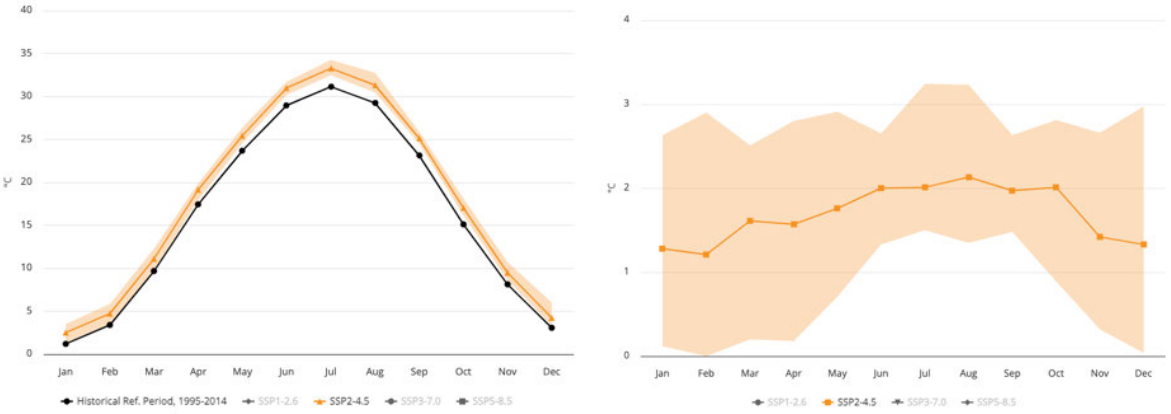


Figure 17-5 Projected Climatology (Left) and Anomaly (Right) of Average Mean Surface Air Temperature for 2040-2059 (Annual) for the Project Region; (Ref. Period: 1995-2014), SSP2-4.5, Multi-Model Ensemble

As presented in the following figure, under scenario SSP2-4.5, in 2027, the 10-90th percentile range of average mean surface air temperature in the Project area is expected to be 16.33°C to 18.00°C (median 17.32°C). By 2052, the 10-90th percentile range of average mean surface air temperature in the Project area is expected to reach 17.04°C to 19.17°C (median 18.14°C).

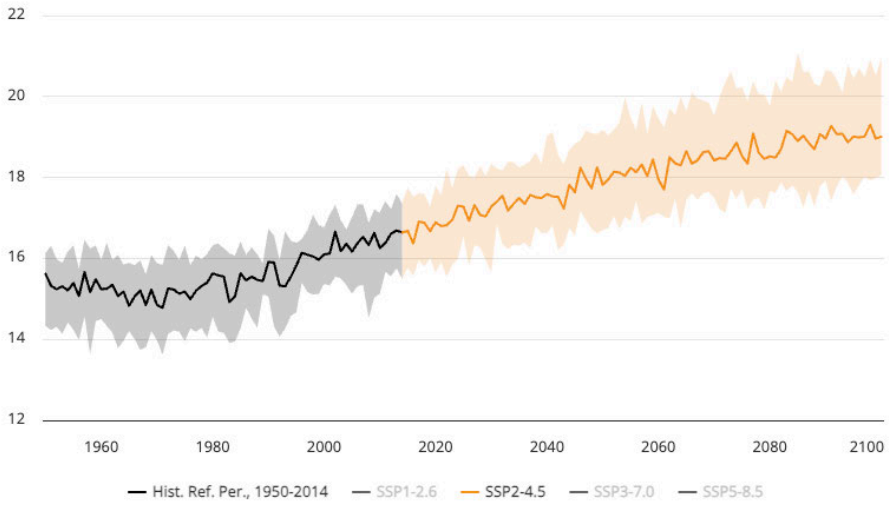


Figure 17-6 Projected Average Mean Surface Air Temperature for the Project Region; (Ref. Period: 1995-2014), SSP2-4.5, Multi-Model Ensemble

Under scenario SSP5-8.5, for the time-period 2020-2039, the average mean surface air temperature in the Project area is expected be highest in July where the 10-90th percentile range is 31.85°C to 33.39°C (median 32.65°C). The lowest temperature is expected in January where the 10-90th percentile range is 0.92°C to 2.67°C (median 1.84°C). The 50th percentile for the projected annual average mean surface air temperature anomaly for 2020-2039 for the Project area (Ref. Period: 1995-2014), is highest in September at 1.57°C.

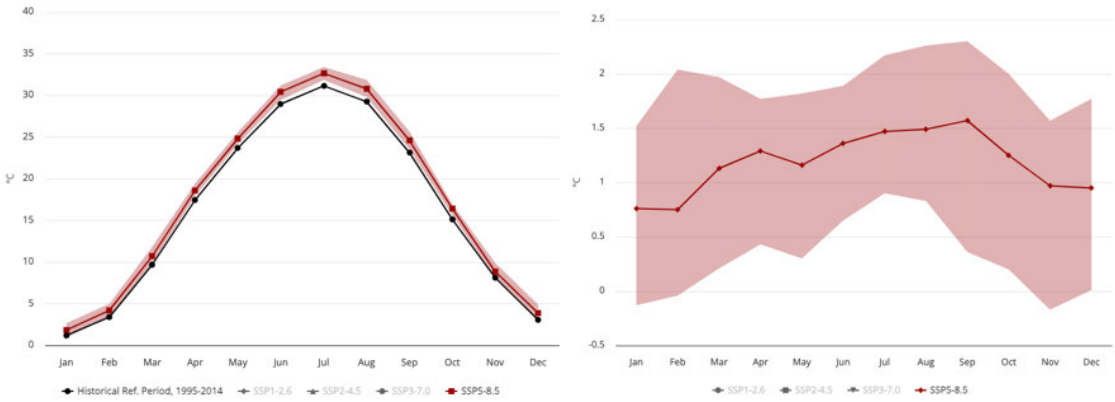


Figure 17-7 Projected Climatology (Left) and Anomaly (Right) of Average Mean Surface Air Temperature for 2020-2039 (Annual) for the Project Region; (Ref. Period: 1995-2014), SSP5-8.5, Multi-Model Ensemble

Under scenario SSP5-8.5, for the time-period 2040-2059, the average mean surface air temperature in the Project area is highest in July where the 10-90th percentile ranges between 32.94°C to 35.23°C (median 33.98°C). The lowest temperature is in January where the 10-90th percentile range is expected at 1.92°C to 4.68°C (median 2.84°C). The 50th percentile for the projected annual average mean surface air temperature anomaly for 2040-2059 for the Project area (Ref. Period: 1995-2014), is highest in August at 3.05°C.

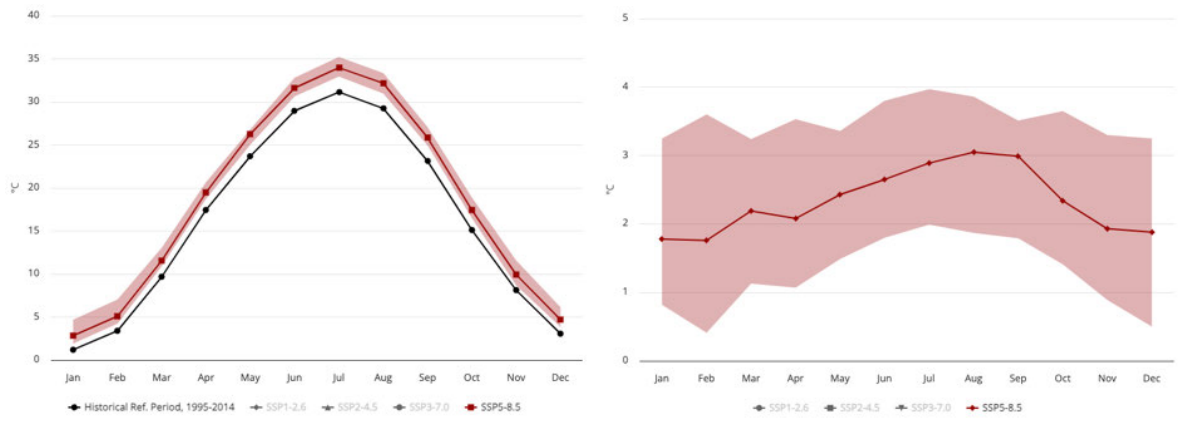


Figure 17-8 Projected Climatology (Left) and Anomaly (Right) of Average Mean Surface Air Temperature for 2040-2059 (Annual) for the Project Region; (Ref. Period: 1995-2014), SSP5-8.5, Multi-Model Ensemble

As presented in the following figure, under scenario SSP5-8.5, in 2027, the 10-90th percentile range of average mean surface air temperature in the Project area is expected to range between 16.06°C and 18.13°C (median 17.44°C). By 2052, the 10-90th percentile range of average mean surface air temperature in the Project area is expected to reach a range of 17.40°C to 20.14°C (median 18.41°C).

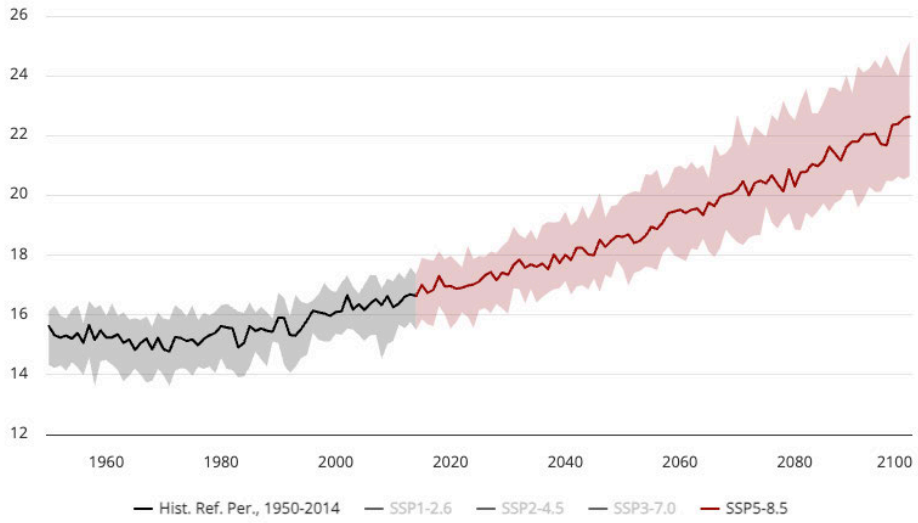


Figure 17-9 Projected Average Mean Surface Air Temperature for the Project Region; (Ref. Period: 1995-2014), SSP5-8.5, Multi-Model Ensemble

17.3.2 Extreme Weather

17.3.2.1 Heatwaves

Primarily, increases in heatwave probability simply reflect the general increase in ambient temperatures, which constantly move away from the baseline Period 1995-2014 against which heat wave is measured. Another lens through which to view extreme heat is the annual frequency of days in which temperatures breach 35°C (CCKP, 2024).

Under scenario SSP2-4.5, the number of hot days with maximum temperature above 35°C in the Project area is highest in July with a median of 26.36 days for the period 1995-2014, projected to increase to 28.72 days for 2020-2039 and to further increase to 29.71 days for 2040-2059. In 2027, the COD of the Project, the projected number of hot days with maximum temperature above 35°C is 89.82 days (median), increasing throughout the Project lifetime to reach 103.12 days (median) in 2052.

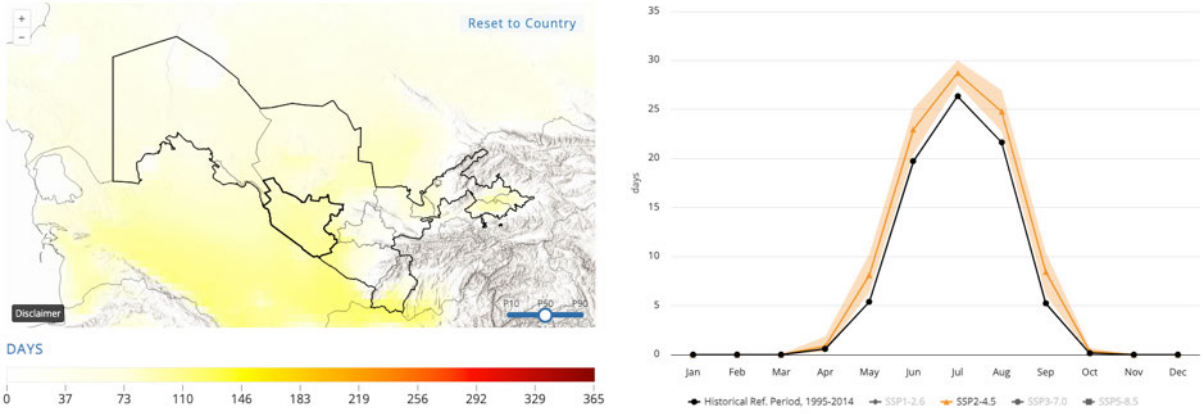


Figure 17-10 Projected Number of Hot Days (Tmax > 35°C) for the Project Area (2020-2039), SSP2-4.5, 50th Percentile

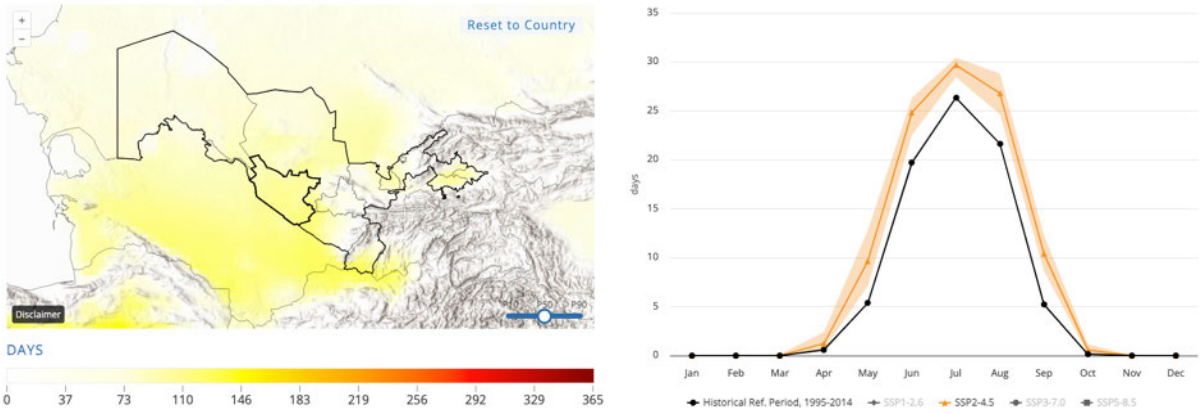


Figure 17-11 Projected Number of Hot Days (Tmax > 35°C) for the Project Area (2040-2039), SSP2-4.5, 50th Percentile

Under scenario SSP5-8.5, the number of hot days with maximum temperature above 35°C in the Project area is highest in July with a median of 26.36 days for the period 1995-2014, projected to increase to 29.06 days for 2020-2039 reaching 30.14 days in the period of 2040- 2059. In 2027, the COD of the Project, the projected number of hot days with maximum temperature above 35°C is 95.01 days (median), increasing throughout the Project lifetime to reach 113.17 days (median) in 2052.

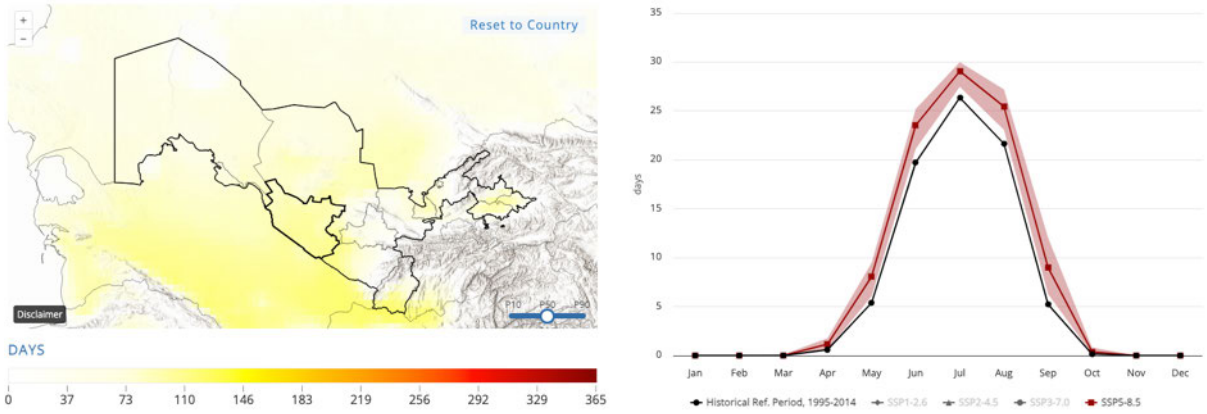


Figure 17-12 Projected Number of Hot Days (Tmax > 35°C) for the Project Area (2020-2039), SSP5-8.5, 50th Percentile

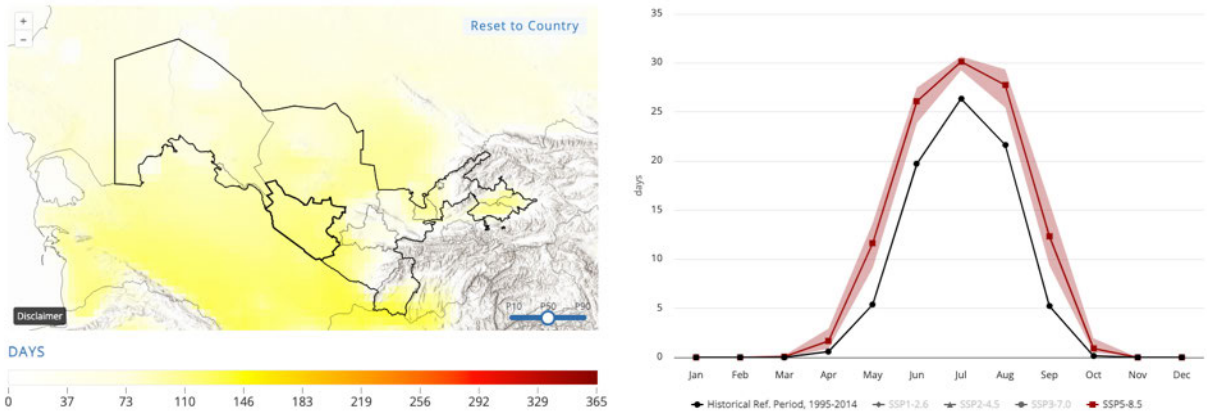


Figure 17-13 Projected Number of Hot Days (Tmax > 35°C) for the Project Area (2040-2059), SSP5-8.5, 50th Percentile

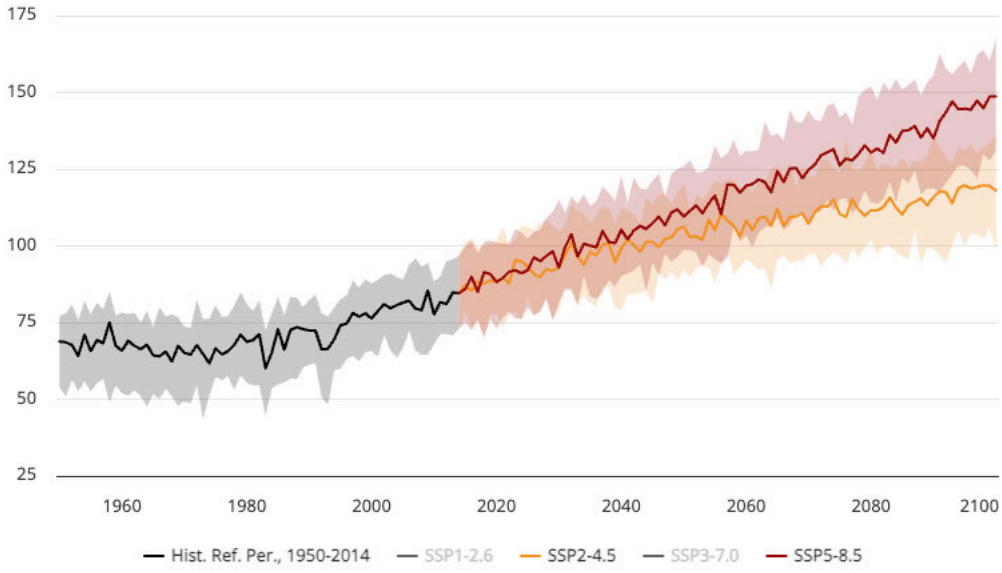


Figure 17-14 Projected Climatology of Number of Hot Days (Tmax > 35°C) per Year for the Project Area (Ref. Period: 1995-2014), SSP2-4.5 and SSP5-8.5, Multi-Model Ensemble

17.3.2.2 Extreme Cold Weather

Under scenario SSP2-4.5, the number of ice days with maximum temperature below 0°C in the Project area is highest in January with a median of 5.23 days for the period 1995-2014, projected to decrease to 4.49 days for 2020-2039 and decrease further to 4.13 days for 2040-2059. In 2027, the COD of the Project, the projected number of ice days with maximum temperature below 0°C is 8.26 days (median), slightly fluctuating and decreasing throughout the Project lifetime, to reach 7.11 days (median) in 2052.

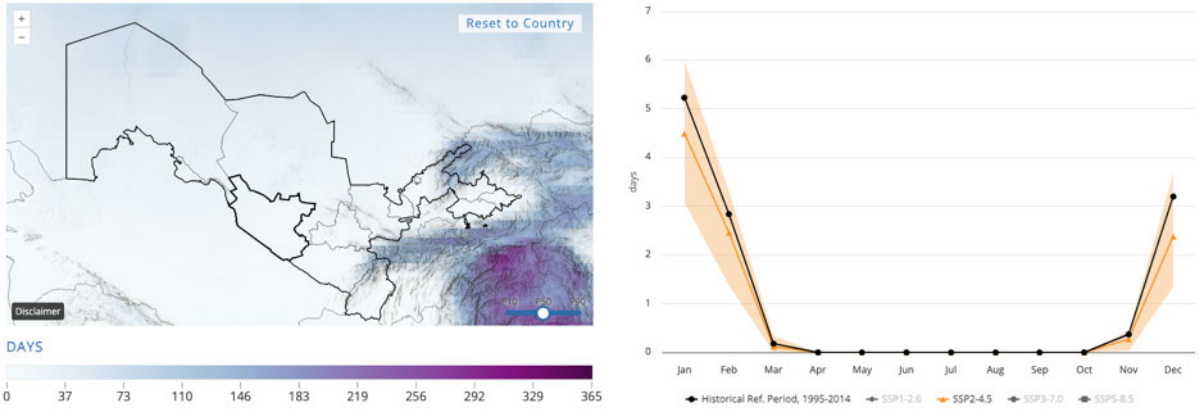


Figure 17-15 Projected Number of Ice Days (Tmax < 0°C) for the Project Area (2020-2039), SSP2-4.5, 50th Percentile

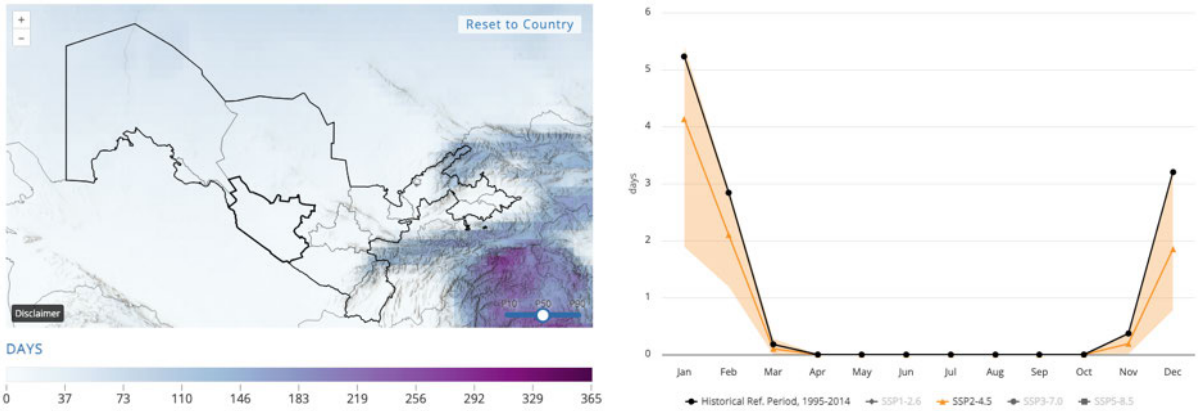


Figure 17-16 Projected Number of Ice Days (Tmax < 0°C) for the Project Area (2040-2059), SSP2-4.5, 50th Percentile

Under scenario SSP5-8.5, the number of ice days with maximum temperature below 0°C in the Project area is highest in January with a median of 5.23 days for the period 1995-2014, projected to decrease to 4.13 days for 2020-2039 reaching 3.36 days for 2040-2059. In 2027, the COD of the Project, the projected number of ice days with maximum temperature below 0°C is 7.93 days (median), slightly fluctuating and decreasing throughout the Project lifetime, to reach 6.53 days (median) in 2052.

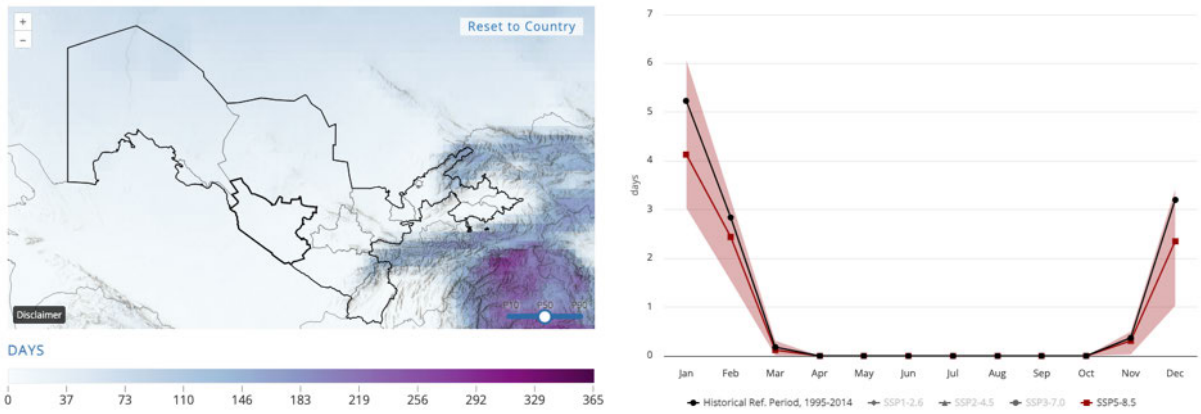


Figure 17-17 Projected Number of Ice Days (Tmax < 0°C) for the Project Area (2020-2039), SSP5-8.5, 50th Percentile

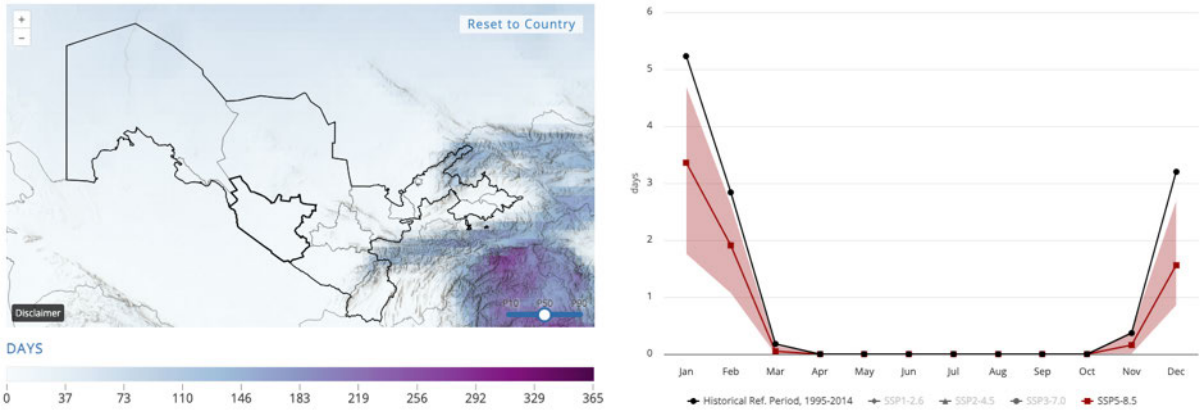


Figure 17-18 Projected Number of Ice Days (Tmax < 0°C) for the Project Area (2040-2059), SSP5-8.5, 50th Percentile

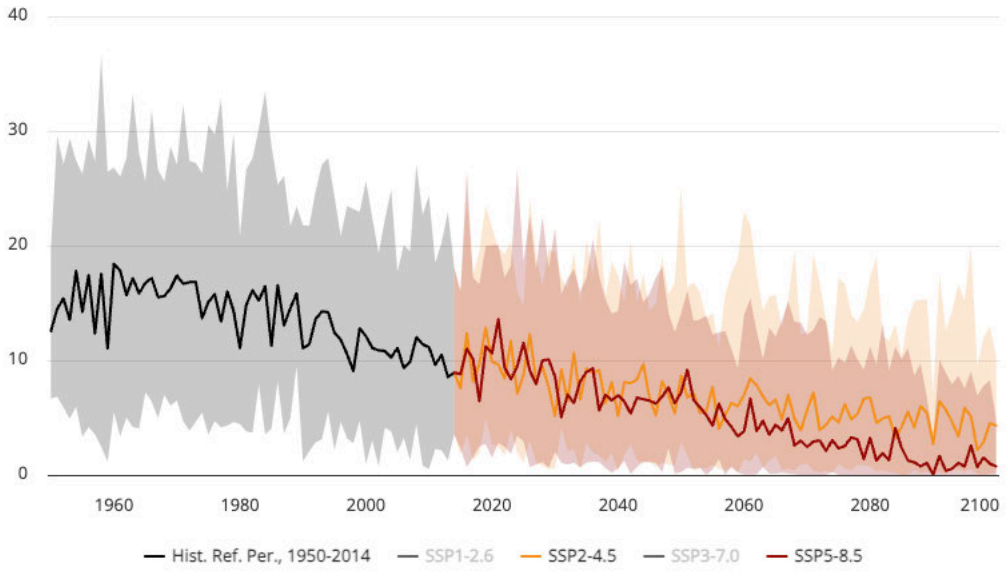


Figure 17-19 Projected Climatology of Number of Ice Days (Tmax < 0°C) per Year for the Project Area (Ref. Period: 1995-2014), SSP2-4.5 and SSP5-8.5, Multi-Model Ensemble

17.3.3 Precipitation

Under scenario SSP2-4.5, for the time-period 2020-2039, the average precipitation in the Project area is projected to be the highest in March where the 10-90th percentile range is 26.04mm to 37.00mm (median 28.66mm). The lowest precipitation is expected in August where the 10-90th percentile range is expected at 0.15mm to 0.74mm (median 0.41mm). The 50th percentile for the projected annual precipitation anomaly for 2020-2039 for the Project area (Ref. Period: 1995-2014), is highest in March with a 3.41mm increase (10-90th percentile range of -4.08mm to 7.57mm).

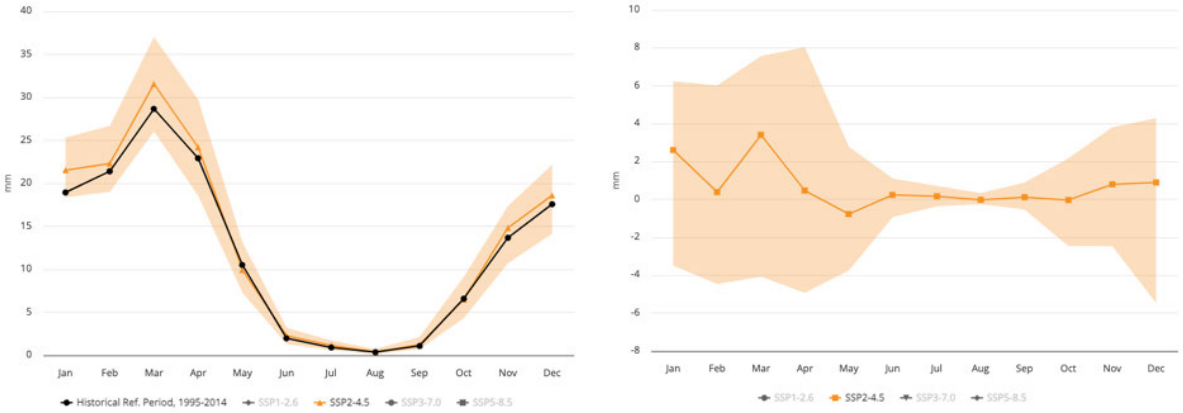


Figure 17-20 Projected Precipitation Climatology (Left) and Anomaly (Right) for 2020-2039 (Annual) for the Project Region; (Ref.Period: 1995-2014), SSP2-4.5, Multi-Model Ensemble

Under scenario SSP2-4.5, for the time period 2040-2059, the average precipitation in the Project area is projected to be the highest in March where the 10-90th percentile range is 25.43mm to 34.62mm (median 29.25mm). The lowest precipitation is expected in August where the 10-90th percentile range is expected at 0.12mm to 0.75mm (median 0.35mm). The 50th percentile for the projected annual precipitation anomaly for 2040-2059 for the Project area (Ref. Period: 1995-2014), is highest in January with a 4.15mm increase (10-90th percentile range of -2.11mm to 8.01mm).

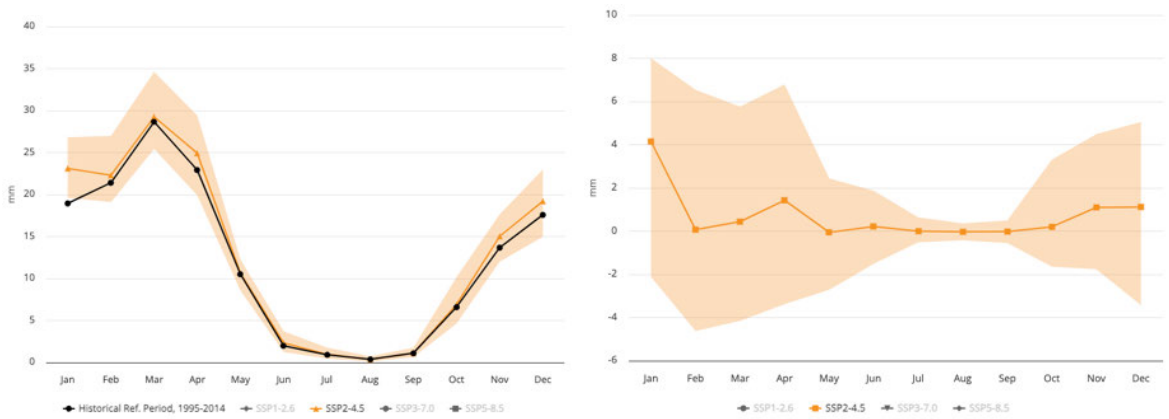


Figure 17-21 Projected Precipitation Climatology (Left) and Anomaly (Right) for 2040-2059 (Annual) for the Project Region; (Ref.Period: 1995-2014), SSP2-4.5, Multi-Model Ensemble

As presented in the following figure, under scenario SSP2-4.5, in 2027, the 10-90th percentile range of precipitation in the Project area is expected to be 89.20mm to 210.77mm (median 150.15mm). By 2052, the 10-90th percentile precipitation in the Project area is expected to reach a range of 108.43mm to 212.12mm (median 149.00mm).

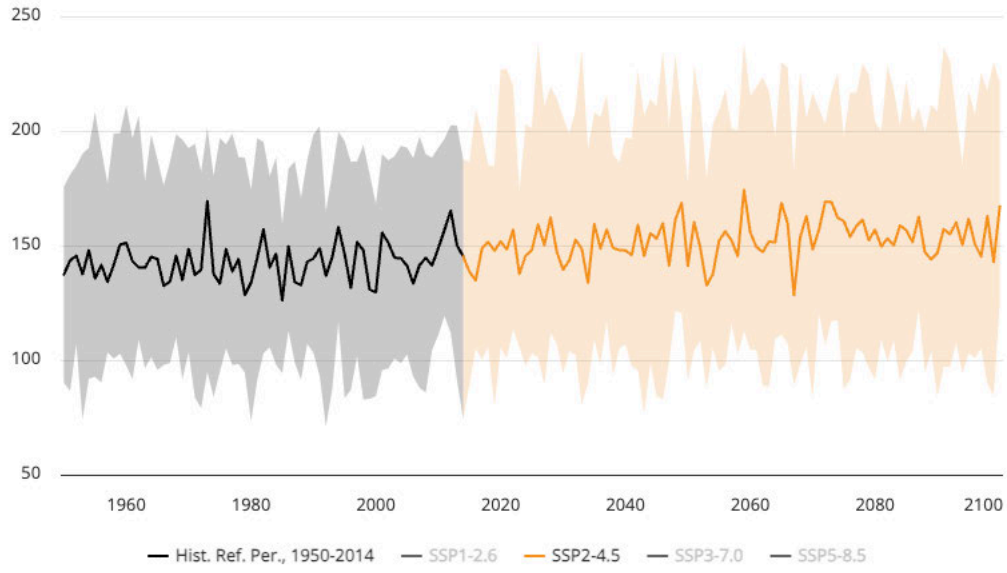


Figure 17-22 Projected Precipitation for the Project Region; (Ref. Period: 1995-2014), SSP2-4.5, Multi-Model Ensemble

Under scenario SSP5-8.5, for the time period 2020-2039, the average precipitation in the Project area is projected to be the highest in March where the 10-90th percentile range is 23.46mm to 34.48mm (median 29.07mm). The lowest precipitation is expected in August where the 10-90th percentile range is expected at 0.18mm to 0.86mm (median 0.37mm). The 50th percentile for the projected annual precipitation anomaly for 2020-2039 for the Project area (Ref. Period: 1995-2014), is highest in January with 2.48mm increase (10-90th percentile range of -4.34mm to 6.61mm).

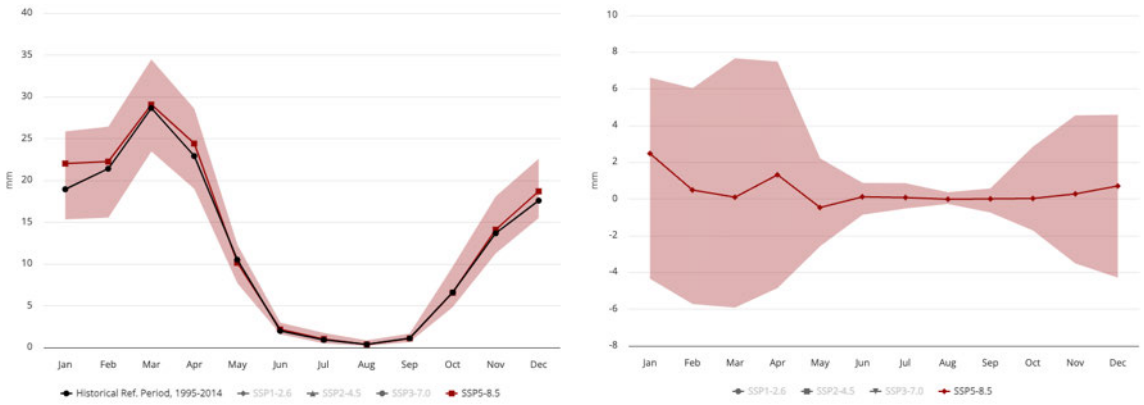


Figure 17-23 Projected Precipitation Climatology (Left) and Anomaly (Right) for 2020-2039 (Annual) for the Project Region; (Ref. Period: 1995-2014), SSP5-8.5, Multi-Model Ensemble

Under scenario SSP5-8.5, for the time period 2040-2059, the average precipitation in the Project area is projected to be the highest in April where the 10-90th percentile range is 23.45mm to 35.66mm (median 28.66mm). The lowest precipitation is expected in August where the 10-90th percentile range is expected at 0.16mm to 0.81mm (median 0.35mm). The 50th percentile for the projected annual precipitation anomaly for 2040-2059 for the Project area (Ref. Period: 1995-2014), is highest in January with a 4.31mm increase (10-90th percentile range of -1.30mm to 9.72mm).

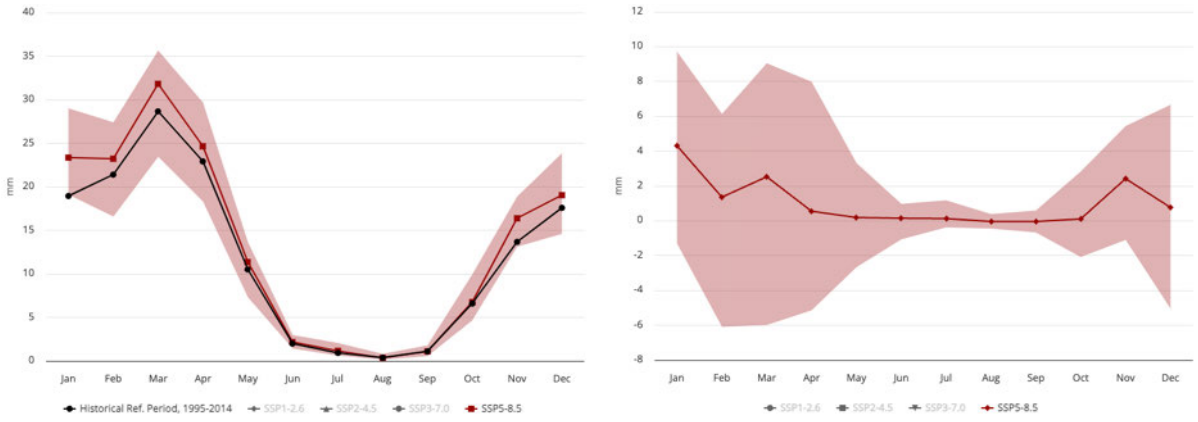


Figure 17-24 Projected Precipitation Climatology (Left) and Anomaly (Right) for 2040-2049 (Annual) for the Project Region; (Ref. Period: 1995-2014), SSP5-8.5, Multi-Model Ensemble

As presented in the following figure, under scenario SSP5-8.5, in 2027, the 10-90th percentile range of precipitation in the Project area is expected to be 107.88mm to 226.76mm (median 146.52mm). By 2052, the 10-90th percentile precipitation in the Project area is expected to reach a range of 84.43mm to 200.28mm (median 152.05mm).

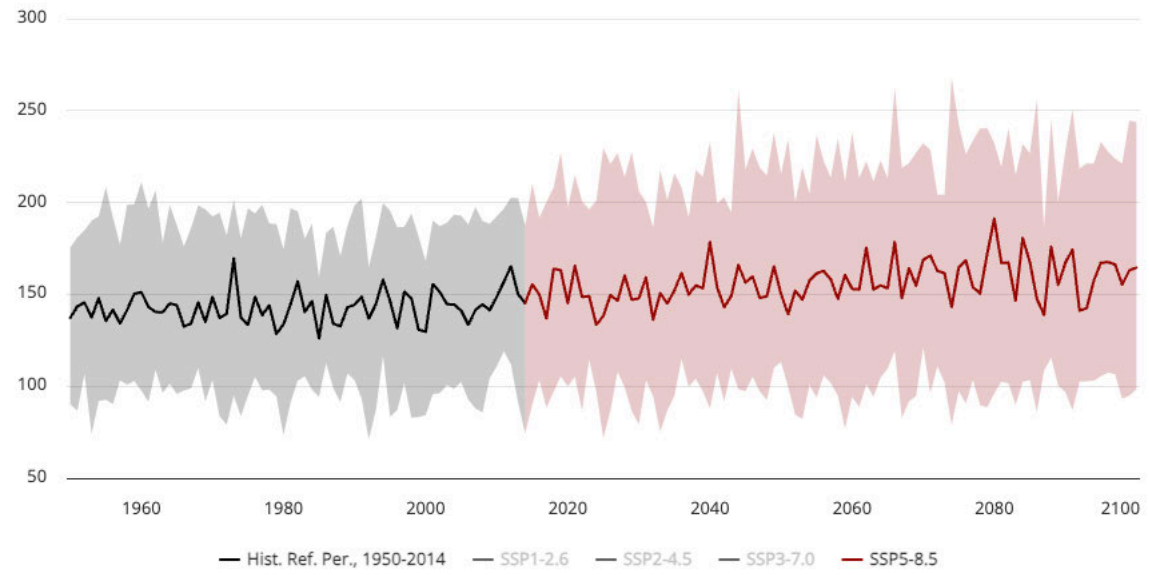


Figure 17-25 Projected Precipitation in the Project Region; (Ref. Period: 1995-2014), SSP5-8.5, Multi-Model Ensemble

17.3.4 Floods

The Bukhara region of Uzbekistan is not immune to flooding, though such incidents are rare due to its predominantly arid climate. Flooding in the area is usually caused by extreme rainfall events and rapid snowmelt from the surrounding highlands. For example, in 2010, a flash flood in the Bukhara region led to temporary disruptions in infrastructure and agriculture, affecting local water management systems. The flat landscape and poor drainage in the region can exacerbate flood impacts when intense rainstorms occur. Despite the low frequency, floods remain a risk that could increase due to climate change.

According to the ThinkHazard website, the Bukhara region faces significant risks from both river and urban flooding, with hazard levels classified as high based on current models, as shown in the figures below. River floods, which are potentially life-threatening and damaging, are expected to occur at least once in the next decade. These floods require careful consideration during project planning, design, and construction, as the region's flat landscape and inadequate drainage systems exacerbate the risk. Urban flooding poses a similar threat, with models predicting at least one major flood event in the next 10 years. Climate change could worsen both hazards, as model projections are inconsistent regarding changes in rainfall patterns, potentially increasing the frequency and severity of flooding. It is crucial to design projects in Bukhara to be resilient to these long-term flood risks, particularly as the urban and rural landscapes may both be impacted by future climate variability.

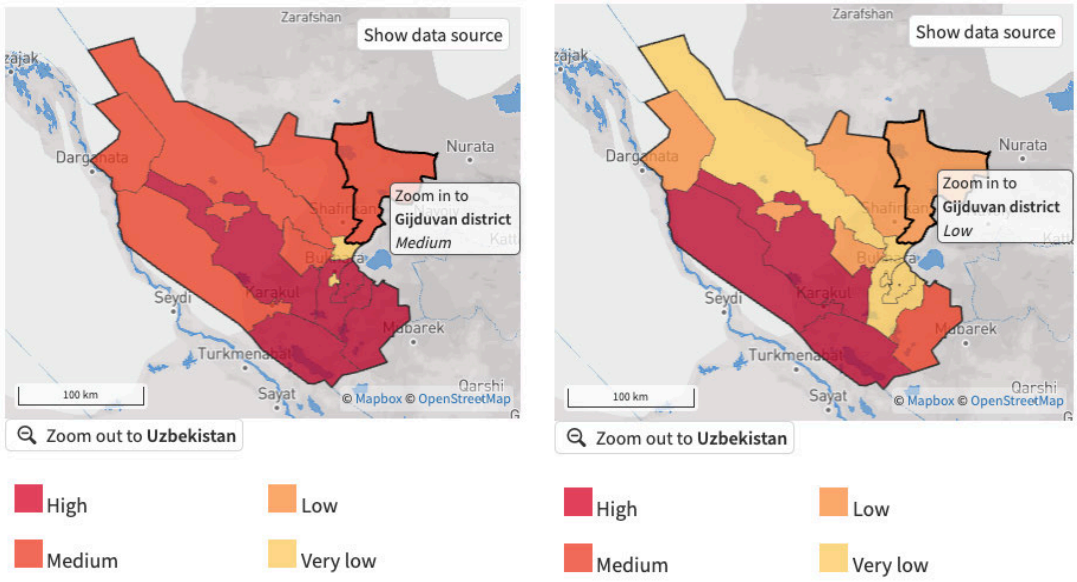


Figure 17-26 Indication of Projected River Flood Risk (left) and Urban Flood Risk in the Gijduvon District of the Bukhara Region (ThinkHazard, 2024)

17.3.5 Drought

According to the Climate Risk Country Profile for Uzbekistan, the country faces two main types of drought, meteorological, characterized by a lack of precipitation, and hydrological, caused by water shortages due to low river runoff, especially from key rivers such as the Amu Darya and Syr Darya. Droughts have become more frequent in recent decades, with the risk projected to increase significantly by the end of the century. Under high emissions scenarios (RCP8.5), severe meteorological droughts could occur in as many as 87% of all years by the 2090s. The western regions, particularly Karakalpakstan, are expected to experience drought conditions for up to 95% of the years (WBG & ADB, 2021).

Naumann et al. (2018) referenced in the Climate Country Profile report provide a perspective on changes in drought conditions under different warming scenarios. They predict significant increases in the duration and magnitude of meteorological droughts in West Asia by the end of the 21st century under global warming levels of 1.5°C, 2.0°C, and 3.0°C. Droughts that are currently extremely rare in West Asia (100-year droughts) are projected to become 5 to 10 times more common under these warming scenarios. Similarly, model ensembles forecast a significant rise in the annual probability of severe drought by the 2090s. This rise is particularly notable in higher emissions pathways, with a projected increase in the median probability of severe drought from an observed 2% per year from 1986–2005 to a forecasted 73% or 85% by the end of the century. These projections indicate a shift towards a chronically drought-affected environment in many parts of Azerbaijan, likely contributing to the expansion of arid (WBG & ADB, 2021).

According to the ThinkHazard Platform and shown below, in the Project area (Gijduvon District of the Bukhara Region) water scarcity is classified as medium according to the information that is currently available to this tool. This is when water availability is <1000 m^3 per capita per year at the 50-year return period.

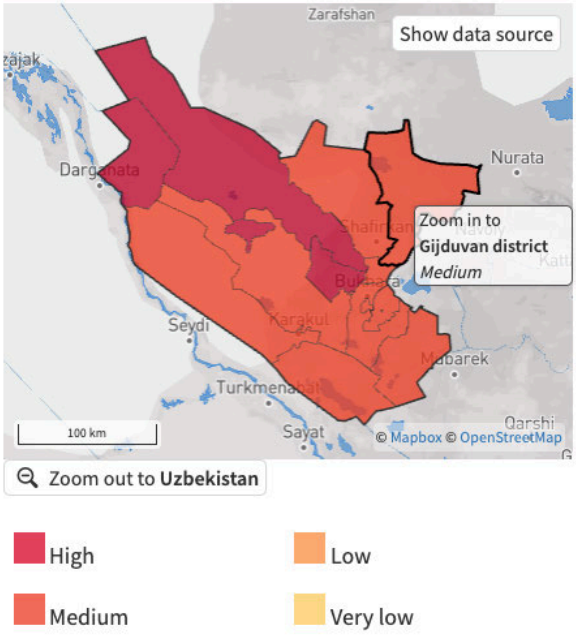


Figure 17-27 Indication of Projected Drought Risk in the Bukhara Region (ThinkHazard, 2024)

To have a better understanding of the potential drought risk, the Standardized Precipitation Evapotranspiration Index (SPEI) during the Project operational lifetime was considered.

Under scenario SSP2-4.5, for the time period 2020-2039: As shown in the graphs below, the mean (50th percentile) SPEI in the Project region, shows a decrease in drought events compared to the historical trend with SPEI projected range of 0.05 to 0.09 compared to -0.12 to -0.15 in 1995-2014. The 10th percentile however shows a potential increase in drought events with SPEI reaching -0.24 in December. The 90th percentile shows a positive trend with the SPEI reaching 0.29 in March.

Under scenario SSP5-8.5, for the time period 2020-2039: As shown in the graphs below, the mean (50th percentile) SPEI in the Project region shows a decrease in the drought index with projected climatology SPEI index reaching -0.01 index compared to -0.12 to -0.15 in 1995-2014. The 10th percentile, however, shows a potential increase in drought events, with SPEI reaching -0.31 in December. The 90th percentile shows a positive trend, with the SPEI reaching 0.27 in February.

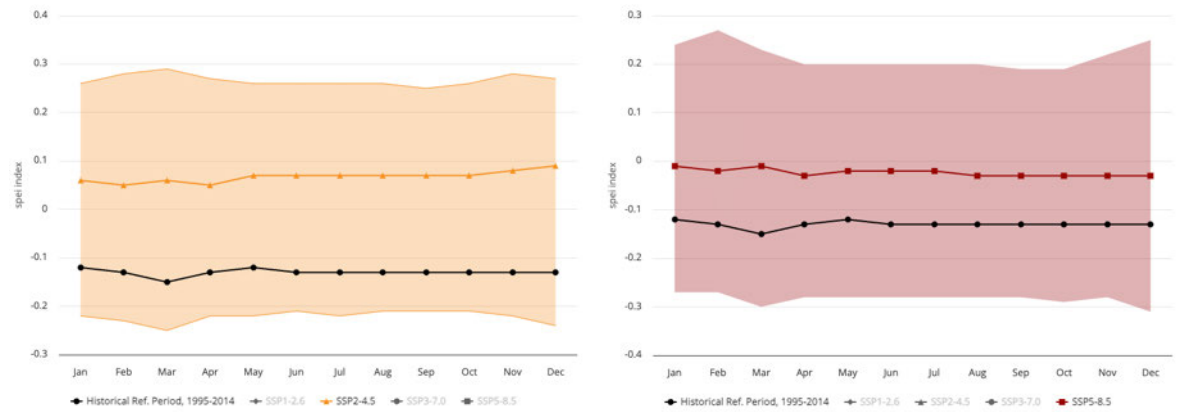


Figure 17-28 Projected Climatology of Annual SPEI Drought Index for 2020-2039 (Annual) for the Project Region; (Ref. Period: 1995-2014), SSP2-4.5 (Left) SSP5-8.5 (Right), Multi-Model Ensemble

Under scenario SSP2-4.5, for the time period 2040-2059: As shown in the graphs below, the mean (50th percentile) SPEI in the Project region, shows a decrease in the drought index with projected climatology SPEI index reaching 0.11 index compared to -0.12 to -0.15 in 1995-2014. The 10th percentile, however, shows a potential increase in drought events with SPEI reaching - 0.18 in March. The 90th percentile shows a positive trend with the SPEI reaching 0.31 in January.

Under scenario SSP5-8.5, for the time period 2040-2059: As shown in the graphs below, the mean (50th percentile) SPEI in the Project region shows a decrease in the drought index with projected climatology SPEI index reaching 0.08 index compared to -0.12 to -0.15 in 1995-2014. The 10th percentile, however, shows a potential increase in drought events, with SPEI reaching -0.18 in September. The 90th percentile shows a positive trend, with the SPEI reaching 0.35 in December and March.

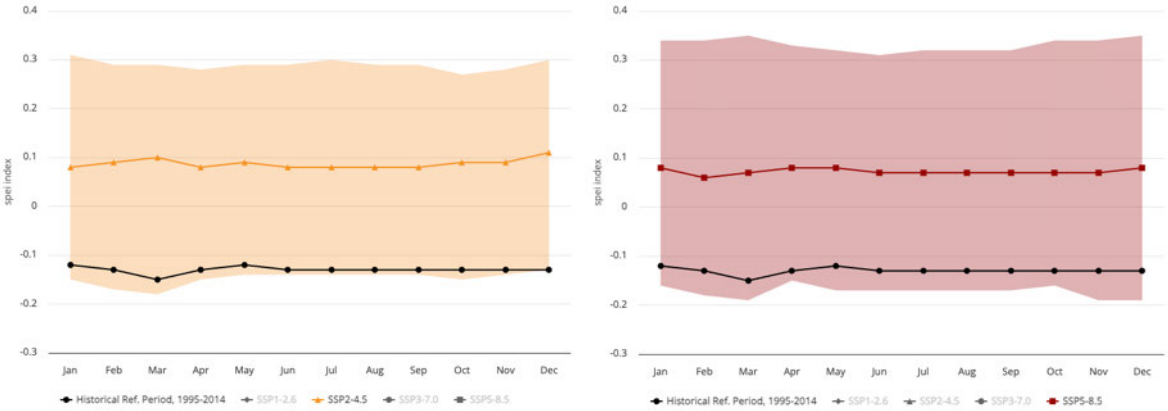


Figure 17-29 Projected Climatology of Annual SPEI Drought Index for 2040-2059 (Annual) for the Project Region; (Ref. Period: 1995-2014), SSP2-4.5 (Left) SSP5-8.5 (Right), Multi-Model Ensemble

17.4 Potential Impacts upon Climate Change

17.4.1 Construction Phase

At this stage, the expected quantity of fuel to be consumed during construction by the appointed EPC & subcontractors is unknown. This will depend on the type and number of mobile equipment and diesel generators used, the hours of machinery/equipment operation during construction and the efficiency of this equipment. For the purpose of this ESIA Report, the assessment of construction impacts is based upon assumptions, using existing experience and understanding of the construction requirements of similar projects.

17.4.1.1 Fuel Combustion

Stationary Source

The primary stationary fuel combustion source that will be used during the construction of the Project will be temporary diesel generators which will be located in EPC Contractor temporary construction facility areas within the Wind Farm site. In addition, the construction phase of the Project will necessitate an amount of mobile equipment/plant and vehicles to facilitate works. Equipment such as excavators, cranes, and other vehicles will be ample on the site and are expected to be used in most construction processes.

At the time of writing the exact fuel consumption during construction was unknown. Therefore, the following calculation has been based on an estimated 10,500 litres of diesel per month.

Using the Greenhouse Gas Protocol calculation tool for GHG Emissions from Stationary Combustion (World Resources Institute, 2015), the GHG emissions during construction were calculated and are summarised in the table below.

Table 17-1 GHG Emissions from the Use of Diesel During Project Construction

Fuel Type	Monthly Volume of Fuel (L)	Emissions (tonnes)			Monthly GHGs (tonnes CO_2eq)
		CO_2	CH_4	N_2O	
Liquid fossil (Diesel)	10,500	28.103	$1.138E^{-03}$	$2.276E^{-04}$	28.195
Monthly GHG emissions from fossil fuels (tonnes CO_2eq)					**28.195**
Annual GHG emissions from fossil fuels (tonnes CO_2eq)					**338.34**
*if/when the generators are operational					

The Project will generate 338.34 tonnes CO_2eq annually. This will be less much less than the IFC threshold value of significance of 25,000 tonnes CO_2eq per year. The construction phase is expected to last 2.5 years, during which it is estimated to generate approximately 845.85 tonnes CO_2eq. The calculations may be updated once the estimated fuel consumption is confirmed by the EPC Contractor.

Scope 2 emissions (electricity use) are not relevant during construction as the site is not connected to the power grid supply.

Mobile Source

The construction of the Project will also necessitate an amount of mobile equipment, machinery and vehicles to facilitate works. Such equipment (such as excavators, rollers, cranes, pneumatic compressors, and other vehicles) will be ample on the site and are expected to be used in most construction processes. It is anticipated that these will be fuelled by either diesel or unleaded petrol. At this stage, the expected quantity of fuels to be consumed during construction by the appointed EPC has not yet been confirmed. The expected fuel quantity will depend on the number of mobile equipment, hours of operation and efficiency of machinery. As such the potential GHGs have not been calculated for the mobile equipment/plant and vehicles.

17.4.2 Operation Phase

17.4.2.1 GHG Sinks – Project Operation

As a renewable energy project, there is essentially a neutral operational impact on GHGs, as the Project will not combust fossil fuels, or otherwise operationally reduce (or affect) carbon sinks. A key benefit of the Project is avoiding the carbon intensity of the conventionally produced electricity and utilising renewable energy.

It is possible to make a comparison of GHGs mitigated against a grid factor for GHG emissions in Uzbekistan. The GHG emissions avoided over the operational phase have been calculated below using the 'IFI (Interim) Dataset of Grid Factors'. Version 1.0 was originally released in July 2016 on the basis of the methodological approaches to GHG Accounting for Emissions from grid-connected renewable energy and energy efficiency projects, that were announced by the IFIs at the 21st Conference of the Parties in Paris in December 2015. The IFI Data set (Version 3.2, April 2022) is currently used by IFIs as the default basis of their GHG emissions accounting.

The Project is expected to generate 1,131,206 MWh electricity annually. An estimated 631,213 Tonnes CO2eq that will be avoided per year, compared with typical grid generation emissions. This is based on the KSA default grid factor of 558 gCO2/kWh from the IFI Dataset for Intermittent renewable energy sources (i.e., solar and wind).

Although being a renewable energy project, the generation of wind power is intermittent and restricted to certain wind conditions. As such the project will draw power from the grid during calm wind conditions to provide electricity for lighting, security purposes (e.g. security systems, CCTV etc.). The amount of power usage is expected to be minimal, and there will be no

operational processes that will require large quantities of power to be drawn from the grid. As such, this limited amount of Scope 2 GHG emissions has not been assessed herein.

17.4.2.2 GHG Emission - Grid Electricity Usage

Although being a renewable energy project, the generation of wind power is intermittent and restricted to certain wind conditions. As such the project will draw power from the grid during calm wind conditions to provide electricity for lighting, security purposes (e.g. security systems, CCTV etc.).

The amount of power usage is expected to be minimal, and there will be no operational processes that will require large quantities of power to be drawn from the grid. As such, this limited amount of Scope 2 GHG emissions has not been assessed herein.

17.4.2.3 Mobile Source - Fuel Combustion

Operational emissions are not expected from the operation of the Wind Farm. Mobile source GHG emissions during operations will only relate to the few vehicles for operation & maintenance purposes. The Project does not require regular deliveries or removals and is not expected to require significant maintenance. An estimated 1,050 L/year is required for the operation of an estimated seven (7) vehicles. Using the Greenhouse Gas Protocol calculation tool for GHG Emissions from Mobile Combustion (World Resources Institute, 2015), the GHG emissions from vehicles during operation were estimated at 2.385 tonnes CO_2eq/year. This will be less much less than the IFC threshold value of significance of 25,000 tonnes CO_2eq per year.

17.5 Vulnerability of the Project to Climate Change and the Proposed Mitigation

17.5.1 Climate Change Physical Risks

17.5.1.1 Increased Temperatures and Extreme Heat

As per the CCKP, under the SSP5-8.5 scenario, the average maximum temperature in 2027 is 23.7°C compared to 24.79°C in 2052. However, during the summer months of June, July and August over the project's lifetime, the Project area may witness extreme temperatures projected to exceed 35°C, with 2.8-3°C (50th percentile) increase from current temperatures. Under scenario SSP5-8.5, the number of hot days (median) with maximum temperature above 35°C in the Project area was 92.02 in 2023, projected to increase to 95.01 in 2027 (Project COD), increasing throughout the Project lifetime to reach 113.17 days (median) in 2052.

Hence, if the project components are not chosen and designed to withstand these high temperatures, the anticipated temperature rise could potentially impact the power

generation of the WF system, accelerate the aging of its components, and elevate the risk of fire.

To ensure the efficiency and reliability of the Project components, the design has been selected with operating temperatures of 40°C. To further mitigate extreme heat events and increased temperature, the detailed design and procurement shall ensure that all equipment and machines allow continuous operation at rated power (or rated current), in the full range of site conditions, without exceeding applicable temperature and temperature rise limits (35°C) or failing upon exceptional electric and electromechanical stresses.

To mitigate fire risks, the Project shall be equipped with a fire protection system that features comprehensive fire detection and response facilities. The Project design shall consider fire-resistant materials WTG structures, cabling, and other components. Installing advanced monitoring systems to detect issues early, such as reduced output due to smoke or potential damage from heat, allowing for timely interventions may be considered.

Acute physical climate risks relevant to the Project include health and safety incidents amongst operational plant workers during periods of extreme heat. The incidence of substantially high temperatures could potentially impact on the wellbeing of workers, particularly those who will not operate within units with controlled temperatures. Workers stationed in the Plant's exterior, for instance, will be prone to health effects such as dehydration, and heat stress, heat stroke, heat exhaustion, heat cramps, heat rashes and burns from contact with overheated surfaces. However, considering the nature of the projects, outdoor activities are expected to be limited to periodic maintenance activities. To ensure the safety of the workers, measures have been provided in the Labour and Working Conditions Chapter.

17.5.1.2 Extreme Cold

As per the CCKP, extreme cold temperatures of 0°C are expected for few months annually during the Project lifetime. The projected number of ice days (median) are expected to fluctuate, decreasing throughout the Project lifetime, to reach 58.61 days in 2052 compared to 68.41 days at Project COD.

Cold weather can have both positive and negative impacts on Wind Farm Projects. The Project operates more efficiently at cooler temperatures which can improve overall efficiency especially when cold weather is accompanied with wind. This can enhance energy production during the winter months. To ensure the efficiency and reliability of the Project components, the design has been selected with operating temperatures of -30°C.

However, ice throw may result in health and safety risks for receptors if they were located within the safety buffer. However, the design of the WTGs ensures a setback distance of 500 m for health and safety purposes including both blade throw & ice throw and therefore the likelihood/risk of blade & ice throw is anticipated to be negligible. In addition, it is expected that the wind turbines will be subject to continuous monitoring and regular maintenance.

To ensure the safety of the workers, during extreme cold conditions measures have been provided in the Labour and Working Conditions Chapter.

17.5.1.3 Increased Precipitation and Flood Risk

Climate-induced natural disasters, such as floods, droughts, high-intensity rainfall events may interrupt the Project's operations through severe damage to the WTGs, buildings, equipment and materials. Forced power outages resulting from natural hazards can therefore compound the risk of economic losses and stress to communities reliant on the power grid. This can also risk the safety of the Project workforce. Based on the projected rainfall data, the presence of water channels within the Project area and flood risk study carried out by UzAssystem (2024b), certain areas of the site is at risk of floods and therefore, design mitigation will be required to ensure the safety of the Project, the workers and the surrounding sites, these are summarised under the flood risk mitigation provided in Table 8-10.

Stormwater drainage systems shall be designed to withstand the maximum discharge in the most extreme foreseeable precipitation events to ensure no loss of operation for a flooding level with a return period of 1 in 100 years.

17.5.1.4 Drought

Water consumption during operation is expected to be minimal. Even though the drought index did not indicate a high risk of drought events in the Project area, the operational and social management plan should include water management measures that should be implemented to reduce the impacts on water resources. The plan should include the following:

- Where possible, installing smart water management systems (faucets with sensors, water meters, leakage detection systems etc.).
- Monitoring water consumption.
- Conducting regular maintenance of faucets, plumbing, water tanks etc.
- Raising awareness on water conservation among workers.

17.6 Climate Transition Risks

The Task Force on Climate-related Financial Disclosures (TCFD) recommendations state that "*transitioning to a lower-carbon economy may entail extensive policy, legal, technology,*

reputation and market changes to address mitigation and adaptation requirements related to climate change" (EP, 2023). As per the EP4 guideline, transition CCRA and alternatives analysis is applicable for all Projects, in all locations, when combined Scope 1 and Scope 2 emissions are expected to be more than 100,000 tonnes of CO_2 equivalent annually. The Project is not expected to result in GHG emissions during operations that would trigger transition risks assessment.

The 300MW Wind Farm is a renewable energy project, which is a key part of wider global and national policies/agendas and 2030 Energy Strategy to reduce GHG emissions and improve Uzbekistan's energy mix from an environmental perspective. Therefore, there are no foreseeable climate transition risks.

17.7 Cumulative Impacts

The operation of three wind farms in parallel would have significant cumulative climate benefits by reducing greenhouse gas emissions and enhancing energy security. By replacing fossil fuel-based electricity generation, these wind farms would prevent millions of tonnes of CO_2 emissions over their lifespan, while also reducing pollutants that would have been generated from conventional power plants. In addition, these Projects support a more diversified and stable energy system and lower dependence on conventional power plants.

17.8 Decommissioning Impacts

Potential climate change impacts relating to decommissioning will be similar to those encountered during the construction phase. As such, the mitigation & management measures outlined for the construction phase, will be applicable to the decommissioning phase as well.