Bash 500MW Wind Farm

Republic of Uzbekistan

Environmental & Social Impact Assessment (ESIA)

Volume 2- Main Text, Tables & Figures

Prepared for:

May 2022

DOCUMENT INFORMATION

PROJECT NAME	Bash 500MW Wind Farm
5CS PROJECT NUMBER	1305/001/100
DOCUMENT TITLE	Environmental and Social Impact Assessment (ESIA) Report
CLIENT	ACWA Power
5CS PROJECT MANAGER	Eva Muthoni Oberholzer
5CS PROJECT DIRECTOR	Ken Wade

ISSUE AND REVISION RECORD

VERSION	VERSION DATE	DESCRIPTION	AUTHOR	REVIEWED	APPROVED
1.0	15/12/2021	ESIA-Volume 2	EMO/EFO/LBG/NM	MKB/KRW	KRW
1.1	11/01/2022	Update based on ACWA Power's	EFO	MKB	AJJB
1.2	27/02/2022	Update based on ADB's comments	EMK/SB	KRW	AJJB
1.3	23/03/2022	Update based on ADB's comments	SB/ST	EMK/KRW	AJJB
1.4	14/04/2022	Updates based on EBRD comments	EFO/EMO/SB/ST	MKB	KRW
1.5	13/05/2022	Updates based on EBRD comments	EFO/EMO/SB/ST	MKB/KRW	AJJB
1.6	19/05/2022		EMO	KRW	AJJB

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Principal office: PO Box 119899 Sheikh Zayed Road, Dubai, UAE
☏+971 4 343 5955 🖷+971 4 343 9366

CONTENTS

LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
ADB	Asian Development Bank
AoI	Area of Influence
ATG	Asia Trans Gas
BTEX	Benzene, Toluene, Ethyl-benzene, Xylene
CAA	Civil Aviation Agency
CESMP	Construction Environmental & Social Management Plan
CFP	Chance Find Procedure
CHA	Critical Habitat Assessment
CO	Carbon Monoxide
COD	Commercial Operation Date
COVID-19	Coronavirus Disease
CRM	Collision Risk Modelling
dB	Decibels
DFIs	Development Finance Institutions
E&S	Environmental & Social
EBRD	European Bank for Reconstruction and Development
EHS	Environment, Health & Safety
EIA	Environmental Impact Assessment
EMF	Electric & Magnetic Field
EMF	Electric & Magnetic Field
EPC	Engineering, Procurement and Construction
ESIA	Environmental & Social Impact Assessment
ESMS	Environmental & Social Management Systems
GBVH	Gender Based Violence and Harassment
GHG	Greenhouse Gas
GW	Gigawatt
HGV	Heavy Goods Vehicle
HPZ	Health Protection Zone
IAQM	Institute of Air Quality Management
IBA	Important Bird Area
IFC	International Finance Corporation
ILO	International Labour Organisation
IPCC	Intergovernmental Panel on Climate Change.
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
kV	Kilovolts
kV/m	Kilovolts per meter
LILO	Loop In Loop Out
LLA	Land Lease Agreement
LNTP	Limited Notice to Proceed
MoE	Ministry of Energy
MW	Mega-Watt
NAC	National Archaeological Center
NEGU	National Grid of Uzbekistan
NO_2	Nitrogen Dioxide
NOC	No Objection Certificate
NNL	No Net Loss
NTP	Notice to Proceed
O&M	Operations and Maintenance
OESMP	Operational & Social Environmental Management Plan
OHTL	Overhead Transmission Line
PAPs	Project Affected Persons

ABBREVIATION	MEANING
PD	Presidential Decree
PBF	Priority Biodiversity Features
PEF	Purchase Electrical Facilities
PPA	Power Purchase Agreement
PR	Performance Requirement
RAP	Resettlement Action Plan
SCEEP	State Committee on Ecology and Environmental Protection
SDOD	Shut Down On Demand
SEA	Sexual Exploitation and Abuse
SNH	Scottish Natural Heritage
SO_2	Sulphur Dioxide
$_tCO_2e$	Tonnes of carbon dioxide equivalent
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
VP	Vantage Point
WF	Wind Farm
WHO	World Health Organisation
µT	Microtesla
5 Capitals	5 Capitals Environmental and Management Consultancy
JE	Juru Energy Consulting

1 INTRODUCTION

The government of the Republic of Uzbekistan through the Ministry of Energy aims to increase the electricity production in the country from 12.9GW in 2019 to 29.3GW in 2030 in order to foster economic growth as part of the Uzbekistan 2030 Energy Strategy.

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:

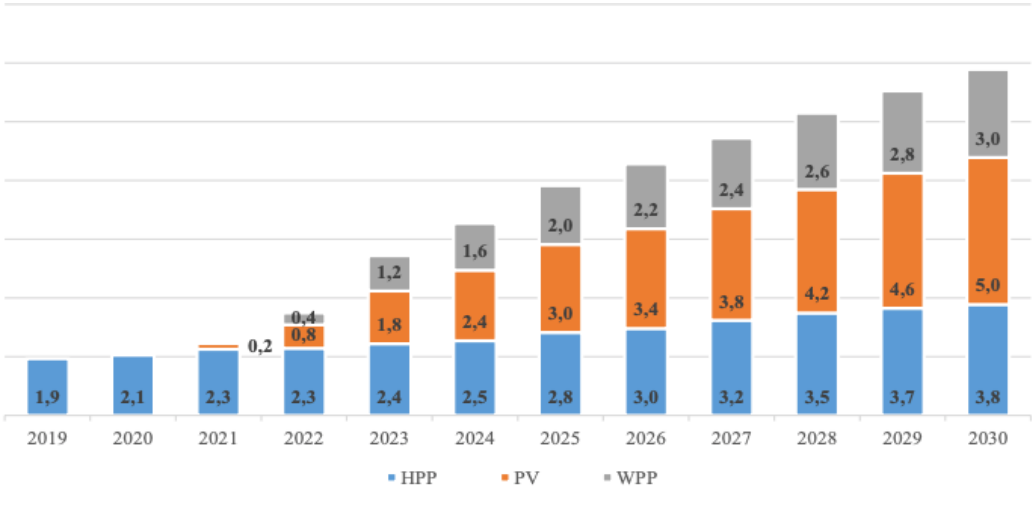
- *Ensure diversification in power and heat energy sectors through increased share of renewable energy sources and creation of renewable energy investment project mechanism utilising PPP approaches, enhancement of government policies related to development of renewable energy sources, demonstration of 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"

The Bash 500MW Wind Farm aligns with the above statement and the 2030 Energy Strategy.

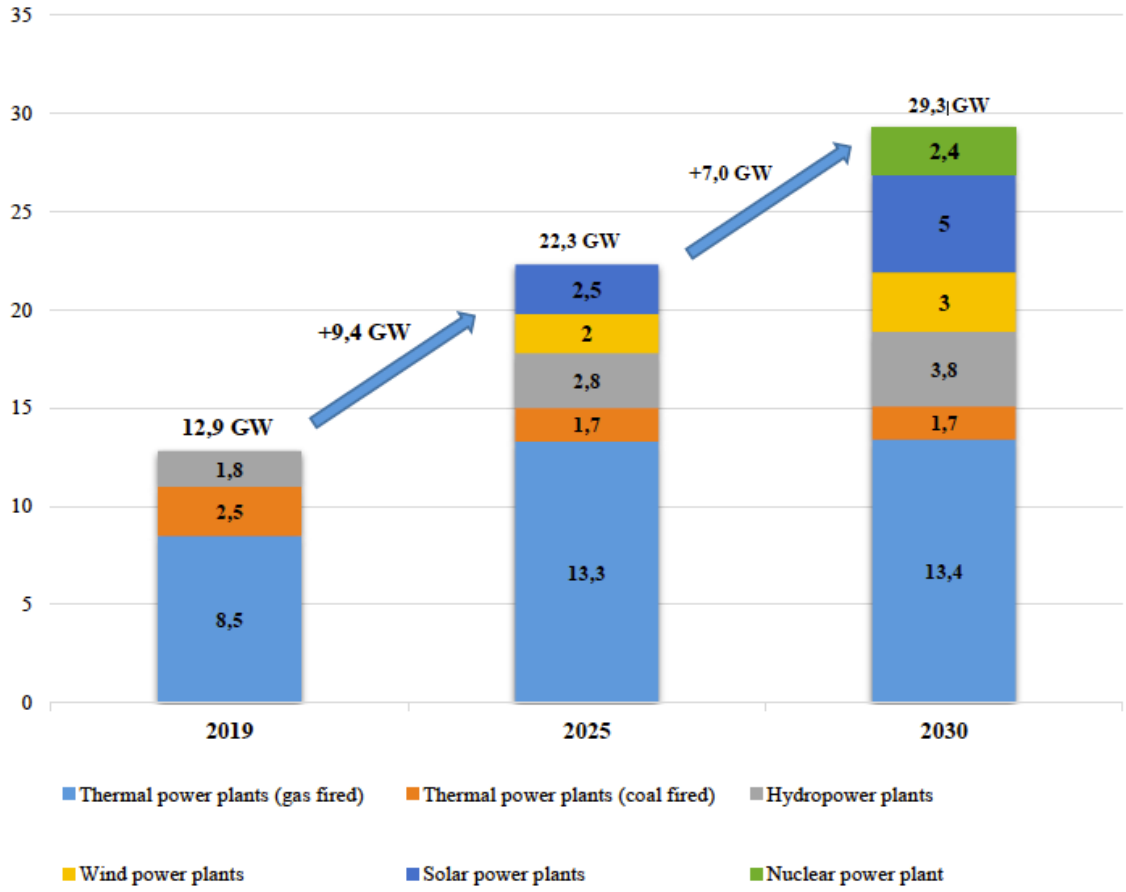
Figure 1-1 Uzbekistan Renewables-Based Generation Targets by 2030



Source: *Uzbekistan 2030 Energy Strategy Concept Note, 2020*

The Government of Uzbekistan will have 29.3GW of power generating capacity by 2030, of which almost half (8GW) will be renewable energy, with wind power accounting for 3GW.

Figure 1-2 Power Generating Capacity Growth Between 2019 and 2030



***Source**: Uzbekistan 2030 Energy Strategy Concept Note, 2020*

1.1 The Project

ACWA Power has signed an implementation agreement with the Ministry of Energy in Uzbekistan, as part of the Uzbekistan 2030 Energy Strategy, for developing, building and operating a 500MW Wind Farm in Bash (herein after referred to as 'the Project') on a plot of land in Gijduvon District.

ACWA Power has since established a Project Company, 'FE ACWA Power Bash Wind LLC' registered in the Republic of Uzbekistan with registration number 839862. ACWA Power Bash Wind LLC has entered into a 25-year Power Purchase Agreement (PPA) with JSC 'National Electric Grids of Uzbekistan'. The Project will include the development financing, construction, operation and maintenance of the Wind Farm including the electrical substations and internal access roads. In addition, it will also include development, financing, construction and transfer

of Purchase Electrical Facilities[1] and common electrical facilities shared with Dzhankeldy 500MW Wind Farm), switchyard (with transformers) and 500/220kV pooling station.

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.

1.2 Background & Scope of the ESIA Report

The European Bank for Reconstruction and Development (EBRD) and the Asian Development Bank (ADB) are understood to be involved in discussions relating to provisions of Project finance. Based on the requirements of these institutions, a process for undertaking Environmental & Social Impact Assessment (ESIA) to assess potential impacts and determine suitable mitigation measures is necessary as a process to reach Financial Close (FC). This is in line with the E&S policies and requirements of these banks (i.e. for EBRD and ADB) or applicable obligations under the Equator Principles. Additionally, ACWA Power implements the E&S requirements of IFC as a minimum on all its projects and as such, the Bash WF is required to adhere to IFC Performance Standards and IFC EHS Guidelines.

A process for environmental permitting by way of EIA (referred to locally as 'OVOS') is also required in Uzbekistan.

5 Capitals Environmental and Management Consulting (5 Capitals) has been engaged by ACWA Power as the lead E&S consultant, which includes scope to undertake the independent EIA and ESIA processes, as well as other environmental & social related scope items to attain the relevant regulatory permits and project finance (from an E&S standpoint).

1.2.1 Environmental and Social Scoping Report

An Environmental and Social Scoping report for the Project was prepared by 5 Capitals on 11th March 2021 prior to the EIA/ESIA. This was submitted to the lenders for review. Comments on the general environmental and social terms of reference for the Project were received from ADB during a virtual meeting on 22nd March 2021. ACWA Power received detailed Project specific comments from the International Financial Corporation (IFC) on 26th March 2020. It is noted that IFC were being targeted for financing of the Project at the time of the scoping report. Additional comments outlining the general environmental and social terms of reference for the Project were received from EBRD on 23rd March 2021. These comments were reviewed by 5 Capitals and have been taken into account in the preparation of this ESIA.

[1] According to Appendix E of the PPA, Transmission Facilities, either 220kV or 500kV over-head transmission lines from Wind Farm Substation to 500/200kV Pooling Station or 500kV switchyard (together they will be referred as Purchaser Electrical Facilities) each to be built by the Seller and transferred to the Purchaser in accordance with this Agreement.

1.2.2 National EIA (OVOS)

5 Capitals has partnered with a locally based consultant, 'Juru Energy' (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 State Committee on Ecology and Environmental Protection (SCEEP) of the Republic of Uzbekistan on Environmental Protection on 30th June 2021 by Juru Energy. This was reviewed by the State Committee and comments were received on 2nd August 2021 with requirements to update the National EIA Stage I. The main comments received from the State Committee include:

- Develop a comprehensive Biodiversity Conservation Plan and long-term Biodiversity Monitoring Programme for the construction and operation of the wind farm. This plan should be approved by the main Department of Biodiversity and Protected Areas of the State Committee on Ecology.
    - The Biodiversity Conservation Plan should include the planned Project activities, potential environmental impacts including the mitigation and management measures. This should also include a complete list of animals & plant species included in the Red Book of Uzbekistan and the IUCN Red List as well as common species in the area.
    - The monitoring plan should include the parameters, locations, period of monitoring and the roles and responsibilities.
- Conduct qualitative & quantitative survey of the trees and shrubs on the Project site. This will be conducted with the participation of representatives of the Inspectorate of Ecology and Environmental Protection in which the requirements of the moratorium on the cutting of trees and shrubs not included in the state forest fund as approved by the Presidential Decree UP-6155 of 03.02.2021 and PCM RUz No 93 of 18.02.2020.
- Archaeology: Provide the opinion of the Ministry of Culture on the possibility or impossibility of the planned activity in the vicinity of the Neolithic site of Ayakagitma and samples of cultural materials.
- Final results of surveys conducted in 2021: These reports should be submitted including current data on the number of and species composition of birds in flyways seasons (autumn & spring), migration routes through the Project site, potential bird mortality from the wind farm etc.

The preliminary Biodiversity Conservation Plan and Biodiversity Monitoring Programme were prepared and submitted to the Department of Biodiversity on 6th September 2021 and it was approved 27th September 2021. The qualitative and quantitative survey of trees and shrubs was conducted by the Bukhara Regional Department of Ecology & Environmental Protection on 19th to 20th August 2021. After the survey, an act (report) was prepared with the summaries of the survey which stated that there were no trees or shrubs within the Project boundary that

are found in the Red Book of Uzbekistan or the state forest fund (of which there is a moratorium against cutting until 31st December 2021).

Upon completion and approval of these processes by the Department of Biodiversity and the Bukhara SCEEP, the updated National EIA (Stage I) was resubmitted to the State Committee on 7th September 2021 and approved on 30th September 2021 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.

Reference Appendix A for conclusions from SCEEP on the National EIA.

1.2.3 Lenders ESIA

The ESIA has been informed by the aforementioned Scoping Report (Ref 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

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

This ESIA is presented in the following format:

- **Volume 1**: Non-Technical Summary
- **Volume 2**: Main Text, Tables and Figures
- **Volume 3**: Framework for Environmental and Social Management
- **Volume 4**: Appendices

Volume 1 provides a Non-Technical Summary of the ESIA, including the main outcomes, and conclusions.

Volume 2 includes the assessment of impacts for the Wind Farm and the OHTL. Due to the different Areas of Influence (AoI) for both the Wind Farm & OHTL Components, this report follows the following structure:

- Chapter 1 to 6: includes general information for both the Wind Farm and the OHTL, regulatory requirements, assessment methodology and baseline conditions.
- Part A (Chapter 7 -16) : These chapters are specific to elements relating to the Wind Farm. It outlines the baseline environmental & social conditions, identifies receptors within the AoI and provides an assessment of the potential environmental and social impacts, identification of mitigation & management measures including monitoring requirements for the Wind Farm's construction & operation phase.
- Part B (Chapter 17 – 27): These chapters include elements specific to the OHTL. It also outlines the baseline environmental & social conditions, identifies receptors within the AoI and provides an assessment of the potential environmental and social impacts, identification of mitigation & management measures including monitoring requirements for the OHTL construction & operation phase.
- Part C (Chapter 28 – 33): These chapters assess the environmental & social elements relevant to both the Wind Farm and the OHTL, potential impacts from the construction and operations including mitigation & management measures and monitoring requirements (which do not change with location). These are specifically Waste and Waste Water Management, Climate Change, Cumulative Impact Assessment, Community Health & Safety, Labour & Working Conditions and Influx Impact Assessment.

Volume 3 provides a framework for the development of the Construction & Commissioning and Operational Environmental and Social Management Systems (including associated system structures, documents and management plans) based on the findings from this ESIA. The intention is that this volume (alongside the full ESIA package and other E&S documents) will be issued to the EPC Contractor and O&M Company to develop and implement their project specific ESMS respectively; under the Project Company's E&S Policy.

Volume 4 comprises of the following Appendices:

Part A - Main Appendices

- Appendix A –Conclusions from SCEEP on National EIA
- Appendix B – Scoping Report
- Appendix C – Land Allotment Order
- Appendix D – Consultation Letter To & From State Committee for Land Resources, Surveys, Cartography and the State Cadaster
- Appendix E – Consultation Letters Clarifying the Issue of Land Lease Agreement
- Appendix F – Air Insulated Substation (AIS)
- Appendix G – Critical Habitat Assessment Reports and Presentations (see Appendices Part B)
- Appendix H – Detailed Terrestrial Ecology Survey Report (see Appendices Part B)
- Appendix I – Interim Bird Report (see Appendices Part B)
- Appendix J – Sound Meter Calibration Certificate
- Appendix K – Noise Modelling Study
- Appendix L – Consultation Letters to & From Lucent Centre LLC and Navoi Sanoat Sadvo LLC
- Appendix M – Soil Laboratory Results – Wind Farm
- Appendix N – Consultation Letter To & From Ministry of Transportation
- Appendix O – Consultation Letter To & From Asia Trans Gas
- Appendix P – Consultation Letter To & From Railway Authority of Uzbekistan and Ministry of Energy
- Appendix Q – Proof of Consultation with Civil Aviation Agency, Bukhara Regional Municipality and Ministry of ICT
- Appendix R – Consultation Letters Minutes of Meetings and Power Point Presentation with Institute of Archaeology
- Appendix S – Consultation Letter to & From Head of Polish Research Team
- Appendix T – Translated Summary of Detailed Archaeological Survey Report (March, 2022)
- Appendix U – Shadow Flicker Assessment Report
- Appendix V – Soil & Water Analysis Laboratory Results – OHTL
- Appendix W – Consultation Letter To & From Agency of Sanitary & Epidemiological Wellbeing
- Appendix X – Consultation Letter To & From Ministry of Employment

Note: Due to the size of the Critical Habitat Assessment Report, Terrestrial Ecology Survey Report and Interim Bird Report referenced in Appendix G,H & I respectively, these have been included in a separate appendix document for the Wind Farm & OHTL as outlined below.

Part B

- Appendix B-1: Wind Farm Terrestrial Ecology Report

Part C

- Appendix C-1: OHTL Terrestrial Ecology Report

1.5 Key Project Information

Table 1-1 Key Project Information

PROJECT TITLE	Bash 500MW Wind Farm
PROJECT DEVELOPER	ACWA Power
PROJECT COMPANY	FE "ACWA Power Bash Wind" LLC
OFF TAKER	JSC National Electric Grid of Uzbekistan
EPC CONTRACTOR	To Be Confirmed
O&M COMPANY	First National Operation and Maintenance Co. Ltd (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 Energy Consulting LLC 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 PROJECT INFORMATION

2.1 Project Location

2.1.1 Wind Farm

The Bash 500MW Wind Farm Project is located at the north-eastern part of Ayakagitma reservoir (depression), in Gijduvan district of Bukhara region. The site is approximately 0.5km east of Lake Ayakagitma.

The proposed Project coordinates and locations are provided in the table and figures below.

Table 2-1 Project Site Coordinates (Based on Preliminary Co-Ordinates)

NORTHING	EASTING
4488709.16	637987.39
4489065.00	645911.20
4492662.15	646074.46
4493476.69	647325.10
4495585.81	646194.93
4498671.77	646323.63
4498528.88	646690.97
4499538.02	648248.52
4500867.54	648351.79
4503425.70	650137.28
4507450.24	649969.59
4507264.73	632532.51
4506189.41	631394.22
4503502.14	631176.63
4503073.76	635108.38
4499198.71	637482.55

Figure 2-1 Project Location- National Context

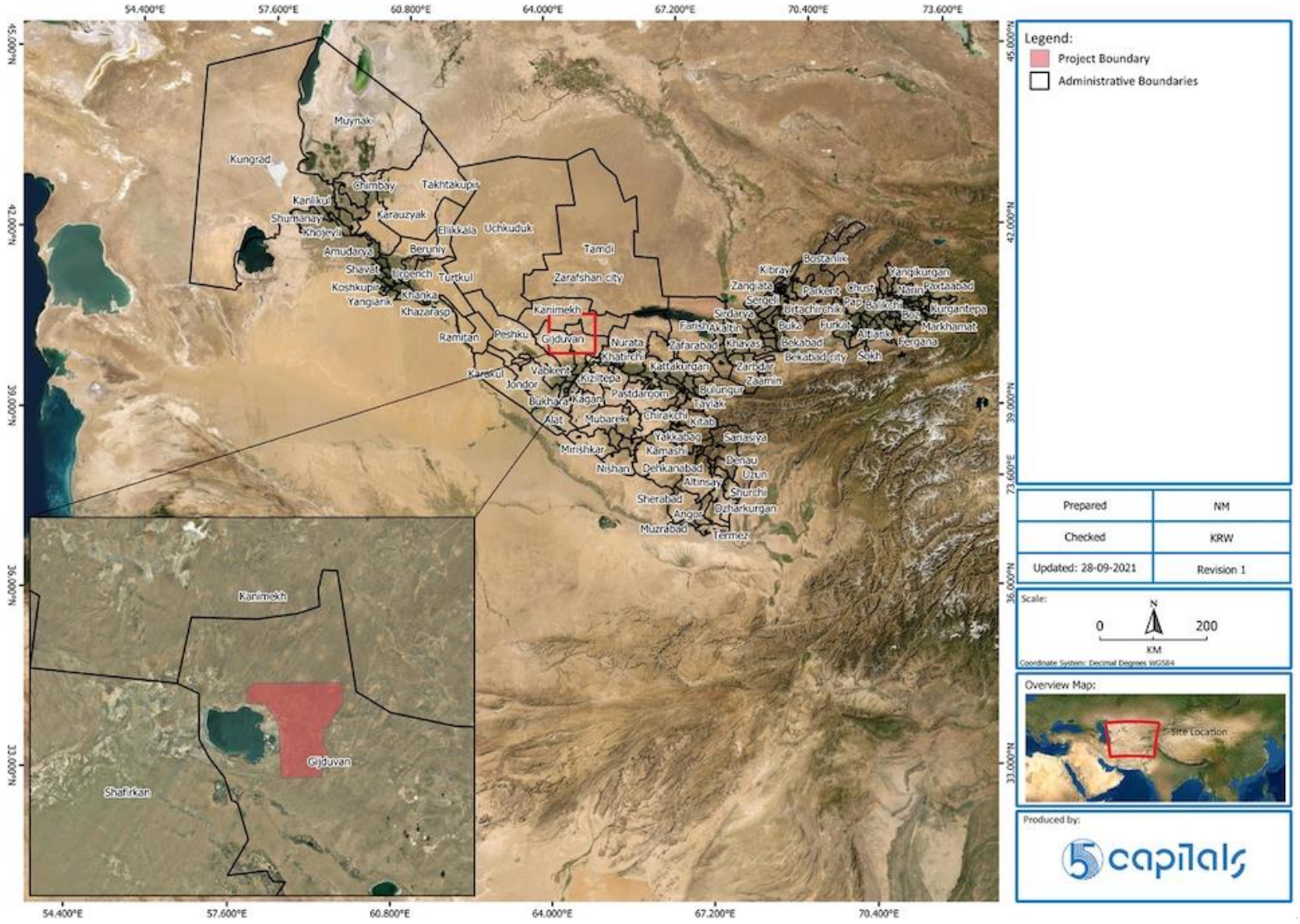
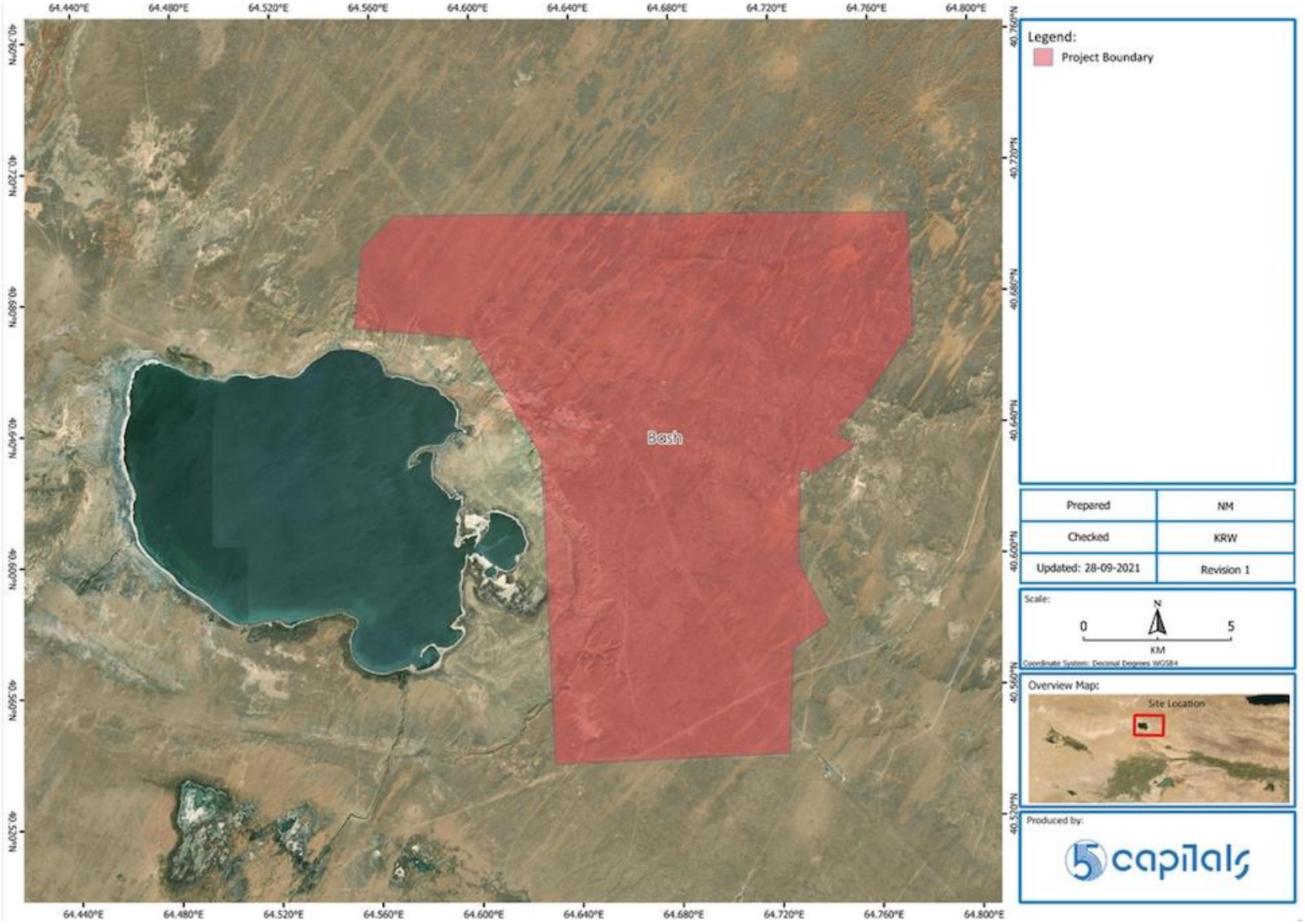


Figure 2-2 Project Location – Local Context



2.1.2 Overhead Transmission Line (OHTL)

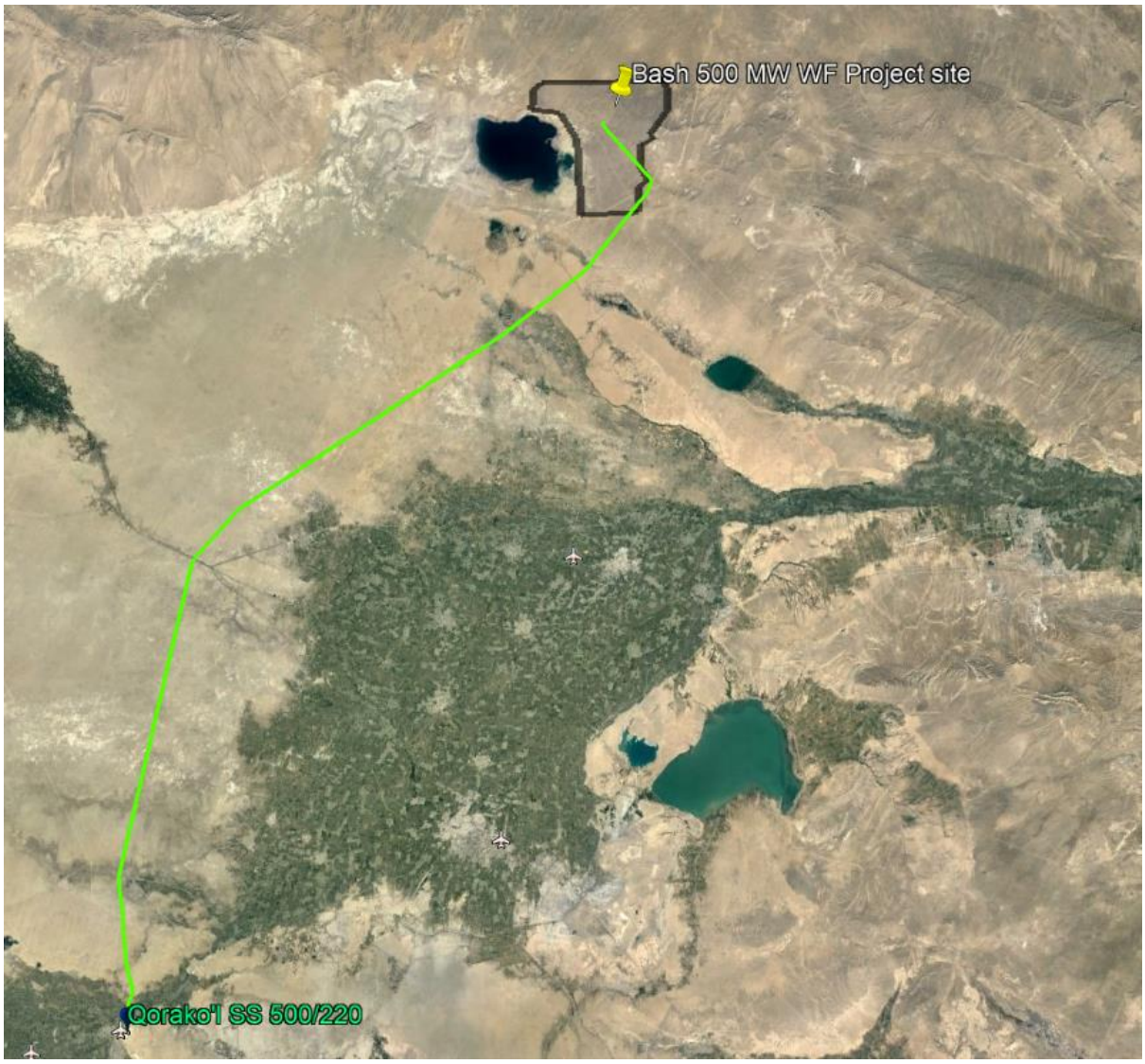
The Project will also include the development of a single circuit 500kV OHTL which will be 162km in length and will run from the Bash Wind Farm site to the existing Karakul substation located south of the Bash Wind Farm site. The OHTL will be developed as part of the Project by the FE "ACWA Power Bash Wind" LLC.

The OHTL routes and proposed coordinates are shown in the table below and the alignment is in the following figure.

Table 2-2 Proposed OHTL Coordinates

ID	LATITUDE (N)	LONGITUDE (E)
1	40.654744°	64.671165°
2	40.650435°	64.668406°
3	40.578722°	64.748099°
4	40.568105°	64.741101°
5	40.565080°	64.741099°
6	40.466868°	64.632437°
7	40.177327°	64.058069°
8	40.112029°	63.979987°
9	39.720782°	63.854230°
10	39.672110°	63.860898°
11	39.670173°	63.860088°
12	39.623804°	63.864667°
13	39.619202°	63.864421°
14	39.577735°	63.876169°
15	39.575831°	63.873457°
16	39.568766°	63.869898°
17	39.566809°	63.868082°
18	39.557805°	63.867206°
19	39.548098°	63.861900°
20	39.545289°	63.864808°
21	39.535229°	63.863383°
22	39.533147°	63.865689°
23	39.531060°	63.864010°
24	39.529151°	63.864674°

Figure 2-3 Alignment of 162km OHTL from the Bash Wind Farm to Karakul Substation



The above OHTL alignment was approved by NEGU on 8th November 2021.

2.2 Land Use and Site Condition

2.2.1 Wind Farm

2.2.1.1 Land Ownership

The Land Allotment Order (see Appendix C) issued to the Project on 19th March 2021, states that "*the Deputy Mayor F.Jabbarov and Department of State Cadastre of Gijduvan district (O.Khakimov) should allocate 285.1ha land from state reserve in Baraka community in Gijduvon district for "ACWA Power Bash Wind" LLC construction of wind power plant with a capacity of 500 MW considering the following:*

- Change status of allocated land for the Project from category of "agricultural land" to the category of "industry, transport, communication and other";
- Land lease agreement should be prepared based on rules and requirements of the investment agreement on "Construction of Bash wind power plant with capacity of 500MW in Gijduvan district, Bukhara region" and PPA agreement"
- Take into consideration exemption from compensation (compensation payments) for losses of agricultural and forestry production within the framework of the implementation of investment projects of FE "ACWA Power Bash Wind" LLC in accordance with the Resolution of the President of the Republic of Uzbekistan dated 23rd February 2021 PQ-5003.

Final approval of the decision will be obtained from regional municipality and final land allotment will be confirmed following receipt of final project layout (layout of wind turbines) when wind intensity surveys are completed (among other requirements).

Following issuance of the land allotment order, ACWA Power Bash Wind LLC will enter into a Land Lease Agreement (LLA) with The Government of The Republic of Uzbekistan as represented by the Khokimiyat of Bukhara Region. Consultation with the State Committee for Land Resources, Surveys, Cartography and the State Cadaster (or Goskomgeodezkadastr) also confirms the above decision by the Gijduvon Mayor through order No.173 dated 19th March 2021. The response from the State Committee for Land Resources is provided in Appendix D.

It is understood from ACWA Power that the LLA will only be for land within the Project footprint (i.e., switching station area, turbine pad area, access road etc) and not the entire 285.1ha. Analysis of the Project BoP shows that approximately 158.9ha will permanently be impacted by the Project footprint while the laydown areas will have temporary impact on 19.28ha of Kokcha land. As such the LLA for the Project will be for the 158.9ha while a land easement will be issued for the laydown areas. The breakdown of area of impact from different Project components is provided in the table below.

Table 2-3 Approximated Ha of Land Impacted by Project Facilities

PROJECT FACILITIES	HA	Type of Impact
WTG Base (79)	80.03	Permanent
Access roads	58.34	Permanent
Bash Substation	20.53	Permanent
Laydown area/storage area	19.28	Temporary (only during the construction phase.
Total	**178.19**	**n/a**

Note: *The project footprint in the table above has been approximated based on the BoP as provided by ACWA Power in November 2021.*

2.2.1.2 Land Leases

The wind farm is used by Kokcha LLC who are a cluster under the Committee for the Development of Sericulture and Wool Industry (the relationship between the Committee and Kokcha LLC is provided below) . Consultations with Kokcha LLC have revealed that they have been allocated 267,398.1ha of grazing land under their management which includes the land within the Project site and in the wider Project area.

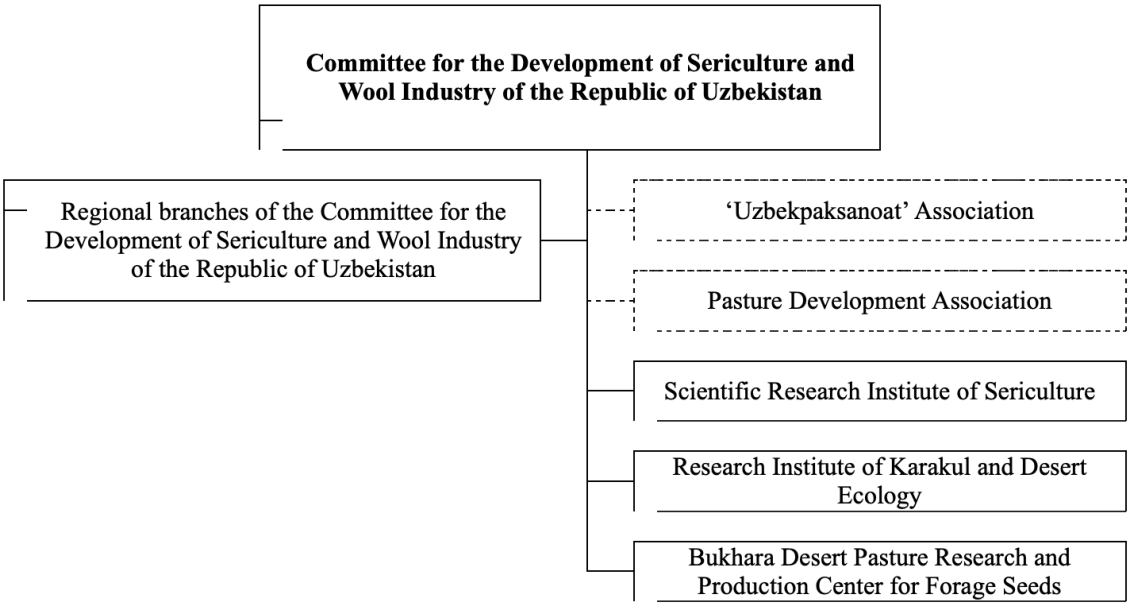
The permanent land impact from the Project footprint will only account for 0.059% of the total land owned by the LLC while the temporary impact accounts for 0.007%. Based on this, it is expected that the Project will have negligible impact on Kokcha LLC activities and operations. These impacts are addressed in the Project specific RAP.

COMMITTEE FOR THE DEVELOPMENT OF SERICULTURE & WOOL INDUSTRY

Background

The Presidential Decree "On the organisation of the Committee for the Development of Sericulture and Karakul Development (now Committee for the Development of Sericulture and Wool Industry) in the Republic of Uzbekistan" was adopted on 02.09.2020. The decree approved the organisational structure of the "Committee of Development Sericulture and Wool Industry" as well as the structure of the Central Committee and the model structure of the regional departments.

Figure 2-4 Structure of the Committee



The establishment of clusters under the Committee is organized in all regions of Uzbekistan where there are pastures. According to the Presidential Decree the clusters are mandated to:

- Lease pastures intended for breeding Karakul sheep, including on the lands of the forest fund not covered with forests.
- Obliged to effectively use pastures, preventing their degradation to breed thoroughbred small ruminants using scientific and innovative approaches to organise deep processing of raw materials and production of products with the establishment of cooperation ties between cluster members;
- Closely cooperate with the Research Institute of Karakul Breeding and Desert Ecology and the Bukhara Research and Production Centre for seed production of steep and pasture forage crops.

As such, Kokcha LLC is a cluster under the Bukhara Regional Department of Wool Industry.

CONSULTATIONS WITH KOKCHA LLC

Multiple consultations were held with Kokcha LLC requesting for information on their land lease with Sericulture Committee and land use. Based on the responses provided on 4th June 2021 and outcome of meetings held on 24th June 2021 and 1st September 2021, the following information was obtained:

- Kokcha LLC owns approximately 267,398.1ha of land (which includes land within and outside of the project boundary).
  - This land was allocated to them under the Order of Gijduvon district Mayor No. 695 dated October 2nd 2020.
  - They were notified about the project by Bukhara Karakul Union on 27th May 2021 and this was communicated to the herders.

- There are 3 herders with contracts with Kokcha LLC using the land at the Project site.
- Kokcha LLC allocates land to herders according to the number of livestock they own and based on availability of water sources. However, there is no clear demarcation for land provided to each herder.
- Kokcha LLC owns structures within the Project site that include one livestock pool, 4 water wells, one room structure, 2 winter and 1 summer stable. It is noted that none of these structures have cadastral documents.
- Herders are required to request for permission before construction of any structures within Kokcha LLC land. Such agreements are mostly verbal with no written agreements.
- Herders are allowed to graze their own livestock as the income from grazing Kokcha LLC's livestock is not always sufficient.
    - Kokcha LLC also undertakes annual monitoring in November to determine the condition/health of their livestock under the care of the herder. During this period, they also determine the privately owned livestock by the herders.
    - There is no limit to the number of livestock that herders can graze on LLC's land and herders pay 3,675 UZS (about 0.34USD) per month per livestock.
- The LLC only monitors activities of herders under their contract and other land users activities are not monitored.
- The LLC stated that they do not have any concerns about the Project and that it would not impact with their activities.

During the stakeholder consultation process with Kokcha LLC, a copy of a letter between the Committee for the Development of Sericulture and Wool Industry and the Bukhara regional municipality regarding the land ownership dated 31st December 2020 was provided to Juru Energy. Of importance to the project, the letter stated:

- In order to implement the 4th part of the Presidential Decree No. 4422 dated 22.08.2021 for development of alternative energy, Karakul committee stated that the request by Bukhara region municipality for 1100ha of land in Peshku and Gijduvon districts will be allocated to the Projects only if it is not interrupting Karakul farming activities.

As a result, a meeting was held with Committee for the Development of Sericulture and Wool Industry on 4th August 2021 a summary of which is provided below.

MEETING BETWEEN ACWA POWER AND COMMITTEE FOR THE DEVELOPMENT OF SERICULTURE & WOOL INDUSTRY

In order to address the issues raised by the Committee for the Development of Sericulture and Wool Industry (Committee), a meeting was held on 4th August 2021 the outcome of this meeting is summarised below:

DATE OF CONSULTATION	4th August 2021
TIME	11:30 – 12:41
VENUE	Zoom
LANGUAGE	Uzbek
NUMBER OF PARTICIPANTS	9
COMMITTEE FOR THE DEVELOPMENT OF SERICULTURE AND WOOL INDUSTRY OF THE REPUBLIC OF UZBEKISTAN	Deputy Head of the Committee for the Development of Sericulture and Wool Industry of the Republic of Uzbekistan
PASTURE DEVELOPMENT ASSOCIATION	Head of Pasture Development Association[2]
BUKHARA REGIONAL BRANCH OF THE COMMITTEE FOR THE DEVELOPMENT OF SERICULTURE AND WOOL INDUSTRY OF THE REPUBLIC OF UZBEKISTAN	Head of the Bukhara region Pasture Development Association
REPRESENTATIVE OF KOKCHA LLC	Director of LLC
ACWA POWER	Mr. Sherzod Onarkulov – Senior Manager Mr. Akbar Mavlonov – BD Manager
JURU ENERGY	Ms. Umida Rozumbetova - Head of Team E&S Mr. Makhmudov Askarbek – Social Consultant
MATERIALS USED	n/a
COVID-19 PRECAUTION IMPLEMENTED	Online meeting instead of organising a physical meeting.

MAIN OUTCOMES

A summary of the meeting is as provided below:

- ACWA Power stated the 285.1ha allocated for the Project will not be fenced and grazing will be possible during the operation phase of the Project. Only the substation will be fenced in line with the required buffer zone.
- In addition, the land allocated to the project will be based on the project layout and BoP and not the entire 285.1ha
- ACWA Power will sign the land lease agreement with the organization that has the rights to the land and in line with the Presidential Decree which refers to the Bukhara Regional Municipality.
- The Committee of Kurakul Farming & Development was informed by ACWA Power that the turbine placement would not prevent the herders from grazing after the completion of construction works.
- Pasture Development Association requested that their departments in Peshku and Gidovan municipalities are involved in future meetings so that they are aware of Project progress and can be able to communicate with their clusters and herders if needed.

After the meeting, further clarification was sought regarding the Presidential Decree (PD) No. 6059 (updated with PD 6259 dated 08.07.2021) which states " *all pastures specified in the target*

[2] Karakul association is subordinate organisation of the Committee. This organisation is primary responsible for karakul activities of the Committee

parameters for the development of karakul breeding in the Republic of Uzbekistan for 2021-2025 are transferred to the permanent ownership of the Committee." According to the Head of Karakul Association, this related to the activities such as breeding, grazing, production of wool, meat etc but not to the direct ownership of land. Hence, the Committee is able to issue land lease agreements to ACWA Power for the number of years required.

SIGNING OF THE LAND LEASE

On 20th September 2021, ACWA Power sent a letter to the Bukhara Region Khokimiyat seeking clarification on whom ACWA Power should sign the land lease with (reference Appendix E). In response, Bukhara Region Khokimiyat provided ACWA Power with a letter from Gijduvon District Municipality Mayor dated 20th January 2021 stating" *land in on north-western part of Ayakagitma lake examined by representatives of Ministry of Energy will be allocated to investor as per request* "

Additional response was provided by Bukhara Region Khokimiyat on 30th September 2021 stating " *As per paragraph 8 of Presidential Decree-5003 on 23.03.2021 "On construction of wind power plant with a capacity of 500 MW in Gijduvon district of Bukhara region", local authorities are obliged to allocate required land plots to Investing company for realisation of these projects. Based on the instructions given in PD-5003 on 23.02.2021 as well as PPA signed by Project develop, "ACWA Power Bash Wind" LLC, Gijduvon municipality has issued an order by allocating 285.1ha for project implementation under order No 173 dated 19th March 2021. Considering the above mentioned, we inform you that land lease agreement should be signed with relevant district municipality as per land allotment orders*".

As such, the land lease agreement will be signed between ACWA Power and Gijduvon municipality as per the land allotment orders. It is understood from the Client that, that SWID have been informed of this decision by the Bukhara Region Khokimiyat.

Reference Appendix E for correspondence between Bukhara Regional Khokimiyat, Gijduvon Municipality Mayor and ACWA Power.

2.2.1.3 Land Use and Site Condition

Based on numerous site visits and review of satellite imagery, the majority of the site has a predominantly open landscape with low lying shrub and grass vegetation. There are cliffs found to the western side of the proposed Project site that slope towards Lake Ayakagitma.

There are modified areas within the Project site due to existing infrastructure corridors (i.e., gas pipeline, OHTL & railway line).

Plate 2-1 View of the Project site (centre)

Plate 2-2 View of the site in Spring (2020)

Plate 2-3 View of the Project site (view of north west)

Plate 2-4 View of the Project site (view of the south)

Plate 2-5 View of the Project site (view of the south west)

There are three OHTLs that cross the site, a railway line running through the north central area of the Project site and another railway line slightly raised above the ground level that splits the site in a south-east to north-west direction. The railway line connects the city of Navoi to Zarafshan city. In addition, Appendix A of the PPA states that there is a gas pipeline running through the southern section of the plot.

Plate 2-6 Overhead Transmission Lines at the Project site

Plate 2-7 Railway Line crossing the Project site

There are also cliffs found to the western side of the proposed Project site that slope towards Lake Ayakagitma as shown in the figure below.

Plate 2-8 Some of the cliffs to the west of the Project site

GRAZING AT THE PROJECT SITE

The Project site is predominantly used for grazing activities by 6 herders with contracts with Kokcha LLC and 4 herders from Agitma village who do not have any contracts with the LLC. 3 out of the 6 herders have structures within the project site and will require to be resettled while the other 3 have structures and additional grazing land outside of the Project boundary.

Plate 2-9 Structures found at the Project site

The Project has worked closely with Kokcha LLC and Bukhara Municipality and the herders to identify suitable alternative land for the 3 herders with structures within the site. However, the herders have indicated they prefer compensation to be paid and will secure alternative land themselves where they can resettle with their livestock. Based on this, it is highly unlikely that any of the herders or their workers will lose their jobs as grazing will be undertaken at alternative land. In the unlikely event of this happening, only 3 herders and their 7 workers would be impacted.

The 4 herders from Agitma village have 2 stables within the Project site which will require to be moved and suitable alternative grazing land has been identified for them north of their village. This will ensure that their grazing activities will not be disrupted during the construction phase of the Project.

Note: Impacts on herders and their workers are assessed in the Project Specific RAP.

2.2.1.4 Local Context & Potential Receptors

In addition to the structures belonging to herders & existing infrastructure corridors, few land uses have been identified external to the Project site within a 5km radius.

There are two (2) mining areas approximately 0.9km west and 1.4km east of the site. The mine at the western boundary was operated by Lucent Centre LLC and is inactive. No mining works or equipment/machinery were present at this location during the site visits. Based on consultation with Lucent Centre, mining works at this mine are expected to commence in 2022.

The mine at the eastern boundary is operated by Navoi Sanoat Savdo and is assumed active due to the presence of smelting equipment and temporary accommodation facilities, however no workers were present at the time of the site visits.

The above-mentioned features/receptors including those identified within the Project site are presented in the table and figures below.

Table 2-4 Potential Receptors Within 5km of the Project Site

ID	Receptor Type	Proximity to Project	Description
R1	Infrastructure	Within the project site	Overhead transmission lines running through the north central area of the Project site.
R2			
R3			
R4	Infrastructure	Within the project site	A small railway station located towards the north-west of the site
R5	Structures	Within the project site	Structures used by herders located towards the north of the site
R6		Within the project site	
R7	Structures	Within the project site	Structure used by herders located to the east of the site
R8	Infrastructure	Within the project site	Railway line that splits the site in a south-east to north-west direction.
R9	Structures	Within the project site	Structure used by herders located to the north of the site
R10	Structures	Approx. 4.9km to the west	Animal holding area used by herders in Ayakagitma village
R11	Infrastructure	Runs through the project site	A dirt road that runs parallel to the railway line
R12	Residential	Approx. 1.6km south east	Kuklam village
R13	Commercial	Approx. 4.55 south east	A substation located to the south east of the site
R14	Commercial	Approx. 1.26km to the south east	Gas storage facilities belonging to Asia Trans Gas.
R15	Ecological	Approx. 0.5km to the west	An IBA lake with important bird species
R16	Commercial	Approx. 1.5km south east	Asia Trans Gas facility storage tanks
R17	Structures	Within the Project site	Structures used by herders found to the south west of the project site.
R18	Structures	Within the Project site	
R19	Commercial	Within the Project site	Gas pipeline running through the southern section of the site.
R20	Vehicle	Within the project site	Old van that is no longer in use

ID	Receptor Type	Proximity to Project	Description
R21	Structure	Within the project site	Structure used by herder found to the south west of the project site.
R22	Structure	Approximately 175m north-east of the project site	Herders' animal holding areas houses used for accommodation all year round.
R23	Structure	Approximately 1.25km to the north of the project site	
R24	Structure	Approximately 1.2 km north west	Herder's accommodation area
R25	Structure	Approximately 1.5km north west	Accommodation structure used for shelter by fishermen in Lake Ayakagitma
R26	Structure	Approx. 1.2km north west of the project site	Animal holding area for a local herder called Isa
R27	Structure	Within the project site boundary	Animal holding area belonging to a herder from Ayakagitma village
R28	Ecological	Approx. 0.7km west of the project site	Well used by herders as a water source for their livestock
R29	Ecological	Approx. 1.3km north west of the project site	A water well used by locals as a source of water for their livestock.
R30	Structure	Approximately 5km south west of the Project site	Structure used by one of the herders who uses the Project site for grazing.
Mining Area 1	Industrial	Approx. 1.4km east	Mining areas belonging to Lucent Centre LLC and Navoi Sanoat Savdo LLC respectively. Appendix A of the PPA states '*The plant should keep distance from mining activities existing as of the signing of this Agreement…*' Mining area 2 also includes workers accommodation areas that were not observed to be occupied during any of the site visits.
Mining Area 2	Industrial	Approx. 0.9km west	

Figure 2-5 Potential Human Receptors Within 5km of the Project Site

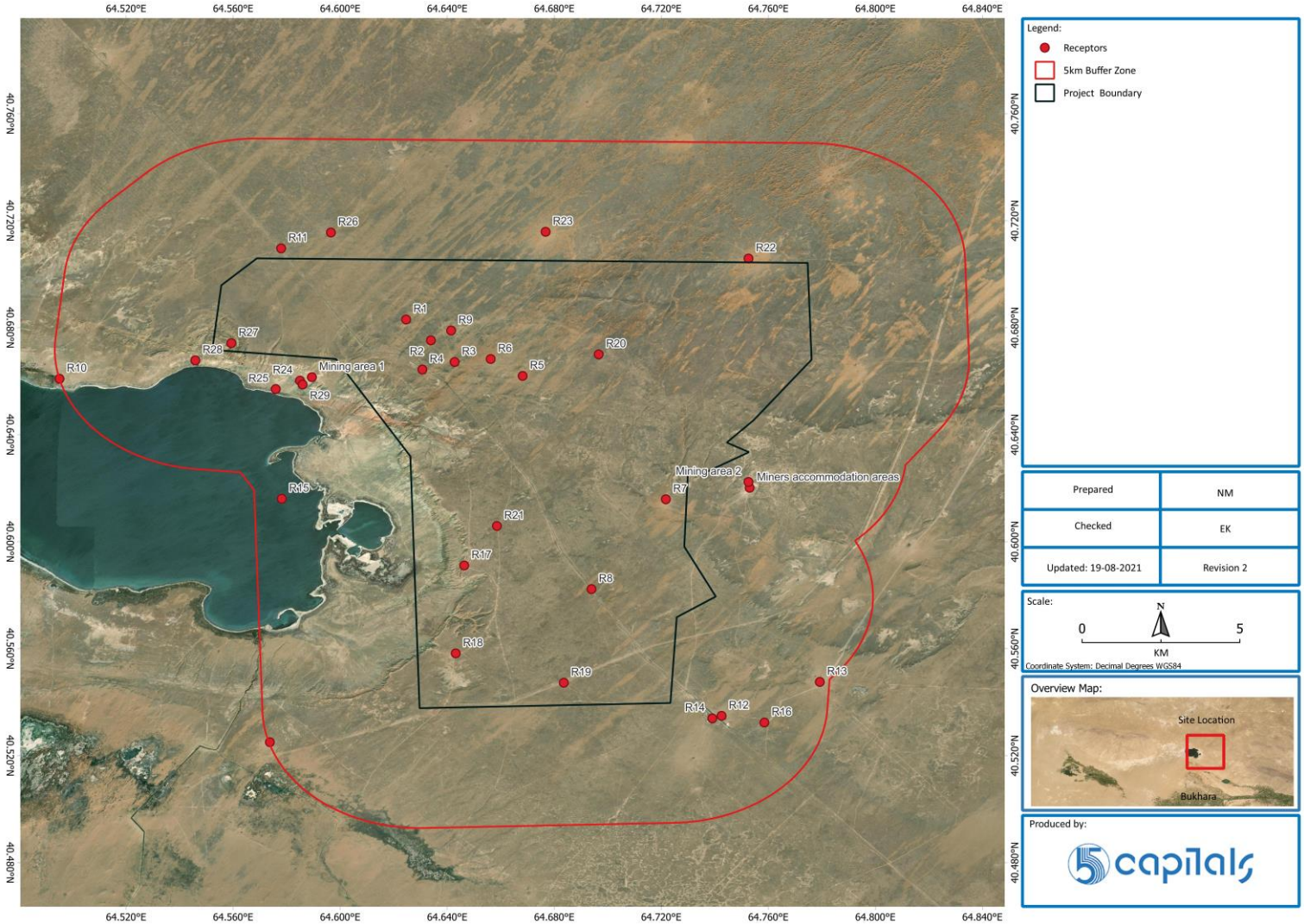


Plate 2-10 #R5 – Structure used by herders for accommodation on site

Plate 2-11 #R6 – Animal holding area including a structure used by herders

Plate 2-12 #R11– Dirt Road running through the site

Plate 2-13 #R13– Substation

Plate 2-14 #R14– Oil station/storage areas

Plate 2-15 #R15– Lake Ayakagitma

Plate 2-16 #R15– Camels along the shores of Lake Ayakagitma

Plate 2-17 #R20– Old railway wagon that is no longer in use

Plate 2-18 #R21– Accommodation facility for herder

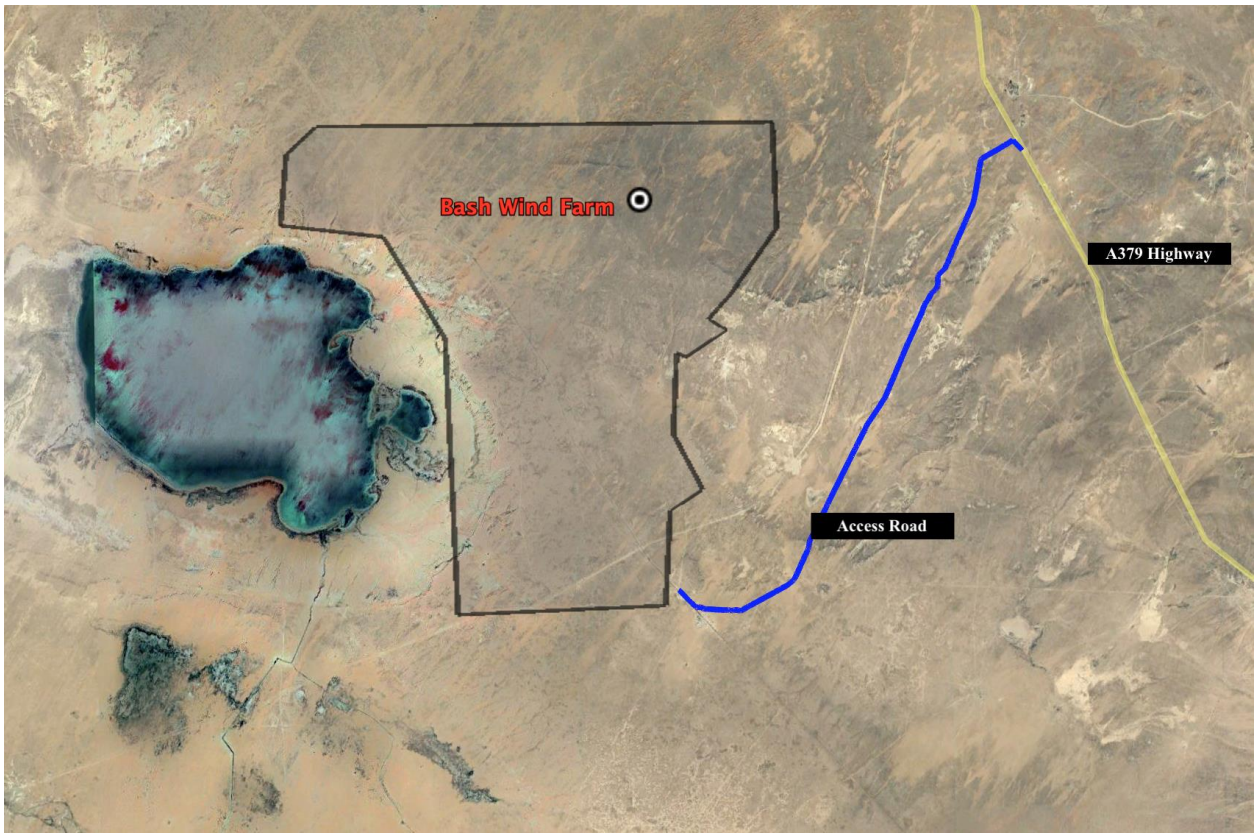
Plate 2-19 #R25– Accommodation house for fishermen

Plate 2-20 #R28– A natural well used as a source of water for livestock

2.2.2 External Access Road

The 27.5km access road from A-379 highway to the Project site that will be used by the Project for the transportation of construction materials and workers. The road is unpaved and was observed to have low traffic during the site visits.

Figure 2-6 Existing Access Road to the Project Site



The receptors identified along the access road are provided in the table below.

Table 2-5 Potential Receptors along the Access Road

ID	Description	Receptor Type	Approximate Distance to Access Road
R31	Overhead Transmission Line including facility owned by grid operator	Infrastructure	Runs parallel to the access road
R32	Memorial	Cultural	Along the access road approximately 7m to the west.
R33	Herder's structure	Residential	This structure is located along the access road with a holding area for animals.
R34	Herder's structure	Residential	Located along the access road but was observed to be vacant during site visits.
R13	Substation	Commercial	Located along the access road approximately 26m to the north west.
R35	Herder's structure	Residential	Located approximately 300m north west of the access road and includes an animal holding area.
R16	Asia Trans Gas facility storage tanks	Commercial	Approximately 500m south west of the access road
R12	Kuklam village	Residential	Found along the access road
R14	Gas storage facilities belonging to Asia Trans Gas on each side of the railway line	Commercial	Found along the access road approximately 177m to the west.
R8	Railway line	Infrastructure	Approximately 2.5km from the access road runs parallel to the railway line before getting into the Project site.
Note: *some of the receptors along the access road are also found within the Project 5kms area of influence. These receptors have retained their ID to match that identified in table 2-3 above.*			

Plate 2-21 Some of the Receptors along the Access Road

#R31– View of the OHTL and structure owned by grid operator

#R32 Memorial along the Access Road

#R33 Herder's structure with an animal holding area

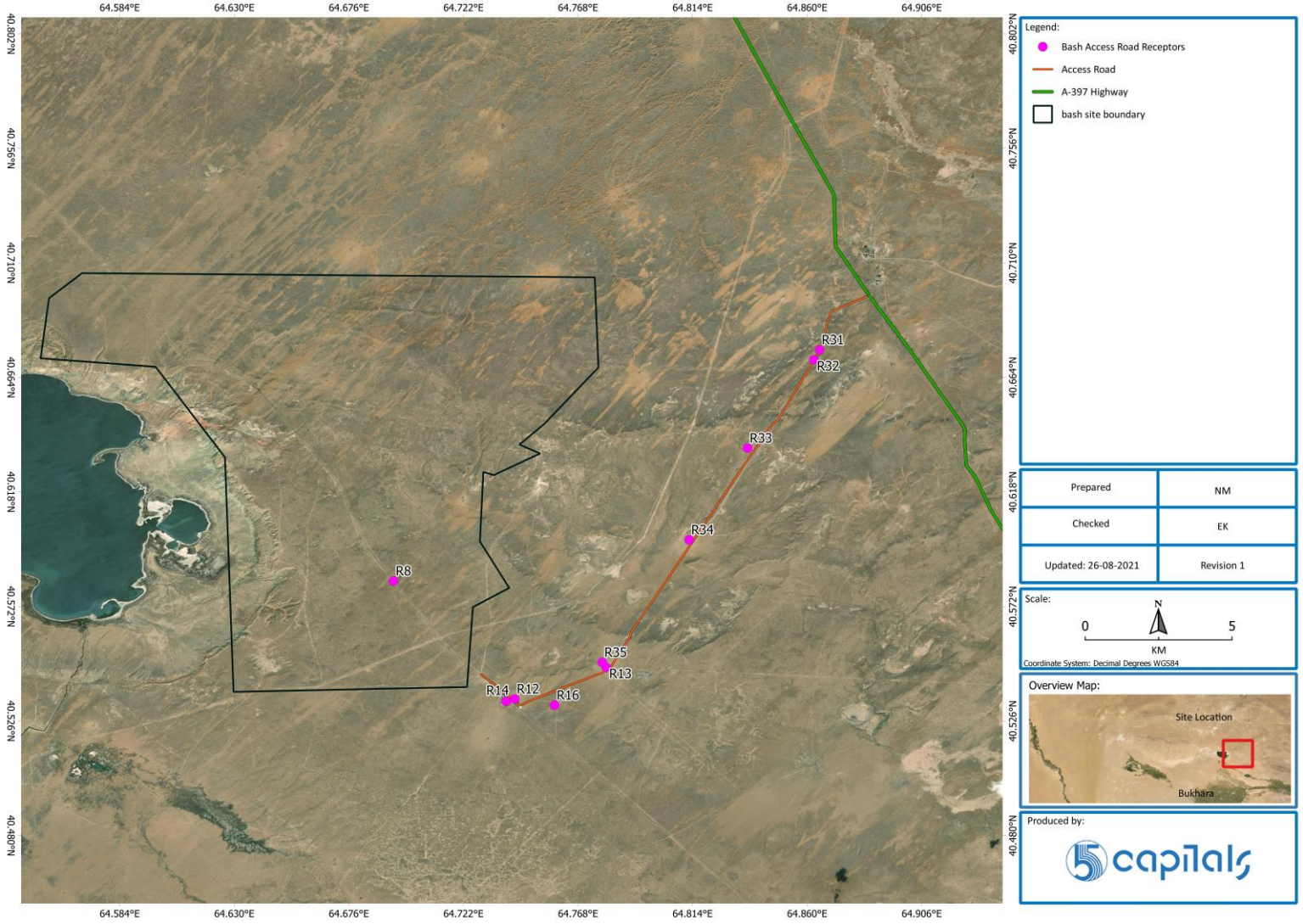
#R34– Vacant herders' structure with animal holding area.

#R13 – View of the Sub-station from the Access Road

#R14– View of the Gas Storage Facilities from the Access Road

View of the OHTL along the Access Road

Figure 2-7 Receptors along the Access Road



2.2.3 Overhead Transmission Line

2.2.3.1 Land Lease

As earlier discussed, ACWA Power will transfer the operation of the OHTL to NEGU after completion of the construction phase. As such, ACWA Power will only be granted land usage rights during the construction phase of the OHTL and the required land will be allocated to NEGU on a permanent basis through a government decree. It is understood from the Client that the allocation of land to NEGU will be undertaken once the required land is taken into state reserve. This process is still ongoing.

2.2.3.2 Land Use along the OHTL

It has been observed during numerous site visits that the 162km OHTL route is located is in an area of desert typology, forestry, agricultural and commercial land. The OHTL route cuts across six districts of the Bukhara region. These districts include Gijduvon, Shofirkon, Peshku, Romitan, Jondor and Karakul.

The construction of the Bash – Karakul OHTL will lead to physical and economic displacement. It is noted that the design of the 162km OHTL has not been finalised. As such, the Client has advised that an assessment of impacts is undertaken within a 50m on each side of the OHTL which also accounts for the required HPZ of 30m on each side. There are a total of 28 land users along the OHTL which include 6 clusters under the Committee for Sericulture & Wool Industry, 6 commercial enterprises, 7 farmers, 5 districts that own forestry land, 1 district that own commercial land 3 leased directly from the municipalities for pastoral use.

There are 6 PAPs with structures within the OHTL 100m AoI that will require to be moved. The 6 PAPs include 1 herder, 2 farmers and 3 commercial enterprises. Consultations have been undertaken to determine whether these structures can be moved to other areas of land that they own. However, all the PAPs have communicated that they prefer cash compensation and they will rebuild the structures in another location.

The OHTL AoI will also partially impact 6 farmers who grow wheat, barley, cotton and fruit trees. Temporary impacts will relate to erection of pylons and movement of materials while permanent impacts will be limited to where the pylons are located. It is expected that the farmers will still be able to farm under the OHTL outside of the RoW though such farming activities may include restrictions on the type of crops and trees that can be cultivated. Any loss and/or damage of crops and trees will be compensated in line with the Project specific RAP.

Among the 6 commercial enterprises located along the OHTL in Kurakul district, 4 are located on undeveloped land. 5 of these commercial enterprises (including 4 on undeveloped land) will experience permanent impact because the OHTL AoI will affect more than 50% of their

land making it unviable. These PAPs have expressed concern that this will impact their future income prospects and those with undeveloped land may potentially be fined by the government if the land is not commercially developed within the stipulated timeline.

As such, consultations have been undertaken with Bukhara Regional Municipality to identify suitable alternative land. However, the Municipality has informed the Project that commercial land is allocated based on a competitive auction process and the impacted PAPs will have to individually apply for this process. Additionally, 3 out of the 5 affected PAPs have stated they want cash compensation instead of land replacement while the other 2 have been informed of the Municipality's decision and will be provided with compensation and support in line with the Project specific RAP.

2.2.3.3 Local Context & Potential Receptors

In addition to some of the above, there are other receptors within 1km buffer of the OHTL and these include; farmers and other users of the agricultural fields, users of the irrigation ditch & canal, herder & livestock stables and the railway line that crossing the OHTL route

The table & figure below presents the receptors including those identified along the OHTL 1km buffer zone.

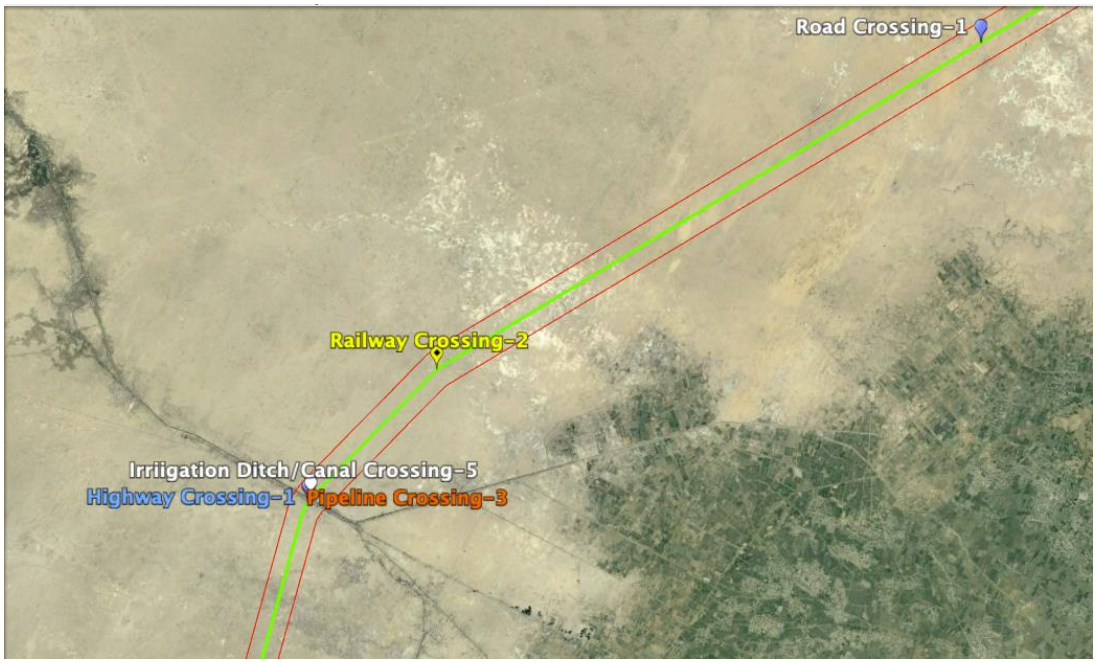
Table 2-6 Potential Receptors Within 1km of the OHTL Route

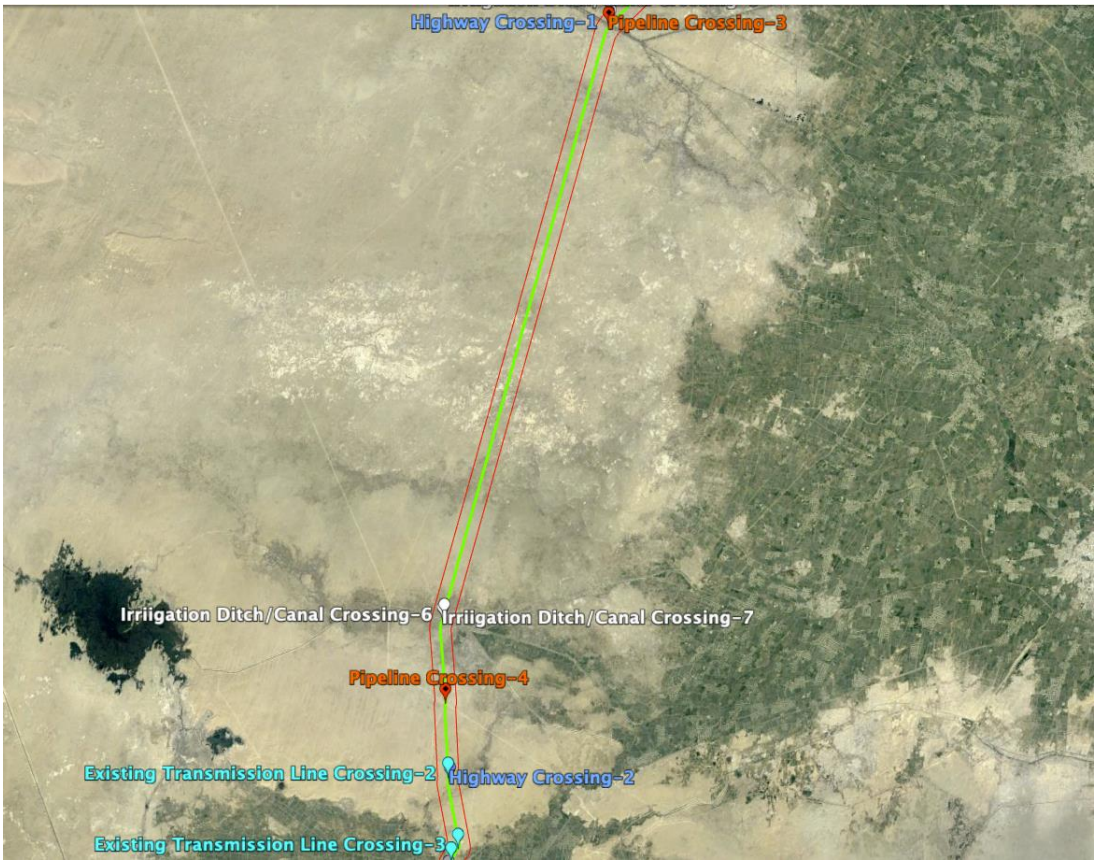
ID	Description	Receptor Type	Approximate Distance to OHTL Route
OHL 1	Farmers & other users of the agricultural fields	Agricultural	Along the OHTL route and within 1km
OHL 2	Users of the irrigation ditch & canal		Along the OHTL route and within 1km
OHL 3	Herder & Livestock stables		Along the OHTL route and within 1km
OHL 4	Railway lines that runs across the OHTL from East to West	Infrastructure	Across the OHTL route and within 1km
OHL 5	Gas pipelines that runs across the OHTL from East to West		Across the OHTL route and within 1km
OHL 6	Existing transmission lines that runs across the OHTL from East to West		Across the OHTL route and within 1km
OHL 7	'Qirobod Mavjlari' LLC (brickwork production)	Industrial	220m west of the OHTL, near the Karakul substation
OHL 8	'Jura' LLC (brickwork production)		570m west of the OHTL, near the Karakul substation
OHL 9	'Az Nafis' Private Entrepreneur (brickwork production)		700m south west of the OHTL, near the Karakul substation

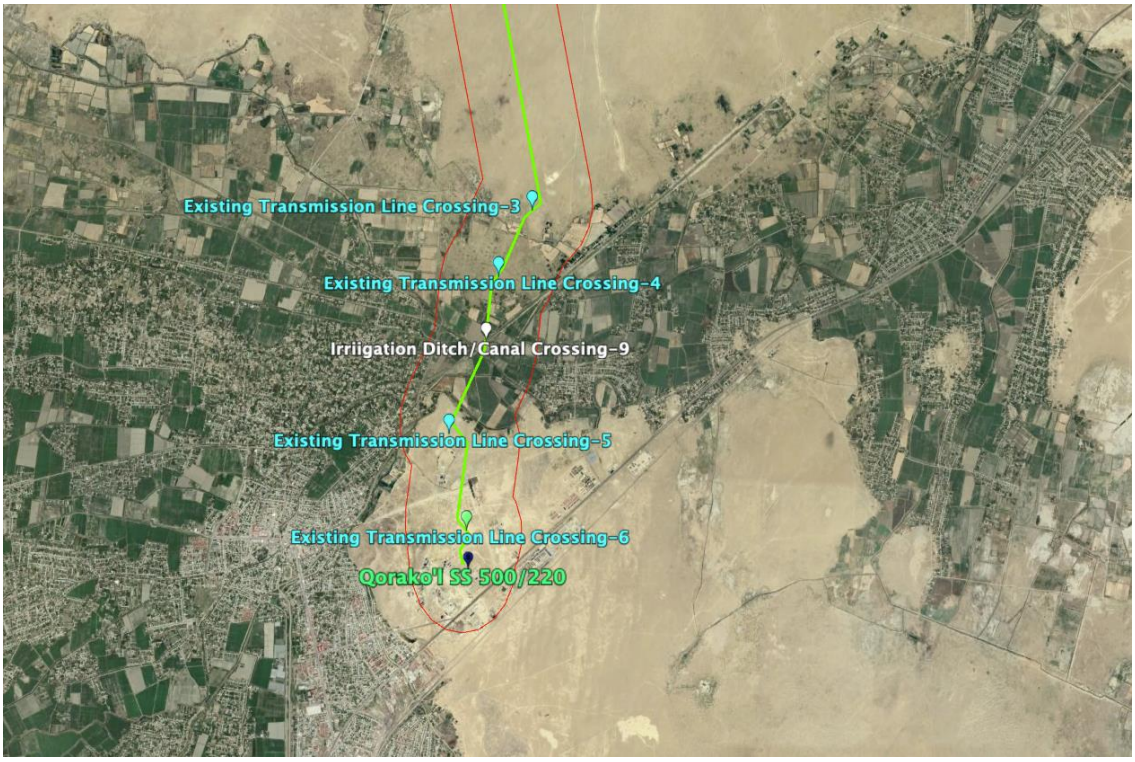
ID	Description	Receptor Type	Approximate Distance to OHTL Route
OHL 10	'Bunyodkor-Shakhzod-Fayz' LLC (brickwork production)		550m south west of the OHTL, near the Karakul substation
OHL 11	'Pakhlavon kichik' Private Entrepreneur (brickwork production)		840m south west of the OHTL, near the Karakul substation
OHL 12	'Ortiq Bobo' (brickwork production)		500m east of the OHTL
OHL 13	'Universal 5' LLC (brickwork production)		300m west of the OHTL
OHL 14	'Akhmad-Huseyn-Zuxro' LLC (brickwork production)		300m east of the OHTL
OHL 15	Western Gas Supply Karakul district branch (gas distribution)	Industrial	660m south west of the OHTL, near the Karakul substation
OHL 16	Central Propane gas distribution department of Karakul and Alat districts (gas distribution)		840m south west of the OHTL, near the Karakul substation
OHL 17	'Karakul Shersahiy' shopping centre	Commercial	700m south of the OHTL, near the Karakul substation
OHL 18	'Alligator' LLC (auto technical services)	Commercial	510m east of the OHTL
OHL 19	'Sabriya' LLC (metan gas station)	Industrial	810m east of the OHTL
OHL 20	'Aziz' Private Enterpreneur (Uncultivated Land)	Agricultural	110m west of the OHTL
OHL 21	'Ismail Sher Chorvador' LLC (Uncultivated Land)		OHTL route crosses this land
OHL 22	Livestock market	Commercial	140m east of OHTL
OHL 23	Construction materials market "Gulobod Bunyodkor" LLC	Commercial	160m east of OHTL
OHL 24	'Azamat Kholmurodov' Individual Entrepreneur,	Agricultural (Poultry)	155m west of OHTL
OHL 25	'Kumush Kalava' LLC (sale of cotton)	Commercial	142m west of OHTL
OHL 26	'Abdukadir Baraka' LLC, Poultry farming	Agricultural (Poultry)	350m east of OHTL
OHL 27	'Barkhayot Mukhammad Rajab' Farm	Commercial & Agricultural	607m east of OHTL
OHL 28	'Mardon' Farm	Agricultural (Cultivated Land)	OHTL route crosses the farmland
OHL 29	Household (Muminov Bobokhon, Bandboshi MCC)	Residential	250m west of the OHTL
OHL 30	Water pump house	Infrastructure	50m east of the OHTL
OHL 31	'Gofur Razzok' Farm	Agricultural (Cultivated Land)	25m west of the OHTL

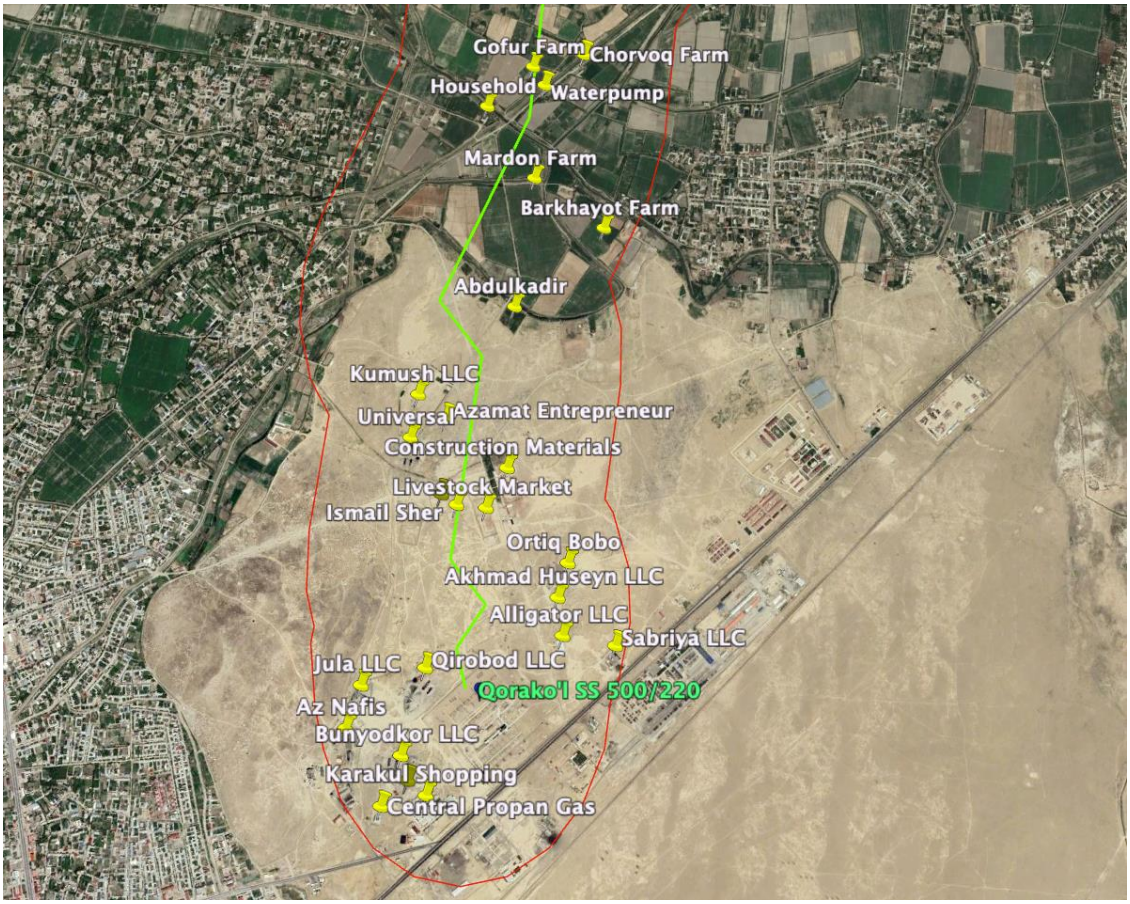
ID	Description	Receptor Type	Approximate Distance to OHTL Route
OHL 32	'Chorvoq NNU' Farm	Agricultural (Poultry)	270m east of OHTL
OHL 33	Karakul district cemetery (it includes a mosque)	Cultural	473m to Southern of OHTL

Figure 2-8 Location of Potential Receptors Within 1km of the OHTL




Highway Crossing-1
Pipeline Crossing-3
Irriigation Ditch/Canal Crossing-6
Irriigation Ditch/Canal Crossing-7
Pipeline Crossing-4
Existing Transmission Line Crossing-2
Highway Crossing-2
Existing Transmission Line Crossing-3


Existing Transmission Line Crossing-3
Existing Transmission Line Crossing-4
Irriigation Ditch/Canal Crossing-9
Existing Transmission Line Crossing-5
Existing Transmission Line Crossing-6
Qorako'I SS 500/220



2.3 Project Description

2.3.1 Wind Farm

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.

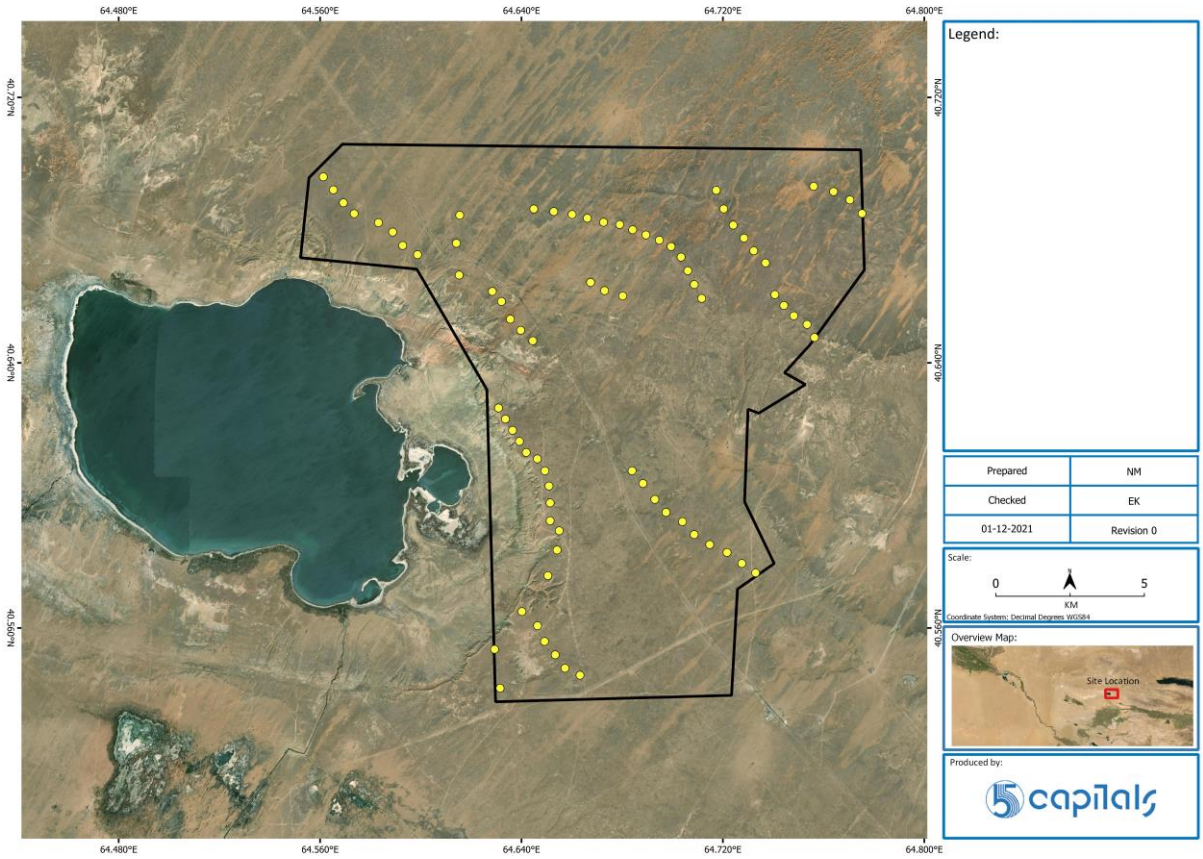
Wind turbines harness the energy of the wind and convert it to electricity. The amount of energy produced by wind turbines increases with wind speed and modern turbines are able to adapt efficiently to extract energy from a range of wind speeds.

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 Bash wind farm will consist of 79 wind turbine generators which will utilize EN 171 6.5MW wind turbines. This turbine features horizontal axis, three blades, upwind rotor, variable speed and pitch regulation.

The proposed locations of the WTGs within the Project site are presented in Figure 2-9 below.

Figure 2-9 Proposed WTG Locations within the Project Site (November, 2021)



2.3.1.1 Wind Farm Components

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

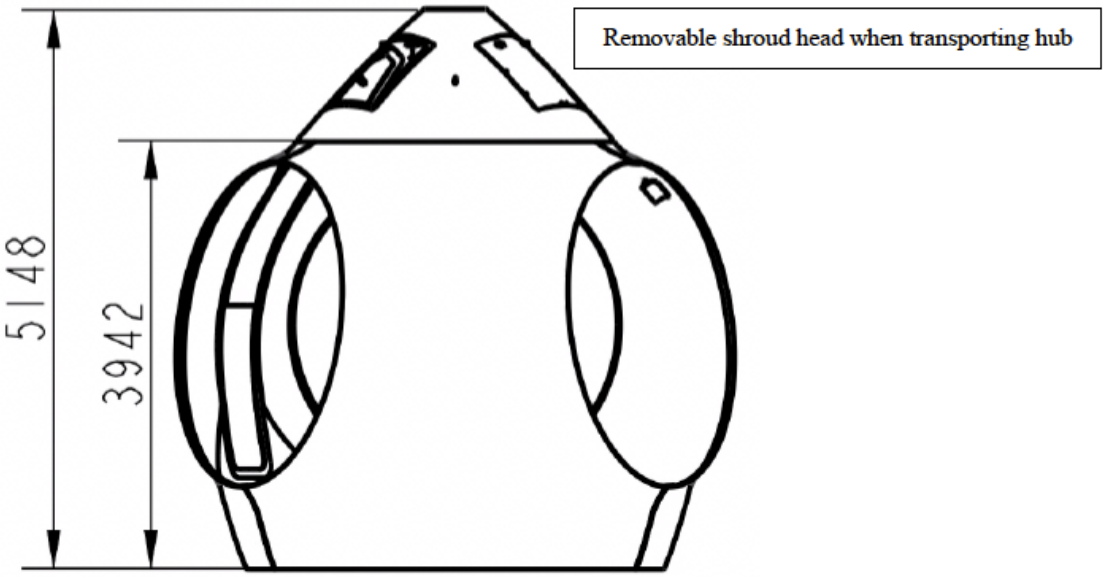
The pitch bearings are used between its hub and blades to transfer loads from blades to the hub. The blades are connected to the inner race of a bearing with root bolts, and the outer race of pitch bearing, and blade pitch bearing is connected to the hub body with bolts. The pitch gears are integrated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

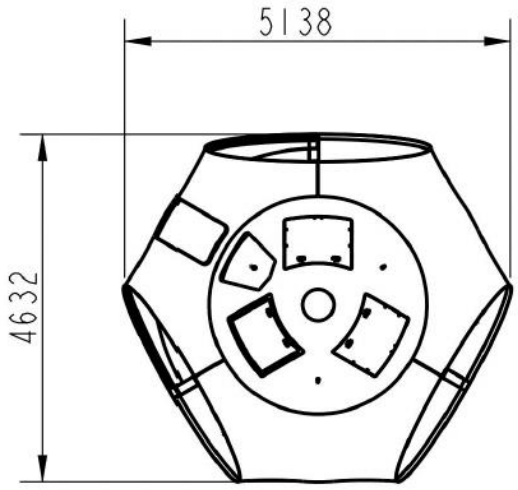
The pitch system consists of two parts; the electrical and mechanical parts. The electrical assembly consists of a control cabinet, a motor and a backup power supply while the mechanical assembly consists of a pitch gearbox, pitch bearings and its connecting parts. The pitch control cabinet of the electrical 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 2-10 Outline of Hub



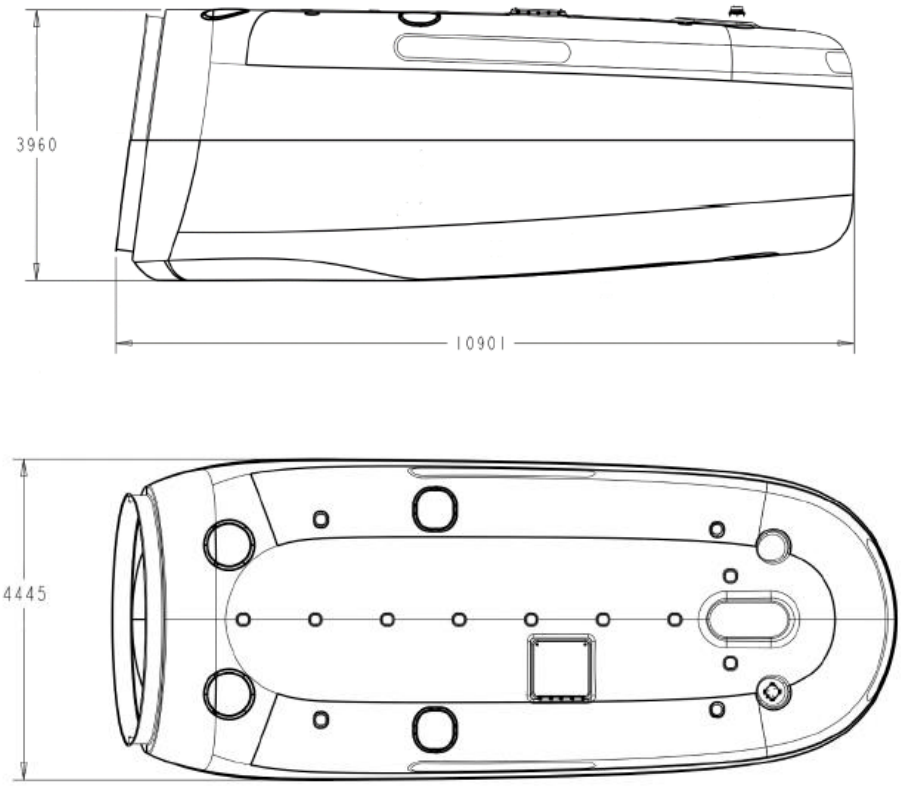


Source: Envision EN 171/6.5 Wind Turbine Specifications

NACELLE

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

Figure 2-11 Outline of Nacelle



Source: Envision EN 171/6.5 Wind Turbine Specifications

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 is for wind alignment and cable untwisting and consists of yaw ring gears, yaw gearbox and yaw caliper. The yaw ring gear is arranged between the tower top flange and the yaw caliper, fixed on the flange with bolts. The yaw caliper and drives are bolted to the nacelle baseplate. By engaging the yaw ring gear with the yaw drive gear, the yaw caliper and the nacelle baseplate can slide relative to the yaw ring gear.

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, speed range of 7.1rpm to 9.94rpm, rated power: 6750kW and rated voltage 1140V. The EN-171/6.5 turbine uses 1140V three-level electrical drive chain design instead of the traditional 690V two-level configuration to improve the efficiency of electrical drive chain. 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 inlet, passes through the winding end, magnetic pole, and radial ventilation slot, and cools down the components in the generator by taking away the heat and sending the warm air into the air collecting device.

The generator temperature rise at the ratings is Class B. It can operate at Class F temperature under special short-term conditions. Its designed thermal life for long term operation exceeds 20 years. The insulation system will be sealed windings which is highly resistible to dust, salt fog, humidity and temperature cycle.

The generator consists of stator, rotor, stator shaft, rotor shaft, etc.

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.

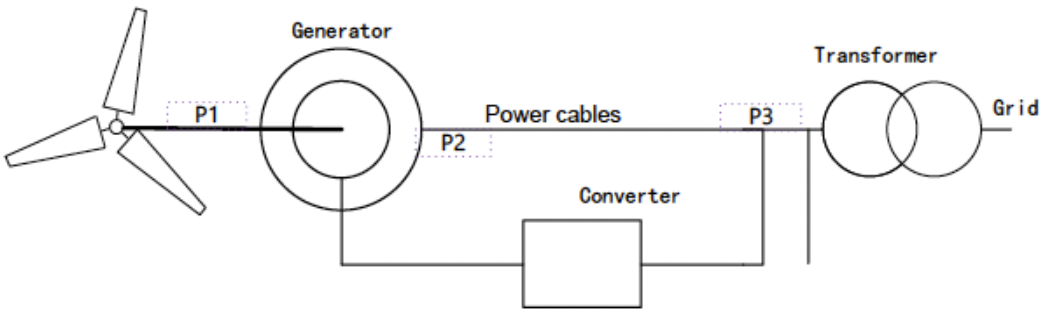
Generator Rotor

The rotor of the wind turbine converts the kinetic energy in the air into mechanical energy of rotation. It is connected to the converter through power cable, slip ring and carbon brush then the voltage is boosted by the box transfer and connected to the grid. Its rotation results from the lift created by the airflow over blades.

Convertor System

The convertor system consists of an LV distribution circuit, complete converter power, control and distribution protection circuits. The generator-side converter in the convertor is connected to the rotor side of the doubly fed generator while the grid side is connected to the grid. The rotor side converter controls the generator torque and the reactive power exchanged between the stator side and the power grid by generating three phase voltages with different amplitudes and frequencies. The line side converter exchanges active power with the power grid. The amplitude of such active power is the active power absorbed or emitted by the rotor side converter. The line-side converter absorbs or emits reactive power.

Figure 2-12 Schematic of the Electrical System – Electrical Drive Chain for DFAG



Source: Envision EN 171/6.5 Wind Turbine Specifications

TOWER

The tower is the main supporting structure of wind turbine. The yaw bearing in the nacelle is directly connected to the tower flange by bolts so as to transfer the load on the upper section of wind turbine to the foundation through the tower. The tower will be equipped with ladders and fall protection equipment inside, as well as aiding apparatus or elevators upon the request of customer. Rest platforms will be provided inside the tower at intervals along the height direction, and all tower tubes will be provided with platforms and lamps.

GRID CONNECTION

Each wind turbine will be provided with one transformer to connect to the grid. The power transmission circuit will be connected with the low voltage side of transformers via a main switch for incoming line and directly buried cables. During the start-up and grid connection process of the wind turbine, the wind direction sensor will detect the wind direction and enable yaw controller to actuate, aligning the wind turbine with the wind direction. When wind speed exceeds cut-in wind speed, the wind turbine output voltage is adjusted to the value of grid voltage and the system frequency is made suitable for grid connection through the control of full power converter. At the same time, the phase difference between grid voltage and generator's terminal voltage is measured. When such difference becomes zero (zero crossing point), the power element of the converter, operates to achieve grid connection (all these actions in EN171.6.5 wind turbine can be realized through converter system).

Other components of the wind turbine will include:

- Lightning protection and grounding;
- Environmental control system;
- Monitoring system;
- Automatic fire protection system;

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

Table 2-7 Brief Technical Information of Selected Turbine

ITEM	UNIT	ENVISION EN 171/6.5
Basic data of Wind Turbine		
Manufacturer/model		Envision EN 171/6.5
Rated Power	kW	6500
Rotor Diameter	m	171
Hub Height	m	100
Cut-in Wind Speed (10 minutes)	m/s	3
Rated Wind Speed (10 minutes)	m/s	12.8
Cut-out Wind Speed	m/s	25

ITEM	UNIT	ENVISION EN 171/6.5
Maximum Wind Speed (10min average)	m/s	42.5
Operating Temperature Range	°C	Normal atmospheric temperature wind turbine : -10°C to 40°C
Survival Temperature Range	°C	-20°C to 50°C
Design Service Life	Year	20
Blade		
Number of blades	-	3
Blade length	m	83.9
Weight	t	20.5
Blade Material		Glass fiber reinforced polymer (GFRP)
Blade Processing Technology	-	Vacuum infusion
Blade Root Connection	-	Metal flange
Swept Area of Rotor	m^2	22965
Pitch System		
Pitch control	-	Electric pitch control
Pitch range	-	-5° ~ 90°
Type of backup power supply for pitch control	-	Supercapacitor
Maximum speed of pitch motor	rpm	2500
Type of pitch motor	-	AC Permanent Magnet Synchro (PMS)
Pitch lubrication	-	Automatic lubrication
Hub		
Material	-	EN-GJS-400-18
Type	-	Casting
Generator		
Manufacturer	-	Envision
Type	-	Doubly fed induction generator
Number of pole pairs	-	2 pairs of poles
Rated Power	kW	6750
Rated Voltage	V	1140
Cooling Method	-	Air cooling
Rated efficiency of generator	-	97%
Rated frequency of generator	Hz	50Hz
Generator protection class	-	IP54
Protection class of rotor slip ring	-	IP23
Insulation Class	-	F
Lubrication Method	-	Lubricated with grease
Converter		
Rated Output Power	kW	6500
Cooling Method	-	Air Cooling

ITEM	UNIT	ENVISION EN 171/6.5
Moisture-proof method	-	Heating and Ventilation
Rated Voltage	V	1140
Protection class	-	IP54
Brake System		
Primary Brake System		Aerodynamic brake achieved by of three blade pitch control
Yaw System		
Yaw Concept	-	Electro-mechanical yaw
Type of Yaw Brake	-	Yaw ring gear + passive brake
Material of Yaw Ring Gear	-	42CrMo4
Lighting Protection		
Lighting protection measures		Electrical lighting protection, blade tip lighting protection, etc.

Wind turbines are typically painted light-grey, with aviation safety lights at the top of the nacelle. The tips of the blades are sometimes painted orange or red to improve daytime visibility of the blade swept area while remaining unobtrusive to the character of the landscape as far as practical.

Turbines are also fixed to the ground and stabilised using reinforced concrete platforms, which ensure that the turbine remains stable. Foundation platforms are constructed below ground level, and soil will placed over the platform to return the visible area to nearly its original condition.

2.3.1.2 Project Auxiliary Facilities

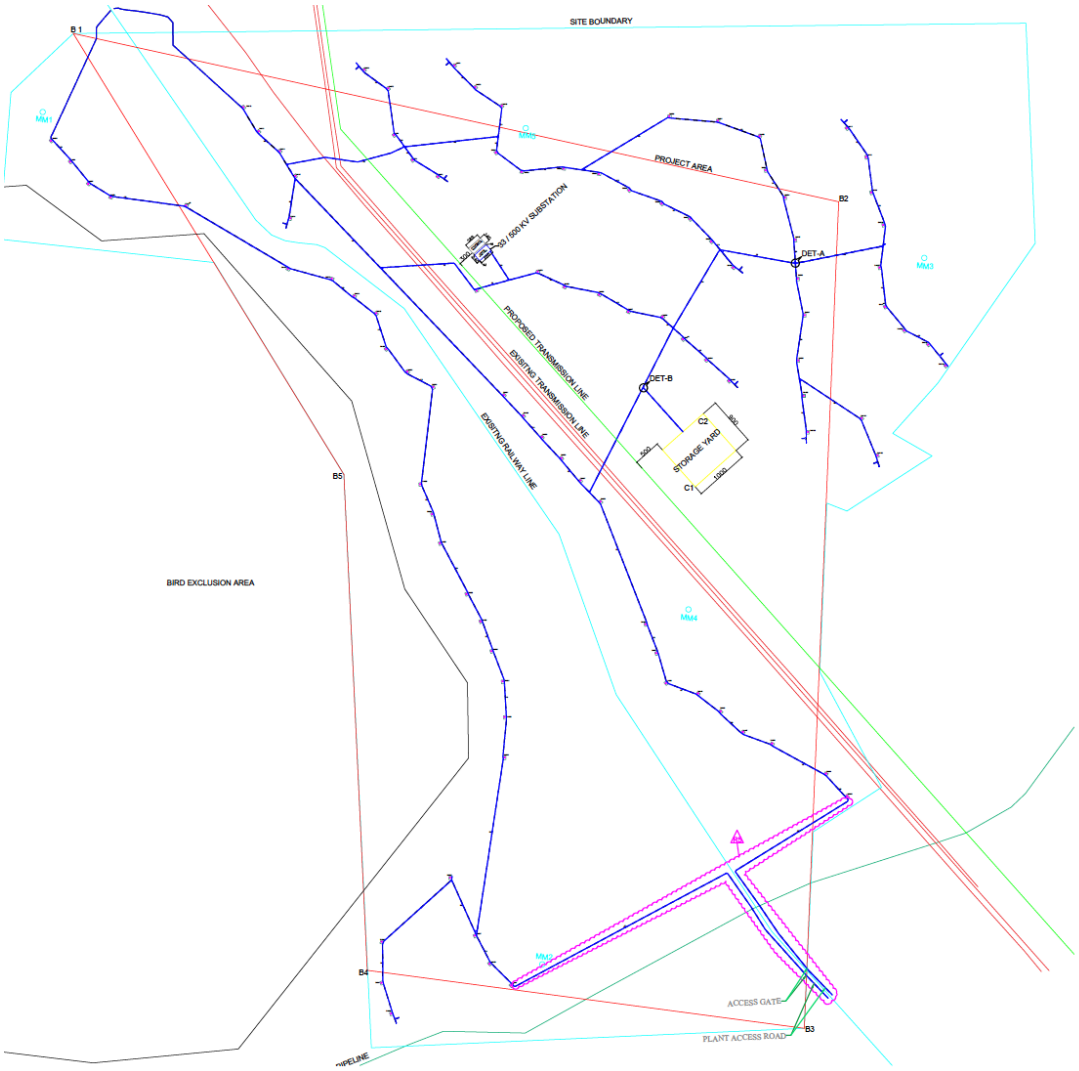
Auxiliary facilities for the Project will include:

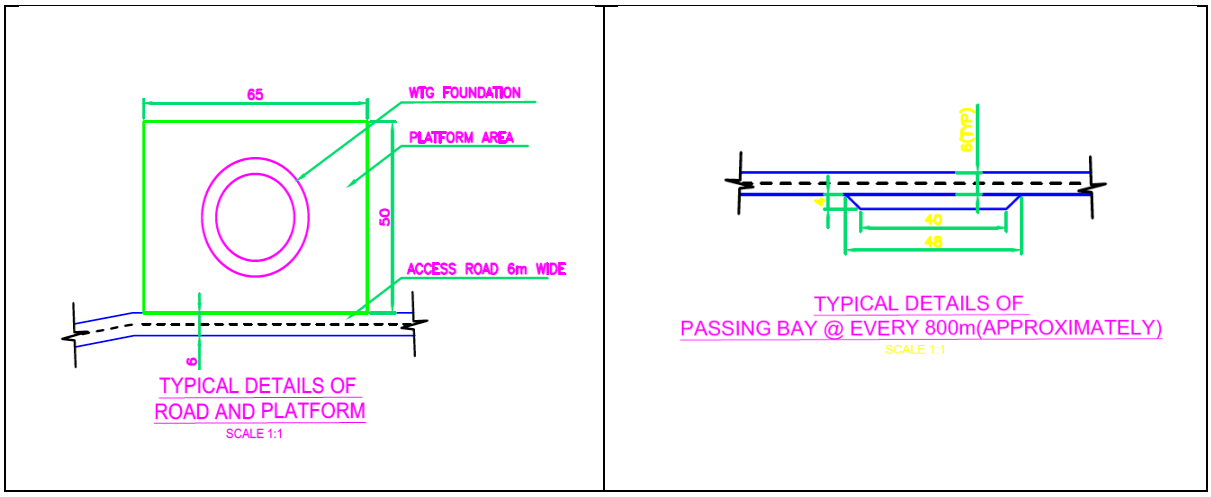
- Site entrance and security building
- Administration building, offices and amenities
- Central Control Room
- Warehouse and stores
- Security
- Lighting
- Other mobile plant and vehicles
- Internal access roads between turbines
- 33/500kV substation
- Electrical Connections

INTERNAL ACCESS ROADS

Internal access roads between turbines will be developed by the EPC Contractor to enable easy access within the Project site. The internal access roads will be 6m wide including shoulders 0.5 +0.5m on either side.

Figure 2-13 Proposed Routing Network of Internal Access Roads (ref. blue lines)





33/500KV SUBSTATION

An AIS 33/500kV sub-station will be located in the centre of the "Bash Wind Farm). The sub-station is approximately 450m*500m with an area of 204,860. The proposed location is near an existing OHTL.

ELECTRICAL CONNECTIONS

In order to enable connection of the Bash Wind Farm to the grid, the Project will require its own electrical connection facility that will consist of a 500kV switchyard and a 33/500kV substation within the Project site. These electrical connection facilities will be located at the centre of the Project site and will enable connection of the Wind Power Plant to an overhead transmission line (OHTL) with a rating of 500kV single circuit. This OHTL will run from the Project site to Kurakul substation several kilometres south of the Project site.

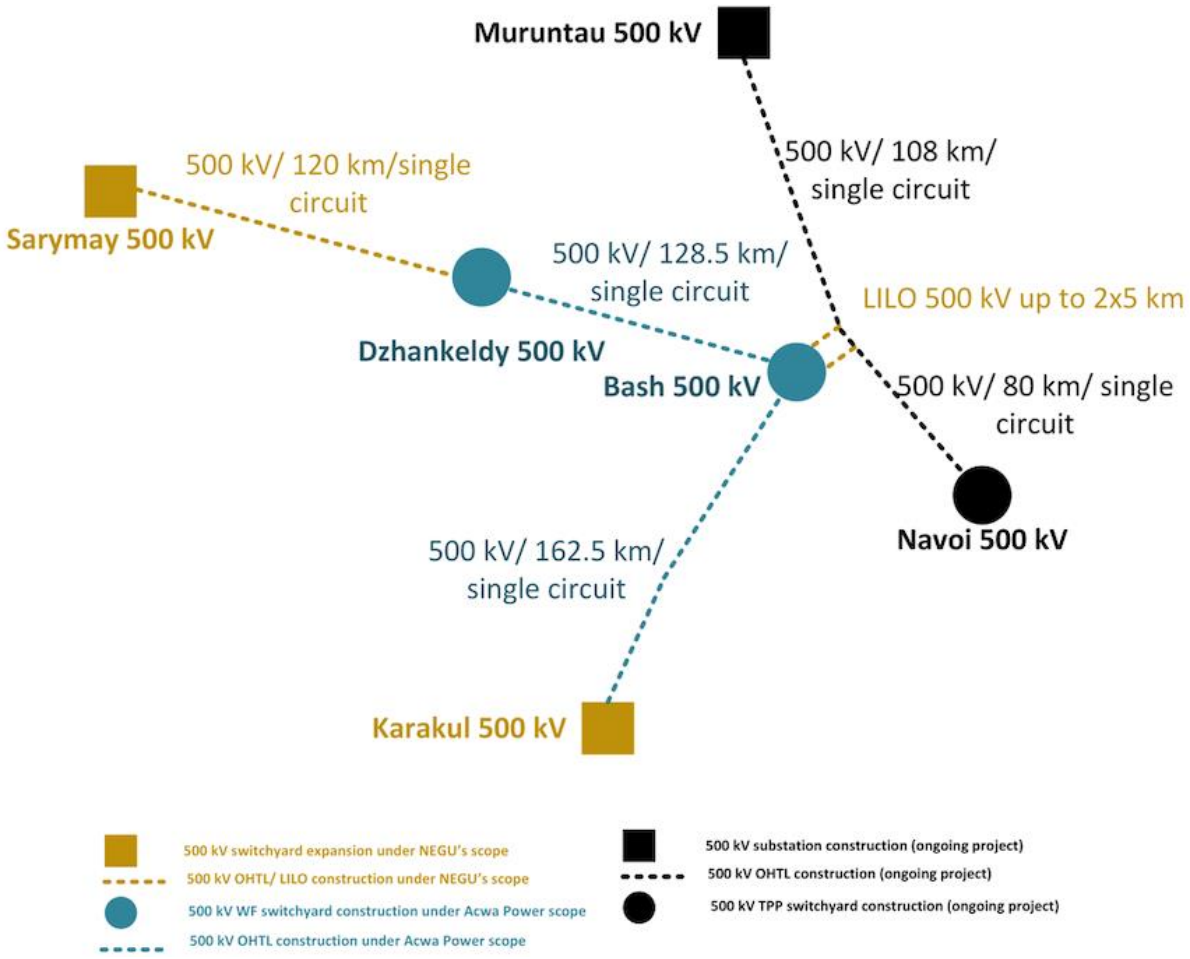
Additional details of the overhead transmission line is provided in the Overhead Transmission Line Sub-section below.

2.3.2 Overhead Transmission Lines

Some of the Project facilities will be shared between ACWA Power's Bash 500MW Wind Farm and the Dzhankeldy 500MW Wind Farm which is located approximately 94km north west of the Bash site. The Project facilities to be shared between the two Projects include:

- Overhead Transmission Lines
- 500kV Pooling Switch Sub-station (located within Bash Wind Farm).
  - The substation will be approximately 450m x 500m with an area of approximately 204,860 square meters.

Figure 2-14 Grid Interconnection Option for 1GW ACWA Wind Farms (Bash & Dzhankeldy)



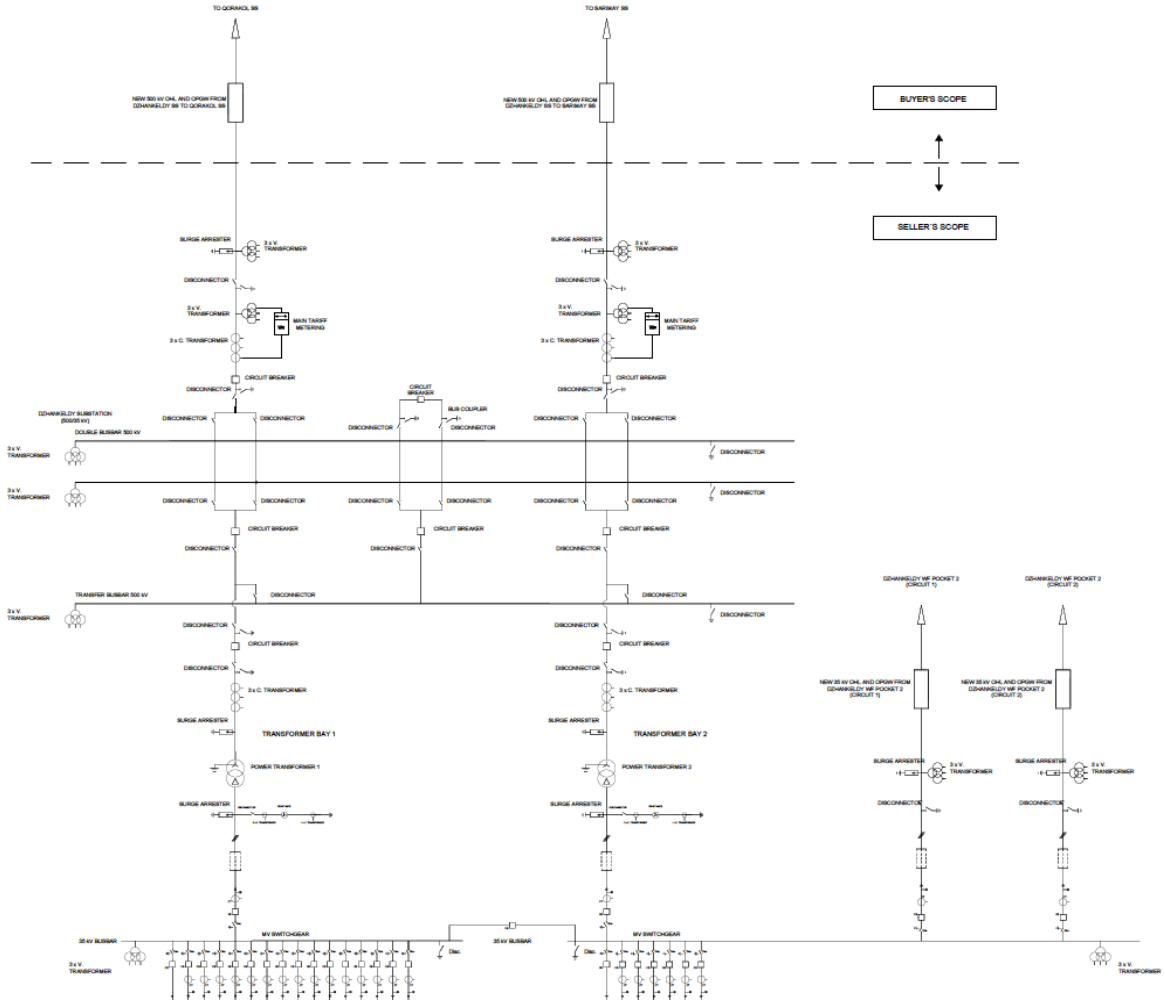
Source: Selection of Interconnection Option

Note: *The length of the OHTLs shown in the figure above have since been revised. The figure is included to illustrate the interconnectedness between the Bash and Dzhankeldy Projects and their associated facilities.*

The 500kV single circuit OHTL from Dzhankeldy to Bash will be approximately 128.5km and connect to the Bash 500kV pooling switch sub-station while the 500kV from Bash sub-station to Kurakul substation will be 162km. The switchyards will be designed to accommodate planned interconnections from Navoi-Muruntau LILO and the line from Sarymay to Dzhankeldy.

Power generated by the wind farms will be exported to NEGU via the plant electrical interconnection facilities/500kV AIS of One and Half Breaker Scheme. Preliminary details of the Air Insulated Substation (AIS) is as shown in the figure below and in Appendix F.

Figure 2-15 Proposed Arrangement for AIS



Source: ACWA Power 2021

The 500kV unit bay for the Bash and Dzhankeldy Wind Farm will comprise of:

- Circuit breaker;
- Isolator;
- Earthing;
- Switches,
- Measuring CTS & amp;
- Protection relays and associated control

Both the AIS for the Bash and Dzhankeldy Wind Farm will be designed for 500kV level and will employ one and half breaker scheme. It is understood from ACWA Power that the Bash 500kV pooling switch sub-station will be operated by both the FE "ACWA Power Dzhankeldy Wind" LLC and FE "ACWA Power Bash Wind" LLC. To allow independent project implementation, the

AIS at Bash Wind Farm will be equipped with section disconnector that will be connected after commissioning both Wind Farms.

Figure 2-16 Location of 162 km OHTL Route from the Project Site to Kurakul Substation

2.3.2.1 OHTL Components

A brief preliminary description of the main components of the transmission lines are as provided below:

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 a large number of towers/pylons that will be self-supporting and grounded to ensure low resistance. At this stage it is anticipated that the type of towers could be either:

- Suspension towers - used for straight section of the line to keep the wires off the ground or;
- Angle angular (tension) towers – used to tension the wires and accommodate changes in direction of the line

The selected tower types will be designed to meet the applicable Uzbekistan standards & regulations and will be stell lattice design. 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.

Plate 2-22 Example of Typical 500kV Suspension & Angle Angular Towers

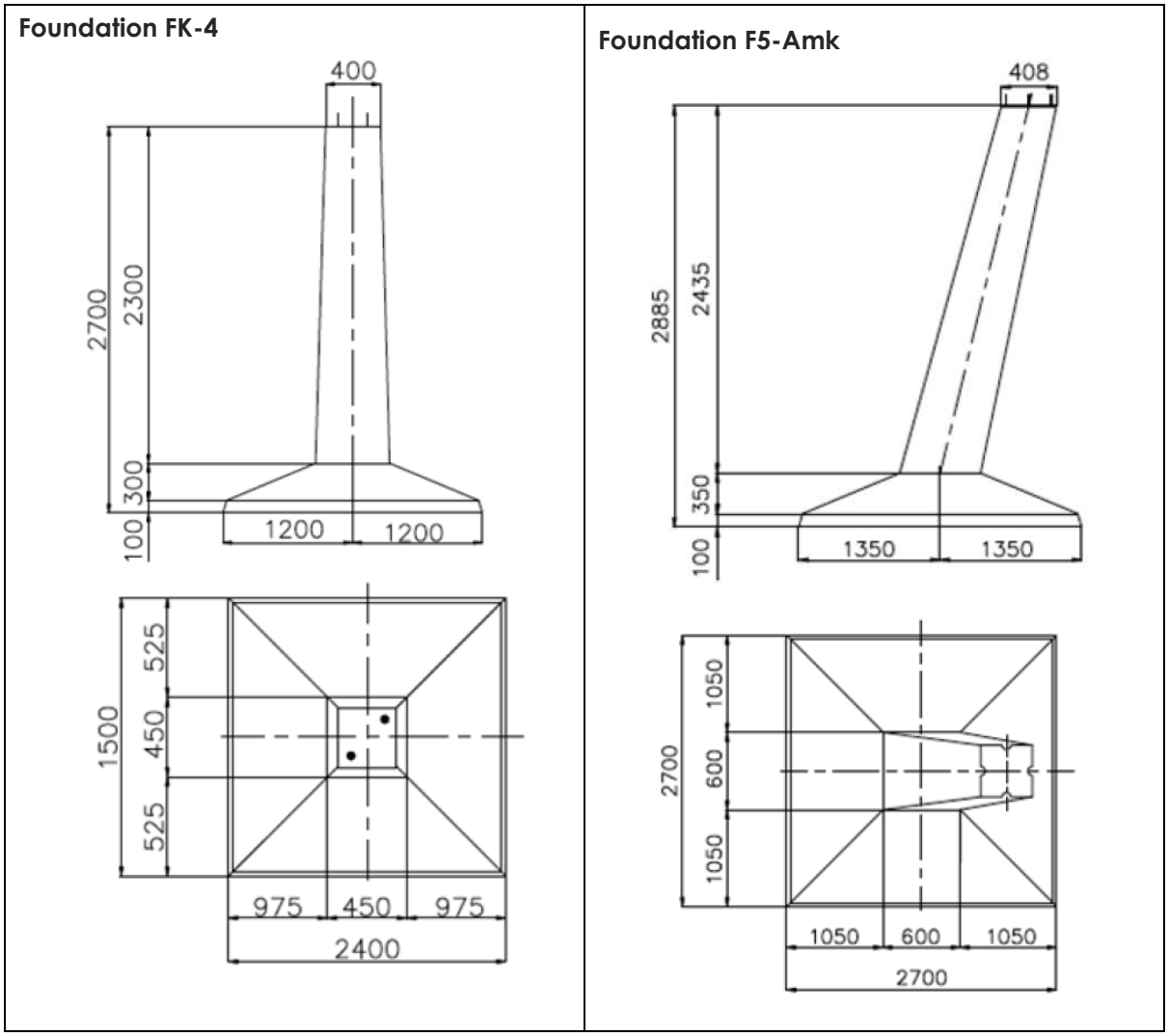
Suspension Tower	Angle Angular Tower
	

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.

Typical foundation dimension for a 500kV tower is presented in the figure below.

Figure 2-17 Typical Foundation Dimension for 500kV Tower



CONDUCTORS & WIRES

It is anticipated that each 500kV tower supports three (3) phases and two (2) earthing wires that protect the line from lighting strike.

Conductors

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 wires will be mounted on the

towers and will consist of three (3) phases of five (5) conductors and two (2) earthing wires. There will be five wires in each of the three phases (i.e. there are three conductors each comprising of five wires). For 500kV transmission the wires will have a cross-section of 400mm.

The height of the wire at the towers is normally approximately 25m which drops to a minimum 12.5m at the centre of the span. When crossing sensitive areas like roads, railway or agricultural land, the height at the centre of the span can be increased to 16m by adding additional sections to the base of the towers or by reducing the distance between the towers.

Earthing Wire

The earthing wires also called Optical Ground Wires (OPGW) combines the function of grounding and communications. It is anticipated that there will be two (2) earthing wires which 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

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.

2.3.2.2 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.

As shown in the figure above (section 2.3.2), the National Grid of Uzbekistan (NEGU) will be responsible for the construction and operation of the associated facilities for both the Bash 500MW Wind Farm and Dzhankeldy 500MW Wind Farm. The OHTLs under NEGU's scope include:

- Dzhankeldy – Sarymay: This will include a 500kV single circuit OHTL which will be approximately 120km. The expansion of the 500kV Sarymay sub-station will also be under NEGU's scope.
    - According to the MOM " Selection of Interconnection Option" held between MoE, NEGU, ACWA Power & Juru Energy, NEGU will follow official procedure with multilateral DFIs (i.e., EBRD) for securing funds and ensuring timely

implementation of Sarymay – Dzhankeldy 500kV OHTL and Sarymay 500kV switchyard commissioning in line with planned Dzhankeldy WF Early Commercial Operation Date (ECOD). It is noted that NEGU stated that they have started discussions with EBRD on the financing of this alignment.

- LILO to Navoi – Murantau: During the meeting NEGU confirmed that the LILO will not exceed 10-15km. This will connect to the:
  - 500kV single circuit 108km OHTL to Murantau 500kV sub-station.
  - 500kV single circuit 80km OHTL to Navoi 500kV TPP switchyard.

It is noted from the MoM that the facilities above are currently under construction.

- Karakul 500kV sub-station: This will include the expansion of the existing Karakul 500kV bay. It is understood from ACWA Power that this will be under NEGU's scope.

2.4 Project Construction Requirements

2.4.1 Primary Construction Works

WIND FARM

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.

2.4.2 Temporary Construction Facilities

WIND FARM

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 Bash to Karakul OHTL 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.

2.4.2.1 OHTL

Where temporary construction laydown area(s) will be established along the OHTL corridor/ROW, these areas will be required for the storage of materials such as pre-assembled tower sub-structures, for the further assembly of these sub-structures into final tower structures, for storage of foundation reinforcement steel or steel tower metal bars, tools & equipment to

be used by the Engineering Procurement and Construction (EPC) contractor as well as sub-contractors responsible for OHTL construction.

It is understood that the indicative length of the laydown areas will be approximately 3-5km of the construction transmission line route covering on average 11 to 12 towers. Each laydown areas is anticipated to be approximately 100m X 50m in area. Following assembly of the tower, the assembled towers will be transported from the laydown area to each tower construction site. Each laydown areas is anticipated to be in use for a few weeks only after which it will be disassembled, and the area will be returned to its original condition.

2.4.3 Batching Plant

It is understood that a concrete batching plant will be located at the wind farm if ready mix concrete will not be sourced for the project. This batching plant will be developed and funded as part of the project. At this stage, the exact location of the batching plant within the project site is unknown. However, it is expected that it will be located at a distance of over 500m from the worker accommodation camp which is also located on site and at a distance of not less than 500m from local communities. This is so as to avoid air quality and noise impacts to the accommodation camp and local communities.

The materials to be used at the batching plant will include to gravel, cement, sand, additives (if required), etc. of various types and sizes. The exact location of where these materials will be sourced from is not known at this stage however, it is anticipated that majority of the materials will be sourced locally.

With regards to water requirement for the batching plant this will be supplied to the site via water tankers. Please see sub-section 2.4.4 on Utility Requirements for additional information on water requirements for concrete works.

This ESIA has assessed the potential impact from the construction & operation of the batching plant in respective chapters herein.

2.4.4 Utility Requirements

The Engineering, Procurement and Construction (EPC) contractor will be solely responsible for all construction utilities required for the wind farm & 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.

ELECTRICAL SUPPLY & FUEL

It is anticipated that diesel electric power generators will be used as the source of electricity during construction and as backup. 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 however, this will be confirmed by the EPC Contractor before the start of construction.

WATER SUPPLY

DOMESTIC WATER

During site preparatory stage, the project will require potable water supply for the construction facilities & activities. The expected volume of water for construction activities in approximately 30,000m^3.

The construction workforce will be provided with potable water that meets local and/or WHO Drinking Water Standards. At this stage, it is anticipated that project personnel will use approximately 80,000m^3 of water.

A licensed potable water supply company will supply the water required to cover the water demand of the Project (both for construction activities and 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. The table below presents the water consumption estimates per WTG for the different construction activities.

Table 2-8 Estimated Water Consumption for Concrete Works

ACTIVITY	MAXIMUM WATER REQUIREMENT (M^3)
WTG Foundation Pouring	90m^3 per WTG foundation, as it is assumed that the size of the foundation is approximately 750m^3
WTG Foundation Curing	1m^3 per WTG foundation per day assuming 10 days will be sufficient for foundation curing.
WTG Components cleaning before erection	2m^3 per WTG

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.

2.4.5 Workforce

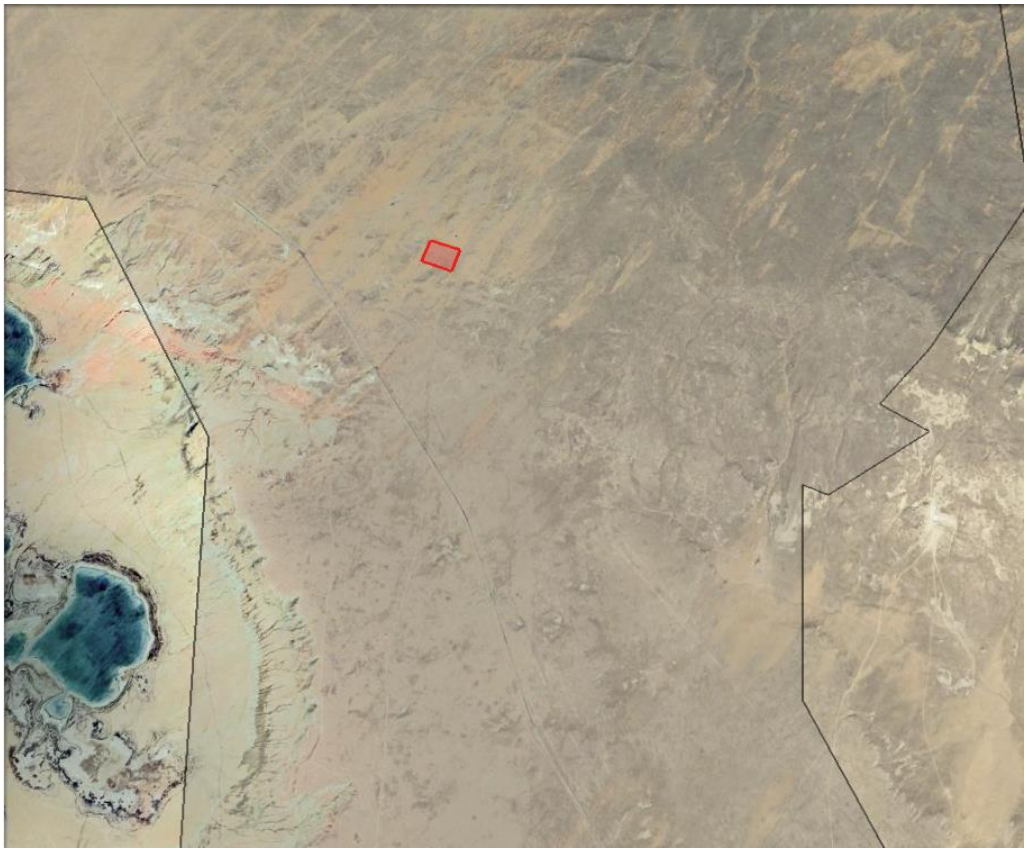
Requirements for construction workforce are yet to be finalised. At this stage it is understood that about 700-1000 personnel will be involved during peak construction periods of the Wind Farm and OHTL (about 50-100 personnel will be involved in the OHTL construction). This will comprise a combination of Project Company, EPC Contractor and sub-contractor staff. Out of these 700-1000 personnel, about 350 - 500 will be employed from within Uzbekistan while approximately 60% will be recruited from China, Turkey, India and Europe.

2.4.6 Worker Accommodation

It is understood that the location of worker accommodation for the Wind Farm and OHTL will be within the Project site and located in the same area as the proposed laydown area (please see proposed location in the figure below). Such worker accommodation is expected to house Project Company and EPC Contractor staff. At this stage, the exact location of the worker accommodation and other workers accommodation requirements for the subcontractor have not been confirmed. However, 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 2-18 Indicative Location of Laydown Areas and Worker Accommodation for Project Company and EPC Contractor Staff (ref. Red Square)



2.4.7 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. T The anticipated vehicles, equipment and machinery to be used on site during the site preparation and construction activities include but not limited to:

Table 2-9 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

NAME	QUANTITY	TYPE OF FUEL
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.

2.5 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.

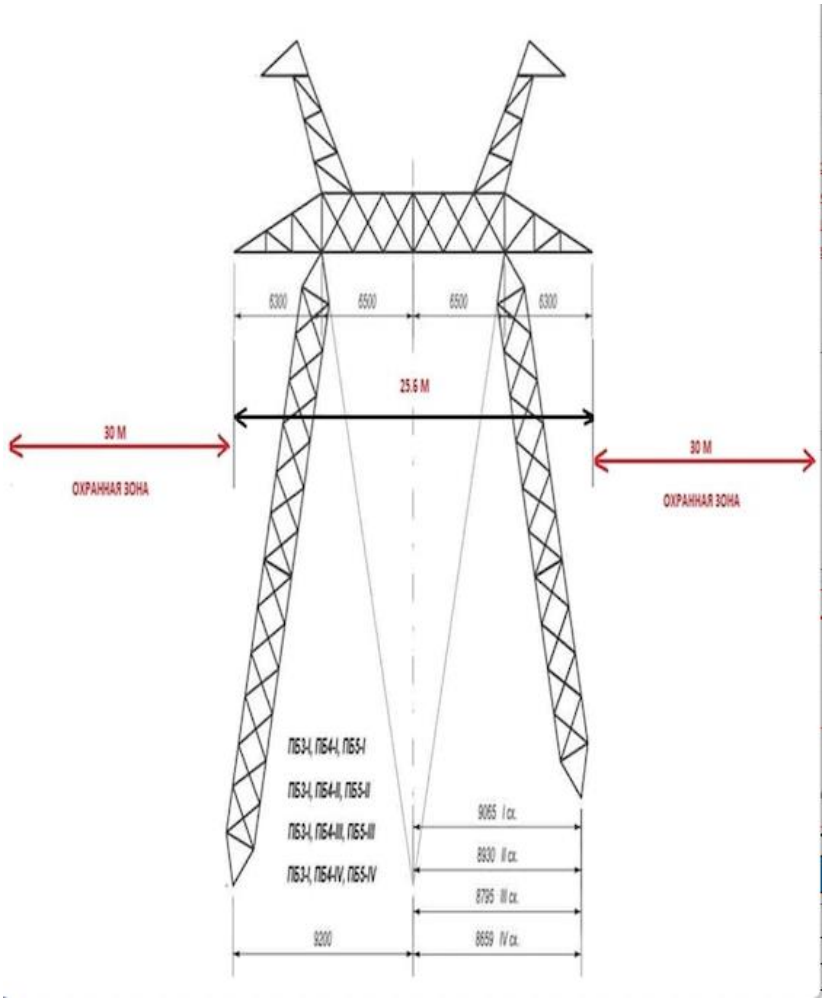
Preventive Maintenance includes works at tower foundation, monitoring of earth resistance values, tree cutting and trimming along the ROW, ground patrolling, thermo-vision scanning on sample basis and attending to defects if any. Corrective Maintenance depends on type of issues.

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 considered to be 85m. This accounts for the 30m buffer zone on each side of the OHTL as required by law and a wire zone of 25.6m. See figure below.

Figure 2-19 Illustration of the Width of Right of Way



2.6 Project Milestone

The indicative project and OHTL milestones are as provided in the table below.

Table 2-10 Key Project Milestone/Timeline Dates

MILESTONES	DATE
Signing Project Agreements (PPA; Investment Agreement)	24th January 2021
Presidential Decrees	22nd February 2021
Land Allotment Orders	19 & 23 March 2021
Limited Notice to Proceed (LNTP)	1st April 2022
Full Notice to Proceed (FNTP)	1st July 2022
Site Mobilisation	8th July 2022
WTG Installation	2nd November 2022
Transmission Line Construction	1st December 2022
Substation Electrical Installation	1st April 2023

MILESTONES	DATE
Grid Connection	23rd July 2023
Scheduled Commercial Operation Date (COD)	31st December 2023
Required Project COD	31st March 2024

2.7 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.

2.8 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.

2.8.1 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 Bash Wind Farm 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 500MW 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.

2.8.2 Alternative Project Site

The process of site selection commenced 2019 between the Ministry of Energy, State Geology Committee of the Republic of Uzbekistan and ACWA Power. In March 2020, ACWA Power considered five (5) potential sites for the development of wind power projects in the country as follows:

- Dzhankeldy: 7km west of Ayakguzhumdy;
- Bash: 30km west of Kokcha;
- Kanimekh 1: 20km northwest of Nurmakhan;
- Kanimekh 2: 50km north east of Aznek; and
- Kulkuduk area: 30km north of Uchkuduk.

It is understood from ACWA Power that the Bash site was selected over other sites due to the wind potential based on the vortex data, wind campaign measurements, geological factors, existing infrastructure, and interconnection to the grid.

On 27th October 2021 the Ministry of Energy provided the key steps of the site identification/selection process and a summary of this is outlined below.

ID	KEY STEP	DATE
1	Participation of ACWA Power in the International Conference on the development of oil and gas in Uzbekistan followed by the meeting in the Ministry of Energy of the Republic of Uzbekistan	Q2 2019
2	The delegation consisting of the specialist from the Ministry of Energy and NEGU visited ACWA Power's facilities in UAE and Saudi Arabia	Q2 2019
3	Proposal from ACWA to do a wind farm in Nurota mountains	July 2019
4	After the State Geology Committee of the Republic of Uzbekistan rejected giving the land in Nurota district and proposed land by SGC as not accepted by ACWA Power, Ministry of Energy proposed that ACWA comes up with new site in Bukhara and Navoiy regions	Q3 - Q4 2019
5	Based on the analyses of ACWA Power on Bukhara and Navoiy regions, the negotiations on Head of Terms started	July 2019
6	Head of Terms signed on the 20th September 2020 which includes the site coordinates for various wind power plants in Uzbekistan	September 2019
7	List of potential wind sites provided by Ministry of Energy based on satellite wind atlas, proximity to the national grid network	Q4 2019 – Q1 2020
8	Implementation Agreement signed on 5th March 2020 between ACWA Power and Ministry of Energy which includes a shortlist of 5 wind sites (including Dzhankeldy & Bash sites)	March 2020
9	Final Selection of the 2 sites (Dzhankeldy & Bash) following the final discussion with: • State Geology Committee (specifically in consideration of existing and future mining activities); • National Electric Grid of Uzbekistan (specifically in consideration of the length of the evacuation and future grid expansion plan); and • Environmental & Social experts (in consideration of minimizing the environmental & social negative impact).	June 2020
10	Project Agreements (PPA & IA) signed on 24th January 2021 which includes the site coordinates for Dzhankeldy & Bash	January 2021

2.8.3 Project Technology

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

Table 2-11 Different Technologies Considered for the Project

WIND TURBINE MODEL	MANUFACTURER
GW 165-6.0	Goldwind
EN171-6.5	Envision
GW165-5.2 & 5.6	Goldwind
GW155-4.5	Goldwind
EN156-5.0	Envision
MySE5.0-166	Mingyang
MySE4.0 -156	Mingyang
W4800-146	Shanghai Electric
DEW-D4500-155	Dongfang

Wind Turbine Model	Manufacturer
SG6.0-170	Siemens Gamesa
V150-6.0	Vestas

The Envision EN 171-6.5 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 (LCOE) which results in highest generation at lowest cost;
- Site Suitability of the chosen WTG Model; and
- Project Schedule.

2.8.4 Wind Farm Project Layout

The siting of the Project site and Wind Turbine Generators (WTGs) was based on the following:

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

Ecological Considerations

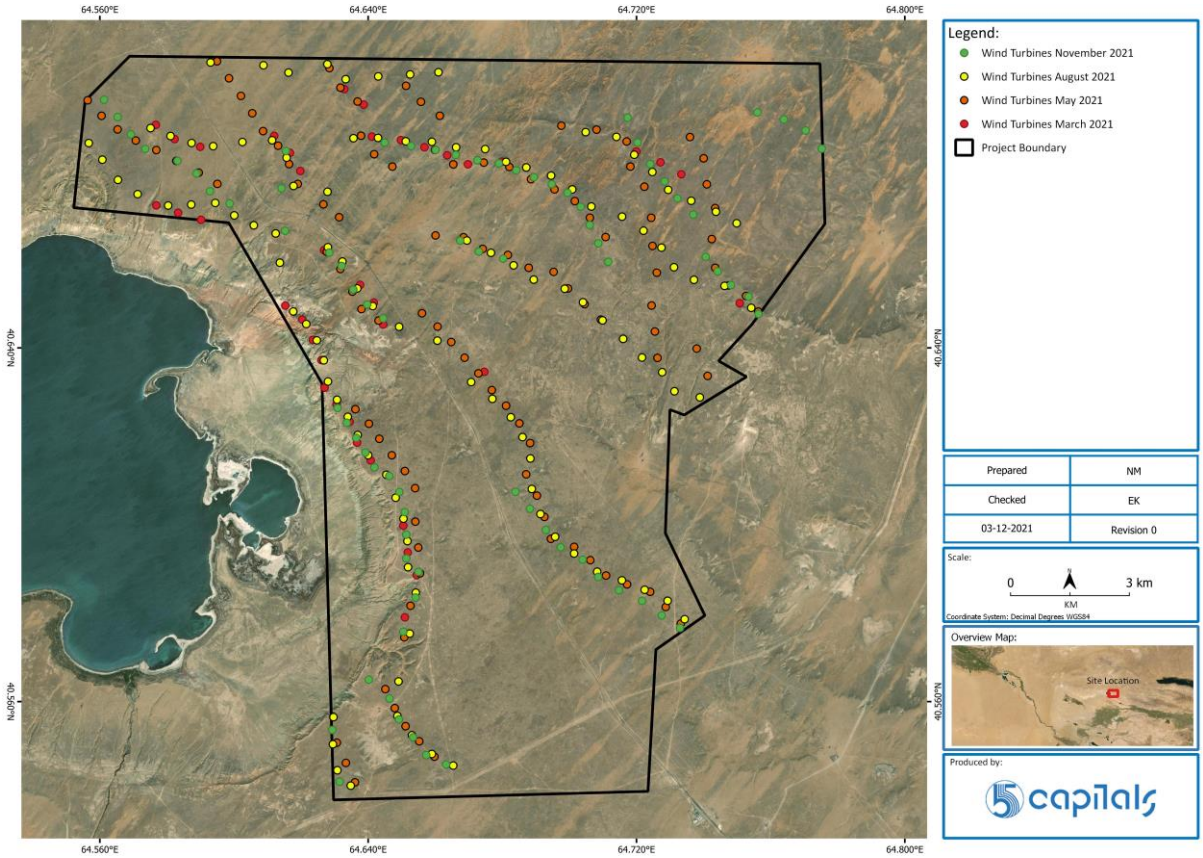
Due to the proximity of the Bash WF to Lake Ayakagitma (IBA site) a number of design changes were undertaken including the reduction of WTGs. This included the reduction of WTGs from the initially proposed 111 in May 2021 to the current 79 WTGs as shown in the table below.

Table 2-12 Optimisation of WTGs for the Bash WF

Month	Number of WTGs
March 2021	91
May 2021	111
August 2021	111
November 2021	79

The different WTGs layouts considered between March and November 2021 are shown in the figure below.

Figure 2-20 Overlay of WTG Considered in March, May, August and November 2021 Showing Difference in WTG Location



These changes were undertaken not only to optimise the wind potential but also based on the following ecological considerations:

- Establishment of a 2km buffer zone between Lake Ayakagitma and the nearest WTG.
  - As a result, ACWA Power undertook micrositing of 3 WTGs in order to align with a 2km buffer zone from the lake.

Table 2-13 WTGs moved due from 2km buffer zone

WTG ID	Distance Moved (m)
BAS50	147
BAS51	175
BAS52	208

- Micrositing of WTGs within 750m of active Tier 1 species' nests.
  - 4 WTGs located within 750m of known active Tier 1 species' nests have been microsited.

Table 2-14 WTGs moved due to Active Tier 1 Species nests

WTG ID	Distance Moved (m)	Remark
BAS59	30	WTGs moved from an Egyptian Vulture nest
BAS60	173	
BAS70	101	WTG moved from a Golden Eagle nest
BAS62	84	WTG moved from an Imperial Eagle nest

- Avoidance of the Southern Even-fingered Gecko habitat.
  - The suitable habitat for the Southern Even-fingered Gecko lies in the valley adjacent to the lake while the Wind Farm BoP and infrastructure is on the highland area.

Existing Infrastructure & Utilities

Stakeholder consultations were undertaken between April to August 2021 before the finalisation of the 79WTG layouts in order to ensure that the Wind Farm facilities are located within the required buffer zones for existing infrastructure and utilities (Reference Chapter 12 Infrastructure & Utilities). As a result, the 79WTG layout ensures that:

- All Wind Farm facilities are within 350m of Asian Trans Gas facilities which includes gas pipeline.
- The design adheres to a 12m and 15m buffer zone between the Wind Farm facilities and the railway line and railway station respectively.
- No Wind Farm structures located below existing OHTLs.

Human Settlements & Land Use Considerations

The Wind Farm boundary is located 1.6km to Kuklam village and 4.9km from Ayakagitma village. The siting of the 79WTGs ensures that a distance of 1000m is in place which is required as part of the noise health protection zone (from nearest WTGs). Reference Chapter 9 Noise & Vibration and Chapter 29 Community Health, Safety & Security.

The Wind Farm is used for grazing by 6 herders employed by Kokcha LLC and 4 herders from Ayakagitma village. In order to minimize the impact on grazing land, the BoP area will only permanently impact approximately 158.9ha of the 285.1ha of land allocated under the Presidential Decree. It is estimated that the 158.9ha of the permanently impacted land will only impact 0.059% of the total land allocated to Kokcha LLC within and outside the Project boundary. This means that there will be minimal disruption to herding activities during the construction and operational phase of the Project (Reference section 2.2.1 and Project specific RAP).

In order to assess and mitigate any impacts on their livelihoods, the Project will implement the Project Specific RAP which identifies alternative land for herders from Ayakagitma village and

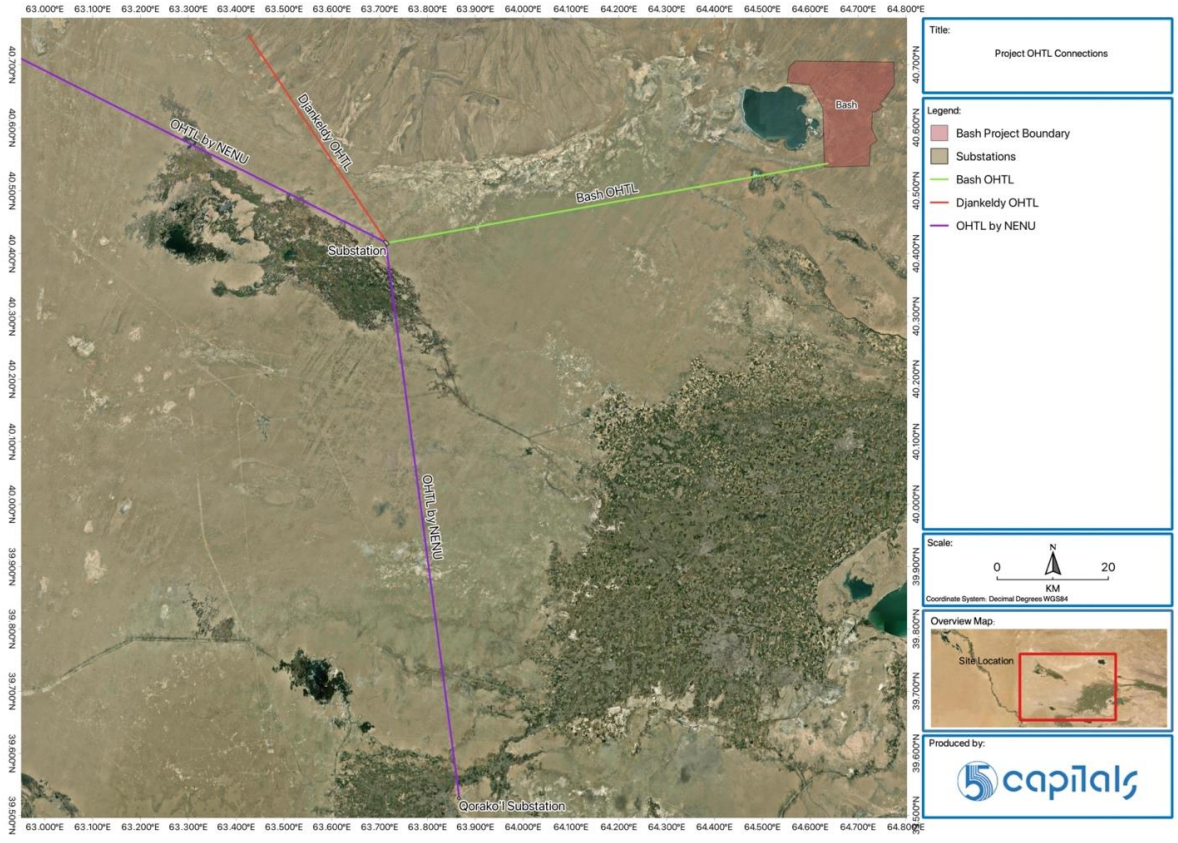
those employed by Kokcha LLC (it is noted herders under Kokcha LLC have stated that they prefer cash compensation to the identified grazing land).

2.8.5 OHTL Routing

In order to connect the Bash 500MW Wind Farm project to the national grid, several options were considered for the routing of the OHTL.

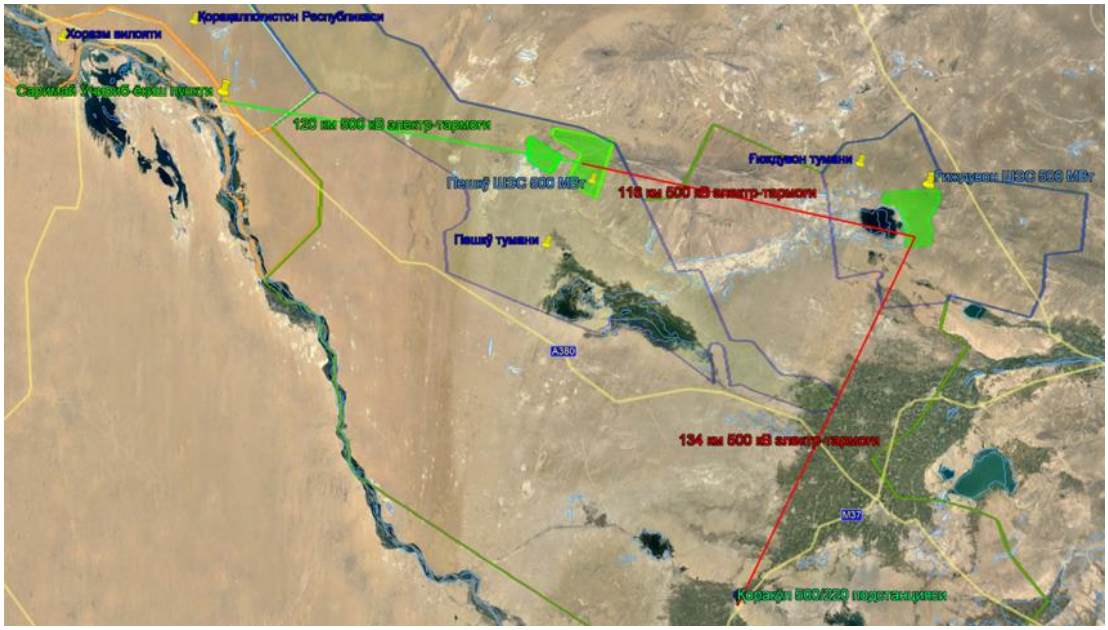
- **Option A**: 95km OHTL from the Project site either with a rating of 220kV double-circuit or 500kV single-circuit.
  - This option will include the construction of a new substation where a 60km 220kV double-circuit or 500kV single-circuit OHTL from the Dzhankeldy site will also connect to the same substation.
- **Option B:** 250km OHTL (from Dzhankeldy Project site to Bash Project site to an existing substation at Kurakol) with a rating of 500kV single circuit.

Figure 2-21 Location of OHTL & substation (Option A)



Initially, Option B of the OHTL (from Dzhankeldy to Bash Project site with a rating of 500kV single circuit) was shown to route through Lake Ayakagytma which is an Important Bird Area (IBA), especially for water birds. This option was outlined in the Environmental & Social Scoping Report which was submitted to the lenders for review on 11th March 2021 as shown in the figure below.

Figure 2-22 Initial OHTL Alignment & Substation (Option B) – March 2021

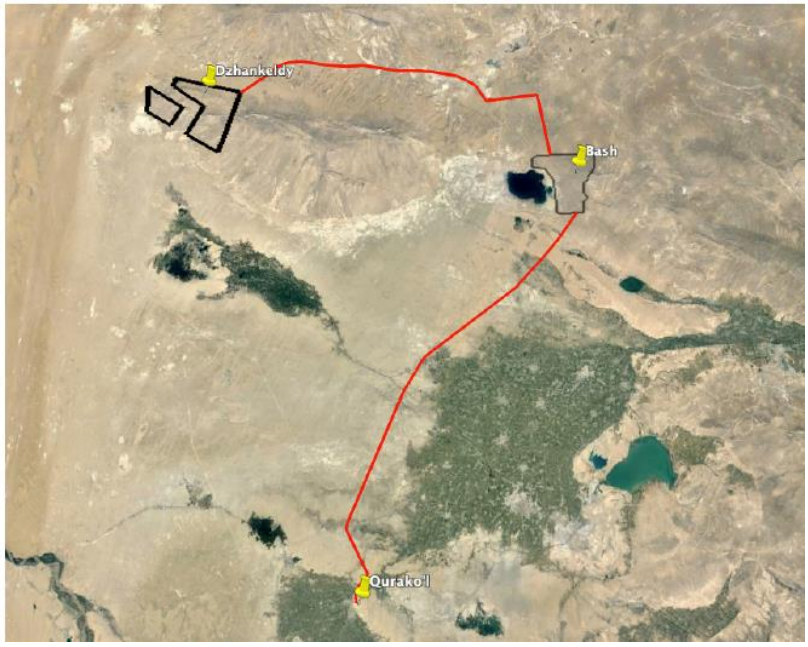


Following the review of the E&S Scoping Report, comments were received from ADB and IFC through emails and online meetings expressing their concern on the risk posed by the OHTLs to the birds in Lake Ayakagytma.

ACWA Power reviewed the proposed alignment and adapted it using available resources (including satellite imagery) to avoid ecologically sensitive areas (and where possible human settlements or farms). The OHTL Option B was also revised due to the following reasons:

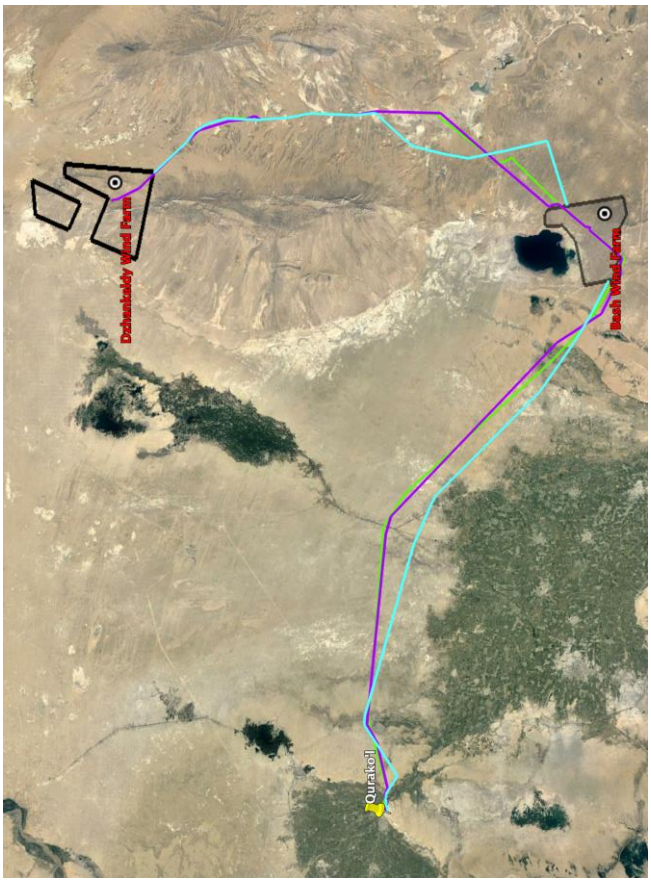
- To avoid proximity of the OHTL to the Ayakagytma lake; an IBA drainage lake approximately 500m west of the Project site.
- Dzhankeldy to Bash avoids Kuldjuktau mountain cliffs which are used by nesting birds of prey and for roosting and breeding bats.
- To avoid proximity of the OHTL to agricultural zones/ farmlands, water bodies (lakes, ponds, canals, irrigation channels, etc.).
- To avoid human settlements and to avoid the need for any physical displacement & resettlement.
- To avoid proximity to bird migratory flyways.
- To select areas for the routing that is close to existing roads and railway.
- To select areas for the routing that is close to the existing EBRD approved 500kV Navoi- Muruntau transmission line.

Figure 2-23 Revised Option B OHTL Alignment & Substation – May 2021



As of mid-May 2021, 5 Capitals was informed by ACWA Power that technical studies were being undertaken along three OHTL alignments as shown below.

Figure 2-24 The three (3) OHTL Alignment Options – May 2021



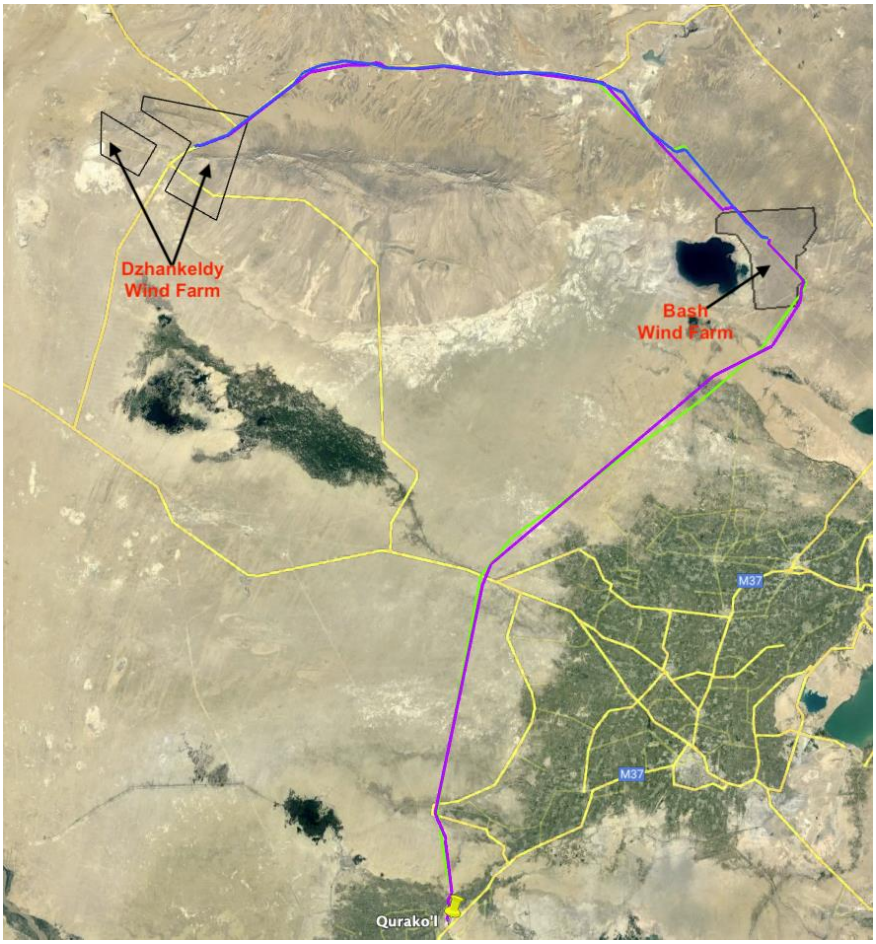
Note

- **Green Line**: OHTL 500kV Line 1
- **Violet Line**: OHTL 500kV Line 2
- **Cyan Blue Line:** OHTL 500kV Line 3

The technical studies were being undertaken by Juru Energy on behalf of ACWA Power and included desktop studies and site surveys. During the desktop study stage, studies along the Cyan Blue Line-Line 3 were discontinued along the Bash to Karakul substation and a new route was considered for the Dzhankeldy to Bash OHTL due to the environmental and social constraints identified along the proposed alignment.

The figure below shows the new alignment options considered in August 2021

Figure 2-25 The Three (3) OHTL Alignment Options - August 2021



Note:

- **Green Line**: OHTL 500kV Line 1
- **Violet Line:** OHTL 500kV Line 2
- **Dark Blue Line:** OHTL 500kV Line 3

2.8.5.1 Bash to Kurakul OHTL

LINE 1 (GREEN LINE)

The proposed 500kV OHTL will start from the Bash Wind Farm to the exiting 500kV Karakul substation. The proposed corridor goes through plain desert areas and through approximately 15-18km of irrigated land (about 13% of the total OHTL). The summary of the route is as provided below.

Table 2-15 Summary of the OHTL Route between Bash – Kurakul (Line 1)

ELEMENT	DESCRIPTION
Name of the OHTL	33/500kV Bash WPP to existing 500kV Karakul substation
Length	162km
No of point of intersection	32
Number of transmission line crossings	8
Number of railway line crossings	3
Number of pipeline crossings	4
Number of highway crossings	2
Number of small road crossings	1
Number of canal/irrigation ditch crossings	9

Source: Pre-feasibility Study for 500kV Transmission Lines (draft), 2021

LINE 2 (VIOLET LINE)

The proposed corridor goes through plain desert areas and through approximately 15-18km of irrigated land (about 10% of the total OHTL). The summary of the route is as provided below.

Table 2-16 Summary of the OHTL Route between Bash – Kurakul (Line 2)

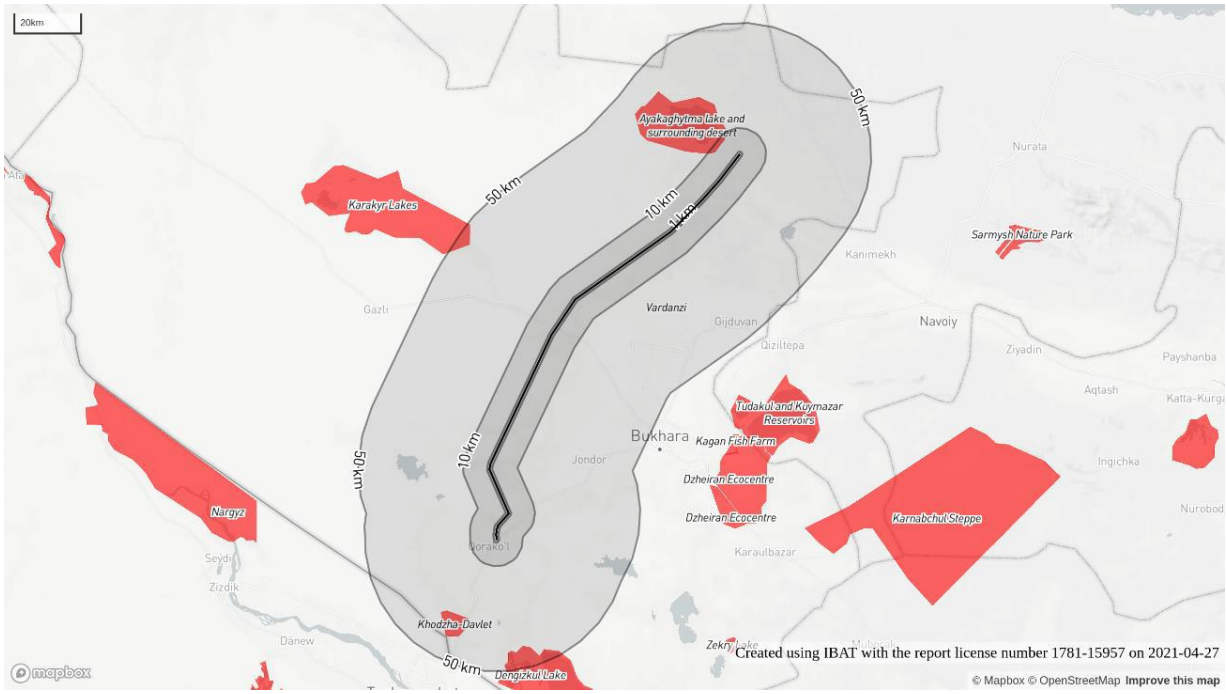
ELEMENT	DESCRIPTION
Name of the OHTL	33/500kV Bash WPP to existing 500kV Karakul substation
Length	162.260km
No of points of intersections	18
Number of transmission line crossings	8
Number of intersections of the design transmission line	1
Number of railway line crossings	3
Number of pipeline crossings	4
Number of highway crossings	2
Number of small road crossings	4
Number of canal/irrigation ditch crossings	13

Source: Pre-feasibility Study for 500kV Transmission Lines (draft), 2021

Environmental & Social Factors

According to the pre-feasibility study, the 162km OHTL is found within a 50km of IBAs as shown in the figure below. The closest IBA site is lake Ayakagitma at approximately 6.7km to the north west of the OHTL. Additional ecological studies (i.e., herpetological, invertebrates, botanical and ornithological surveys) along the OHTL have been undertaken and are detailed in this ESIA.

Figure 2-26 IBAs found within 1km, 10km & 50km of the OHTL



Source: Pre-feasibility Study for 500kV Transmission Lines (draft), 2021

The proposed Line 1 (green) crosses through four (4) agricultural lands owned by local farmers and on the eastern border of land belonging to Qirobod Mavjlari LLC and Kumush Kalava LLC but this land will not be impacted. Line 2 (violet) crosses through five agricultural lands and would not have any impact on other social infrastructure located near or around the Karakul sub-station (ACWA Power, 2021). Impacts on the Project Affected Persons (PAPs) are assessed in the Project-specific Resettlement Action Plan (RAP).

Based on the above and in order to avoid residential areas, community structures/facilities and agricultural areas as far as practicable, the pre-feasibility study recommends that Line 1 is the best alignment between Bash to Karakul due to the limited number of crossings.

In August 2021, this OHTL Line 1 was slightly revised to avoid small farmlands along the route as far as practicable and to ensure the line connects to the available spare bay at Karakul sub-station.

2.8.5.2 Dzhankeldy to Bash OHTL

The 500kV will start from 33/500kV Dzhankeldy substation to the Bash Wind Farm 33/500kV substation. In some sections, the proposed OHTL runs parallel to existing OHTL near the Bash site while the rest of the alignment is parallel to an access road and highway. Additionally, there are a few hills with an elevation of 20-30 m along the alignment.

LINE 1 (GREEN LINE)

A summary of Line 1 is as provided below.

Table 2-17 Summary of the OHTL Route between Dzhankeldy - Bash (Line 1)

ELEMENT	DESCRIPTION
Name of the OHTL	33/500kV Bash WPP to 33/500 Dzhankeldy substation
Length	127.05km
No of point of intersection	31
Number of transmission line crossing	3
Number of railway crossing	1
Number of pipeline crossing	0
Number of highway crossing	1
Number of small road crossings	1
Number of irrigation ditch crossing	0

Source: Pre-feasibility Study for 500kV Transmission Lines (draft), 2021

LINE 2 (VIOLET LINE)

A summary of Line 2 is as provided below.

Table 2-18 Summary of the OHTL Route between Dzhankeldy - Bash (Line 2)

ELEMENT	DESCRIPTION
Name of the OHTL	33/500kV Bash WPP to 33/500 Dzhankeldy substation
Length	127.44km
No of point of intersection	18
Number of transmission line crossing	3
Number of railway crossing	1
Number of pipeline crossing	0
Number of highway crossing	0
Number of small road crossings	3
Number of irrigation ditch crossing	0

Source: Pre-feasibility Study for 500kV Transmission Lines (draft), 2021

LINE 3 (BLUE LINE)

A summary of Line 3 is as provided below.

Table 2-19 Summary of the OHTL Route between Dzhankeldy - Bash (Line 3)

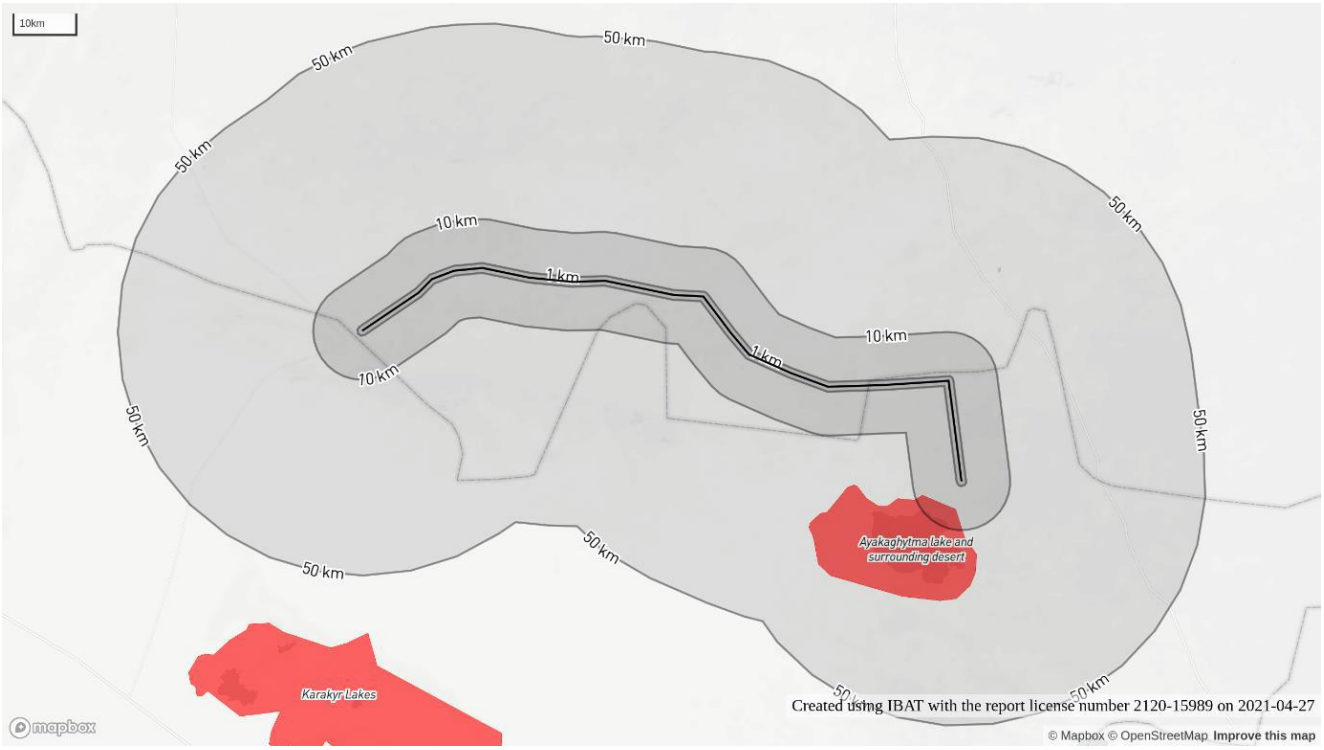
ELEMENT	DESCRIPTION
Name of the OHTL	33/500kV Bash WPP to 33/500 Dzhankeldy substation
Length	128.5km
No of point of intersection	25
Number of transmission line crossing	2
Number of railway crossing	1
Number of pipeline crossing	0
Number of highway crossing	0
Number of small road crossings	1
Number of irrigation ditch crossing	0

Source: *Pre-feasibility Study for 500kV Transmission Lines (draft), 2021*

Environmental & Social Factors

According to the pre-feasibility study the 127.2km is found approximately 3km north east of the Lake Ayakagitma which is an IBA site as shown in the figure below.

Figure 2-27 IBAs found within 1km, 10km & 50km of the OHTL



Source: Pre-feasibility Study for 500kV Transmission Lines (draft), 2021

A walkover conducted along the OHTL identified there is a livestock stable located approximately 215m from the OHTL and approximately 5.4km from the Dzhankeldy Wind Farm. No PAPs were identified along the OHTL but additional assessments have been undertaken in Dzhankeldy Wind Farm as part of the RAP.

According to an Environmental & Social Constraints analysis conducted by 5 Capitals, the proposed OHTL route was identified to pass through habitat of the Southern-Even Fingered Gecko; a critically endangered and endemic species vulnerable to habitat loss.

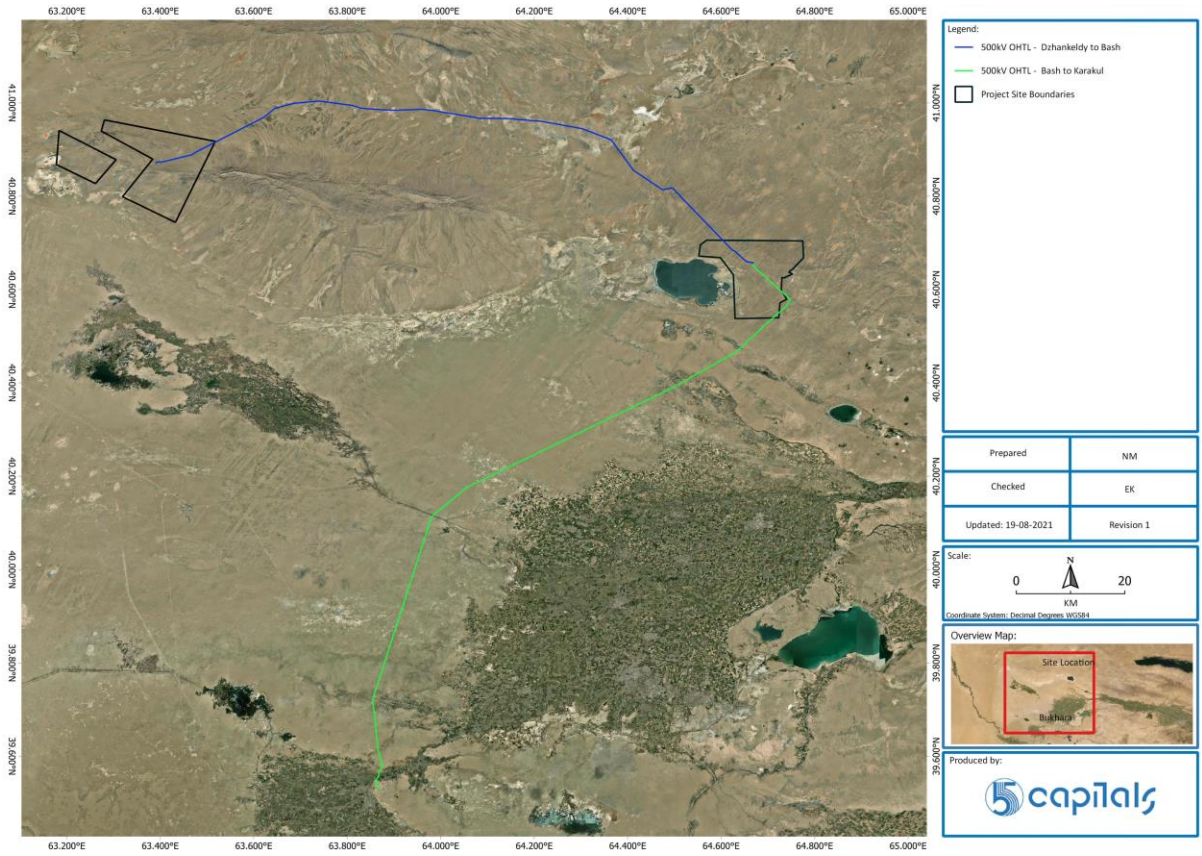
Based on the above factors, the pre-feasibility study recommended Line 3 (dark blue) as the best alignment because it runs parallel to the highway, existing transmission line and access road. The highway and access road will provide easy access during the construction phase and maintenance work during the operational phase.

Line 3 is located as close as possible (approximately 100-140m) of the existing highway where the gecko habitat overlaps with the highway, and is more aligned with the existing railway and existing 220kV OHTL corridor. This allows for minimal additional habitat loss of the gecko, and minimizes the amount of ground disturbed by construction vehicles and machinery.

The proposed Dzhanekldy – Bash – Kurakul OHTL alignment was submitted to NEGU by ACWA Power and is as shown in the figure below.

Note: Additional ecological studies (i.e., herpetological, invertebrates, botanical and ornithological surveys) along the OHTL have been undertaken, the results of which are detailed in the Terrestrial Ecology Chapters of this ESIA.

Figure 2-28 Proposed OHTL Alignment – August 2021



The above OHTL alignment was approved by NEGU on 8th November 2021 following their review of the OHTL pre-feasibility study and consideration of environmental & social impacts of other OHTL alignment options.

Note: This ESIA report only includes the assessment of E&S impacts for the Bash WF and along the 162km 500kV single circuit OHTL from Bash to Karakul 500kV sub-station (see figure above). The Dzhankeldy WF and 128.5km OHTL from Dzhankeldy to Bash site sub-station is subject to another ESIA and has not been assessed in this ESIA.

3 REGULATORY FRAMEWORK

This chapter includes the overarching regulatory framework in Uzbekistan and lenders requirements. Specific standards and regulatory requirements relating to different environmental and social elements are provided in Chapter 5.

3.1 National Regulations

3.1.1 Constitution of Uzbekistan

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

- Article 50: All citizens shall protect the environment.
- Article 54: Any property shall not inflict harm to the environment.
- Article 55: Land, subsoils, flora, fauna, and other natural resources are protected by the state and considered as resources of national wealth subject to sustainable use.

The constitution of Uzbekistan also has provisions for protection against gender inequality and personal rights and freedoms which include:

- Article 18: All citizens of the Republic of Uzbekistan shall have equal right and freedoms, and shall be equal before the law without discrimination by sex, race, nationality, language, religion, social origin, convictions, individual and social status.
- Article 26: No one may be subject to torture, violence or any other cruel or humiliating treatment.
- Article 29: Everyone shall be granted freedom of thought, speech and convictions. Everyone shall have the right to seek, obtain and disseminate any information, expect that which is directed against the existing constitutional system and in some other instances specified law.
- Article 30: All state bodies, public associations and officials in the Republic of Uzbekistan shall allow any citizen access to documents, resolutions and other materials, relating to their rights and interests.

Provisions for guarantee of human rights and freedoms within the Constitution include:

- Article 45: The rights of minors, the disabled and the elderly shall be protected by the state.
- Article 46: Women and men shall have equal rights.

3.1.2 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.

3.1.3 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.

3.1.4 Law on Nature Protection, 1992 as Amended in 2021

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

Article 53 of this law states that 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.

3.1.5 Law on Environmental Control, 2013 as Amended in 2021

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.

3.1.6 Environmental Audit Law No. ZRU-678, 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 impact*'.

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 on March, 2022."

3.1.7 Law on the Rational Use of Energy, 1997

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.

3.1.8 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 Sea bed 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).

3.1.9 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.

3.1.10 Presidential Decree on Measures to Ensure Equality & Transparency in Land Relations, Reliable Protection of Land Rights & Their Transformation into a Market Asset.

This Decree is meant to regulate land relations in Uzbekistan including the procedures for the purchase and lease of land. Some of the relevant provisions include:

- Section 2 of the Decree: in case of implementing public-private partnership projects and projects aimed at achieving socially important purposes, the parcels of land are allocated to the state organisation on the right of permanent use, these parcels are of land can be provided in lease to the private sector, non-state non-profit organisation and other institutes of civil society on the duration of the agreement about state-private partnership.
- Section 3 allows Cabinet Secretaries to directly lease land plots for the implementation of a major investment project, determined by selecting the best offer worth the equivalent of at least 10 million USD (increased depending on the size of the land plot) upon initial placement of funds equal to at least 10% of the project cost to a special settlement account;

- Enterprises with the participation of foreign investments, international associations and organisations, foreign legal entities and individuals – with payment at market value for obtaining the right to lease (with the exception of international associations and organisations).

Other relevant national laws and regulations to the Bash Wind Farm project include:

3.1.10.1 Presidential Decrees Specific to the Project

- Decree of the President of the Republic of Uzbekistan
  - Includes measures to implement the investment of the project on construction of a 300-500MW wind power plant in Peshku district in Bukhara region No.5003 (23/02/2021).

3.1.10.2 Environment

- The Law of the Republic of Uzbekistan "On water and water use" (1993) as amended in 2021.
- The Law of the Republic of Uzbekistan "On Ecological Expertise" (2000) as amended in 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 Protected Natural Reserves" (2004) as amended in 2020.
- 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 Wastes" (2002) as amended in 2019.
- The Resolution of the Cabinet of Ministries of the Republic of Uzbekistan №541 "On further improvement of the environmental impact assessment mechanism' (2020).
- The Resolution of Cabinet of Ministries of the Republic of Uzbekistan №820 "On measures to further improve the economic mechanisms for ensuring nature" dated on 11th October, 2018 amended in 2019.
- The Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No 14. "On approval of the regulation on the procedure for the development and agreement of projects with environmental standards" 2014 as amended in 2018..
- The Law of the Republic of Uzbekistan "On Atmospheric Air Protection" (1996, amended on 23.09.2020)
- The Law of the Republic of Uzbekistan "On further improvement of the environmental impact assessment mechanism" No. 541 (2020 as amended 2021)
- The Law of the Republic of Uzbekistan "On Environmental Expertise" No.73-II of 25.05.2000 as amended in 2021
- Resolution of Cabinet of Ministers of Republic of Uzbekistan No.95 "On approval of general technical regulations of environmental safety" (2020).

3.1.10.3 Labour and Employment

- Labour Code of the Republic of Uzbekistan 1995 as amended on 03.08.2021
- Law "On the employment of the population" No. 642 of 20.10.2020
- Ordinance No. 30-31 of the Ministry of Labour and Social Security and the Ministry of Health of the Republic of Uzbekistan approving the list of hazardous jobs mentioned in Article 355, for which the employment of persons under the age of eighteen years is prohibited
- Joint Decree of the Ministry of Labour and Social Protection of the Population (No. 7) and the Ministry of Healthcare (No. 1) of Uzbekistan dated 30 May 2001 to approve the list of occupations with unfavourable working conditions to which it is forbidden to employ persons under 18 years of age - registered by the Ministry of Justice of the Republic Uzbekistan, dated July 29, 2009 No. 1990.
- 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".

3.1.10.4 The National/Local Requirements

The national Environmental Impact Assessment (EIA) procedure is principally required and regulated by the:

- Law "On Ecological Expertise" No.73-II of 25.05.2000 (as amended on 29.04.2011)
- Resolution of Cabinet of Ministers of Republic of Uzbekistan No.541 "On further improvement of the environmental impact assessment mechanism, 2020" amended 2021.

3.1.10.5 Overhead Transmission Lines & Substation

- 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".

- San Rules & Norms No. 0236-07 "Sanitary norms and rules to ensure safety for people living near high voltage power transmission lines, 2007".
- San Rules & Norms No. 0350-17 "Sanitary norms and rules for the protection of atmospheric air in populated areas of the Republic of. Uzbekistan, 2017"

3.1.10.6 Land Rights and Resettlement

- Civil Code of the Republic of Uzbekistan "Civil code" (№ 163- I, 21.12.1995, as amended on 12.01.2020);
- Land Code (1998 as amended 2010) (№ 598-I, 30.04.1998, as amended on 17.08.2021);
- Law of the Republic of Uzbekistan on State Land Cadastre No.666-I of 28.08.1998 as amended on 17.08.2021
- Resolution N2 146 of the Cabinet of Ministers "On the Procedure for Compensation for Losses of Land Owners, Users, Tenants and Owners, As Well As Losses Of Agricultural And Forestry Production" (2011) as amended 25.02.2021.

3.1.11 Environmental Regulator

The main regulatory body for national EIA in Uzbekistan is the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection of the Republic of Uzbekistan.

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

- Presidential Decree of April 21, 2017 No. UP-5024 "On improving the system of public administration in the field of ecology and environmental protection." As amended on 17.03.2021
- Resolution of the President of the Republic of Uzbekistan of April 21, 2017 No. PP-2915 "On measures to ensure the organization of the activities of the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection" as amended 30.04.2021.
- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated January 15, 2019 No. 29 "On Approving the Provision on the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection" amended on 28.12.2020.
- Resolution of the President of the Republic of Uzbekistan dated October 3, 2018 No. PP-3956 "On measures to ensure the organization of the activities of the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection" as amended 30.12.2021.

3.2 International Conventions/Protocol

The proposed Project must comply with the environmental requirements of the following protocols and conventions listed in Table 3-1 below, of which Uzbekistan is a signatory:

Table 3-1 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 with all national standards for GHG emissions in order to contribute to Uzbekistan's 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 and canal ecology during the Project lifecycle.
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 where identified.
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

NAME OF INTERNATIONAL PROTOCOL/CONVENTION	SIGNED/ RATIFIED	RELEVANCE TO THE PROJECT
		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 3-2 ILO Conventions Ratified by Uzbekistan

ILO CONVENTIONS[3]	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
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

3 ILO: Ratifications for Uzbekistan: https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11200:0::NO::p11200_country_id:103538

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

3.3 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

At this stage, it is understood that EBRD and ADB are potential lenders. As ACWA Power implements the E&S requirements of IFC on all its projects, the Bash WF Project must comply with the IFC Performance Standards and IFC EHS Guidelines as part of ACWA Power Internal E&S requirements. 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.

3.3.1 EBRD

3.3.1.1 Policy and Performance Requirements

EBRD has an internal Environmental and Social Policy (2019) and a set of specific Performance Requirements (PRs) covering key environmental and social components for consideration, assessment and management in their investments. These reflect EBRD's commitments to promote EU environmental standards, as well as the European Principles for the Environment in their investments. The PRs are outlined below:

- PR1: Assessment and Management of Environmental and Social Impacts and Issues;
- PR2: Labour and Working Conditions;
- PR3: Resource Efficiency and Pollution Prevention and Control;
- PR4: Health, Safety and Security;
- PR5: Land Acquisition, Restriction on Land Use and Involuntary Resettlement;
- PR6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- PR7: Indigenous People;
- PR8: Cultural Heritage;

- PR9: Financial Intermediaries, and
- PR10: Information Disclosure and Stakeholder Engagement

Majority of the above EBRD PRs are applicable to this Project with the exception of PR7 on Indigenous Peoples. This is because as per the criteria in PR7, there are no indigenous peoples within the project area of influence.

3.3.1.2 Project Categorisation

As per EBRD's Environmental and Social Policy (2019), 'EBRD categorises each Project to determine the nature and level of environmental and social investigations, information disclosure and stakeholder engagement required'.

Appendix 2 of EBRD's E&S Policy outlines an indicative list of project types that would fall under Category A, which is defined as '*projects with potentially significant adverse future environmental and/or social impacts which require a formalized and participatory environmental and social impact assessment process*'. This includes, '*Large scale wind power installations for energy production (wind farms)*' and '*Construction of high voltage overhead electrical power lines*'

It was confirmed by EBRD on 23rd March 2021that the ACWA Power Bash 500MW Wind Farm and the Bash-Kurakul falls into this description and that EBRD will classify the project as **Category A**.

3.3.2 ADB

3.3.2.1 ADB Safeguard Policy Statement (SPS 2009)

The main objectives of the ADB's safeguards are:

- 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; and
- 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.

The 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.

3.3.2.2 Project Categorisation

ADB Project Categorisation is based on 3 specific safeguards: (i) Environmental, (ii)Involuntary Resettlement and (iii) Indigenous People. It was confirmed by ADB (via virtual meeting on 23rd March 2021) that the ACWA Power Bash 500MW Wind Farm) falls within the following categorisations:

- Environment: the Project will fall under **Category A** because it is expected to have significant environmental impacts. These impacts will potentially affect an area larger than the site or facilities subject to physical works.
- Involuntary Resettlement: the project falls under **Category B** because the project land is used for grazing by "Kokcha" LLC and by local herders for livestock grazing.
- Indigenous People: the project is classified under **Category C**. because early screening established that the project is not expected to have impacts on Indigenous People.

The Equator Principles (EP) is a risk assessment framework used by financial institutions to determine, assess and manage the environmental and social risk in Projects 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 EP IV became effective from 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.

3.3.2.3 Applicable Standards

EP IV establishes the minimum E&S standards to be adopted by 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.

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

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 (PPE);
  - Special Hazard Environment; and,
  - Monitoring.
- Community Health & Safety:
  - Water Quality and Availability;
  - Structural Safety of Project Infrastructure;
  - Life and Fire Safety (L&FS);
  - 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)
  - Guidelines for Water and Sanitation (2007)

3.3.2.4 Project Categorisation

Under the IFC Performance Standards, '*Business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible or unprecedented*.', The ACWA Power Bash 500MW Wind Farm falls into this description and it was confirmed by IFC

during a virtual meeting held on 25th March 2021 that the project will be targeted as a **Category A**.

3.4 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.

3.4.1 Lenders Standards

An overview of the lender standards is presented below, whilst the applicable standards are presented in the respective environmental parameter sections of this report.

3.4.1.1 EBRD

In accordance with the EBRD Environmental and Social Policy (2019), *'The EBRD, as a signatory to the European Principles for the Environment, is committed to promoting the adoption of EU environmental principles, practices and substantive standards by EBRD-financed projects, where these can be applied at the project level, regardless of their geographical location. When host country regulations differ from EU substantive environmental standards, projects will be expected to meet whichever is more stringent.'*

3.4.1.2 ADB

In accordance with the ADB's SPS (2009) and Safeguard Requirements 1: Environment, *'During the design, construction, and operation of the project the borrower/client will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. These standards contain performance levels and measures that are normally acceptable and applicable to projects.'* Please refer to applicable WB EHS Guidelines below.

3.4.1.3 EPFIs

In accordance with EP IV, EPFI's require compliance with both national regulations/standards and the applicable World Bank Group EHS Guidelines relevant to the Project. These include:

- General EHS Guidelines (2007);
- EHS Guidelines for 'Wind Energy' (2015); and
- EHS Guidelines for 'Electric Power Transmission and Distribution' (2007).

3.5 EIA/ESIA Requirements

3.5.1 National Requirements

3.5.1.1 Project Categorisation

Project categorisation under the national requirements is determined in accordance with the Resolution of the Cabinet of Ministries of the Republic of Uzbekistan No 541 "on measures for the further improvement of environmental impact assessment procedures".

The indicative list of Category 1 projects with 'high-risk' of environmental impacts, includes,

- Wind farms with a capacity of 300MW or more.
- Power lines of republican and interstate significance.

According to the Resolution, the proposed project falls under **Category 1** which is equal to **Category A** in accordance with international categorization.

3.5.1.2 EIA Process

In accordance with the resolution of the Cabinet of Ministries of the Republic of Uzbekistan No. 541 "On further improvement of the environmental impact assessment mechanism, 2020", 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 SCEEP 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. 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.

3.5.2 Lender Requirements

3.5.2.1 EBRD

In accordance with PR 1, there is a requirement for EBRD financed projects to undertake an appropriate Environmental and Social Assessment in order to:

- Identify and evaluate environmental and social impacts and issues of the Project.
- Adopt a mitigation hierarchy approach to address adverse environmental or social impacts and issues to workers, affected communities, and the environment from Project activities.
- Promote improved environmental and social performance of clients through the effective use of management systems.
- Develop an ESMS tailored to the nature of the Project, for assessing and managing environmental and social issues and impacts in a manner consistent with the relevant PRs.

According to PR 1 "*The ESIA will include an examination of technically and financially feasible alternatives to the sources of such impacts, including the non-project alternative, and document the rationale in selecting the particular course of action proposed. It will also identify potential improvement opportunities and recommend measures needed to avoid, or where avoidance is not possible, minimise and mitigate adverse impacts.*"

3.5.2.2 ADB

Since the proposed ACWA Power Wind Farm falls under Category A (under the environmental safeguard), an environmental impact assessment (EIA) including an environmental management plan (EMP) is required.

3.5.2.3 EU EIA Legislation

EBRD is committed towards the promotion of the European Union's (EU) environmental requirements and is a signatory of the European Principles for the Environment. The Principles endorse and reinforce the European consensus on the values attached to the fundamental right for both present and future generations throughout the world to live in a healthy environment.

EIA Directive 85/337/EEC was introduced in 1985 and applied to a wide range of defined public and private projects. Since then, the initial Directive of 1985 and its three amendments have been codified by Directive 2011/92/EU of 13 December 2011. Directive 2011/92/EU was amended in 2014 by Directive 2014/52/EU.

Article 3 of the Directive states:

The environmental impact assessment shall identify, describe and assess in appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

a) *Population and human health;*

b) *Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;*

c) *Land, soil, water, air and climate;*

d) *Material assets, cultural heritage and the landscape; and*

e) *The interaction between the factors referred to in points (a) to (d).*

The ACWA Power Bash Wind Farm falls under Annex II of the EIA Directive as '*Installation for the harnessing of wind power for energy production (wind farms)*' while the OHTL is under Annex I '*Construction of overhead electrical power lines with a voltage of 220kV or more and a length of more than 15km*'. The Project will therefore undergo through a full EIA assessment.

3.5.2.4 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*'.

4 APPROACH TO ESIA

4.1 ESIA Team

ACWA Power has engaged 5 Capitals Environmental & Management Consulting (5 Capitals) to lead the environmental and social process with regard to this project. This includes supporting Project consortium up to Financial Close with their prospective lenders.

In order to ensure that the Project meets the requirements of the State Committee on Ecology and Environmental Protection, 5 Capitals has sub-contracted Juru Energy, who will be responsible for some elements of the ESIA process, including baseline studies, stakeholder identification and engagement/consultation and liaison with relevant government authorities in Uzbekistan.

The specialists and experts from 5 Capitals and Juru Energy involved in the environmental and social process include; ESIA specialists, Environmental Specialists, Biodiversity, Ecological & Avifauna expert, Noise & Shadow Flicker specialist, Social Mobilisation Specialists, International Bird Expert & Advisor, Ornithologists, Houbara Bustard & Endangered Species Expert, Herpetologist & Biodiversity Expert, Bat Expert, Bat Signal Analysist, Mammal Expert and Invertebrates experts.

Archaeological experts from the Uzbekistan Institute of Archaeology were also involved in the archaeological survey undertaken for the project.

4.2 ESIA Methodology

This section provides information about the data collection and consultation process undertaken to inform the ESIA and the methodology that has been used to describe the sensitivity of environmental and social receptors; predict the magnitude of environmental and social impacts and assess the significance of impacts upon applicable environmental parameters.

4.2.1 Baseline Studies and Research

Forming an integral part of the ESIA, the baseline surveys provide a benchmark of the existing conditions by which the potential impacts of the proposed project can be assessed for the construction and operational phase.

This ESIA has been informed by a review of relevant desktop information as well as a series of physical site surveys which have been summarised in the relevant environmental and social impact assessment chapters of this report. The environmental baseline surveys carried out as part of the ESIA included:

Table 4-1 Environmental and Social Baseline Surveys

SITE SURVEYS		PERIOD
Project Site		
Ecology Surveys	Installation of bat detectors on wind mast	8th April 2021 – 30th June 2021
	Flora survey	9 – 11th April 2021 18th -21st June 2021
	Reptile survey	19th -21st April 2021 22nd -25th June 2021
	Invertebrates	19th – 21st April 2021
	Mammals including deployments of 5 photo traps	20th to 22nd April 2021 20th to 23rd June 2021
	Bat roost search	19th to 21st April 2021 23rd to 25th June 2021
	Houbara survey	14th to 16th April 2021 1st to 5th June 2021
	Raptor Nest survey	22nd – 24th April 2021
Bird Survey	Spring Survey	14th March 2020 – 15th May 2020
	Rapid Water Birds Survey	23rd March, 17-18th May, 6-8th August 2020
	Rapid Raptor Nests Survey	21st May 2020, 5th to 6th 2020
	Summer Survey	16th May 2020 – 31st August 2020
	Autumn Survey	1st September 2020 – 23rd November 2020
	Rapid Winter One Day Survey	5th January 2021
	Winter Bird Survey	November 2021 – March 2022
Bats Monitoring		2 to 7th July 2020 14th to 21st July 2020 5th to 8th August 2020
Noise Survey	Construction Noise Monitoring Survey	15th to 18th April 2021
	Detailed Noise Survey	10th August to 9th September 2021
Herders Survey		10th March 2021
Soil Survey		6th April 2021
Water samples from Lake Ayakagitma		6th April 2021
Archaeological Survey		28th May to 21st June 2021
Landscape Survey		11th March 2021 18th April 2021 30th July 2021

Site Surveys		Period
Socio Economic Survey	36 households in Ayakagitma village	19th – 22nd April 2021
	6 households in Chulobod village	
	6 households in Kuklam village	
Stakeholder Consultations		This has been ongoing with different stakeholders from March 2021 through official letters, calls and public consultation meetings.
Public Consultations as part of the National EIA		15th April 2021
Public Consultations as part of the ESIA (project site)		23rd to 24th June 2021
Overhead Transmission Line		
Ecology Surveys along OHTL	Reconnaissance Survey	21st– 22nd April 2021
	Flora survey	14th May 2021 29th June to 1st July 2021
	Reptile survey	3rd May 2021 28th to 30th June 2021
	Invertebrates	3rd May 2021
	Mammals	24 – 25th June 2021
	Bird Monitoring	7th May 2021, June, July, August, September, October and November 2021
Soil Survey		21st & 22nd August 2021
Landscape Survey		31st July– 1st August 2021
Archaeological Survey Walkover		To be determined
Water Sampling		21st & 22nd August 2021
Socio-economic Surveys		To be determined
Stakeholder Consultations	Interest Based Stakeholders	July 2021 – November 2021
	Public Consultations	6th to 7th October 2021
Resettlement Action Plan		
Resettlement Action Plan		Completed

The baseline survey data for the different environmental and social elements are described in respective chapters herein, with results provided, and included in the applicable appendices (Volume 4).

4.2.2 Impact Assessment Significance Criteria

In order to obtain a credible assessment of environmental and social impacts, the assignment of 'impact significance' to each identified impact needs to be a robust, consistent and transparent process. The methodology to assess 'impact significance' is outlined below and

follows an International good practice guideline [4] based on the assumption that the significance of an impact on resources or receptors is considered to result from an interaction between three factors:

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

IDENTIFICATION AND EVALUATION OF SENSITIVE RECEPTORS

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,archaeology); 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).

The environmental value (or sensitivity/vulnerability) of the environmental and social value (or sensitivity/vulnerability) of the resource or receptor has been defined by using the criteria in the Table below.

[4] See for example Scottish Natural Heritage (2009) A handbook on environmental impact assessment or Highways Agency (2008) Assessment and Management of Environmental Effects design manual for roads and bridges HA 205/08 Volume 11, Section 2, Part 5.

Table 4-2 Value of Receptor or Resource

VALUE (SENSITIVITY)	DESCRIPTION OF VALUE
Very High	• High importance and rarity on an international scale 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 infrastructures and services such as (hospitals, 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). • Other examples are very high proportion of vulnerable groups (women, elderly, disabled, etc.) in project's area, very frequent occurrences of gender based violence, very low probability of women's 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 infrastructures and services, 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/marginalized 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 infrastructures 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

VALUE (SENSITIVITY)	DESCRIPTION OF VALUE
	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 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).

The existence of receptors that are legally protected (e.g. designated areas, protected habitats or species) will be taken into consideration for the assessment of the sensitivity of the receptors.

IDENTIFICATION AND EVALUATION OF POTENTIAL IMPACTS

The following types of impacts have been considered in line with 5 Capital's assessment methodology:

- Direct Impacts - Potential impacts that may result from the construction and occupation of the Project acting directly on an environmental or social receptor (e.g. land take for construction of the camps);
- Indirect Impacts – Potential impacts which are not a direct result of a Project activity, often produced later in time or further removed in distance, but are normally a result of a complex pathway (e.g. dust deposition on vegetation which causes reduction in photosynthetic rates);
- Beneficial Impacts – Impacts that have a positive, desirable or favourable impact on the sensitive resources or receptors (e.g. landscape providing artificial habitat for a variety of species, creating jobs during the construction and/or occupation phases of a project);
- Adverse Impacts – Impacts that are detrimental and have a negative influence on sensitive resources or receptors;
- Event Related Impacts - Potential unplanned or accidental impacts stemming from an unintentional event such as fire, explosion, oil spill, etc. taking into consideration likelihood of occurrence;

- Cumulative Impacts - The additive potential impacts that may result from the incremental potential impacts of the planned Project plus the potential impacts of reasonably anticipated future projects or future phases of a same development.

The magnitude of the impact refers to the extent of change that is anticipated to occur for the receptor(s) under consideration and is considered as a function of:

- Extent/scale;
- Duration;
- Frequency; and
- Likelihood of occurrence.

In other words, the criterion that has been used for assessing the magnitude of impacts includes: the geographical scale of the impact, the permanence of impact and the reversibility of the impacted condition. A brief description of the magnitude of the impacts is provided in the Table below.

Table 4-3 Criteria for Magnitude of Impacts

MAGNITUDE OF IMPACT	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 scale, 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 above 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.

DETERMINATION OF SIGNIFICANCE OF IMPACTS

Significance of impacts is determined by taking into consideration the sensitivity of an identified receptor or resource and the magnitude of the Project impact. That is, the greater the sensitivity of an identified receptor or resource, and the greater the magnitude of impact, the more significant the impact (project impact).

In addition to this, where a Project has a major detrimental impact on a highly valued resource/receptor, the consequences of that impact on the said resource would be significant adverse impact. In other words, it is the result of the impact acting on the receptor that produces an impact.

Impacts can be either beneficial or adverse. The table below shows the criterion used for determining the significance of impacts. Definitions of each significance categories are provided in the table below.

Table 4-4 Criteria for Determining Significance of Impacts

		MAGNITUDE OF IMPACT (DEGREE OF CHANGE)				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
SENSITIVITY OF RECEPTOR	**Very High**	Neutral	Minor	Moderate to Major	Major	Major
	High	Neutral	Minor	Minor to moderate	Moderate to Major	Major
	Medium	Neutral	Negligible to minor	Minor	Moderate	Moderate to Major
	Low	Neutral	Negligible to minor	Negligible to minor	Minor	Minor to moderate
	Very Low	Neutral	Negligible	Negligible to minor	Minor	Minor

In some cases, above the significance is shown as being one of two alternatives. In these cases, a single description is decided upon with reasoned judgement for that level of significance chosen.

Table 4-5 Definition of Impact Significance

SIGNIFICANCE CATEGORY	CRITERIA
Very Large	Only adverse impacts are assigned this level of importance as they represent key factors in the decision-making process. Impacts are associated with sites and features of national or regional importance. Impacts exceed statutory limits. Mitigation measures are unlikely to remove such impacts.
Large	Important considerations at a local scale but, if adverse, are potential concerns to the project and may become key factors in the decision-making process. Mitigation measures and detailed design work are unlikely to remove all of the impacts upon the affected communities or interests.
Moderate	These impacts, if adverse, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative impact of such issues may lead to an increase in the overall impacts on a particular area or on a particular resource. They represent issues where impacts will be experienced but mitigation measures and detailed design work may ameliorate or enhance some of the consequences upon affected communities or interests. Some residual impacts will still arise.
Slight	Local issue unlikely to be of importance in the decision-making process. Impacts do not exceed statutory limits. Nevertheless, they are of relevance in enhancing the subsequent design of the project and consideration of mitigation or compensation measures.
Neutral	No impact or impact 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 of impact relies on reasoned argument, professional judgement and taking on board the advice and views of appropriate organisations. For some disciplines it is determined by comparison, wherever possible with company, locally, nationally or internationally accepted standards. If no standards are available then it is necessary to develop Project specific limits, based on guidance or best practice as necessary.

Such standards or limits are referred to as the **Significance Threshold**. If the size and type of impact is greater that the significance threshold, then this is termed a **Significant Impact**. Potential significant impacts need to be avoided and are therefore prioritised identifying mitigation measures to reduce the impact to an acceptable level.

Note: All predicted impacts with a beneficial impact have been colour coded green.

4.2.3 Mitigation and Management Measures

The Project includes a variety of measures to ensure that environmental and social standards and guidelines can be achieved by the Project. The Project's impact assessment process as outlined above will therefore take into consideration those measures included to the Projects design. In addition to specific measures included to the Projects design, 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 ameliorate 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 the lenders as part of the loan agreement.

4.2.4 Residual Impacts

Following assessment of the mitigation and management measures, the Projects residual impact significance will be considered to determine whether the proposed mitigation and management can be considered acceptable. The significance of such impacts is based upon the same criteria used to determine the impact significance before applying additional mitigation and management measures.

4.2.5 E&S Disclosure

In line with the EBRD, ADB and EPs requirements for consultations and disclosure, Project Information has been made available to the stakeholders and the general public at key stages of the ESIA assessment stages. The ACWA Power Bash Wind Farm ESIA will undergo a 60-day disclosure period in accordance with the EBRD Environmental and Social Policy (2019) since the Project is an IPP and under the private sector and a 120-day disclosure period in accordance with the ADB Operations Manual as the Project falls under Category A of the environment safeguard.

In addition to posting the ESIA on ACWA Power's website, ESIA disclosure through public consultation meetings (in line with Covid-19) and the distribution of Project leaflets and brochures will be undertaken. The purpose of these meetings will be to invite the different stakeholders to present an overview of the Project, and the Environmental & Social assessment process undertaken; and to receive comments/feedback from the public (particularly the comments by the communities likely to be affected by the implementation of the Project), which will be incorporated to finalise the ESIA document.

At the end of 60 days EBRD disclosure period and 120 days ADB disclosure period, a public consultation and disclosure report will be developed based on additional consultation and feedback undertaken during the disclosure period. This feedback report will then be disclosed on ACWA Power's website together with the final ESIA package explaining the disclosure activities that have been undertaken, feedback received and whether/how these are addressed in the final ESIA and management plans.

5 STANDARDS AND REGULATORY REQUIREMENTS

5.1 Terrestrial Ecology

5.1.1 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.
- The Resolutions of Cabinet of Ministers of the Republic of Uzbekistan: No. 290 of 20.10.2014 "About the settlement of use of biological resources and about the procedure for passing of allowing procedures in the field of environmental management" (as amended on 26.12.2020)
    - Regulations on procedure for use of objects of flora and passing of allowing procedures in the field of use of flora objects
    - Sets out the requirements to obtain permission to cut wood and shrub plantations that are in the zone of the construction site.
    - Regulations on procedure for use of objects of fauna and passing of allowing procedures in the field of use of fauna objects;

- Regulations on procedure for passing of allowing procedures in the field of international trade in the types of wild fauna and flora which are under the threat of disappearance in the territory of the Republic of Uzbekistan
- Regulations on procedure for distribution of the means received as payment for use of objects of animal and flora, the penal amounts, and the amounts collected from violators of the nature protection legislation for the caused damage.

- No. 255 of 31.03.2018 "On approval of some administrative regulations of state services in the sphere of nature management", which establishes the procedure for issuing permits for cutting trees and shrubs that are not included in the state forestry fund, to legal entities and individuals;
- No. 43 of 17.01.2019 "On measures to further improve the procedure for streamlining the use of trees and shrubs not included in the state forest fund, as well as the issuance of permits in their use" which establishes the amounts of fees for cutting trees and shrubs not included to the state forestry fund. However, it states that cutting of trees and shrubs, during construction works financed from the state budget, loans and grants of foreign and international organizations or investments of international financial institutions, as well as to perform activities established by decrees and orders of the President and the government of RUz are made on the basis of conclusion of the SCEEP and permit issued by local public administration and are exempt from the established fees as an exception;
- No. 484 of 11.06.2019 "On approval of the strategy for the conservation of biodiversity in the Republic of Uzbekistan for the period 2019-2028". The strategy involves the creation of a unified system for monitoring components of biodiversity with a central element - the reference ecosystems of state reserves; unified information database of state monitoring and state cadastre of biodiversity based on modern geo-information technologies (GIS technologies).
- No. 93 of 18.02.2020 "On additional measures to conserve valuable varieties of trees and shrubs not included in the state forest fund". It approves the list of valuable tree and shrub species not included in the state forest fund, for the cutting of which a moratorium is established until December 31, 2021, according to the Presidential Decree No. 6155 dated 03.02.2021

5.1.2 Lender Requirements

EBRD

EBRD PR6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources establishes general requirements for the conservation of biodiversity and sustainable management of living natural resources covering aspects such as the assessment of risks and impacts and protection and conservation of biodiversity.

Biodiversity baseline studies must be undertaken to understand the existing biodiversity and ecosystem services in the area that may be affected by the project. Where applicable, the Project will intend to follow the targets set out by the EU Biodiversity Strategy including the

Habitats Directive 92/43/EEC, the Birds Directive 2009/147/EC and the EU Regulation 1143/2014 on Invasive Alien Species.

Baseline studies will describe the general ecological context and provide additional focused information on ecological features and processes confirmed to occur in the study area. Baseline studies will conclude with a critical habitat assessment to determine if any features in the project area qualify as priority biodiversity features or critical habitat. This assessment answers the basic question, "how important is the study area for conservation and what PR6 requirements will apply?" and does not consider specific impacts at this stage of analysis.

PR6 defines critical habitat and priority biodiversity features as:

Critical Habitat: The most sensitive biodiversity features; which comprise one of the following: (i) highly threatened or unique ecosystems; (ii) habitats of significant importance to endangered or critically endangered species; (iii) habitats of significant importance to endemic or geographically restricted species; (iv) habitats supporting globally significant migratory or congregatory species; (iv) areas associated with key evolutionary processes; or (v) ecological functions that are vital to maintaining the viability of biodiversity features described in this paragraph

Priority Biodiversity Features (PBF) : This concept replaces the previous definition of natural habitat used by the EBRD (in the 2008 ESP) and encompasses a sub-set of biodiversity that is particularly irreplaceable or vulnerable, but at a lower priority level than critical habitats; which include (i) threatened habitats; (ii) vulnerable species; (iii) significant biodiversity features identified by a broad set of stakeholders or governments (such as Key Biodiversity Areas or Important Bird Areas); and (iv) ecological structure and functions needed to maintain the viability of priority biodiversity features.

The criteria used by the EBRD's PR6 to define critical habitat build on and are closely aligned with those used by the International Finance Corporation Performance Standard 6 (IFC PS6). PR6 also explicitly includes ecological functions that are vital for maintaining the viability of critical habitat features.

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.'*

EPFI's

The assessment of impacts upon terrestrial ecology will be made with due reference to the IFC Performance Standard 6 on Biodiversity Conservation and Sustainable Natural Resource Management which 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, reclaimed coastal zones, and reclaimed wetlands".

CRITICAL HABITAT ASSESSMENT

Given that the project is located in proximity of an IBA and KBA, the requirement to undertake a CHA for the Project as part of the overall Environmental and Social Impact Assessment (ESIA) process has been triggered.

'Critical Habitat' is a concept applicable to several international financial lending institutions, designed to enable the identification of areas of high biodiversity value in which development would be particularly sensitive and require special attention. The concept has been developed in consultation with numerous international conservation organisations and thus takes into account many pre-existing conservation approaches, such as Key Biodiversity Areas,

Important Bird Areas, and Alliance for Zero Extinction Sites. This comprehensive approach has meant that it has seen high levels of interest and uptake.

The concept is further defined in the following documents:

- European Bank for Reconstruction and Development (EBRD) Performance Requirement 6 (PR6) Biodiversity Conservation and Sustainable Management of Living Natural Resources.
- Guidance Note 6 EBRD Performance Requirement 6 (PR6) Biodiversity Conservation and Sustainable Management of Living Natural Resources.
- International Finance Corporation (IFC) IFC Performance Standard 6 (PS6) on Biodiversity Conservation and Sustainable Management of Living Resources.
- A number of multilateral banks have policies closely aligned with PS6, and more than 75 private banks signed up to the Equator Principles have an implicit commitment to PS6.
- Asian Development Bank (ADB) Environment Safeguards A Good Practice Sourcebook Draft Working Document

The objective of undertaking a Critical Habitat Assessment (CHA) is to arrive at definitive conclusions regarding whether or not the area where a development has been proposed meets the definitions of a Critical Habitat, per the classifications set out in EBRD PR6, IFC PS6, and the ADB Safeguards following the criteria and processes for CHA described therein.

A Critical Habitat Assessment was undertaken utilizing a three-stage approach:

- Stage 1 – Desktop Assessment and Stakeholder Engagement.
  - Following the definition of the study area, initial desktop reviews and stakeholder consultation of the local community and qualified specialists through interviews and letters was conducted to understand the possible biodiversity features and use of natural resources within the project landscape from the perspective of all relevant stakeholders.
- Stage 2 – Field Surveys and Data Collection.
  - At this stage surveys were undertaken over one year to confirm the seasonal and annual distribution of biodiversity features and ecological functions with the project area.
- Stage 3 – Assessment of Findings against Critical Habitat criteria.
  - Determination of critical habitat and priority biodiversity feature status against prescribed thresholds as per EBRD PR6 GN6 (v. January 1, 2020).

The findings of the CHA process fed into the overall project ESIA and subsequent environmental management and monitoring programmes.

Refer to Appendix G for the full CHA reports and presentation.

5.2 Air Quality

5.2.1 National Standards

THE LAW OF THE REPUBLIC OF UZBEKISTAN "ON ATMOSPHERIC AIR PROTECTION" (1996, AMENDED ON 28.09.2020)

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.

SANPIN № 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

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 - the average of the number of average monthly concentrations revealed during a year in the course of one-time sampling.

5.2.2 Lender Requirements

EBRD

- Directive 2008/50/EC of the European Parliament and of the Council on ambient air quality and cleaner air for Europe.

Table 5-2 EC Ambient Air Quality Standards (µg/m³ unless stated)

POLLUTANT	CONCENTRATION	AVERAGING PERIOD	PERMITTED EXCEEDANCES PER YEAR
$PM_{2.5}$	25	Annual	n/a
PM_{10}	50	24-hour	35
	40	Annual	n/a
Sulphur Dioxide	350	1-hour	24
	125	24-hour	3
Nitrogen Dioxide	200	1-hour	18
	40	Annual	n/a
Lead	0.5	Annual	n/a
Carbon Monoxide	10 mg/m3	Maximum Daily 8-hour mean	n/a
Benzene	5	Annual	n/a
Ozone	120	Maximum Daily 8-hour mean	25 days averaged over 3 years
Arsenic	6 ng/m3	Annual	n/a
Cadmium	5 ng/m3	Annual	n/a
Nickel	20 ng/m3	Annual	n/a
PAH	1 ng/m3 (expressed as concentration of Benzo(a)pyrene)	Annual	n/a

Note: Not being a member State of the EU, it is noted that the Uzbekistan government does not manage ambient air quality in line with these standards, and as such the applicability of these standards in this ESIA assessment will only be for good practice benchmarking purposes, and not compliance purpose/assessment.

ADB AND EPFI'S

WHO ambient air quality standards as adopted by the IFC General EHS Guidelines are presented in the table below.

Table 5-3 WHO Ambient Air Quality Standards (µg/m³ unless otherwise specified)

PARAMETER	24 HOUR	ANNUAL
PM_{10}	100 (Interim target 2)	50 (Interim target 2)
	75 (Interim target 3)	30 (Interim target 3)
	50 (guideline)	20 (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 (guideline)	10 (guideline)
NO_2	200 (1 hour)	40

Parameter	24 hour	Annual
SO_2	125 (Interim target 1)	500 (10-minute guideline)
	50 (Interim target 2)	
	20 (guideline)	
O_3	160 (interim target 1) (8-hour daily maximum)	
	100 (8 hour daily maximum guideline)	

Source: World Bank General EHS Guidelines, 2007

5.3 Noise and Vibration

5.3.1 National Standards

SANPIN NO. 0267-09 RELATING TO RULES ON ACCEPTABLE LEVELS FOR HABITABLE AREAS IN UZBEKISTAN

This law sets out the acceptable noise levels for habitable areas both inside and outside of buildings in Uzbekistan as shown in the table below.

Table 5-4 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)

SANPINNO. NO 03225-16 SANITARY STANDARDS FOR PERMISSIBLE NOISE LEVELS IN THE WORKPLACE

This law 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 5-5 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)

SANPIN NO. 0339-16. "SANITARY RULES AND NORMS OF PLANNING AND DEVELOPMENT OF SETTLEMENTS OF UZBEKISTAN.

These rules and regulations are applicable to the design of new and renovated urban and rural settlements and include basic hygienic requirements for their layout and development.

Table 5-6 Noise Limits under SanPiN No. 0339-16

LOCATION	TIME	SANPIN NO. 0339-16
Areas directly adjacent to residential buildings, recreation centres, pioneer camps, retirement and nursing homes for the disabled and elderly, and pre-schools	7am to 11pm	55dB(A)
	11pm to 7am	45dB(A)

O'Z DST 1314:2017 ON 'RENEWABLE ENERGY SOURCES: WIND POWER: WIND TURBINES

The sound level generated by a single wind turbine at a distance of 50 metres from the wind turbine at a height of 1.5 metres from ground level must not exceed **60dB.**

5.3.2 Lender Requirements

EBRD

The European Commission Environmental Noise Directive (Directive 2002/49/EC) relating to the assessment and management of environmental noise is the main EU instrument to identify noise pollution levels and to trigger the necessary action both at Member State and at EU level. The Directive applies to noise to which humans are exposed, particularly in built-up areas, in public parks or other quiet areas in an agglomeration, in quiet areas in open country, near schools, hospitals and other noise-sensitive buildings and areas. It is important to note, however, that the Directive does not set limit or target values, nor does it prescribe the measures to be included in the action plans, thus leaving those issues at the discretion of the competent Member State authorities.

ADB AND EPFI'S

IFC is likely to require adherence to WHO noise standards as detailed in World Bank EHS Guidelines (2007), which stipulate a maximum threshold of 70dB(A) at industrial or commercial receptors during daytime.

Table 5-7 World Bank Ambient Noise Level Guidelines

RECEPTOR	ONE HOUR LAEQ (DBA)	
	DAYTIME (7AM-10PM)	NIGHT (10PM-7AM)
Residential, Institutional, Educational	55	45
Industrial, Commercial	70	70
Guideline values are for noise levels measured out of doors.		

Source: World Bank Group EHS General Guidelines, 2007.

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 (dBA) 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 85dB (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 140dB(C).
- The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85dB (A), the peak sound level reaches 140dB(C), or the average maximum sound level reaches 110dB (A). Hearing protective devices provided should be capable of reducing sound level at the ear to at least 85dB (A).
- For every 3dB(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 (World Bank/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 meters (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 decibels (dB) (A) at a wind speed of 10 meters/second (m/s) at 10m 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 12m/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.

5.3.3 Vibration Good Practice Guideline

Good practice vibration exposure limits and action values are stated in guidance issued by the American Conference of Governmental Industrial Hygienists (ACGIH), which advises threshold limit values for both hand-arm vibration and whole-body vibration.

5.4 Soils, Geology, Groundwater and Surface Water

5.4.1 National Standards

Issues related to protection of soils, geology and groundwater in Uzbekistan are regulated by the following legislations:

- 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.

5.4.2 Lender Requirements

EBRD

Performance Requirement 3 on Resource Efficiency and Pollution Prevention and Control establishes general requirements for pollution prevention as follows:

- The assessment process must identify technically and financially feasible pollution prevention and control techniques that are best suited to avoid or minimise adverse impacts on human health and the environment. Such techniques will be appropriate to the nature and scale of the project's adverse impacts and issues; and
- The Project must meet the relevant EU substantive environmental standards, where these can be applied at the project level. Where no EU substantive environmental standards at project level exist, the Project will identify, in agreement with the EBRD, other appropriate environmental standards in accordance with GIP.

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.

EPFI's

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

- Avoid or minimize 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.

GOOD INDUSTRY PRACTICE

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. The Dutch Standards for the most significant pollutants are presented in the table below. Where a parameter is not covered by the Dutch Standards, other appropriate international standards shall be used.

Table 5-8 Dutch Soil and Groundwater Standards

CONTAMINANT	SOIL /SEDIMENT (MG/KG DRY WEIGHT)		GROUNDWATER (µG/L)	
	TARGET	INTERVENTION	TARGET	INTERVENTION
1. Metals				
Antimony	3	15	-	20
Arsenic	29	55	10	60
Barium	200	625	50	625
Cadmium	0.8	12	0.4	6
Chromium	100	380	1	30
Chromium III	-	180	-	-
Chromium VI	-	78	-	-
Cobalt	9	240	20	100
Copper	36	190	15	75
Mercury	0.3	10	0.05	0.3
Mercury (inorganic)	-	36	-	-
Mercury (Organic)	-	4	-	-
Lead	85	530	15	75
Molybdenum	3	200	5	300
Nickel	35	210	15	75
Zinc	140	720	65	800
2. Other inorganic substances				
Chloride (mg Cl/l)	-	-	100	-
Cyanide (free)	1	20	5	1500
Cyanide (complex)	5	50	10	1500
Thiocyanate	1	20	-	1500

- **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.
- **Source**: Soil Remediation Circular 2009, Annex 1: Groundwater target values and soil and groundwater intervention values. (*Target values for soil refer to 2000 version as they are not present in the 2009)
- 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.

5.5 Electric Magnetic Field

5.5.1 National Requirements

- 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 determines 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 etc shall be allowed with the permission of the Cabinet of Ministers of the Republic of Uzbekistan.
  - Protected zones of 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;
    - 220kV: 25 meters; and
    - 500kV: 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 sets the requirements for ensuring public safety when overhead power lines pass over populated, unpopulated or inaccessible territories.
  - It requires sanitary norms and rules to be followed in the design, construction and operation of overhead power lines.
  - The distances corresponding to the projection onto the ground of the outer phase wires in a direction perpendicular to the overhead line as follows:
    - Up to 110kV/m: 10 meters;
    - Up to 220kV/m: 15 meters;
    - Up to 330kV/m: 20 meters;
    - Up to 500kV/m: 30 meters; and
    - Up to 570kV/m: 40 meters.

In addition, SanPin 0236-07 specifies that EMF in population living areas is not to exceed 1.0kV/m and magnetic fields 80 A/m (equivalent to 100μT).

5.5.2 Lenders Requirements

EBRD

EU Council Recommendation 1999/519/EC on the limitation of exposure of the general public to EMF (0 Hz to 300 GHz) references and recommends ICNIRP derived limits as applicable "*when the time of exposure is significant*" that is the limits should apply to "*areas where members of the public spend significant time in relation to the effects covered by this recommendation*".

EHS GUIDELINES FOR ELECTRIC POWER TRANSMISSION & DISTRIBUTION

The EHS Guidelines for Electric Power Transmission and Distribution include information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas.

The guideline refers to the International Commission on Non-Ionizing Radiation Protection (ICNIRP) which establishes the allowable levels for public exposure field as shown in the table below.

Table 5-9 ICNIRP Exposure Limits for General Public Exposure to EMF

FREQUENCY	ELECTRIC FIELD V/M	MAGNETIC FIELD (UT)
50 Hz	5,000	100
60 Hz	4,150	83
Source: ICNIRP (1998): "Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz).		

Corresponding ICNIRP limits for occupational exposure to EMF are significantly higher as shown in the table below.

Table 5-10 ICNIRP Exposure Limits for Occupational Exposure to Electric & Magnetic Fields

FREQUENCY	ELECTRIC FIELD V/M	MAGNETIC FIELD (UT)
50 Hz	10,000	500
60 Hz	8,300	415
Source: ICNIRP (1998): "Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz).		

5.6 Traffic and Transportation

5.6.1 National Requirements

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)

5.6.2 Lenders Requirements

EBRD

The EBRD PR 4 on Health and Safety establishes management requirements with regards to traffic and road safety risks to workers and potentially affected communities. Relevant EU Road and traffic safety management standards must therefore be taken into consideration.

"For Projects that operate moving equipment on public roads and other forms of infrastructure, the client will seek to prevent the occurrence of incidents and injuries to members of the public associated with operation of such equipment."

EPFIs AND ADB

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'.

5.7 Infrastructure and Utilities

5.7.1 National Requirements

CONSTRUCTION MEASURE (KMK) 020506-97

Construction measure (KMK) 020506-97 outlines the required buffer zone distances between gas pipelines and development projects. It aims to ensure normal operating conditions and to exclude the possibility of damage to the main pipelines and their facilities. Main pipelines are classified as below based on their operating pressure:

- Category I: At an operating pressure of more than 2.5 to 10.0 MPa (more than 25 to 100 kgf/sq.cm inclusive.
- Category II: At an operating pressure of more than 1.2 to 2.5 MPa (more than 12 to 25 kgf/sq.cm) inclusive.

The distance from the axis of underground and ground pipelines to villages, individual industrial and agricultural enterprises, buildings and structures should be considered depending on the class and diameter of the pipelines and the need for safety. The distance should not be less than the values indicated in the table below.

Table 5-11 Minimum distances from gas pipeline axis (m)

	CATEGORY							
	I						II	
	DIAMETER NOMINAL, MM							
Objects, buildings & structures ie., shops, communities	300 & less	300 - 600	300-800	800-1,000	1,000-1,200	1,200-1,400	300 & less	More than 300
Certain industrial enterprises/facilities	100	150	200	250	300	350	75	125

The pressure of the gas pipeline at the Project site is 9.8MPa and therefore falls under category I. In addition, the diameter of pipeline AB is 1067mm and line C is 1219mm. As such, the buffer zone of AB pipelines is 300m and 350m for C.

KMK 2.10.10-97 NORMS & REGULATIONS FOR ALLOCATION OF LAND FOR RAILWAYS

Based on KMK 2.10.10-97 " Norms & regulations for allocation of land for railways", 12m of buffer zone should be maintained along the railway line while the buffer zone at the railway station

should be maintained at 50m. The buffer zone is established to ensure the safety of trains, stations as well as ensure that the movement of trains is not disrupted.

SANPIN NO. 0236-07 "SANITARY NORMS AND RULES TO ENSURE SAFETY FOR THE POPULATION LIVING NEAR HIGH VOLTAGE POWER LINES" DATED 06.09.2007: The HPZ is established based on the voltage of the OHTL. The following HPZ distances are established on both sides of the outermost phase conductors in the direction perpendicular to the OHTL:

- Up to 35kV – 5m
- Up to 110kV – 10m
- Up to 220kV – 15m
- Up to 330kV – 20m
- Up to 500kV – 30m

The following activities are prohibited within the HPZ:

- Construction of housing or siting of recreational areas;
- Placement of motor vehicles servicing enterprises, storage and carrying out any operations with flammable and explosive materials;
- Stopping or vehicles exceeding permissible dimensions, repair of machines;
- Placement of long length ungrounded conductors; and
- Operation of machines and equipment without protective shields to reduce EF intensity on workers.

REGULATIONS ON THE PROTECTION OF ELECTRIC GRID FACILITIES (APPENDIX NO.1 TO CABINET OF MINISTERS DECREE NO. 1050 OF DECEMBER 26, 2018: Determines the procedure for establishing protected zones of electric grid facilities as well as special conditions for the use of land plots located within the protected zones that ensure safe functioning and operation of the said facilities.

Article 15 stipulates that any actions that may disrupt the safe operation of electric grid facilities, including damaging or destroying them, and/or causing damage to life and property of individuals or legal entities, as well as causing environmental damage and fires, are prohibited within the protected zones.

Article 17 states that within the protected zones, without the written permission of the owner of the electric grid facility, the following is prohibited:

- Construction, overhaul, reconstruction or demolition of buildings and structures;
- Planting and cutting down of trees and bushes; and
- Passage of machines with an overall heigh of more than 4.5m with or without load within the protection zones of the OHTL.

In order to obtain written permission to perform any of the actions listed above, the concern parties shall submit a written application to the operator of the grid at least 15 working days prior to the execution of the works.

AIR CODE FOR THE REPUBLIC OF UZBEKISTAN

Article 18 of the Air Code provides the details on the procedures to obtain permission to carry out activities that may pose a threat to flight safety. Chapter III sets out the necessary documents to obtain from the developer for constructing facilities located near civil aviation aerodromes.

AVIATION REGULATIONS AP RUZ – 150 NO. 73 OF 31.07.2006

According to Chapter IV, clause d, AP RUz-150, stationary objects with a height of 50m or more, regardless of their location, must be marked.

Chapter V states that " White lights operating in flashing mode can be used to illuminate freestanding obstacles located outside the airfield zones that do not have extraneous lights around them. The flash strength of the obstruction light must be at least 10 candelas (cd) and the flash rate must be at least 60 per minute."

Other requirements for equipping objects with light-shielding lights will be provided by CAA specialists study the coordinates of the objects (in the WGS-84 system) and their technical characteristics.

5.8 Archaeology and Cultural Heritage

5.8.1 National Requirements

The Ministry of Culture of the Republic of Uzbekistan is responsible for preserving, developing and promoting the cultural wealth and the national tourism attractions of the nations, nationalities and peoples of Uzbekistan.

Relevant legislation in Uzbekistan relating to archaeology and cultural heritage include:

- Constitution of the Republic of Uzbekistan (2017) states that it is the duty of every citizen to protect the historical, spiritual and cultural heritage of the people of Uzbekistan. Furthermore, cultural moments are to be protected by the state.
- The Law of the Republic of Uzbekistan № 269-II dated August 2001 "On the protection and use of the sites and objects of cultural heritage."
- 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."
- Law on Protection and Use of The Objects of Archaeological Heritage (2009), No.ZRU-229

- 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."
- Criminal Code of the Republic of Uzbekistan (1994 amended in 2002). Article 132 states that fines for intentional destruction or damage of objects of cultural heritage under state protection causing significant or major damage will be imposed.

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.

5.8.2 Lender Requirements

EBRD

EBRD Performance Requirement 8 recognises the importance of cultural heritage for economic and social development, both tangible and intangible for present and future generations. The aim is to protect cultural heritage and to guide clients in avoiding or mitigating adverse impacts on cultural heritage in the course of their business operations. The clients are expected to be precautionary in their approach to the management and sustainable use of cultural heritage.

Cultural heritage according to PR 8 refers to "*a group of resources inherited from the past which people identify, independently of ownership, as a reflection and expression of their evolving values, beliefs, knowledge and traditions. It encompasses tangible and intangible cultural heritage, which is recognised at the local, regional, or national level, or within the international community*".

- Tangible cultural heritage refers to movable or immovable objects, sites, groups of structures as well as cultural or sacred spaces associated therewith, and natural features and landscapes that have archaeological, ethnological, paleontological, historical, architectural, religious, aesthetic or other cultural significance;
- Intangible cultural heritage refers to practices, representations, expressions, knowledge and skills that communities, groups and, in some cases, individuals recognise as part of their cultural heritage and which are transmitted from generation to generation.

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.

EPFI's

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.

IFC Performance Standard 8 on Cultural Heritage recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity. Its aim is 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.

5.9 Landscape and Visual Amenity

Specific legislation in regard to landscape and visual assessment has not been published in Uzbekistan. Therefore, reference to the guidelines set out by the UK Landscape Institute 'Guidelines for Landscape and Visual Impact Assessment 3rd Edition' (2013) has been used for this assessment. As such, the 'Landscape and Visual Assessment' presented herein will distinguish between:

- Effects on landscape as a resource in its own right; and
- Effects on specific views and general visual amenity experienced by people.

EPFIs AND ADB

- IFC EHS Guidelines for Wind Energy (2015)

<u>Landscape & Visual Impacts</u>

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.'

5.10 Shadow Flicker

The IFC EHS Guidelines for Wind Energy (2015) outlines 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.

5.11 Socio-Economics

5.11.1 National Regulations

The following laws are applicable concerning land rights, acquisition and resettlement:

- Civil Code of the Republic of Uzbekistan "Civil code"
- Land Code (1998 as amended 17.08.2021)
- Law of the Republic of Uzbekistan on State Land Cadastre No.666-I of 28.08.1998 as amended on 17.08.2021

- Presidential Decree "On Measures for The Efficient Use of Land and Water Resources in Agriculture" as amended 12.02.2022
- Resolution № 146 of the Cabinet of Ministers "On the Procedure for Compensation for Losses of Land Owners, Users, Tenants and Owners, As Well As Losses of Agricultural and Forestry Production" as amended 25.02.2021..

5.11.2 Lender Requirements

EBRD

Performance Requirement 1 outlines the need for assessing social impacts as part of ESIA. This is interpreted to include socio-economic effects to individuals/groups/populations that may be impacted by a project.

Performance Requirement 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. This PR requires clients to assess the potential social impacts to all project workers including full time, part-time, temporary, fixed term, seasonal, migrant, third party or supply chain workers. This is so as to ensure compliance with all labour and working conditions set out by EBRD.

Performance Requirement 4 on Health, Safety and Security addresses the client's responsibility to identify and avoid or minimise the risks and adverse impacts to community health, safety and security. It is the client's responsibility to provide a healthy and safe working environment to all workers

Performance Requirement 5 on land acquisition, restriction on land use and involuntary resettlement refers to Involuntary resettlement as both physical displacement (relocation or loss of shelter) and economic displacement (loss of assets or resources, and/or loss of access to assets or resources that leads to loss of income sources or means of livelihood) as a result of project-related land acquisition and/or restrictions on land use.

Where resettlement is government led, PS5 requires, *'the client (to) collaborate with the responsible government agency, to the extent permitted by the agency, to achieve outcomes that are consistent with the objectives of this PR.'*

Performance Requirement 8 requires projects to protect the cultural heritage from adverse impacts from the Project in line and consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage and the Convention for the Safeguarding of Intangible Heritage.

Performance Requirement 10 requires clients to identify and document individuals or groups who are affected or likely to be affected by the project by developing a Stakeholder Engagement Plan (SEP).

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 involuntary resettlement safeguard 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.

EPFI's

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.

5.12 Stakeholder Engagement and Consultations

5.12.1 National Requirements

Based on changes in the national legislation regarding the process of National Environmental Impact Assessment conducting public consultation is now mandatory part of Stage I of the National EIA process.

According to the Resolution of the Cabinet of Ministries of the Republic of Uzbekistan "On further improvement of mechanism for Environmental Impact Assessment" No. 541 dated 07.09.2020 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, opinion 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; and
  - Mass media.
- Expenses, if any, related to the public consultations shall be financed by the Project Developer.

5.12.2 Lender Requirements

EBRD

Effective stakeholder engagement and consultation are a key part of EBRD's Environmental and Social Policy and PRs. The EBRD PR10 on Information Disclosure and Stakeholder Engagement requires that 'Clients conduct stakeholder engagement on the basis of providing local communities that are directly affected by the project and other relevant stakeholders

with access to timely, relevant, understandable and accessible information, in a culturally appropriate manner, and free of manipulation, interference, coercion and intimidation'. Stakeholder Engagement must involve the following elements:

- Stakeholder identification and analysis;
- Stakeholder Engagement Planning;
- Disclosure of information and meaningful consultation;
- Implementation of a Grievance mechanism; and
- On-going reporting to relevant stakeholders.

Stakeholder identification process will include those project-affected parties (individuals or groups) who, because of their particular circumstances, may be disadvantaged or vulnerable.

Stakeholder Engagement for the Project should be proportionate to the nature and scale of its potential adverse impacts on the affected communities and the sensitivity of the environment.

All stakeholders with particular focus on vulnerable groups will be engaged in a meaningful, effective, inclusive and culturally appropriate manner.

EBRD PR10 BRIEFING NOTE (COVID-19)

The guidance note provides considerations for continuing effective information disclosure and stakeholder engagement during the COVID-19 pandemic. The note provides possible alternative approaches through email campaigns, Project leaflets, text-based messaging, traditional media, signage etc.

The following processes, systems and tools are recommended:

- Stakeholder database: Ensuring its updated and key contact information is provided. The development of the database must respect people's privacy and be consistent with regulations such as General Data Protection Regulations.
- Messaging: When using different engagement platforms, the information provided should be clear, concise and consistent and provided in relevant local languages.
- Documentation: Keep track of interactions through documentation of engagement activities, commitments and complaints.
- Resources: Ensure appropriate resources are in place to track and respond to queries, concerns and disputes or grievances that may be raised.

Note: EBRD advises that the briefing note is not a compliance document and should be taken as a source of information and analysis

IFC

All of the IFC Performance Standards include requirements for an amount of stakeholder consultation/engagement (either in the EIA, or as part of the future ESMS) and therefore the project will require a level of engagement. In particular, IFC Performance Standard 1 on "Social and Environmental Assessment and Management Systems" describes the stakeholder engagement requirements in more depth. It states the following:

"Stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts. Stakeholder engagement is an on-going process that may involve, in varying degrees, the following elements:

- Stakeholder analysis and planning;
- Disclosure and dissemination of information;
- Consultation and participation;
- Grievance mechanism; and
- On-going reporting to Affected Communities.

The nature, frequency, and level of effort of stakeholder engagement may vary considerably and will be commensurate with the project's risks and adverse impacts, and the project's phase of development."

The IFC Performance Standards indicate that when Affected Communities are subject to identified risks and adverse impacts from a project, the developer/client will undertake a process of consultation in a manner that provides the Affected Communities with opportunities to express their views on project risks, impacts and mitigation measures, and allows the client to consider and respond to them. Effective consultation is a two-way process that will:

- Begin early in the process of identification of environmental and social risks and impacts and continue on an on-going basis as risks and impacts arise;
- Be based on the prior disclosure and dissemination of relevant, transparent, objective, meaningful and easily accessible information which is in a culturally appropriate local language(s) and format and is understandable to Affected Communities;
- Focus inclusive engagement on those directly affected as opposed to those not directly affected;
- Be free of external manipulation, interference, coercion, or intimidation;
- Enable meaningful participation, where applicable; and
- Be documented.

EQUATOR PRINCIPLES GUIDANCE ON IMPLEMENTATION OF THE EQUATOR PRINCIPLES DURING THE COVID-19 PANDEMIC

The guidance recommends that the borrower should communicate information to local communities on the Project's response to Covid-19 including control of work-force community interactions, any necessary changes to procedures, the project approach to controlling COVID-19 risks in the workforce and any aspects of support being offered by the Project to the local community. This should include the review of appropriate stakeholders and include a focus on any identified vulnerable groups.

The guidance recommends the following alternative engagement processes:

- Consideration of opportunities for engagement through local actors such as women, youth, leaders, local authorities, traditional leaders etc.
- Implementation of additional training for Community Liaison Officers to ensure they can effectively deliver key messages, particularly to the most the most vulnerable and where Project impacts will be significant.

The engagement should be mindful of managing social stigma of COVID-19 and consider alternative methods that ensure anonymity.

5.13 Solid Waste & Wastewater Management

5.13.1 National Requirements

THE LAW OF THE REPUBLIC OF UZBEKISTAN "ON WASTES" (2002) AMENDED IN 2019

The principle 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. Hygenic classifier of industrial hazardous waste and SanPiN No 0127-02-Sanitary procedures for industrial waste inventory, classification, storage and disposal. Waste hazard classes include:

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

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 contained asbestos in Uzbekistan.

5.13.2 Lenders Requirements

SOLID WASTE

<u>EBRD</u>

EBRD PR3 on Resource Efficiency and Pollution Prevention and Control establishes general requirements with regards to waste management as follows:

- The Project must strive to avoid the generation of hazardous and non-hazardous waste materials and reduce their harmfulness as far as practicable. Where waste generation cannot be avoided, the waste must be reused, recycled or recovered,

or used it as a source of energy. Where waste cannot be recovered or reused, the waste must be treated and disposed of it in an environmentally sound manner;

- The Project must identify technically and financially feasible alternatives for the environmentally sound disposal of any hazardous waste considering the limitations applicable to trans boundary movement; and
- When waste disposal is transferred offsite and/or conducted by third parties, chain of custody documentation to the final destination must be obtained and only contractors that are reputable and legitimate enterprises licensed by the relevant regulatory agencies must be commissioned. The Project must ascertain whether licensed disposal sites are being operated to acceptable standards. Where this is not the case, alternative disposal options must be considered, including the possibility of the Project developing its own recovery and disposal facilities at the project site.

ADB

The Environmental Safeguard requires the borrower/client to avoid, or where avoidance is not possible, to minimise 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.

Where the waste disposal is conducted by third parties, the borrower/client is required to use reputable and legitimate enterprises licensed by the relevant regulatory agencies.

EPFIs

Section 1.6 of "the IFC General EHS Guidelines" is titled 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.

WASTEWATER

EBRD

EBRD PR3 on Resource Efficiency and Pollution Prevention and Control establishes general requirements for wastewater management as follows:

- The Project must seek to minimise water usage in order to minimise wastewater generation; and
- The Project must identify technically and financially feasible techniques for reusing and recycling effluents in accordance with GIP, which should be implemented as part of the project design.

5.14 Community Health, Safety and Security

5.14.1 National Requirements

- Resolution of Cabinet of Ministers of Republic of Uzbekistan No.334 dated 29.05.2021. This law states that security guards of all other legal entities' agencies, organisations and industrial facilities are allowed to use weapons under the category of "civilians". Where any entity wants to protect the life and health of the employees, property and natural resources, the special contract can only be provided by the National Guard in the Republic of Uzbekistan.
- 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 determines 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 etc shall be allowed with the permission of the Cabinet of Ministers of the Republic of Uzbekistan.
    - Protected zones of 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;

- 220kV: 25 meters; and
- 500kV: 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 sets the requirements for ensuring public safety when overhead power lines pass over populated, unpopulated or inaccessible territories.
  - It requires sanitary norms and rules to be followed in the design, construction and operation of overhead power lines.
  - The distances corresponding to the projection onto the ground of the outer phase wires in a direction perpendicular to the overhead line as follows:
    - Up to 110kV/m: 10 meters;
    - Up to 220kV/m: 15 meters;
    - Up to 330kV/m: 20 meters;
    - Up to 500kV/m: 30 meters; and
    - Up to 570kV/m: 40 meters.

5.14.2 Lenders Requirements

EBRD

Performance Requirement 4 establishes the importance of avoiding or mitigating adverse health and safety impacts and issues associated with project activities on workers, project affected communities and consumers. The objectives of EBRD PR4 are:

- To protect and promote the safety & health of workers by ensuring safe and healthy working conditions and implementing a health and safety management system, appropriate to the relevant issues and risks associated with the Project.
- To anticipate, assess and prevent or minimise adverse impacts on the health and safety of project affected communities and consumers during the project lifecycle from both routine and non-routine circumstances.

PR4 also required clients to identify and assess project related risks and adverse impacts to the health and safety of the potentially affected communities and develop protection, prevention and mitigation measures proportionate to the impacts and risks and appropriate to the stage size and nature of the project. In addition, the client is required to cooperate with the relevant authorities and other stakeholders, as appropriate, on mitigation measures and plans. These measures are required to be consistent with the mitigation hierarchy approach and voluntary principles on security & human rights.

EBRD's PR 2 provides the requirements for security personnel the aim of which is to ensure that security personnel are trained (in the acceptable standard of practice and behaviour, use of force, applicable law etc) , equipped and monitored in order to prevent abuse of workers and local communities. In addition, it requires the establishment of an effective grievance

mechanism to allow the affected community and workers to express any concerns about the security arrangements and actions of the security personnel,

EBRD also requires the application of PR 5 on Land Acquisition, Restrictions on Land Use and Involuntary Resettlement to be consistent *with the universal respect for, and observance of human rights and freedoms specifically the right to private property, adequate housing and to the continuous improvement of living conditions.*

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 are also required to be made to plan for such events.

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.

IFC, EBRD AND CDC GROUP GUIDANCE ON GENDER BASED VIOLENCE AND HARASSMENT (GBVH)

According to the guidance, addressing GBVH can build relationships and provide a Project with a 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. In addition, it broadens the pool of potential workers that companies can draw upon, including women workers from nearby communities because of lower perceived risk of GBVH.

WORLD BANK GOOD PRACTICE NOTE ON 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.

EQUATOR PRINCIPLES GUIDANCE ON 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.

5.15 Labour and Working Conditions

5.15.1 National Requirements

Regulations and standards relating to labour and working conditions include:

- Labour Code of the Republic of Uzbekistan (1995 as amended on 03.08.2021)
  - This is the key national labour focused legislation which takes into account the interests of the employees, employers and the state. Its main aim is to promote fair and safe working conditions and protect the labour rights and the health of employees. 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.
- Law "On the employment of the population: No. 642 of 20.10.2020
- Ordinance No. 30-31 of the Ministry of Labour and Social Security and the Ministry of Health of the Republic of Uzbekistan approving the list of hazardous jobs mentioned in Article 355, for which the employment of persons under the age of eighteen years is prohibited.
- Joint Decree of the Ministry of Labour and Social Protection of the Population (No. 33) and the Ministry of Healthcare (No. 13) of Uzbekistan "On the approval of the list of jobs with unfavourable working conditions where the employment of persons under 18 years is prohibited" registered by the Ministry of Justice of the Republic 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 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".

- (SanPin 0372-20 "Temporary sanitary rules and regulations on the organization of activities of state authorities and other organizations")
- SanPin (Sanitary Rules&Norms) 0372-20 (New edition, May 2020) on"Temporary sanitary rules and regulations on the organization of activities of state authorities and other organizations". This local legislation subjects entrepreneurships under conditions of restrictive measures concerning the Covid-19 pandemic.
- Resolution of Cabinet of Ministers No244 "On the approval of the regulations on the procedure for the attraction and use of foreign workforce in the Republic of Uzbekistan" dated 25.03.2019. This resolution provides the overall procedure on how citizens can work within Uzbekistan.

5.15.2 Lenders Requirements

EBRD

PR2 is applicable to Labour and Working Conditions and has the following key objectives:

- Respect and protect the fundamental principles and rights of workers;
- Promote the decent work agenda, including fair treatment, non-discrimination and equal opportunities of workers;
- Establish, maintain and improve a sound worker-management relationship;
- Promote compliance with any collective agreements to which the client is a party, national labour and employment laws;
- Protect and promote the safety and health of workers, especially by promoting safe and healthy working conditions; and
- Prevent the use of forced labour and child labour (as defined by the ILO) as it relates to project activities.

Concerning dedicated accommodation, compliance is required with:

- IFC & EBRD Workers Accommodation: Processes and Standards (2009).

EBRD PR2 BRIEFING NOTE (COVID-19)

EBRD has issued a briefing note highlighting some critical areas of concern that clients may need to address in their COVID-19 response planning. The key areas addressed in the briefing note include:

- Other options/alternatives should be assessed before the retrenchment of workers such as voluntary unpaid leave, reduced working hours etc.
- Decisions to reduce labour costs should be taken incrementally and revisited in light of rapidly changing circumstances and levels of support provided by the national government.
- Retrenchment planning should consider the options for re-employment of dismissed workers once the situation improves.

- Companies should consider applying positive discrimination criteria to dismissals, within bounds permissible under applicable labour and social protection laws and regulations in order to protect workers who are most vulnerable i.e. based on gender, ethnicity, age, economic situation, supply chain workers etc.
- Companies should engage with workers and their representatives during the consideration of the different options viable.
- Grievance mechanism will be essential to monitor staff morale, understand how workers are affected and what their concern are and address pressing matters promptly.

Note: EBRD notes that the briefing note is not a compliance document and should be taken as a source of information and analysis

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.*'

EPFIs

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;

In accordance with IFC Performance Standard 2 (Labour and Working Conditions) there is a requirement to align with the following conventions:

- ILO Convention 29 on Forced Labour;
- ILO Convention 87 on Freedom of Association and Protection of the Right to Organize;
- ILO Convention 98 on the Right to Organize and Collective Bargaining;
- ILO Convention 100 on Equal Remuneration;
- ILO Convention 105 on the Abolition of Forced Labour;
- ILO Convention 138 on Minimum Age (of Employment);
- ILO Convention 182 on the Worst Forms of Child Labour;
- ILO Convention 111 on Discrimination (Employment and Occupation);
- 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 addition, the Project will also be required to adhere to the United Nations Guiding Principles on Business and Human Rights to ensure that it complies with all applicable laws and to respect human rights.

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.

5.16 Human Rights

5.16.1 National Context and Regulations

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.

CONSTITUTION OF THE REPUBLIC OF UZBEKISTAN (1992)

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."

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).

5.16.2 Lender Requirements

EBRD

According to EBRD's Environmental and Social Policy, EBRD is committed to the respect of human rights in the Project they finance. EBRD is also guided by the International Bill of Human Rights and the eight core conventions of the International Labour Organization.

PR 1 states "*…it may be appropriate for the client to complement its environmental and social assessment with further studies focusing on specific risks and impacts such as human rights.*"

EBRD also requires the application of PR 5 on Land Acquisition, Restrictions on Land Use and Involuntary Resettlement to be consistent *with the universal respect for, and observance of human rights and freedoms specifically the right to private property, adequate housing and to the continuous improvement of living conditions.*

EPFI

In line with EP IV requirements, the United Nations Human Rights Guiding Principles 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. 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

UNITED NATIONS GUIDING PRINCIPLES ON BUSINESS AND HUMAN RIGHTS

In addition to adhering to human rights requirements under the Uzbekistan laws and lenders requirements, the project construction and operational phases will be required to adhere to the United Nations Guiding Principles on Business and Human Rights. The Guiding Principles are grounded in recognition of the role of business enterprise as specialised organs of society required to comply with all applicable laws and to respect human rights.

5.17 Climate Affairs

5.17.1 National Context and Regulations

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.

5.17.2 Lender Requirements

Equator Principles IV establishes that impacts to 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.

Factors including climate change are required to be incorporated into the Project Review and Categorisation (EP1), while a key element of EP IV (under EP2 for Environmental and Social Assessment) is that an assessment of climate change risks is expected in an ESIA.

For projects that have Scope 1 & 2 GHG emissions of over 100,000 tonnes of CO2 equivalent per annum, there are also other requirements linked to alternative analysis and client annual reporting on GHG emissions.

EBRD

According to EBRD Environmental and Social Policy, climate change shall be considered throughout the assessment process and identify appropriate climate resilience and adaptation measures to be integrated into the project design.

EBRD is committed to 'engage, whenever appropriate, in innovative investments and technical assistance to support no/low-carbon investments and climate change mitigation and adaptation opportunities, as well as identify opportunities to avoid, minimise or reduce greenhouse gas emissions in projects. EBRD requires its clients to assess risks caused by climate change to the projects. EBRD will also support its clients in developing climate adaptation measures and climate resilient investments as well as in managing risks caused by climate change'.

ADB

ADB Environment Safeguards, the borrower/client is required to promote the reduction of project-related greenhouse gas (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.

6 REGIONAL BASELINE CONDITIONS

This chapter outlines regional baseline environmental and social conditions that are intended to provide information that is representative for both the wind farm and OHTL elements of the Project. Site specific baseline conditions, impact assessment and mitigation measures for the Wind Farm are presented in Part A (Chapters 7 to 16) and those for the OHTL are presented in Part B (Chapters 17 to 27). Part C (Chapter 28 to 32) describes E&S elements relevant to both the Wind Farm and the OHTL.

6.1 Terrestrial Ecology

6.1.1 General Overview of Biodiversity in Uzbekistan

Uzbekistan lies between the two major Central Asian Rivers, the Amudarya and the Syrdarya. According to the UNESCO world map of desertification and the UN convention to combat desertification, the country has an aridity index of between 0.03 to 0.20, and is situated in the arid region, which is subject to intensive desertification and droughts. As agriculture is one of the most important sectors in the economy of Uzbekistan, the well-being and sustainable development of Uzbekistan depends significantly on the state of its natural resources.

According to SCEEP, the basis of fauna of Uzbekistan consists of 14,900 invertebrate species (850 protozoa species, 61 species of annelids, 1179 species of roundworms, 533 species of flatworms, 223 mollusks species, and 12,000 arthropod species) and 714 species of vertebrate animals (84 -species of fish, 3 species of amphibians, 60 species of reptilians, 460 avian species and 107 mammal's species).

Endemic species constitute 8.5% of the entire number of species (subspecies) of terraneous vertebrate animals. The fauna of reptiles is noted for the highest level of endemism: up to 50% of all species of this class. The class of mammals is noted for the lower level of endemism - 14% as well as class of birds is also noted for its low level of endemism - 1.7%.

Table 6-1 Level of Endemism

CLASS	NUMBER OF TAXA (SPECIES, SUBSPECIES) % OF THE TOTAL NUMBER		% OF THE TOTAL NUMBER
	TOTAL	ENDEMICS	
Reptiles	60	30	50,0
Birds	460	8	1,7
Mammals	107	15	14,0
Total	627	53	8,5

The main threats to biodiversity in Uzbekistan include industrialization, expansion of mining and conversion of land for agricultural purposes through irrigation and dry farming.

6.2 Air Quality

The southern region of the country is located in subtropical climate zone and the northern region is in a moderate climatic zone. According to the Third National Communication under the UNFCC, 2016, the climate of Uzbekistan is of arid continental and subtropical type with large seasonal & daily variations in air temperature with long hot summers, mild winters and humid springs. The hottest month in the country is July with average mean monthly air temperature ranges from 37°C in the south (Termez) to 32-33°C in the north (Ustyurt Plateau). The maximum air temperature in the southern region reaches 48-50°C & reaches 44-46°C in the northern region. In mountainous areas with elevation up to 800-900m above mean sea level, temperature reaches over 42°C.

Rainfall in the country varies with region as it is associated with terrain elevation, mountain systems and direction of mountain slopes. In the deserts & steppes areas of the country (the north western & western region – Ustyurt Plateau, lower reachers of Amudarya river and Kyzylkum desert), rainfall is moderate ranging from 100mm to 200mm per year. In these areas, precipitation occurs during cold period (September to March) while the warm period (April-August) is extremely arid. In the mountainous areas (south east & eastern region), precipitation ranges from 300mm to 400mm per year increasing to about 800mm to 900mm per year.

The atmospheric air condition of the country is monitored by 13 meteorological stations controlled by the Hydrometeorological Service Center under the Cabinet of Ministers of the Republic of Uzbekistan (Uzhydromet). One of these 13 meteorological stations is the Bukhara meteorological station located approximately 90km from the proposed wind farm site.

The meteorological conditions of the Project area are described in the Air Quality Chapter of Part A of this ESIA.

6.3 Soils, Geology, Groundwater and Surface Water

6.3.1 Geological Setting & Geomorphological Structure

The majority of Uzbekistan territory (approximately 78.8%) consist of desert plains stretching from the north west to south east which are regions of Turan depression or Turan Platform . The plain area is presented by steppes, Kyzylkum and Karakum desert. The south eastern & eastern region (21.2%) of the country consist primarily of mountains.

According to the Geotechnical Site Investigation report prepared by UzAssystem on behalf of ACWA Power (UzAssystem, 2021a), the multiple folded basement of the Turan Platform includes sedimentary, metamorphic and igneous rocks which belongs to the Uralo-Mongolian

Late Paleozoic orogenic belt. Major ancient continental blocks are the Kazakh and Karakum-Tajik microcontinents separated by the Turkestanian paleo-oceanic structure. The latter originated by rifting during Late Proterozoic and closed progressively from the Ordovician through the Early Triassic. The last collision of both microcontinents followed the formation of a large nappe pile intruded by granite in the South of Uzbekistan and the formation of a volcanic-plutonic belt in the North. A Late-Neogene-Quaternary secondary orogeny formed the present appearance of the territory.

The south east part of the Turan Platform experienced the secondary orogenic process the same as in the Alpine fold belt (Pamir). As a result of this secondary tectonic activity, a new orogenic belt - The Tien Shan Mountains was formed.

The geological and lithological structure of the Bash Project Area includes the alluvial-proluvial deposits of the Zarafshan-Sukayta complex. The sediments are represented by overlapping sandy loams, loams, sands and clays. The layers are not sustained, both in stretch and in thickness.

Four engineering-geological layers are identified as described in the table below

Table 6-2 Geological Layers Identified at the Project Area

Ground layer	Characteristics	Density of soil particles (g/sm^3)	Dry soil density (g/sm^3)	Soil density, at natural humidity (g/sm^3)	Modul of Deformation (Mpa)
Sandy loam (layer 1)	Light yellow to grey in colour with thin layers of loam, clay and sand. Sandy loam of solid and semi-solid consistency	2.69 - 2,70	1.8 – 1.90	1.78 – 1.90	18.5
Loam sands (layer 3)	Gray colour of solid and semi-solid consistency	2.66	1.68	1.95	29.4
Small sands (layer 3)	Grayish-yellow colour, medium density, low-moisture up to the level of the ground water, below-saturated with water. The slope angle is 33°. The angle of the slope under water is 29°	-	1.25	1.54	-
Clays (layer 4)	Brown colour of a firm and refractory consistency. Streaks of gypsum are noted	2.67	1.64	1.96	21.0

Source: UzAssystem, 2021a.Bash Site Wind Farm Geotechnical Site Investigation report

6.3.2 Seismicity of the Region

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, 2021a). Several seismic zones are identified in western and central Uzbekistan which could have effect on the project area. This seismic zone include North-Kuldzhuktau-Turkestan and Predkyzylkum, South-Auminzatau-Aktau and South-Tyan-Shan seismic zones and these are dynamically influenced by South Tyan Shan Fault, Zaravshan Fault and Uchbash-Karshi Flexure Fault. The North-Kuldzhuktau-Turkestan seismic zone with an earthquake potential & magnitude of M>5.5 passes through the Bash Project site.

Based on the above, the possible seismic activity which could affect the Project area is considered as M > 5.5.

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 8. The location of these earthquakes in relation to the Project Site is presented in the figure below.

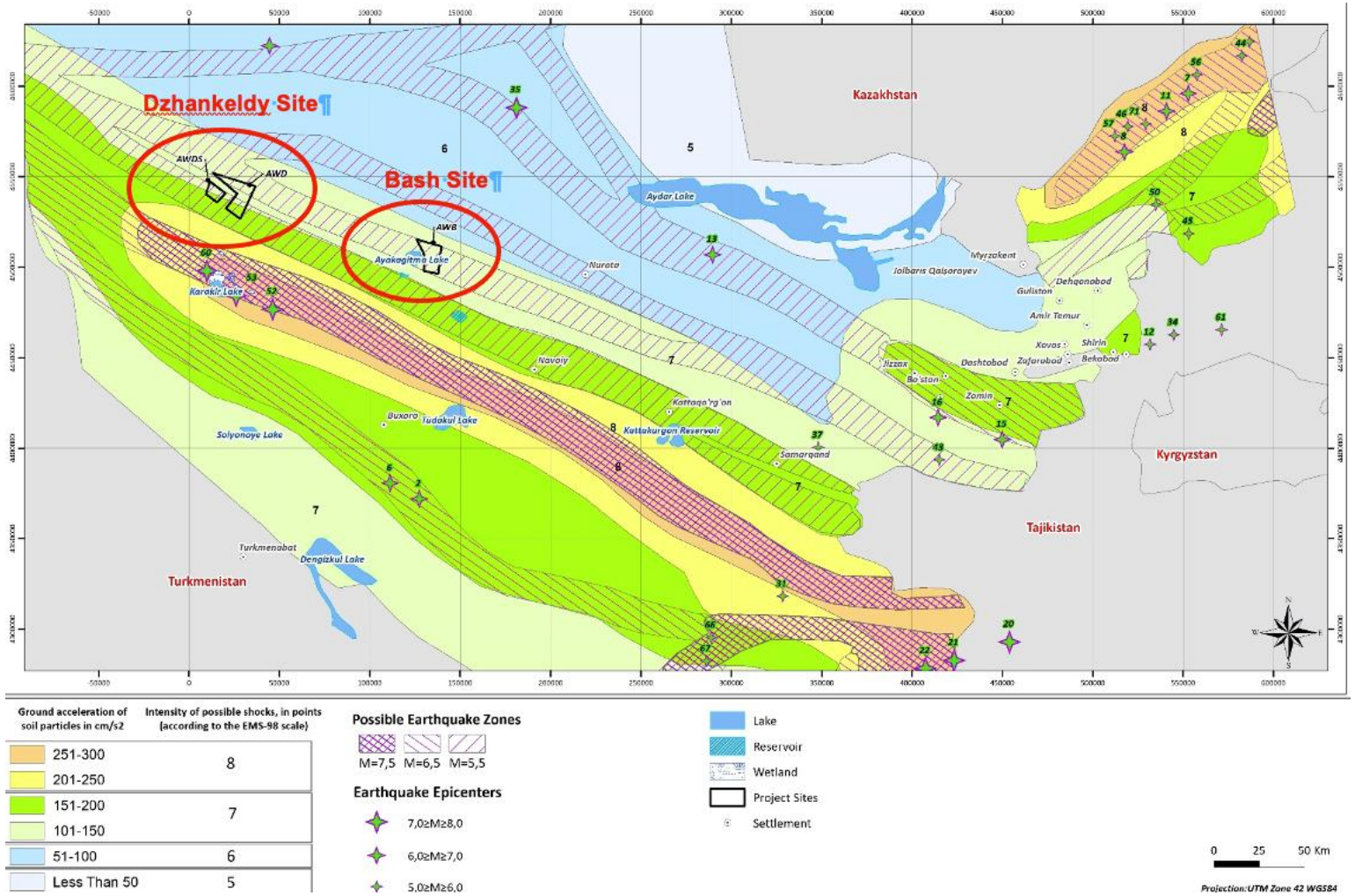
Table 6-3 Earthquakes with M>5 Occurred Around the Project Area (Adapted from UzAssystem, 2021a)

YEAR	EARTHQUAKE	MAGNITUDE	MSK-64 DEGREE	DEPTH (KM)	SEISMIC ZONE
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:

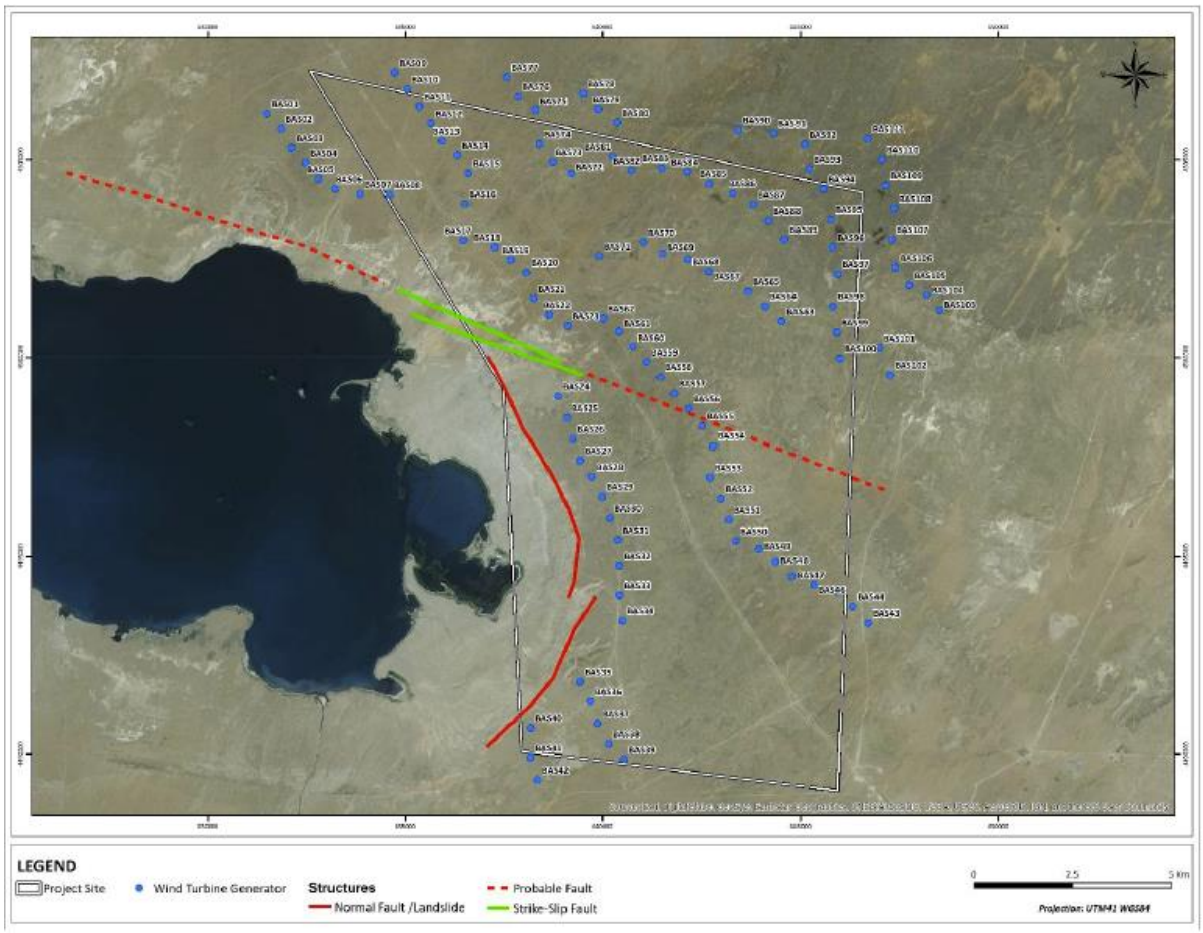
- *Intensity degree 7 means that most people are frightened and try to run outdoors. Furniture may be shifted and overturned. Objects fall from shelves and water splashes from containers. Older buildings can be seriously damaged and masonry chimneys can collapse. Small landslides can occur (Medevedev et al., 1964).
- **Intensity degree 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 6-1 Location of Earthquakes with M>5 in Relation to the Bash Project Site (Adapted from UzAssystem, 2021a)



The figure below shows the right lateral strike-slip fault zone passing through the middle of the Project site. This fault zone is within the North-Kuldzhuktau-Turestan active seismic zone with an earthquake potential magnitude of M>5.5. As can be seen from the figure below, the closest WTG to the fault zone is BAS56 with a distance of 110m which does not fall within the fault avoidance zone of 20m on either side of the fault trace as reported in the Geotechnical Site Investigation Report (UzAssystem, 2021a).

Figure 6-2 Simplified Structural Map Showing the Main Structural Features and the WTG Locations in the Bash Site



For the indirect effect, the active fault zone which is capable of producing most destructive earthquake in the central Uzbekistan is South-Tyan-Shan seismic zone. It has the major contribution to the seismic hazard in the project area. The distance between the most southern WTG location BAS42 and the active South-Tyan-Shan seismic zone, which has an earthquake potential with magnitude of M>7.5, is 43.02km which does not fall within the fault avoidance zone.

6.3.3 Hydrology and Hydrographic Network

Uzbekistan is located between two of the greatest rivers of Central Asia; the Amu-Darya and Syr-Darya (UzAssystem, 2021a). As Uzbekistan is landlocked, water resources of the country

consist of surface runoff of Amu-darya & Syr-darya river contributing approximately 55%, runoff of small rivers contributing 33%, underground waters contributing around 10% and collector/drainage waters contributing (2%). All watercourses and water bodies of Uzbekistan are attributed to the Aral Sea basin. (Third National Communications, UNFCCC, 2016).

The Annual Report of Surface Water Quality in the Territory of Uzhydromet (2018), states that the main watercourse in Bukhara region is Zarafshan River. According to hydrographic features, it belongs to the Amu-Darya river basin. The catchment of Zarafshan River is located in the most elevated part of the Pamir-Alai mountain system with eternal snow and glaciation, therefore, the supply of the river is fed by glacial-snow with maximum flow occurring in July-August. The Kuyumazar reservoir is constructed in the lower reaches of Zarafshan. This reservoir feeds on the discharge water of the Amubukhar canal. The main power source of the Kuyumazar reservoir discharges from the Amubukhar canal, which supplies water to Amu Darya river. Additionally, water from Zarafshan river comes to reservoir through the supply canal during the flood and non-vegetation period. The Kuyumazar reservoir has fishery importance.

The chemical composition of Zarafshan River is formed under the influence of wastewater from industrial enterprises in Samarkand, Kattakurgan, Navoi and agricultural areas. According to the Hydrologic and Hydraulic Report prepared by UzAssystem for the Project, (UzAssystem, 2021b) the main hydrographic infrastructure of the Bukhara irrigation canal network includes the Amu-Bukhara-II pumping station, the Amu-Karakul canal as well as the Kuyi-Mazar. Tudakul and Shurkul reservoirs. which are used for the irrigation water management. This irrigation network is complemented by an extensive drainage system with six major "Drainage Water Collectors" (DWC)-Central, North, Parallel, Tashkuduk, Parsankul and Ogitma.

The main collectors in the region are the West Romitan, North Bukhara, Dengizkul, Main Karakul, Parallel and Central Bukhara collectors. The drainage not only removes the surplus water from the irrigated fields but also the leached salts, fertilizers and pesticides. The greatest contribution to the state of the watercourse is organochlorine pesticides, as well as phenols (3 MPC), copper and chromium (2 MPC). In terms of water pollution index (WPI), the Annual Report of Surface Water Quality in the Territory of Uzhydromet (2018) reports that the water quality of Zarafshan River in Bukhara region belongs to the III class of moderately polluted waters.

6.3.4 Groundwater

Groundwater resources in the country is used mainly for drinking & municipal water supply. Small portion of this is used for land irrigation (Third National Communications, UNFCCC, 2016).

Groundwater is mainly fed by underground flow from overlying horizons, as well as by water infiltration from large canals and the irrigation network. During the period of the start of the irrigation season and until the end of autumn, groundwater level rises rapidly. Its highest level

is observed in summer (June-September), the lowest – in winter and in the first months of spring (December-April). Annual amount of ground water level fluctuation is 1-2 meters.

6.4 Archaeology and Cultural Heritage

According to EBRD PR 8, tangible and intangible cultural heritage should be identified and protected to avoid adverse impacts on cultural heritage items that may be recognised to be an integral part of the continuity of cultural practices locally, regionally or internationally.

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. Currently, Uzbekistan has four (4) cultural heritage sites and one (1) natural heritage and 10 elements of intangible cultural heritage listed by UNESCO. These are as provided below.

Table 6-4 Registered Cultural & Natural Heritage sites in Uzbekistan (UNESCO)

NAME	NATURE	DISTANCE FROM THE PROJECT SITE (KM)	
		WIND FARM	OHTL
Historic Centre of Bukhara (1993)	Cultural Heritage Site	87	48
Itchan Kala (1990)		361	336
Historic Center of Shakhrisyabz (2000)		245	261
Samarkand – Crossroad of Cultures (2001)		222	220
Western Tiern – Shan (2016)	Natural Heritage site	473	470

The following elements are listed by UNESCO as Intangible list of cultural heritage in Uzbekistan.

Table 6-5 Intangible Cultural Heritage in Uzbekistan (UNESCO)

ELEMENT	DESCRIPTION (SUMMARY)	REGION WHERE IT IS COMMONLY PRACTICED
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
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.	Mainly in Khorazm Region but it has also spread to other regions in Uzbekistan.

ELEMENT	DESCRIPTION (SUMMARY)	REGION WHERE IT IS COMMONLY PRACTICED
	It is performed through national holidays and folk festivities as well as in the daily-based interpretation during family events.	
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. The patterns art represents beliefs, world views and lifestyles in a pictorial fashion and has also been influenced by Islam.	Bukhra region and Samarkand region
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

ELEMENT	DESCRIPTION (SUMMARY)	REGION WHERE IT IS COMMONLY PRACTICED
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 apprenticeship and it is interpreted by a minimum of two and a maximum of five singers.	Ferghana Valley in Uzbekistan
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

None of the tangible cultural & natural heritage sites are within the Project or OHTL's area of influence. However, elements of intangible cultural heritage occurring across Uzbekistan such as Palov culture and Nawrouz are practiced by communities living near the Project site. As such, Assessment of the project impacts on these elements and others is provided in Chapter 13 for the Wind Farm and Chapter 25 for the OHTL.

6.5 Socio-Economics

6.5.1 National & Regional Context

6.5.1.1 Population and Demographics

According to the CIA World Fact Book, the population of the Republic of Uzbekistan was estimated to be approximately 30,842,796 individuals of which about 83.8% are Uzbek, 4.8% are Tajik, 2.5% are Kazakh, 2.3% are Russian, 2.2% are Karakalpak 2.2%, Tater are 1.5% and other national comprise of 4.4%.

The official language of the country is Uzbek with about 74.3% of the population speaking Uzbek. 14.2% of the population speak Russian, 4.4% speak Tajik and the remaining 7.1% speak other languages.

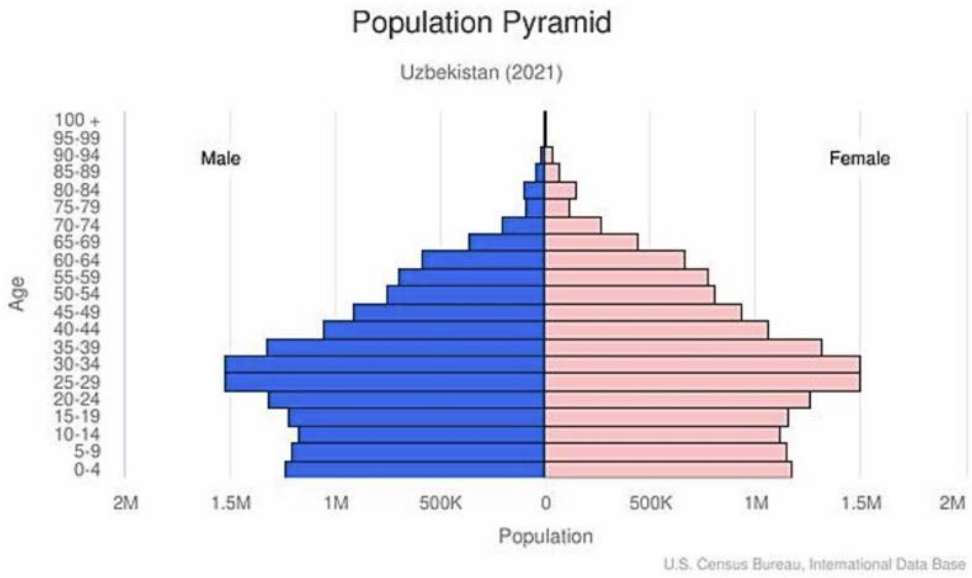
The table below gives a summary of Uzbekistan population information.

Table 6-6 Uzbekistan Population Data Summary

CRITERIA	DATA (2017 ESTIMATE UNLESS SPECIFIED)
Population	30,842,796 (2021 est.)
Age Structure	0-14 years: 23.19% 15-24 years: 16.63% 25-54 years: 45.68% 55-64 years: 8.63% 65 years and over: 5.89% (2020 est.)
Sex Ratio (Male/ Female)	At birth – 1.06 0-14 years: 1.05 15-24 years: 1.05 25-54 years: 0.99 55-64 years: 0.89 65+ years: 0.75 Total population 0.99 male/ female (2020 est.)
Life expectancy at birth	Total Population: 75.03 years Male: 71.98 years Female 78.25 years (2021 est.)
Birth Rate	15.85 births/1,000 population (2018 est.)

Source: https://www.cia.gov/the-world-factbook/countries/uzbekistan/#people-and-society Accessed 4th June 2021

Figure 6-3 Uzbekistan Population Pyramid



Source: https://www.cia.gov/the-world-factbook/countries/uzbekistan/#people-and-society Accessed 4th June 2021

6.5.1.2 Economy and Employment

Uzbekistan is the 5th largest exporter of cotton and 7th largest producer of cotton in the World. Uzbekistan's economy growth has been primarily driven by state led investments Export of natural gas, gold and cotton provide a significant share of foreign exchange earnings.

Table 6-7 Summary of Uzbekistan Economic Data

CRITERIA	DATA (2019 ESTIMATES UNLESS OTHERWISE STATED)
GDP (Official Exchange)	US$57.789 billion
GDP (Purchasing Power Parity)	US$235.021 billion
GDP per Capita	US$6,999
GDP Real Growth Rate	5.3% (2017 est.)
Industrial Production Growth Rate	4.5% (2017 est.)
Labour Force	13.273 million (2018 est.)
Labour Force - by occupation	Agriculture: 25.9% Industry: 13.2% Services: 60.9% (2012 est.)
Unemployment Rate	5% (2017 est.)
Exports	US$ 11.48 billion (2017 est.)
Imports	US$ 11.2 billion (2016 est.)

Source: https://www.cia.gov/the-world-factbook/countries/uzbekistan/#people-and-society Accessed 4th June 2021

6.5.1.3 Gender Roles

According to UNECE (2019), 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 lower wages and most are also involved with unpaid household work while men participate in productive paid labour work. In addition, women are under-represented in the decision-making process at all levels in the public and private sector.

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 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. 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).

6.5.1.4 Gender Based Violence

Uzbekistan prohibits violence against women and girls. However, there is no reliable data on domestic violence in Uzbekistan where many victims remain silent for fear of bringing shame to their families (ADB,2018). Alongside the economic hardships which have resulted into income and job losses in many households, there has been an increase in the rates of physical, verbal, emotional, economic, and sexual abuse against women and girls.

In September 2020 the president signed a domestic violence law that provides a legal definition of sexual, physical, economic, and psychological violence against women, and provided support to the victims of harassment and violence. It also set up an interagency framework of responsibilities, including governmental entities such as the Cabinet of Ministries, Ministries of Internal Affairs and Employment and Labour Relations, local government bodies, the mahalla (neighbourhood) committee network, and NGOs working in the area of protecting women from domestic violence.

According to the Ministry of Internal Affairs, local law enforcement in Uzbekistan issued more than 8,430 protection orders to ensure security of domestic violence victims between January to October 2020. Out of these, 4330 experienced physical abuse, while around 3,200 suffered emotional abuse (World Bank, 2021). The number of unreported cases is expected to be much

higher. In over 7,600 cases, women and girls in Uzbekistan experienced violence within their own families and in almost 5,920 of these cases, the aggressors were the husbands.

6.5.1.5 Social Protection and Social Services

Uzbekistan's National Strategy of Action 2017-2021 includes a commitment to social protection which includes the "Improvement of the social protection and health system" including provision of compulsory social security, strengthening of social protection of vulnerable groups and reforms of healthcare (UNECE,2019).

It provides three main types of social benefits to vulnerable families which include:

- Child care allowance for households with children aged 0-2 years;
- Allowances for families with children aged 2-14 years; and
- Financial assistance in form of benefits for low-income families, disability pension and healthcare allowances for people living with disabilities and financial and non-material support for elderly aged people.

These benefits are provided upon request and distributed through the mahallas (communities). Eligibility is determined through direct and indirect assessment of needs and is reinstated upon re-submission of an application every six months.

6.5.1.6 Property Rights and Access to Resources

The Uzbekistan law guarantees equal rights to property ownership for both men and women. The National Agency on Land and Property Cadastre, shows that female-owned property comprises 22.3% of the total value of the property registered. Rural households are traditionally led by men and hence property is registered under their name. Women limited access to finance and assets affect their economic opportunities, empowerment and decision making.

6.5.1.7 Gender and Energy Access

Low-income and poor households often have a higher energy burden than higher income households because they spend a greater percentage of their income on energy. They also often live in less-energy-efficient housing and pay more for energy because they cannot be able to afford improvements that would make their homes more energy efficient (World Bank, 2019).

In addition, 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).

According to the World Bank survey " Energy Vulnerability in Female Households", female led households' inability to pay for utilities differ according to region with the highest in Bukhara, Kashkadarya, Syradarya and Surkhandarya.

In Uzbekistan, families cope with low temperatures at home in winter by residing in one room; wearing warm clothes, covering windows, doors & floors; moving to temporary living quarters etc. However, 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).

6.5.2 Bukhara Region

Bukhara region is situated in the southwestern part of Uzbekistan with most of its territory occupied by the Kyzylkum desert. It borders with Turkmenistan, Khorezm, Navoi and Kashkadarya provinces, and the Autonomous Republic of Karakalpakstan. The area of Bukhara region is 40.32 thousand km². As of April 1, 2020, the permanent population in Bukhara region was 1,929,100 people. The region has an estimated Gross Regional Product of 30,758.1 billion Uzbek Soums and the main export products include cotton fibre, energy resources, food products and services.

The region is divided into 11 districts 6 of which are where the Wind Farm and OHTL are located. The key socio-economic characteristics of these districts is provided in the table below.

OHTL & Wind Farm Component District	Key Socio-Economic Characteristics
Gijduvon District (Wind Farm & OHTL)	This districts covers 11 urban settlements & 14 rural councils and a city in its territory. It has an estimated population of 304.2 thousand people (15.8% of the total population of the region) with 148.8 thousand women and 155.4 thousand men. It is one of the centers of folk art in Uzbeksitan and has skilled potters. There are 20 archaeological, 27 architectural monuments and 2 cultural heritage sites. The most recognisable monument is the Mazar Abdulkhalik Gijduvani; Ulugbek Madrasah.
Shofirkon District (OHTL)	There are 8 towns (urban type settlements), 12 rural citizens dormitories and 37 communities. It has a population of approximately 158.1 thousand people. The district specialises in agriculture and there are cotton cleaning plants, wine plants etc. Irrigated land account for approximately 28.2 thousand ha including 12110ha of cotton, 6100ha of wheat, 94ha of vegetables and melons.

OHTL & Wind Farm Component District	Key Socio-Economic Characteristics
Peshku District (OHTL)	This district has a total area of 8,200km^2 comprising of ten (10) rural communities (Abu Ali ibn Sino, Bogimuso, Varakhsha, Jongeldi, Zandoni, Peshku, Chibogani, Yangibazar, Galaimirishkor, Karakalpak). As of 2020, this district has an estimated population of 122,500 and according to the district municipality, the number of females and males in this district is distributed equally by 50%. 83% of the population are Uzbeks, 14% Tajiks, 2.33% Kazakhs, 0.3% Tatars, 0.3% Turkmen and the remaining 0.5% are representatives of other nationalities[5].
Romitan District (OHTL)	There are 2 cities and 7 communities in this district. As of 2020, the population of this district was approximately 141.1 thousand people. In this district, agriculture is represented by cotton growing, grain growing, gardening. Also, animal husbandry, karakul breeding, poultry farming, camel breeding, fish farming, sericulture are undertaken and developed in this district. There are 858 agricultural farms. There are 1,667 small and medium enterprises in the Romitan district.
Jondor District (OHTL)	Jondor district has a total area of 5,17 thousand km^2 with a population 174,0 thousand people as of 2020. Agriculture is the leading branch of the economy in this district with cotton being the main produce. Animal husbandry, melon growing and sericulture is also being undertaken. Irrigated land account for approximately 28.2 thousand ha including 7.5 thousand ha of grain crops, 17.5 thousand ha of industrial crops, 1.3 thousand ha of potatoes, vegetables and melons, and 66.4 thousand ha of forestry land.
Karakul District (OHTL)	There are 8 urban type villages and 42 communities in the district. The district has a 163,8 thousand people as of 2020. The main branch of agriculture is this district is cotton growing, grain growing, animal husbandry and melon growing. Cotton, grain, potatoes, vegetables, melons and fodder crops are grown on irrigated lands. Orchards, vineyards, mulberry groves are also present within the district

[5] **Source:** https://tochka-na-karte.ru/Goroda-i-Gosudarstva/10230-Peshkunskij-rajon.html Accessed 3rd June 2021

Figure 6-4 Administrative Districts in Bukhara Region

Specific socio-economic characteristics of communities living near the Wind Farm and OHTL is provided in Chapter 16 and 27 respectively.

6.6 Waste and Wastewater Management

Solid and liquid waste can exhibit certain characteristics according to its chemical, physical and biological features. 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. In order to categorise the different risks to these receptors, it is often useful to demarcate the streams into different categories that effectively equate to the level of the management and disposal which are required for each.

Industrial or domestic wastewater streams have the potential to contribute to a number of environmental problems if not properly handled, stored and/or managed, such us direct contamination to water bodies potentially leading to severe environmental and public health issues downstream.

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.

6.6.1 Solid Waste

The State Unitary Enterprise "Toza hudud – translated to Clean Area" under the State Committee is responsible for supervising cleaning and waste collection in public places and responsible for the collection of household waste. 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 and household waste is buried in the desert. The nearest landfill is located in Gijduvon district approximately 111km from the Bash site and it is operated by Toza Hudud.

6.6.2 Wastewater

In Uzbekistan wastewater and sewerage systems are only accessible to 38% of the urban population and less than 5% of the rural population. Wastewater is collected from enterprises and households and fed to the Bukhara city wastewater treatment plant (WWTP which is the centralised wastewater collection system in the region.

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[6].

The State Unitary Enterprises (provincial Suvokavas) have been established in each province of the country with the responsibility to develop and implement water supply and sanitation improvements in their respective jurisdictions. In conjunction with this, previously independent district water and sanitation enterprises (Suvokavas, (also called vodokanals), have also been restructured and have been absorbed as district branches into their respective provincial Suvokavas.

About 150,000 residents of Bukhara are not connected to the sewerage system as they use pit latrines and septic tanks. Human waste is often collected and disposed by sewage truck at the request of residents and transported to farms where they are used as fertilizer.

[6] Rehabilitation of treatment facilities and sewerage systems of Bukhara

Based on a survey conducted in 2019with 300 households residing in two towns and nine districts of Bukhara Province, only 7% of respondents had access to a centralized sewerage system. 50% of respondents reported that they discharge wastewater into a special drainage pit in the inner garden of their homes. 30.3% reported they dispose wastewater in their yard garden, while 8.3% reported that they use drainage pits in the public yard of apartment buildings.

There is no existing sewage treatment plant in Gijduvon district. The Bukhara Region Water Supply and Sewerage Project plans to develop a treatment plant of 10,000m^3/day capacity in the district[7].

6.7 Climate Affairs

6.7.1 Overview

Significant amounts of scientific research have identified a link between the rising concentration of greenhouse gases in the atmosphere and trends in current global warming. A key factor in the increases of GHGs would result from the combustion of fossil fuels and the associated release of GHGs into the atmosphere. Potential impacts of global warming have been modelled by various agencies and organisations and are now well documented. Besides a global average rise in temperature, there is expected to be more frequent extreme weather events, as well as associated impacts to biodiversity, amongst many other primarily negative impacts. Such impacts of current climate change are starting to be realised worldwide, and will likely include impacts to Uzbekistan.

According to the Asian Development Bank *Guidelines for Climate Proofing Investment in the Energy Sector,* power sector's vulnerability to projected climate change includes the following:

- Increase in air temperature will reduce generation efficiency and output as well as increase customers' cooling demands, stressing the capacity of generation and grid networks.
- Extreme weather event, such as stronger and/or more frequent storms, can reduce the input of energy (water, wind, sun, biomass), damage generation and grid infrastructure, reduce output, and affect security of supply.
- Rapid changes in cloud cover or wind speed (which may occur even in the absence of climate change) can affect the stability of those grids with a sizable input of renewable energy, and longer-term changes in these precipitation patterns can affect the viability of a range of renewable energy systems.

[7] Bukhara Region Water Supply and Sewerage Project (BRWSSP)

6.7.2 National Context

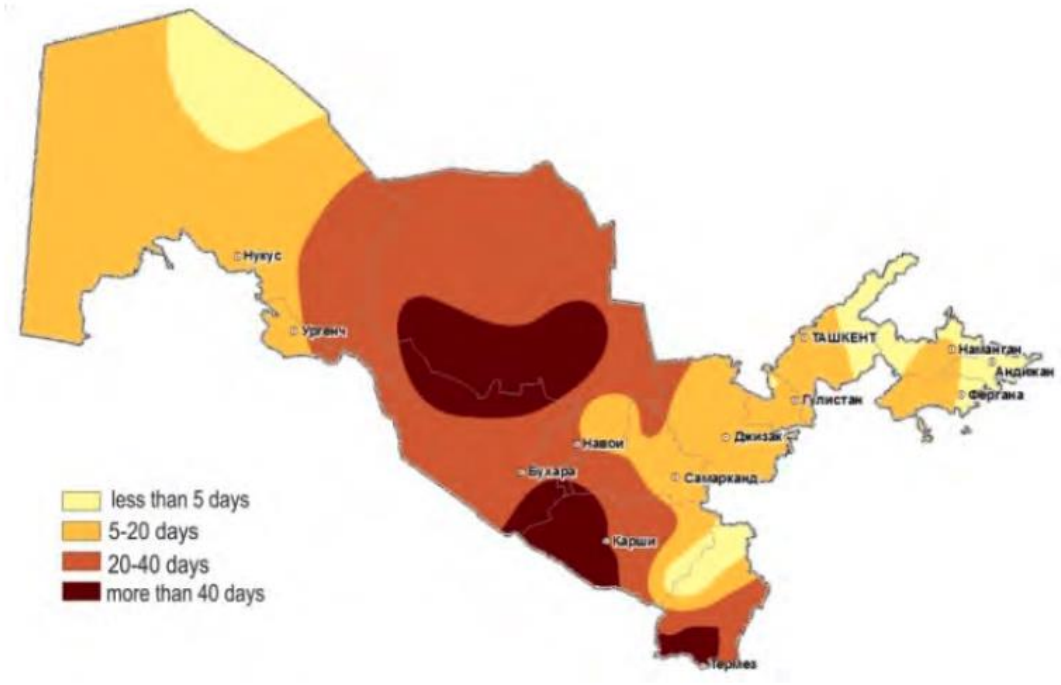
Uzbekistan is among the countries most vulnerable to climate change and has identified agriculture, economy, population health, energy, water resource management and disaster risk reduction as its most vulnerable sectors (WBG, 2021). Increase in average annual temperature with a warming rate of 0.29°C per 10 years. Analysis in the total annual precipitation amount averaged by various regions of Uzbekistan for the period 1950-2013 show very low trends towards decrease. The most significant trend in decrease in precipitation amount is observed in the southern plains of the Country (Bukhara province-where the Bash 500MW Wind Project is located - and Kashkadarya province)

Increase in the number of positive anomalies is observed by all territories of Uzbekistan and in all the seasons of the year. Climate observations in Uzbekistan show that the number of days of high air temperature (>40°C) has increased from the 1950's to 2000s. The number of days with low temperature (below either -15°C or -20°C) has decreased.

According to Third National Communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change (2016) the different regions of Uzbekistan face varying vulnerability to climate change. Bukhara Province where the Bash 500MW Wind Project is located is classified as medium vulnerability territory to climate change.

In addition to increase in temperature and decrease in precipitation, climate change impacts will result to an increase in droughts due to river runoff decrease specifically from the Amudarya river & Syrdarya river (WBG, 2021). Currently, the largest number of days (>40) with drought is in the Navoi, Bukhara, Kashkadarya and Surkhandarya province (see figure below). The impacts of climate change are expected to result in more shortage of water and increased droughts in Uzbekistan as there will be decrease in river runoff and increase in water consumption in all sectors of the economy as well as increased population growth. This will be significant in regions/provinces in lower reaches of the Amudarya river basin such as Bukhara province.

Figure 6-5 Schematic Illustration of Number of Days with Atmospheric Drought in Uzbekistan



Source: Third National communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change (2016)

6.7.3 Climate Projections

To understand the projections of future climate change and related impacts, global climate models are used. According to averaged outputs from 8 Global Climate Models with use of model MAGIC/SCENGEN5.3 (Climate Scenario Generator for Vulnerability and Adaptation Assessments), climate change scenarios for the whole of Uzbekistan and for upper watersheds of Syrdarya and Amudarya river basins indicate that air temperature will continue to increase in accordance with current trends and will increase by 1.0-1.4°C by 2030. The probability of heat waves in the future will increase along with retention of cold waves due to climate warming.

Precipitation changes are more uncertain than temperature changes. The medium-impact scenario indicates an increase in precipitation of about 48mm/yr in the desert and steppe zones, an increase of 42mm/yr in the piedmont zone, and a decrease of about 10mm/yr in the highlands zone. Even though the overall precipitation in Uzbekistan is generally forecasted to increase, the decrease in precipitation could occur in the period from June through August in the desert and steppe zones, when precipitation is already at its lowest level. Such an estimate implies that these seasonal changes are likely to have more negative impacts on a number of sectors (most notably on crop production) than what would national-level projections suggest.

Despite an overall increase in precipitation, aridity is also expected to increase across the entire country, most notably in the western parts of Uzbekistan. In addition, the situation with water scarcity in Uzbekistan might significantly worsen due to the expected reduction of existing water resources (projections suggest that the water flow will potentially decrease by 2–5% in the Syrdarya River Basin and by 10–15% in the Amudarya River Basin by 2050). In addition to reduction in water resources, climate change will increase current competition over water resources because the demand for irrigation water will increase due to increasing temperatures.

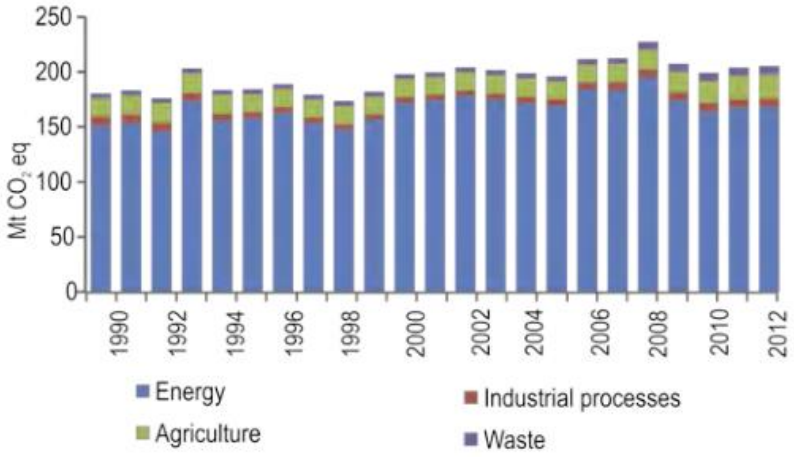
Evaluation of water use by use of WEAP (Water Evaluation and Planning System) model also show deficiency in water resources will be increased considerably as a result of climate change. By the 2040s even with increase in runoff of the Amudarya and Syrdarya rivers, the total deficiency of water for irrigation in Uzbekistan may be 8.0% with materialisation of the low impact scenario, 15.4% under medium impact and 33.5% under the high impact scenario (Third National Communication for the Republic of Uzbekistan, 2016).

6.7.4 Greenhouse Gases Trends by Sector

Uzbekistan accounts for approximately 0.33% of global GHG emissions but it is one of the most emission intensive economies in the world due to a fossil fuel intensive energy mix dominated by natural gas, aging energy infrastructure, elevated energy subsidies and an energy intensive industrial sector i.e. cement industry. Almost 40% of Uzbekistan's available energy generation capacity is past its service life leading to frequent power outages. Even if there are plans to diversify the energy mix, approximately 60% of the planned and under construction power generation projects remain in natural gas (OECD, 2019).

According to Third National communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change (2016), the energy sector contributes to 82% or 168.1Mt CO_2 eq. while the agricultural sector contributed to 21.6 1Mt CO_2 eq. In 2012, the GHG emissions from the energy sector increased by 11.2% against those in 1990 while the agricultural sector saw 27.1%.

Figure 6-6 Greenhouse Gas Emissions by Sector



Sector	1990	1995	2000	2005	2010	2012	Δ(2012-1990)
Energy	151,2	157,9	172,4	169,2	164,1	168,1	+11,2%
Industrial Processes	8,1	5,3	4,9	6,2	7,9	7,8	-3,7%
Agriculture	17,0	16,7	16,2	16,1	19,9	21,6	+27,1%
LUCF	-1,6	-1,4	-1,0	0,4	-3,1	-2,9	+81,3%
Waste	4,1	4,3	4,5	4,7	7,3	7,7	+87,8%
Total emissions with LUCF	**178,8**	**182,8**	**197,0**	**196,6**	**196,1**	**202,3**	**+13,1%**
Total emissions without LUCF	**180,4**	**184,2**	**198,0**	**196,2**	**199,2**	**205,2**	**+13,7%**

Source: Third National communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change (2016).

6.7.5 Key Vulnerabilities

According to the World Bank Climate Change Knowledge Portal (2021) Uzbekistan will be subject to the following vulnerabilities due to impacts of climate change:

- Summer months are expected to have high temperatures, prolonged heat waves, and expanded summer season. Heat waves, and increased frequency of the consecutive number of days above 39°C are expected to occur throughout the country. Climate warming is also expected to shift boundaries of spring frosts with potential for adverse impacts on the agricultural sector.
- Climate change, specifically changes in precipitation patterns are likely to alter slope and bedrock stability, resulting in localized landslides. This is expected to be a high-degree hazard for southern and eastern parts of the country.
- Precipitation patterns and increased variability, land use, wind, glacial and snow melt, and other climatic conditions will affect the river systems. Changed precipitation patterns and river flows have led to riverine flooding and are also associated with heavy rainstorms, mudslides and landslides.

PART A – WIND FARM

This part of the report assesses the wind farm element of the Project only. It outlines site specific baseline conditions for the Wind Farm area, identifies receptors within the identified Area of Influence (AoI) and provides an assessment of the potential environmental and social impacts for Project construction and operations. Further, it proposes mitigation & management measures to prevent or minimize negative impacts and ameliorate positive impacts where possible and outlines monitoring requirements to ensure continuous monitoring of the environment.

7 TERRESTRIAL ECOLOGY

7.1 Observation and Baseline Conditions

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 B-1, which includes full detailed reports accounting for specific methodologies, a recount of all found results, photos, maps and the full spectrum of collected data for each aspect of terrestrial ecology that was surveyed.

7.1.1 Ecosystems, Habitats and Plant Communities

7.1.1.1 Survey Methodology

The field studies were conducted 9th –11th April, 12th –20th May and 18th–30th June 2021 by traditional methods of botanical survey 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). The majority of proposed turbine locations within two project sites were inspected.

Refer to the detailed habitat and flora reports in Appendix B-1 for survey methodology, location coordinates, maps, and full datasets of results.

7.1.1.2 Results

HABITATS

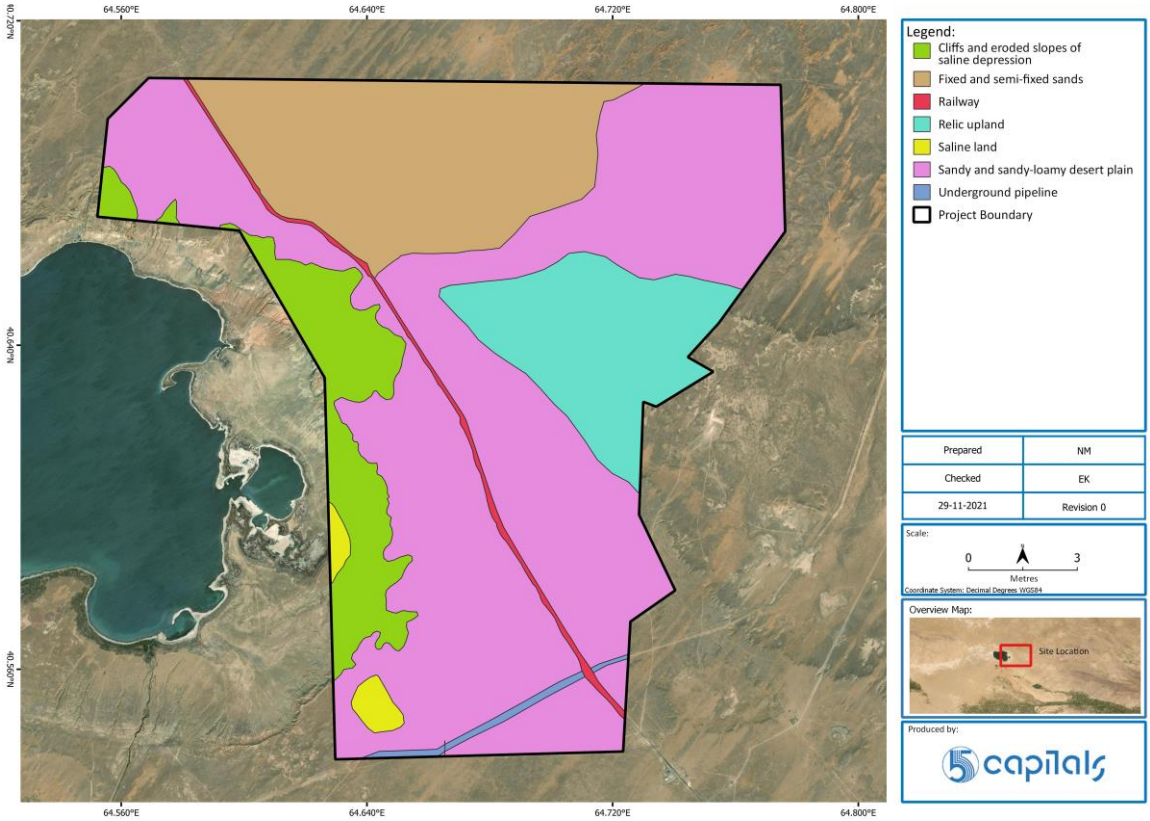
The following habitats were identified throughout the Bash WF site:

- 120.72 km^2 of Sandy and sandy-loamy desert plain.
- 19.84 km^2 of Cliffs and eroded slopes of saline depression.
- 42.74 km$_2$ of Fixed and semi-fixed sands.

- 25.35 km^2 of Relic uplands.
- 2.28 km^2 of Saline land.

The following figure showcases the habitat map for the Bash WF site.

Figure 7-1 Habitat Map for Bash Wind Farm



FLORA

The total check-list of vascular plants recorded within the project site during the field survey in April and June includes 49 species. In June, the same species were found in each survey area, the only difference was their phenological stage (all ephemers and ephemeroids were fruiting or dried).

The majority of species recorded are considered to be common and are not threatened. One species is listed as vulnerable on the Uzbekistan Red Data Book, while two species are considered as Nationally protected. These are presented in the following table. These species do not meet the conditions for critical habitat or priority biodiversity feature as per the EBRD PR6 requirements.

Table 7-1 Bash Wind Farm – Threatened and Important Flora

SPECIES	ABUNDANCE ON SITE	RANGE	IUCN /RDB STATUS
"Bash WF" Site			
Tulipa lehmanniana	Occasional to Rare	Regional	Not Evaluated (NE) / UzbRDB 3 (vulnerable, declining species)

Species	Abundance on Site	Range	IUCN /RDB Status
Black Saxaul *Haloxylon ammodendron*	Occasional to Frequent	Transcontinental	Nationally Protected
White Saxaul *Haloxylon persicum*	Occasional to Frequent	Transcontinental	Nationally Protected

Plate 7-1 Flowering *T. lehmanniana* at the Bash WF site

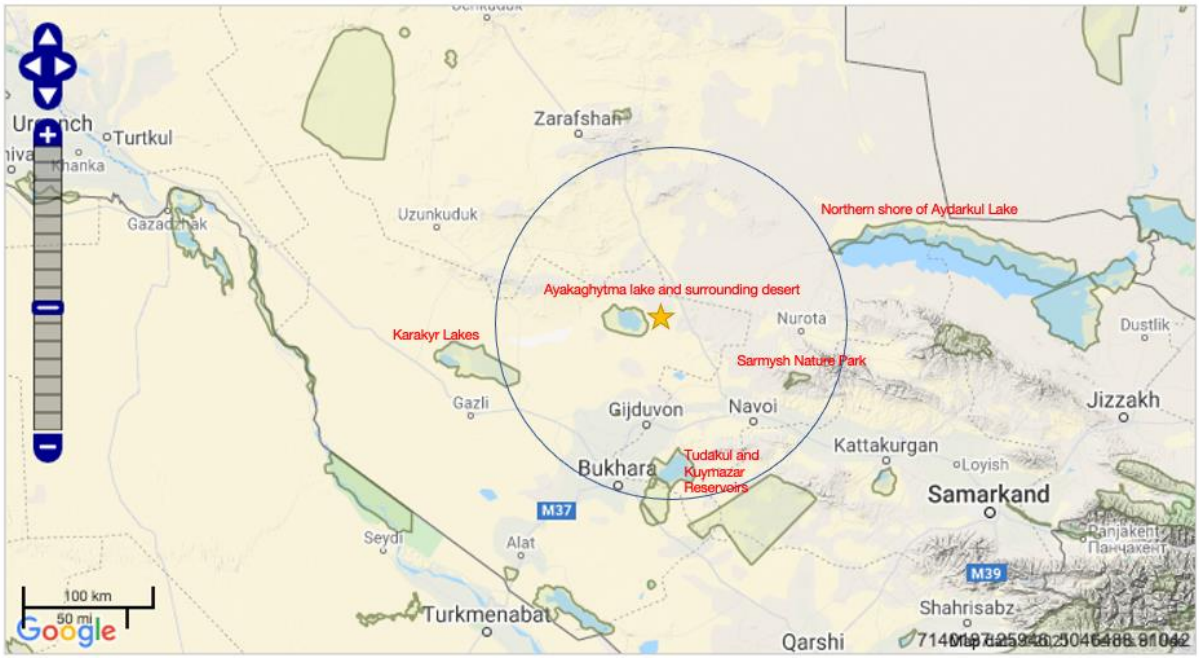
7.1.2 Birds

7.1.2.1 Regional Context

In order to analyse the potential impacts on avifauna, the spatial context around the project site was assessed including Important Bird Areas (IBAs).

A number of Important Bird Areas were highlighted that exist in the immediate area as well as several in the larger region.

Figure 7-2 IBAs within 100km of the Project site



The project site is located immediately adjacent to Lake Ayakagitma, which is a designated IBA. In particular, the lake is of international significance for wintering waterfowl and shorebirds.

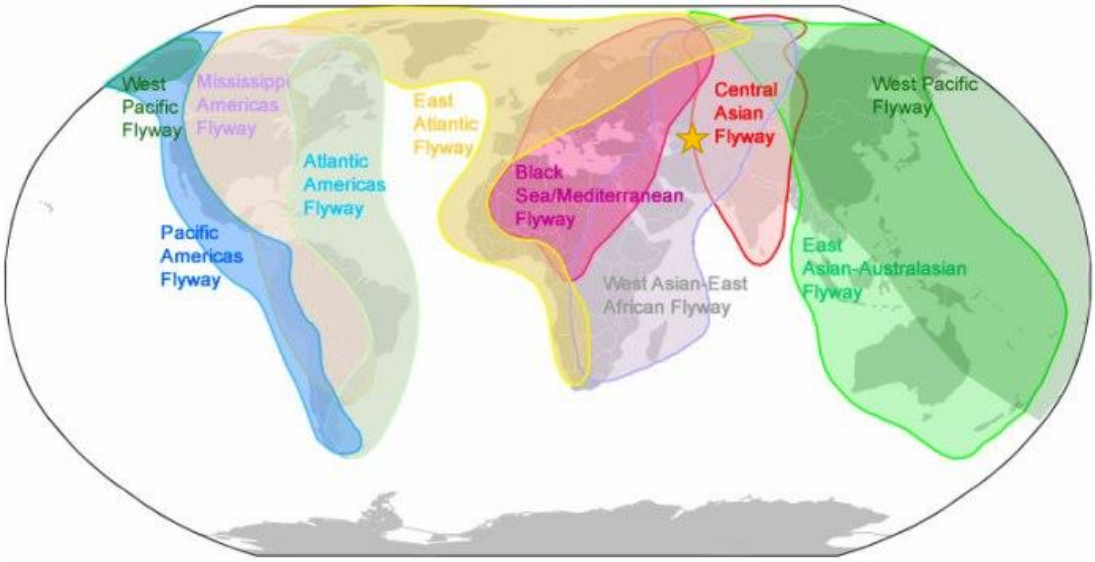
Additionally, the following IBAs are within a 100km buffer zone of the project site:

- Karakyr Lakes, located 90km to the west, a prominent wintering site for waterfowl and waterbirds;
- Sarmysh Nature Park, located 80km to the east, which hosts unique habitat and a number of breeding passerine bird species;
- Aydarkul Lake, located 100km to the northwest, which is a prominent site for waterfowl and waterbirds; and
- Tudakul and Kuymazar Reservoirs, located 80km to the south, which is a prominent site for shorebirds and waterbirds.

MIGRATORY FLIGHT PATH ANALYSIS

The project site is also located within the convergence of two major migratory flyways; the Central Asian Flyway and the West Asian/East African Flyway.

Figure 7-3 Project Location in Relation to Global Migratory Bird Flyways



An assessment of the landforms surrounding the project site enables us to predict a general flight path of migratory flocks*, which typically avoids large expanses of flat desert and mountain features, and follows along coastlines or river deltas to wetland staging areas and stopover sites. (*migratory flight path prediction is an imperfect science. Migration pathways vary by population type of birds, species, age, and even individuals year by year. However, very broad, general patterns can be made based on these behavioural assumptions.)

The following figures showcase the likely pathways that migrating birds may follow when heading south towards wintering grounds during early autumn.

Figure 7-4 Predicted Flight Path Analysis for Migratory Birds (1)

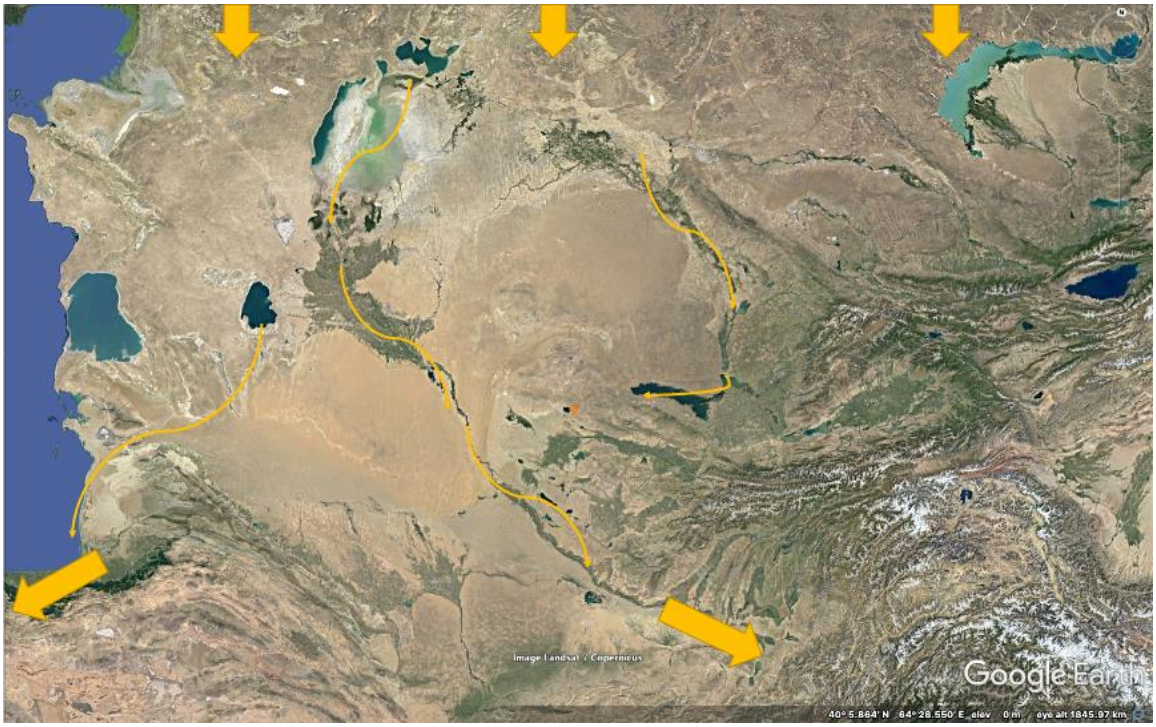
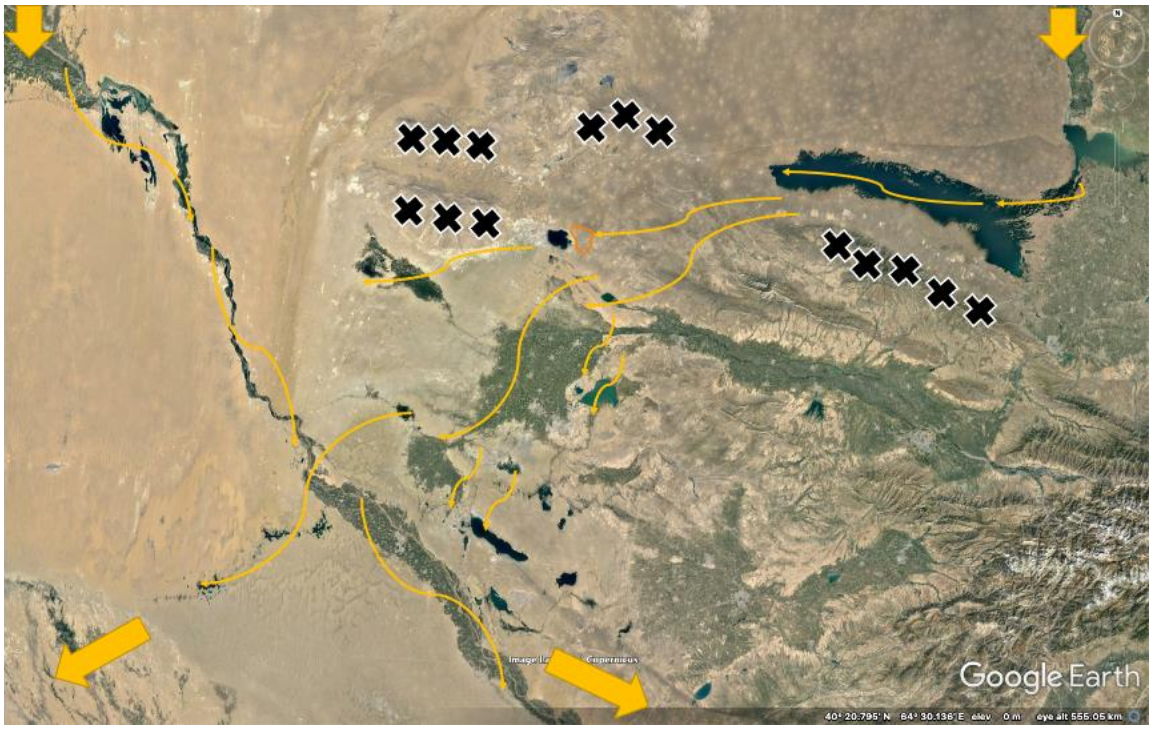
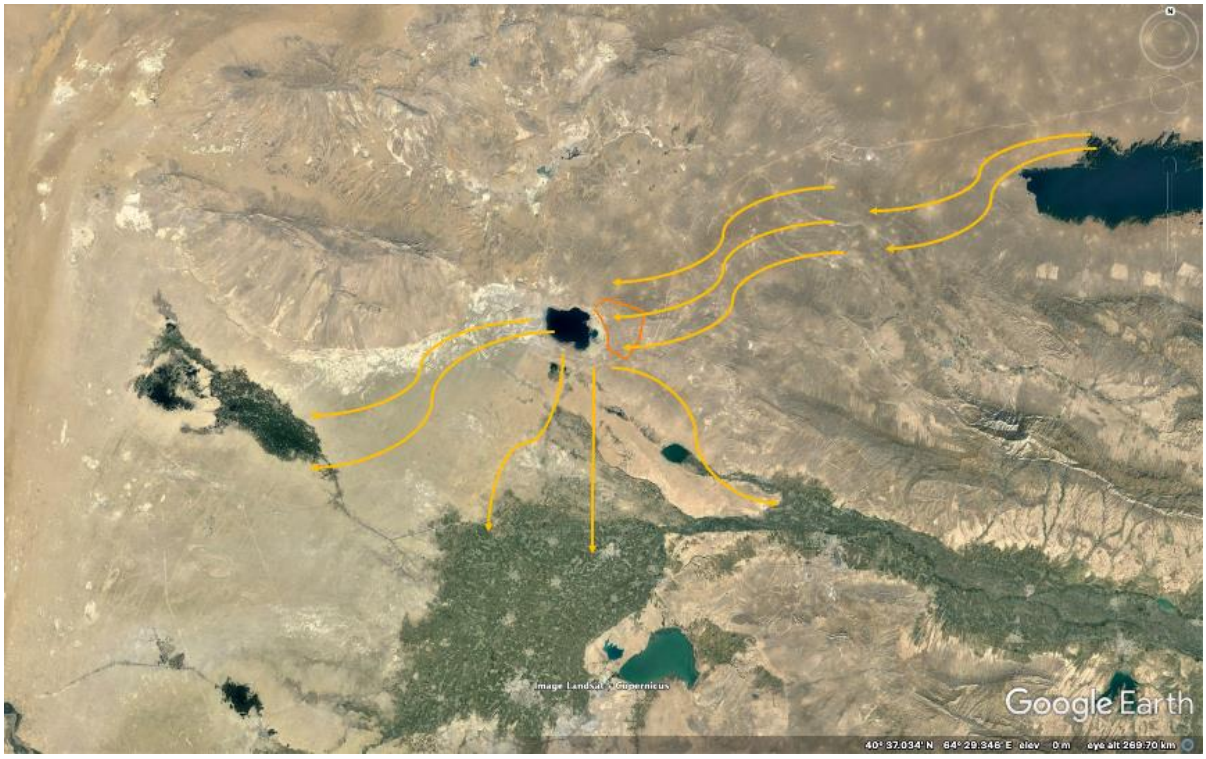


Figure 7-5 Predicted flight path analysis for migratory birds (2) – Lakes and Green Areas as Stopover Points; Avoiding Direct Flights over Mountainous Terrain



Based on the location of Aydarkul Lake, and the mountain landforms to the north and west of the project site, it is likely that migratory birds would cross the site from the northeast heading towards Ayakagytma Lake or further south.

Figure 7-6 Predicted flight path analysis for migratory birds (3) – Lakes and Green Areas as Stopover Points; Avoiding Direct Flights over Mountainous Terrain



The predicted migratory flight paths indicate the possibility of high levels of flight activity occurring in the project site airspace, especially during autumn migration.

7.1.2.2 Survey Methodology

SURVEYING TECHNIQUE

For the purposes of Collision Risk Assessment, the Bash WF site was comprehensively surveyed over all four (4) seasons, (Spring, Summer, Autumn and Winter) following the guidance of the Scottish Natural Heritage (SNH) guidelines, which are currently the internationally accepted best-practice for onshore wind farm surveying and assessment. A total of 9 Vantage Points (VPs) were surveyed to collect data on species, numbers, physical characteristics, and flight behaviour. This data was used in the development of the Collision Risk Model (CRM).

Further, specialized nest-searching surveys were undertaken, particularly in the known breeding seasons, with the aim to identify any breeding behaviour taking place within the Wind Farm and Area of Influence. A detailed breeding bird and raptor nest surveying effort is being conducted for Spring 2022 and continuing throughout the relevant nesting period for species of concern.

Surveys of waterbirds on Lake Ayakagitma were undertaken to establish the numbers of birds utilizing the adjacent Lake (also considered an IBA and KBA). A rapid survey was undertaken in winter to investigate the importance of the lake for wintering birds.

Specialized Houbara surveys were undertaken during the peak Houbara mating season, which is one of the only times that Houbara can readily be viewed, due to the specie's intensively secretive and shy nature.

COVERAGE AND TIMING/DATES

Bird surveys were carried out covering the following seasons:

- VP surveys during Spring 2020, Summer 2020, Autumn 2020 and Winter 2022
- Survey of Water Birds on Ayakagitma Lake during Spring 2020, Summer 2020, Winter 2021 and Winter 2022
- Raptor Nest Search and Breeding Surveys during Spring 2020, Summer 2020
- Houbara Breeding Survey, during Spring 2021
- Raptor Nest Search and Breeding Surveys during Spring 2022, currently ongoing

Refer to the detailed reports in Appendix B-1 for location coordinates, maps, and full datasets of results.

7.1.2.3 Results

VP Surveys

During the VP surveys, birds were categorized into four 'groupings' which are based on threat status and sensitivity to wind turbine impacts. The following table summarizes the bird species recorded throughout all four seasons of VP surveys within each grouping of Tier 1 (most sensitive), Tier 2, and Tier 3 (less sensitive). Due to the relative increase in number of individuals recorded over the course of the baseline surveys, Cinereous Vulture (NT) was up listed to Tier 1 and the White-tailed Sea Eagle (LC) and the Litted Bustard (NT) were up listed to Tier 2. All other bird species were deemed least sensitive and although are recorded in data annexes, have not been summarized here.

Table 7-2 Bash Wind Farm – VP Surveys Results

Scientific Name	English Common Name	Uzbek RDB status	IUCN status	VP Observations			
				Spring 2020	Summer 2020	Autumn 2020	Winter 2021
Tier 1							
Aquila nipalensis	Steppe Eagle	VU	EN	7	11	27	10
Aquila chrysaetos	Golden Eagle	VU		12	2		5
Neophron percnopterus	Egyptian Vulture	VU	EN	33	30	1	
Falco cherrug	Saker Falcon	NT	EN				1
Chlamydotis macqueenii	Houbara Bustard	VU	VU				2
Aegypius monachus	Cinereous Vulture	NT	NT			14	6
Clanga clanga	Greater Spotted Eagle	VU	VU				2
Tier 2							
Hieraaetus pennatus	Booted Eagle	VU		1			
Haliaeetus albicilla	White-tailed Sea-eagle	VU					7
Tetrax tetrax	Little Bustard	VU	NT				1
Circus aeruginosus	Eurasian Marsh-Harrier			18	19	17	3
Circus cyaneus	Hen Harrier			32	18	14	2
Accipiter nisus	Eurasian Sparrowhawk			10	2		1
Accipiter badius	Shikra			1			
Buteo buteo	Common Buzzard					15	7
Buteo rufinus	Long-legged Buzzard			33	14	8	7
Gyps fulvus	Eurasian Griffon	VU	LC	1		1	
Pelecanus onocrotalus	Great White Pelican	VU				30	

Scientific Name	English Common Name	Uzbek RDB status	IUCN status	VP Observations			
				Spring 2020	Summer 2020	Autumn 2020	Winter 2021
Grus grus	Common Crane			236		372	
Falco tinnunculus	Eurasian Kestrel			15	25	53	35
Falco naumanni	Lesser Kestrel	NT			20		
Tier 3							
Tadorna ferruginea	Ruddy Shelduck				3	35	
Anas strepera	Gadwall					76	
Anas platyrhynchos	Mallard					188	
Anas crecca	Green-winged Teal					7	
Cygnus olor	Mute Swan					52	26
Aythya fuligula	Tufted Duck					260	
Phalacrocorax pygmaeus	Pygmy Cormorant				8	24	
Phalacrocorax carbo	Great Cormorant					26	
Nycticorax nycticorax	Black-crowned Night-Heron				34	19	

Of the Tier 1 species, Egyptian Vulture (EN) and Steppe Eagle (EN) were the most abundant species in the project area registering a total of 64 and 55 individuals respectively during the seasonall VP surveys, whereas the Saker Falcon (EN), Houbara Bustard (VU) and the Greater Spotted Eagle (VU) were observed in very low numbers during the VP surveys of the project site.

Among the Tier 2 species, the Common Crane registered the highest number of records (608) in the project site followed by the Eurasian Kestrial (128) over the course of one year. The commonly recorded Tier 2 raptor species were Hen Harrier (66), Long-legged Buzzard (62), Eurasian Marsh Harrier (57) and Common Buzzard (22). 6 species of National Importance were recorded in this group; Lesser Kestrel (NT), Great White Pelican (VU), Eurasian Griffon Vulture (VU), Little Bustard (VU), White-tailed Sea Eagle (VU) and Booted Eagle (VU).

The majority of the Tier 3 species were recorded during the Autumn VP surveys where Mallard (188) and Tufted Duck (260) were observed in highest numbers. The least abundant species of this group was the Green-winged Teal (7). None of the species in recorded in this group are of elevated conservation status at international or national levels.

As per the EBRD PR6 requirements, CHA shows that none of the above species were recorded in abundances that meet the thresholds of criticality. However, given that the Houbara Bustard are a shy secretive species, surveys are likely to underestimate the species population size in the project area which lies within prime breeding ground as well as a migratory corridor. Therefore, the Houbara Bustard is considered as triggering criticality for the project.

Though the Egyptian Vulture, Steppe Eagle and Saker Falcon occur in the project area, the CHA found that these species do not occur in the project area at abundances high enough to trigger criticality for endangered species. However, as per EBRD PR6 GN6, these species satisfy Criterion ii for Priority Biodiversity Feature (supports <0.5% of global population of an EN species;) for which mitigation will be addressed in the ecological impact assessment.

A total of 2 Greater Spotted Eagles were recorded during the VP Surveys whereas no Eastern Imperial Eagles were observed during seasonal surveys of the wind farm. However observations were made during the nest survey and OHTL surveys. Based on the low numbers recorded during ongoing yearly surveys, is not considered that criticality would be triggered in the WF area for these species. However, these species are listed as Vulnerable on the IUCN Red List thus satisfying for Priority Biodiversity Feature designation.

In conclusion, a number of species of importance regularly fly through the project airspace. The **Collision Risk Assessment** is presented in the ecological impact assessment section and delves into further detail regarding the outcomes of the **Collision Risk Model**.

Refer to the detailed Collision Risk Assessment reports in Appendix B-1 for CRM methodology, detailed analysis and results.

Plate 7-2: Summer sighting of Egyptian Vulture

LAKE AYAKAGITMA

Waterbird surveying of Ayakagitma Lake found relatively low numbers in comparison to earlier reports from public databases (>20,000 birds in 2000).

Refer to the detailed waterbird survey reports in Appendix B-1 for location coordinates, maps, and full datasets of results.

Table 7-3 Bash Wind Farm – Lake Ayakagitma Surveys Results

LATIN NAME	ENGLISH NAME	MAR 2020	MAY 2020	AUG 2020	JAN 2021	DEC 2021	JAN 2022	FEB 2022	MAR 2022	IUCN	UZBEK RDB
Acridotheres tristis	Common mayna						2				
Anas acuta	Northern pintail					2			2		
Anas clypeata	Northern Shoveler		52	360	144	15	85	15	76		-
Anas crecca	Green-winged Teal				960	170	20	80	525		
Anas penelope	Eurasian Wigeon								66		
Anas platyrhynchos	Mallard		26	80	380	411	380	205	160		-
Anas strepera	Gadwall					12	15	10	31		
Apus apus	Northern Swift		120	3							-
Ardea cinerea	Grey Heron		2	2		6	3	3	2	LC	-
Ardea purpurea	Purple Heron		3	5						LC	-
Athene noctua	Little Owl		2	2	2	1					-
Alcedo atthis	Common kingfisher					1					
Aythya ferina	Common pochard				700		40	78	195	VU	
Aythya fuligula	Tufted pochard						214	67	180		
Bucephala clangula	Common Goldeneye				38			15			
Buteo rufinus	Long-legged buzzard						1				
Calandrella rufescens	Lesser Short-toed Lark			120	320	140	710	290	190		
Calidris minuta	Little Stint		18								-
Charadrius alexandrinus	Kentish Plover			80							
Charadrius asiaticus	Caspian Plover		15								-
Charadrius leschenaultii	Sand Plover			26							

Latin name	English name	Mar 2020	May 2020	Aug 2020	Jan 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	IUCN	Uzbek RDB
Chlamydotis undulata	Houbara Bustard		2	1						VU	2 (VU:D)
Circus aeruginosus	Marsh Harrier		7	18	6	5	5	1			-
Circus cyaneus	Hen Harrier				1	2					
Coracias garrulus	Eurasian Roller		22	6							-
Corvus corone	Eurasian Carrion Crow				5	1	2				
Corvus frugilegus	Rook								14		
Cygnus cygnus	Whooper Swan				43	7	3				
Cygnus olor	Mute Swan		4	124	191	46	172	65		LC	3 (NT)
Egretta alba	Great white egret					9	4	2	2		
Emberiza schoeniclus	Reed bunting					11	10	4	5		
Falco naumanni	Lesser Kestrel			3							
Fringilla coelebs	Chaffinch				8	11					
Fulica atra	Common Coot		80	1270	4700	85		620	760		-
Galerida cristata	Crested Lark			46					42		
Glareola pratincola	European Collared Pratincole			32							
Haliaeetus albicilla	White-tailed-Eagle			1	9	4	9	6	5	LC	VU
Himantopus himantopus	Black-Winged Stilt		8	160							-
Hirundo rustica	Barn Swallow			180							
Lanius isabellinus	Isabeline shrike								1		
Larus cachinnans	Caspian Gull	2	6	34		31	19	7	12		-

Latin name	English name	Mar 2020	May 2020	Aug 2020	Jan 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	IUCN	Uzbek RDB
Larus genei	Slender-Billed Gull		4	5		6	1		20		-
Larus heuglini	Heuglin's Gull					1			2		
Larus ichthyaetus	Pallas's Gull								4		
Larus ridibundus	Black-Headed Gull		14	78			17	2	42		-
Melanocorypha leucoptera	White-winged Lark				1200						
Mergellus albellus	Smew				16						
Mergus merganser	Goosander				6	4					
Merops superciliosus	Blue-cheeked Bee-eater		60	240							-
Motacilla alba	White Wagtail		5	20			4		4		-
Motacilla alba personata	Pied Wagtail	3									
Motacilla flava	Yellow Wagtail		4	8							-
Netta rufina	Red-creasted pochard						10	155	130		
Neophron percnopterus	Egyptian Vulture			1							
Oxyura leucocephala	White-headed duck								18	EN	
Passer hispaniolensis	Spanish sparrow								190		
Pelecanus crispus	Dalmatian pelican						2				
Pelecanus onocrotalus	Great White Pelican		2	48						LC	2 (VU:D)
Phalacrocorax carbo	Great Cormorant			4	62	44	320		24		

Latin name	English name	Mar 2020	May 2020	Aug 2020	Jan 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	IUCN	Uzbek RDB
Phalacrocorax pygmaeus	Pygmy Cormorant		12	36						LC	3 (NT)
Phalaropus lobatus	Red-necked Phalarope		37	32							-
Phasianus colchicus	Common Pheasant		2 (voice)								-
Philomachus pugnax	Ruff		6								-
Phoenicopterus roseus	Greater Flamingo		23							LC	2 (VU:D)
Podiceps cristatus	Great crested grebe					3	6	4	3		
Pterocles orientalis	Black-bellied Sandgrouse								4		
Remiz coronatus	White-crowned penduline-tit					3					
Riparia riparia	Sand Martin		80	28							-
Sterna hirundo	Common Tern		15	38							-
Sturnus vulgaris	Common starling						15	400	820		
Tadorna tadorna	Shellduck		6	14	236	4	18	6	31		
Tadorna ferruginea	Ruddy Shelduck	2	10	120					18		-
Tringa glareola	Wood Sandpiper		4	2							-
Tringa totanus	Common Redshank								65		
Vanellus vanellus	Northern Lapwing								40		
Vanellochettusia leucura	White-tailed Plover			24							

In conclusion, Lake Ayakagitma has been established as supporting waterbirds during all seasons, One globally threatened species, White-headed Duck (*Oxyura leucocephala*) listed

as critically endangered on the IUCN Red List was recorded during the Winter 2022 survey of Lake Ayakagytama. The survey recorded 18 individuals over 54 surveying hours; the extrapolated annual population therefore is 390. A conservative global population is 5,300 individuals, thus the 0.5% critical threshold would be 26 individuals. Thus, Lake Agytma is considered as critical habitat for this species.

The Winter 2021 and 2022 surveys recorded over 700 and 300 individuals of the IUCN VU listed, Common Pochard (*Aytha ferina*). This species satisfies Criterion ii for Priority Biodiversity Feature (supports VU species) for which mitigation will be addressed in the ecological impact assessment.

Extrapolations of all recorded birds from the year's vantage point surveys were completed. No migratory water bird species reached the 1% of the current global population criteria for critical habitat status.

Plate 7-3 Mute Swan recorded during the winter survey at the lake

Plate 7-4: Blue-cheeked bee eater

Plate 7-5: Sighting of a Little owl at Lake Ayakagytma

Plate 7-6: Greater Flamingoes (VU) at Lake Ayakagytma

Plate 7-7 Caspian Plover at Lake Ayakagytma

NEST SEARCHES

The cliffs bordering the Lake Ayakagitma basin, that lie immediately west of the WF area, extending from the northern to the southern limits of the area, are the most likely area in which a variety of raptor species possibly nest within the project's larger area of influence.

The height of the cliffs is about 25-40 meters, so they offer a very good overview of the lake which can be used by raptors for hunting. The cliffs have many indentions and provide a lot of cavities, cracks, and gouges, where birds of prey could nest.

Stakeholder have confirmed the presence of a minimum of 5 breeding pairs of Egyptian Vulture and 4 breeding pairs of Saker Falcon in the cliffs bordering the Lake Ayakagytma. Breeding Houbara Bustard have also been recorded by stakeholders in the project area.

The following table provides the species recorded during the nest surveys in 2021:

Table 7-4 Bash Wind Farm – Species Observed During Nest Search Surveys Results

LATIN NAME	ENGLISH NAME	NUMBER	IUCN STATUS	UZBEKISTAN RED BOOK STATUS
Aquila heliaca	Imperial Eagle	1,1	VU	2 (VU:D)
Aquila nipalensis	Steppe Eagle	2	EN	2 (VU:D)
Neophron percnopterus	Egyptian Vulture	3	EN	2 (VU:D)
Falco tinnunculus	Common Kestrel	3	LC	-
Circus aeruginosus	Marsh-Harrier	2	LC	-
Tadorna ferruginea	Ruddy Shelduck	2	LC	-
Charadrius alexandrinus	Kentish Plover	44	LC	
Bubo bubo	Northern Eagle Owl	2 ad + 1 dead fledgling	LC	-
Athene noctua	Little Owl	3	LC	-
Columba livia	Pigeon	80	LC	-
Pterocles orientalis	Black-bellied Sandgrouse	2,13	LC	-
Merops superciliosus	Blue-cheeked Bee-eaterr	40	LC	-
Hirundo rustica	Barn Swallow	72	LC	-
Galerida cristata	Crested Lark	24	LC	-
Calandrella rufescens	Lesser Short-toed Lark	87	LC	-
Oenanthe isabellina	Isabelline Wheatear	6	LC	-

A total of 9 nests were identified during 2020 / 2021 surveying efforts. 5 of these were confirmed to be Egyptian Vulture nests while 4 are unknown raptor nests.

Table 7-5 Location of nests found during the nest search surveys

NEST NO.	DISTANCE TO NEAREST TURBINE	SPECIES	COORDINATES		DESCRIPTION / STATUS
			NORTHING	EASTING	
B-N01-2021	3.88 km	Egyptian Vulture	40°40'10.89"N	64°31'47.31"E	May 2021 - Incubating adult Jul 2021 - adult not observed

Nest No.	Distance to Nearest Turbine	Species	Coordinates		Description / Status
			Northing	Easting	
B-N02-2020	1.93 km	Unidentified species	40°40'10.23"N	64°33'47.81"E	August 2020 - Empty nest. Signs of use during this breeding season, (excrements and bones)
B-N03-2021	2.11 km	Egyptian Vulture	40°39'59.08"N	64°34'0.48"E	July 2021 - 1 adult and nest
B-N04-2021	1.77 km	Unidentified species	40°39'25.40"N	64°35'28.37"E	January 2021 – empty nest
B-N05-2021	1.95 km	Egyptian Vulture	40°39'0.48"N	64°36'26.57"E	July 2021 - 2 adults and nest
B-N06-2020	1.77 km	Unidentified species	40°39'3.03"N	64°36'43.66"E	August, 2020 Empty nest. Signs that this nest had been used this breeding season, such as excrements and bones
B-N07-2021	1.82 km	Unidentified species	40°38'23.70"N	64°37'6.73"E	January 2021 - Nest on a cliff found during the Water birds survey on Agitma lake
B-N08-2021	0.69 km	Egyptian Vulture	40°35'10.67"N	64°38'49.44"E	May 2021- 2 adults and nest
B-N09-2021	16.01 km	Egyptian Vulture	40°38'30.55"N	64°23'12.44"E	May 2021 - Incubating adult

A detailed breeding bird and raptor nest surveying effort is being conducted for Spring 2022 and continuing throughout the relevant nesting period for species of concern, namely, Egyptian Vulture. The results of this nesting survey will be used for a detailed impact assessment and for the development of mitigation measures in relation to turbines that may be an increased risk for breeding birds.

The Spring 2022 nesting survey will be completed in May, 2022. The following table provides the status of nests recorded during the nests search surveys to date.

Refer to the detailed reports in Appendix B-1 for methodology, location coordinates, maps, and full datasets of results.

Table 7-6 Nest Search Survey Results

Dates Observed	Coordinates	Nest number	Distance to turbine	Species	Breeding status	Notes
23/03/2022 10/04/2022	40.555825 64.62129	NB-1-2022 (identified in Spring 2022)	BAS-70 760 m	*Aquila chrysaetos*	Probably active	In March and April birds (male and female) flew around the nest
23/03/2022 10/04/2022	40.57147 64.638323	NB-2-2022 (identified in Spring 2022)	BAS-60 710 m	*Aquila heliaca*	Probably active	In March and April birds (male and female) few around the nest
23/03/2022 10/04/2022	40.650842 64.612128	NB-3-2022 (previously identified in 2021)	Within 5 km zone of wind turbines	*Falco cherrug*	Probably active	In March and April birds (male and female) flew around the nest, attacked other raptors

Dates Observed	Coordinates	Nest number	Distance to turbine	Species	Breeding status	Notes
10/04/2022	40.551276 64.619056	NB-4-2022 (identified in Spring 2022)	BAS-68 900 m BAS-70 1.5 km	*Neophron percnopterus*	No birds	Just after 10th April birds arrived to breeding area
10/04/2022	40.551276 64.619056	NB-5-2022 (identified in Spring 2022)	BAS-68 900 m BAS-70 1.5 km	*Falco tinnunculus*	Active	In April two individuals were observed, one clutched a lizard in its talons
10/04/2022	40.639917 64.618536	NB-6-2022 (previously identified in 2021)	Within 5 km zone of wind turbines	*Buteo rufinus*	-	In April 2022 one individual was observed near the nest
11/04/2022	40.669692 64.529808	NB-7-2022 (identified in Spring 2022)	Within 5 km zone of wind turbines	*Neophron percnopterus*	Just arrived	In the early morning on April 11th two individuals were observed near the nest
11/04/2022	40.669692 64.529808	NB-8-2022 (previously identified in 2021)	Within 5 km zone of wind turbines	*Falco tinnunculus*	Active	In April two individuals were observed, one clutched a lizard in its talons
11/04/2022	40.669692 64.529808	NB-9-2022 (previously identified in 2021)	Within 5 km zone of wind turbines	*Athene noctua*	Active	On 10-11 April a male individual was calling throughout the night
11/04/2022	40.668913 64.642011	NB-10-2022 (identified in Spring 2022)	BAS-48 1.4 km	*Falco tinnunculus*	Active, power line pillar № 418	These nests began to be occupied in early March (as per last field trip for winter census). In April active breeding behavior was observed
11/04/2022	40.660107 64.651888	NB-11-2022 (identified in Spring 2022)	BAS-47 1.4 km BAS-32 1.5 km	*Falco tinnunculus*	Active, power line pillar № 411	These nests began to be occupied in early March (as per last field trip for winter census). In April active breeding behavior was observed
11/04/2022	40.654843 64.657782	NB-12-2022 (identified in Spring 2022)	BAS-48 1.4 km BAS-31 1.4 km	*Falco tinnunculus*	Active, power line pillar № 407	These nests began to be occupied in early March (as per last field trip for winter census). In April active breeding behavior was observed
11/04/2022	40.644625 64.669251	NB-13-2022 (identified in Spring 2022)	BAS-48 2.6 km	*Falco tinnunculus*	Active, power line pillar № 399	These nests began to be occupied in early March (as per last field trip for winter census). In April active breeding behavior was observed
11/04/2022	40.63728 64.677533	NB-14-2022 (identified in Spring 2022)	Within 5 km zone of wind turbines	*Falco tinnunculus*	Active, power line pillar № 393	These nests began to be occupied in early March (as per last field trip for winter census). In April active breeding behavior was observed
11/04/2022	40.635365 64.6795	NB-15-2022 (identified in Spring 2022)	Within 5 km zone of wind turbines	*Falco tinnunculus*	Active, power line pillar № 392	These nests began to be occupied in early March (as per last field trip for winter census). In April active breeding behavior was observed
11/04/2022	40.634131 64.680883	NB-16-2022 (identified in Spring 2022)	Within 5 km zone of wind turbines	*Falco tinnunculus*	Active, power line pillar № 391	These nests began to be occupied in early March (as per last field trip for winter census). In April

Dates Observed	Coordinates	Nest number	Distance to turbine	Species	Breeding status	Notes
						active breeding behavior was observed
11/04/2022	40.632755 64.682415	NB-17-2022 (identified in Spring 2022)	Within 5 km zone of wind turbines	*Falco tinnunculus*	Active, power line pillar № 390	These nests began to be occupied in early March (as per last field trip for winter census). In April active breeding behavior was observed
11/04/2022	40.628927 64.686724	NB-18-2022 (identified in Spring 2022)	Within 5 km zone of wind turbines	*Falco tinnunculus*	Active, power line pillar № 387	These nests began to be occupied in early March (as per last field trip for winter census). In April active breeding behavior was observed
11/04/2022	40.626308 64.689657	NB-19-2022 (identified in Spring 2022)	Within 5 km zone of wind turbines	*Falco tinnunculus*	Active, power line pillar № 385	These nests began to be occupied in early March (as per last field trip for winter census). In April active breeding behavior was observed
11/04/2022	40.619735 64.697052	NB-20-2022 (identified in Spring 2022)	BAS-80 1.79 km	*Falco tinnunculus*	Active, power line pillar № 380	These nests began to be occupied in early March (as per last field trip for winter census). In April active breeding behavior was observed
11/04/2022	40.615867 64.70137	NB-21-2022 (identified in Spring 2022)	BAS-80 1.79 km	*Falco tinnunculus*	Active, power line pillar № 377	These nests began to be occupied in early March (as per last field trip for winter census). In April active breeding behavior was observed
11/04/2022	40.609262 64.708787	NB-22-2022 (identified in Spring 2022)	BAS-79 1.73 km	*Falco tinnunculus*	Active, power line pillar № 372	These nests began to be occupied in early March (as per last field trip for winter census). In April active breeding behavior was observed

In conclusion, usage of the cliffs for breeding birds, including threatened species, has been confirmed; thus, impacts related to disturbance of breeding birds have also been included within the ecological impact assessment.

Plate 7-8 Large Nest Recorded During the Summer Survey of 2020

Plate 7-9 Large Nest Recorded During the Summer Survey of 2020

Plate 7-10 Eastern Imperial Eagle recorded during the nest survey

HOUBARA

Asian Houbara is an iconic inhabitant of steppe and semi-desert in Central Asia and the Middle East. A highly terrestrial bird, capable of going long periods without taking flight, it is nonetheless a true long-distance migrant, with some individuals travelling more than 7,500 km over the course of a single year.

Specialised Houbara surveys were carried out within the project area during the Spring in April and May 2021 from 0600 to 1000 and from 1600 to 2000 when displaying males are easily observed from long distances.

Refer to the detailed reports in Appendix B-1 for methodology, location coordinates, maps, and full datasets of results.

As Asian houbara are a desert species, they naturally occur at a low density throughout their range. Houbara typically occur at densities of < 1 bird per km2 even in good quality habitat (Hardouin et al. 2015).The prime Houbara habitat type within the project site is desert plains dominated by Sagebrush (*Artemisia* sp). Habitat mapping exercises undertaken during the baseline survey indicated that the Bash site consists of 264 km^2 of desert plain habitat. M. Koshkin's[8] study on density of Houbara in relation to shrub assemblages estimates density of this species on *Artemisia* dominant habitat to be 0.090 (0.081-0.1) birds (males)/km^2 (95% CI).

During the specialised Houbara Bustard survey, a total, 3 displaying males were recorded in April and 1 in May; no females in April and 1 female with 2 chicks in May; and 2 birds (unknown

8 Koshkin, M.A., Burnside, R.J., Collar, N.J., Guilherme, J.L., Showler, D.A., Dolman, P.M. (2016a) Effects of habitat and land use on breeding season density of male Asian Houbara Chlamydotis macqueenii. Journal of Ornithology 157, 811–823. doi: 10.1007/s10336-015-1320-4

gender) in May. Two additional birds were recorded incidentally during survey mobilization periods. The density of the males recorded in May and April is 0.022 birds/km^2 and 0.027 birds/km^2 respectively, far less than M. Koshkin's estimated density on *Artemisia* habitat. This difference in density is possibly due to the small sample location of the project site and shorter sampling period of the baseline survey compared to the study by M. Koshkin *et al.* Seasonal detectability, weather and time of sampling also have the potential to cause sampling errors.

In order to obtain a more robust estimate of the Houbara population at the project site, authors of the baseline report extrapolated Koshkin's density of the species on *Artemesia* habitat [0.090 (0.081-0.1) males/km^2] to the *Artemisia* habitat mapped in the project area (264 km^2). The extrapolated male population in the study site is estimated to be 21-26 individuals, which when extrapolated to include females if the sex ratio is 1:1[9], would estimate a total population of 42-52 breeding individuals.

In conclusion, a viable population of breeding Houbara has been assumed to exist within the project's Area of Influence in accordance with the Precautionary Principle, which is reflected as an important Sensitive Receptor in the ecological impact assessment.

Though the quantitative population estimation of the baseline surveys is below the proposed threshold for criticality, it is considered that population extrapolation for such a secretive species has a high margin of possible error. The stakeholder accounts of M.Koshkin and R.J. Burnside confirm a high density estimate of the Houbara population within the project area (0.36 birds per km^2) and that the project area lies within prime breeding ground and a migratory corridor. Therefore, this species is considered as triggering criticality for the project.

The following figure provided by stakeholders show the tracking data obtained from 48 wild Asian Houbara tracked between 2011-2021 indicating that the that the birds breeding in Bukhara move extensively throughout the region and many of the tracks cross over the project footprint.

9 Combreau, O., Qiao, J., Lawrence, M., Gao, X. J. Yao, J., Yang, W. and Launay, F. (2002) Breeding success in a Houbara Bustard Chlamydotis [undulata] macqueenii population on the eastern fringe of the Jungar Basin, People's Republic of China. Ibis 144: E45–E56.

Figure 7-7 Satellite tracked data of tagged Asian Houbara

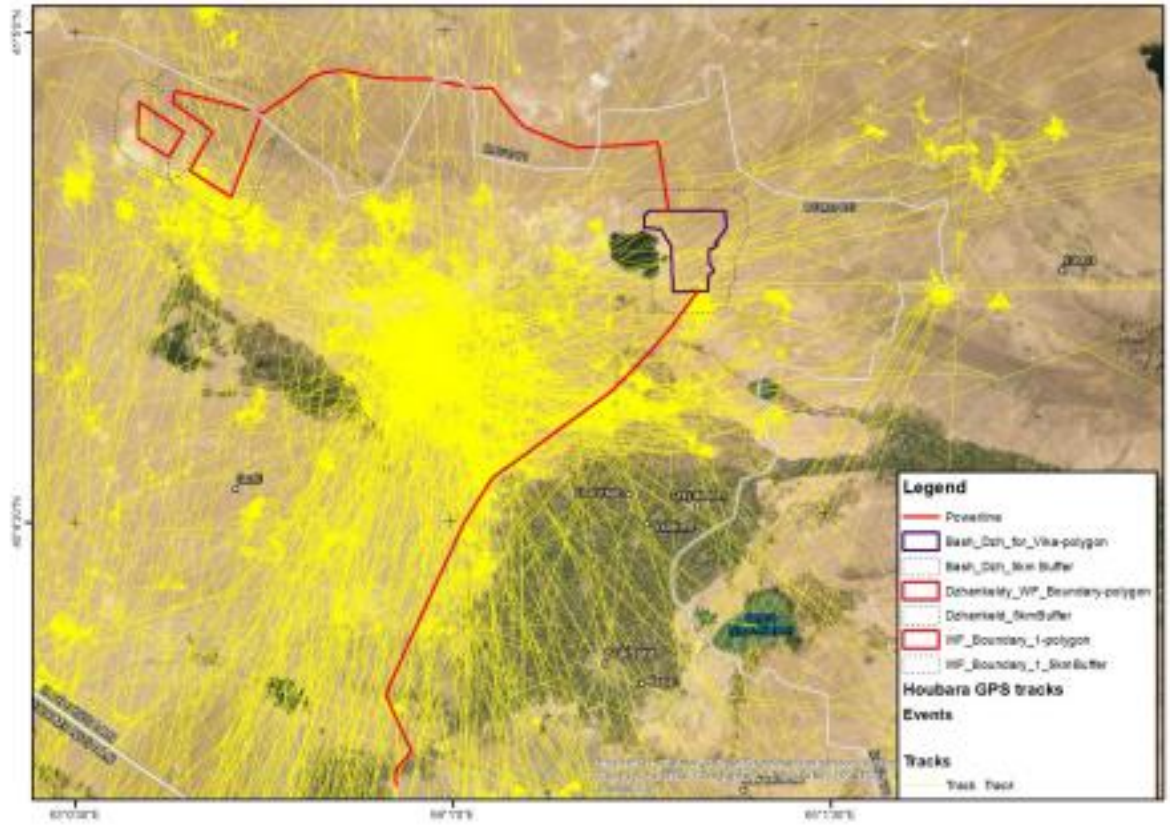


Plate 7-11 Houbara Bustard Recorded During the Summer and Winter Surveys

OBSERVATIONS OF LIVESTOCK CARCASSES

Surveyors also documented other observations throughout the various seasons of surveying which are of significance for avian fauna at the site. During the bird monitoring period, JE's local ornithologists regularly observed the corpses of livestock in the territories of Bash and Dzhankeldy WFs.

According to the local herders after a sharp cold snap (when the temperature dropped to -5°C and the cold lasted for a few days in a row) in March 2021, a large number of lambs died in both territories.

Below there are tables with the number of livestock died from August 2020 to August 2021 according to the data received from the herders in the Bash WF areas.

Table 7-7 Number of dead livestock in Bash WF from August 2020 to August 2021

HERDER'S NAME	SHEEP/LAMBS	CAMELS	GOATS	HORSES
Latif	376		80	4+8 foals
Shamshod	89+300 lambs		13	
Farhod	100		75	
Anvar	16			
Kamol	80			
Bahtiyor	15			
Total	**976**	**0**	**168**	**12**

Plate 7-12 Dead Sheep in Bash WF (April 2021)

If the fallen livestock belong to the LLC, most often shepherds either photograph and/or dry the corpses on the roof of their huts in order to prove to Kokcha LLC (their employer) that these animals were not lost or stolen, but dies of natural causes. In rare cases, the corpses of animals are buried or burned.

Plate 7-13 Dead sheep being dried on top of the roof

Most often, animals remain lying on the ground. Shepherds and local biodiversity experts confirm that these carcasses attract scavengers' attention. The local mammal expert observed a situation where feeding vultures consumed large amounts of carcass and were unable to fly for some time.

7.1.3 Bats

7.1.3.1 Survey Methodology

SURVEYING TECHNIQUE

Stationary acoustic detectors (Wildlife Acoustics Song Meter SM4) were deployed to capture echolocation data over time. Bat calls parameters known for European bat populations (Barataud, 2015) and bat species from neighbouring countries for Uzbekistan (Benda et al., 2012) were used for identification and analysis.

Further, the possible location of bat roosts, which would be used by residential bats, maternity colonies, hibernating, bats and for mating, is of importance to understand. Specialized bat roost searches were undertaken within the project boundaries and area of influence.

COVERAGE AND TIMING/DATES

The detectors were deployed in Summer-Autumn 2020 as well as Spring-Summer 2021. This covers the 7-month 'active' period for bats in Uzbekistan.

Bat roost search surveys were undertaken in Spring 2021 and Summer 2021.

Refer to the detailed bat baseline reports in Appendix B-1 for methodology, location coordinates, maps, and full datasets of results.

7.1.3.2 Results

The acoustic monitoring surveys ultimately found a number of bat species utilizing the site, but a generally low density of bats. No species of elevated status or concern were recorded.

Table 7-8 Bash Wind Farm – Bat Acoustic Surveys Results (Summer/Autumn 2020)

Species	Summer and Autumn		
	All	Relative abundance, %	Frequency of occurrence, %
Eptesicus bottae	181	12,9	66,7
Eptesicus serotinus	82	5,8	100,0
Hypsugo savii	1	0,1	16,7
Pipistrellus pipistrellus	928	66,2	100,0
Plecotus sp.	3	0,2	33,3
Rhinolophus sp.	84	6,0	50,0
Vespertilio murinus	129	9,2	83,3
Total:	1402	100,0	
Days of work	33		
Acoustic activity index (AI)	42,5		

Table 7-9 Bash Wind Farm – Bat Acoustic Surveys Results (Spring/Summer 2021)

Species	St_Det_3-1	St_Det_3-2	St_Det_3-3	St_Det_6-1	Det_6-MM_6	Det_3-MM_6	Det_3-MM_8 (17-19 Apr)		Avg bat calls/night (AI)
							Call pass	RA%	
Eptesicus sp. (E. bottae + E. serotinus)	+	+	+	+	+	+	25	58,1	8,3
P. kuhli			+				0	0,0	0
P. pipistrellus		+	+	+		+	9	20,9	3
R. bocharicus	+	+	+	+			0	0,0	0
V. murinus		+	+	+			9	20,9	3
Total:	3	5	6	5	2	3	43	100,0	14,3

Calls of *Pipistrellus pipistrellus* are dominant in the datasets. Calls of this species dominate in both summer and autumn. Calls of other bat species are much less common. In general, the highest Activity Index (AI) values are typical for the southern part of the project's area, although this varied considerably over time. Common pipistrelle (*Pipistrellus pipistrellus*) roosts were identified during the roost survey near the lake and in the Ayakagitma village.

Plate 7-14 *Pipistrellus pipistrellus* Recorded During Roost Search

In conclusion, moderate levels of bat activity occur, characterized by sporadic highs and lows. This may be driven by weather conditions. Typically, bat activity is higher during warmer nights, post-rain, when wind speeds are low. No threatened species of concern were recorded, although a total of 7 species occur regularly. Some species are lower altitude flyers, while others are medium to high altitude flyers, which will influence the relative risk for wind turbine collision (see ecological impact assessment sections for more details).

No species reached 1% of the current global population, therefore none triggered criticality as per EBRD PR6 requirements. Bats play an important role in the prey-predator control of insect populations and are thus are considered as PBFs.

7.1.4 Mammals (Non-volant)

7.1.4.1 Survey Methodology

SURVEYING TECHNIQUE

Surveying for non-volant mammals was undertaken in the spring and summer seasons, the periods of most activity. Camera traps were set for a period of 2 months and manual surveying was undertaken in the daytime as well as nocturnal spotlighting. Any signs of tracks and spoor were recorded.

COVERAGE AND TIMING/DATES

Surveying for the Bash WF site was undertaken in Spring 2021 and Summer 2021, which represents the most active periods for mammals in the region.

Refer to the detailed mammal baseline survey reports in Appendix B-1 for methodology, location coordinates, maps, and full datasets of results.

7.1.4.2 Results

The following table summarizes the findings of the mammal surveying effort for Bash WF site.

Table 7-10 Bash Wind Farm – Mammal Survey Results (Spring/Summer 2021)

NAME OF SPECIES		IUCN /RDB STATUS	TOTAL NO. OBSERVED
LATIN	ENGLISH		
Hemiechinus auritus	Long-eared hedgehog	LC/-	6 individuals
Paraechinus hypomelas	Brandt's hedgehog	LC/3NT	6 individuals/4 camera trap captures
Lepus tolai	Tolai hare	-/game sp	1 individual
Spermophilus fulvus	Yellow ground squirrel	LC/-	6 individuals
Ellobius tancrei	Zaisan Mole Vole	LC/-	24 inhabited colonies
Allactaga elater	Small five-toed jerboa	-	1 individual
Allactaga severtzovi	Severtzov's jerboa	LC/-	1 individual
Phombomys opimus	Great gerbil	LC/-	2 individuals; 77 inhabited colonies
Meriones libycus	Libyan jird	LC/-	1 individual; 2 inhabited colonies
Vulpes vulpes	Red fox	LC/ game sp	3 individuals/25 camera trap captures
Meles leucurus	Asian Badger	LC/game sp	2 individuals
Felis silvestris ornate	Asiatic wildcat	-/game sp	10 camera trap captures
Gazella subgutturosa	Goitered Gazelle	VU/3(VU)	1 individual /7 camera trap captures (1 male: 1 femail:1 young)

The survey found 13 of 24 potential mammalian species in the Bash WF project area, including 2 species, Brandt's Hedgehog and Goitered Gazelle which are listed in the Red Data Book of Uzbekistan and the IUCN Red List. The general mammalian diversity of the area is considered relatively rich. This may be due to the presence of different landscapes including different types of desert, desert clay and gypsum hills with some rocky sites, niches and caves, canyons, scrublands and coastal zone and Ayakagitma lake itself.

CHA for the Goitered Gazelle, listed as VU on the IUCN Red List and the Uzbek RDB, shows that though this species has been established to occur in the project area, it is not at abundances high enough to trigger criticality. However, being a VU species, it is considered to be as an important sensitive receptor and a Priority Biodiversity Feature.

Turkmen Caracal (Desert Lynx), *Caracal caracal* is listed as CR on the Uzbekistan Red List due to the presence of a locally distributed subspecies. No sightings or signs of the caracal were made during the baseline surveys of the project site and along the OHTL route. Given the absence of records, it is not considered that criticality is triggered. However, as per the EBRD PR6 GN6 criteria the species satisfies the conditions of Criterion ii for Priority biodiversity feature (PBF) and is considered as such.

Plate 7-15 Female Goitered Gazelle with Calf Captured by A Camera Trap

7.1.5 Herptiles

7.1.5.1 Survey Methodology

SURVEYING TECHNIQUE

Transect surveying was undertaken with the aim to identify herpetofauna and record abundances and density across the project site.

COVERAGE AND TIMING/DATES

Surveying was undertaken in Mid-Spring (April) 2021 and early Summer (June) 2021, as these represent the seasons of highest reptile activity.

Refer to the detailed herpetology survey reports in Appendix B-1 for methodology, location coordinates, maps, and full datasets of results.

7.1.5.2 Results

The following table summarizes the results recorded during herpetofauna surveying of the project site.

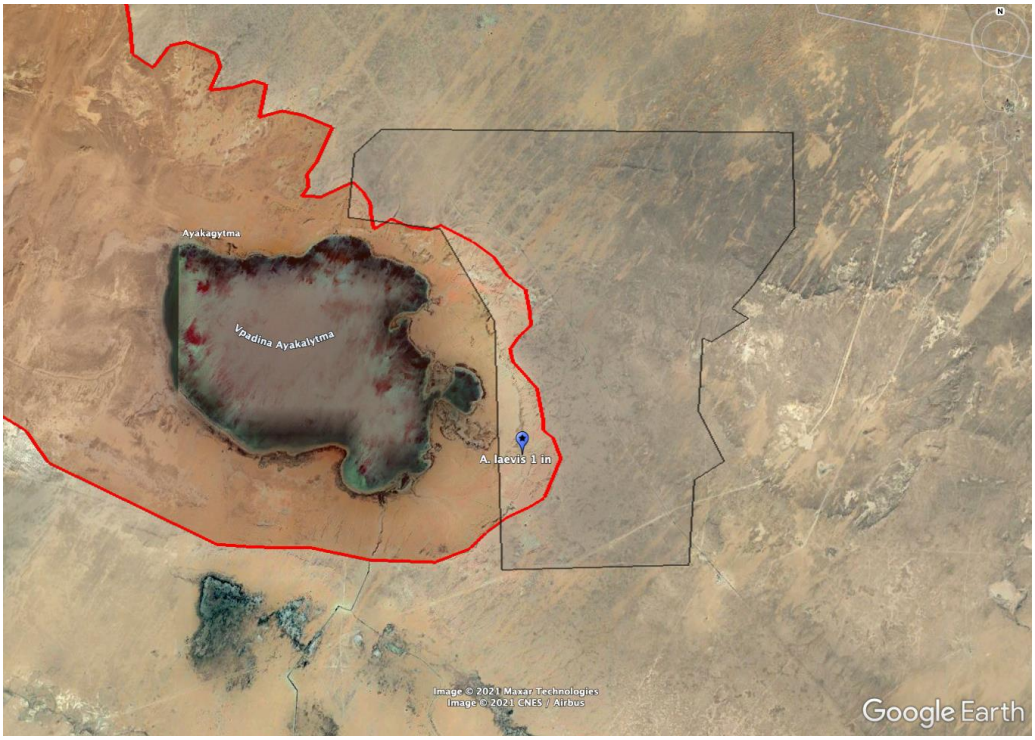
Table 7-11 Bash Wind Farm – Herpetofauna Survey Results (Spring/Summer 2021)

Name of species		IUCN /RDB Status	Total No. Observed	
Latin	English		Spring	Summer
Testudo horsfieldii	Russian tortoise	VU/ 2 (VU)	35	-
Alsophylax laevis	Southern Even-fingered Gecko	CR/2(VU:D)	-	1
Trapelus sanguinolentus	Steppe Agama	-/-	8	-
Phrynocephalus helioscopus	Sunwatcher toad-headed agama	-/-	2	-
Eremias velox	Rapid racerunner	-/-	14	-
Varanus griseus	Caspian Monitor	-/2(VU:D)	1	-
Eryx miliaris	Desert sand boa	-/3(NT)	1	-
Psammophis lineolatus	Sand racer	-/-	1	-

A total of four species of heightened concern were recorded.

- Russian Tortoise is listed as Vulnerable and a large number were recorded during the spring (34 individuals). Lack of sightings during the summer survey are attributed to the species' hibernation period which begins in late May. OHTL survey in May recorded one individual at one site and burrows at two other sites.
    - There are no global population estimates available for this species. However, sexual maturity is not reached until 10 years of age, with average lifespans of 20 to 30 years. It is considered therefore that losses to mature individuals in areas with viable populations could easily have significant impacts on the regional population. As per the EBRD PR6 GN6 the species satisfies Criterion ii for Priority Biodiversity Feature (PBF) as a Vulnerable IUCN Red List species and is classified as such.
- Caspian Monitor and Desert Sand Boa are both nationally threatened (listed on the Uzbekistan Red Data Book) although they are considered of least concern globally (on the IUCN Red List). One individual of each was recorded during surveying. These species do not trigger criticality nor meet the conditions for classification as priority biodiversity feature.
- Southern Even-fingered Gecko is a Critically Endangered gecko in the IUCN. A single individual was located during survey efforts. However, it has been stated by the surveying expert that the species likely has a viable population and has provided a map indicating the extent of suitable habitat for the species (see subsequent figure) overlapping with the boundaries of the windfarm. CHA for this species concluded that criticality was triggered.

Figure 7-8 Suitable Habitat and Sighting Locations of Southern Even-fingered Gecko



However, although the critical habitat overlaps with the boundaries of the wind farm, none of the wind turbine locations fall within 'takyr' patches of suitable habitat for the gecko, as these are located on the west side of the cliffs, whilst all turbines are located on the east side of the cliffs.

7.1.6 Invertebrates

7.1.6.1 Survey Methodology

SURVEYING TECHNIQUE

Transects and area surveys were both undertaken. Visual identification as well as netting was undertaken. Some specimens were taken from the field for accurate identification in a laboratory setting, when necessary.

COVERAGE AND TIMING/DATES

Invertebrate surveying was undertaken in Spring 2021, which is the optimal time as invertebrate populations are at a peak due to the increase in available vegetation.

Refer to the detailed entomology survey reports in Appendix B-1 for methodology, location coordinates, maps, and full datasets of results.

7.1.6.2 Results

Table 7-12 Bash Wind Farm – Invertebrate Survey Results (Spring 2021)

	Invertebrates	
	Taxonomic Order	No. of Species
1	Hymenoptera	11
2	Coleoptera	5
3	Diptera	2
4	Lepidoptera	1
5	Hemiptera	2
6	Araeae	1
7	Scorpiones	1
8	Scolopendromorpha	1
9	Bllatodae	1

No species listed in the Red Book of Uzbekistan or IUCN Red List were found. One regionally endemic species found was *Lioponera desertorum*.

7.2 Receptors

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 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 100km 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 100km buffer, to account for (1) potential major invasive spread and (2) secondary impacts caused by displacement of less competitive fauna into adjacent areas.

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 WF surveys as well as sensitive species that are anticipated to possibly occur within the area of influence.

Table 7-13 Bash Wind Farm – Sensitive Ecological Receptors

GROUP		RECEPTOR(S)	JUSTIFICATION	VALUE
Natural Habitats		Sandy and sandy-loamy desert plain	The plant species diversity is low (8 to 18 species). The canopy cover is 20–50%. The vegetation is more or less uniform. The main type of land use is pasture; impact of grazing is medium.	Medium
		Cliffs and eroded slopes of saline depression	Native sparse ephemeroid-saltwort community canopy cover is 0–10% Supports nesting habitat and roosting habitat	High
		Fixed and semi-fixed sands	Psammophilous vegetation, particularly desert shrubs and saxaul woodlands, plays an important ecological role forming a unique landscape of sandy deserts of Central Asia and fixing sands. The plant species diversity is higher than on flat and flat-wavy sandy desert plain (up to 30–31 species). The canopy cover is 40–50%. The vegetation is more or less uniform, only local abundance of saltworts and Calligonum varies on different areas. One nationally red-listed species, *Tulipa lehmanniana*, occurs sporadically within all territory of this habitat type,	High
		Relic uplands	Gently sloping stony relic hills with blown sandy cover are situated in the eastern part of the project site, and small insular uplands are found in the north-western part, at the border of saline depression Ayakagitma. The canopy cover varies from 10–20% on stony areas to 30–40% on sabulous places.	Medium
Threatened Flora		*Tulipa lehmanniana*	Listed as Vulnerable on the Uzbekistan Red Book.	High
Protected Flora		Black Saxaul *Haloxylon ammodendron* White Saxaul *Haloxylon persicum*	Nationally Protected	High
All other Flora		All other flora species	Listed as Least Concern, not considered to be of national importance.	Low / Lower
Endangered Birds	**Raptors**	Egyptian Vulture (PBF) Steppe Eagle (PBF) Saker Falcon (PBF)	Listed as critically endangered or endangered on IUCN Red List,	Very High

Group		Receptor(s)	Justification	Value
		Pallas's Fish-eagle (not confirmed within AoI)		
	Waterbirds	Sociable Lapwing (not confirmed within AoI) White-headed Duck (PBF)	Listed as critically endangered or endangered on IUCN Red List.	Very High
Threatened Birds	**Raptors**	Eurasian Griffon (PBF) Cinereous Vulture (PBF) Greater Spotted Eagle (PBF) Eastern Imperial Eagle (PBF)	Listed as vulnerable or near threatened on IUCN Red List.	High
	Waterbirds	Marbled Teal (not confirmed) Lesser White-fronted Goose (not confirmed) Common Pochard (not confirmed) Dalmatian Pelican (not confirmed) Ferruginous Duck (not confirmed) Eurasian Oystercatcher (not confirmed) Great Snipe (not confirmed)	Listed as vulnerable or near threatened on IUCN Red List.	High
	Groundbirds	Houbara Bustard (Critical) Great Bustard (not confirmed) Little Bustard (not confirmed)	Listed as vulnerable or near threatened on IUCN Red List.	High
	Songbirds/ Allies	European Turtle-dove (not confirmed) Yellow-eyed Pigeon (not confirmed) Meadow Pipit (not confirmed) Redwing (not confirmed)	Listed as vulnerable or near threatened on IUCN Red List.	High
Nationally-threatened Birds	**Raptors**	White-tailed Sea Eagle (PBF) Booted Eagle (PBF) Golden Eagle (PBF) Lesser Kestrel	Classified as Least Concern on the global IUCN Red List but listed as vulnerable or near-threatened under Uzbekistan Red Data Book.	Medium
	Waterbirds	Great White Pelican (PBF)		

Group		Receptor(s)		Justification	Value
Non-threatened Birds	**Raptors**	Eurasian Marsh-harrier Hen Harrier Eurasian Sparrowhawk Shrikra Common Buzzard Long-legged Buzzard Eurasian Kestrel		Classified as Least Concern on the global IUCN Red List, but listed as vulnerable or near-threatened under Uzbekistan Red Data Book.	Medium
	Waterbirds	Common Crane Tufted Duck			
All other Birds		All other Bird species		Listed as Least Concern on the IUCN Red List, not of national importance.	Low / Lower
Bats		*Eptesicus serotinus* *Pipistrellus kuhli,* *Pipistrellus pipistrellus* *Vespertilio murinus* *Rhinolophus bocharicus* *Plecotus sp* *Hypsugo savii* *Eptesicus bottae*	PBF	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; classified as PBFs	Medium
Threatened Mammals	**Artiodactyl**	Goitored Gazelle (PBF)		This species is listed as Vulnerable on the IUCN Red List	High
	Insectivores	Brandt's Hedgehog		This species is listed as near threatened in the Uzbekistan Red Book. Hedgehogs are an important top-down control for various invertebrate populations.	Medium
	Carnivores	Striped Hyaena (Not confirmed)		This species is listed as near-threatened on the IUCN Red List.	
	Mustelids	Marbled Polecat *Vormela peregusna* (Not Confirmed within AoI)		Mustelids act as top-down control on prey populations and help control disease. This species listed as VU on the IUCN Red List Book.	

Group		Receptor(s)	Justification	Value
Non-threatened Mammals	Carnivores	Red Fox	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. As a generalist species, population increase near anthropogenic areas is typical.	Low / Lower
		Asiatic Wildcat	This carnivore acts as top-down control on prey populations and help control disease. Further as a shy and secretive species, populations near anthropogenic areas tend to decline. However this species is not threatened or endemic.	Medium
	Insectivores	Long-eared Hedgehog *Hemiechinus auritus*	Hedgehogs are an important top-down control for various invertebrate populations. However, this species is not threatened or endemic and are common and widespread.	Low / Lower
	Mustelids	Asian Badger	Mustelids act as top-down control on prey populations and help control disease. However, this species is not threatened or endemic and are common and widespread.	Medium
	Rodents & Small Herbivories	Tolai hare *Lepus totai* Yellow ground squirrel *Spermophilus fulvus* Zaisan Mole Vole *Ellobius tancrei* Small five-toed jerboa *Allactaga elater* Severtzov's jerboa *Allactaga severtzovi* Great gerbil *Phombomys opimus* Libyan jird *Meriones libycus*	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 / Lower
Endangered Herptiles		Southern Even-fingered Gecko *Alsophylax laevis* (Critical)	This species is listed as critically endangered on the IUCN Red List and is considered regionally endemic; Meets criteria for PBF. Consultation with expert stakeholders indicate that the Uzbekistan population may be genetically distinct and possibly form a separate species.	Very High
Threatened Herptiles		Russian tortoise *Testudo horsfieldii* (PBF)	This tortoise is listed as Vulnerable on the IUCN Red List. Meets criteria for PBF.	High
	Lizards	Caspian Monitor *Varanus griseus caspius*	This species is listed as vulnerable in the Uzbekistan Red Data Book.	Medium

Group		Receptor(s)	Justification	Value
Nationally important Herptiles	**Snakes**	Desert sand boa *Eryx miliaris*	This species is listed as near threatened in the Uzbekistan Red Data Book.	Medium
Non-threatened Herptiles	**Amphibians**	Turan Toad *Bufotes turanensis*	This species is not threatened and are common and widespread.	Low / Lower
	Geckos and Lizards	Caspian Bent-Toed Gecko *Tenuidactylus caspius* Comb-toed Gecko *Crossobamon eversmanni* Turkestan thin-toed gecko *Tenuidactylus fedtschenkoi* Common Wonder Gecko *Teratoscincus scincus* Steppe agama *Trapelus sanguinolentus* Sunwatcher toad-headed agama *Phrynocephalus helioscopus* Lichtenstein's Toadhead Agama *Phrynocephalus interscapularis* Rapid Lizard *Eremias velox* Aralo-Caspian racerunner *Eremias intermedia* Sand Racerunner *Eremias scripta*	These species are not threatened and are common and widespread.	Low / Lower
	Snakes	Sand racer *Psammophis lineolatus* (Not Confirmed) Spotted whip snake *Hemorrhois ravergieri* (Not Confirmed) Spotted desert racer *Platyceps karelinii* Dice Snake *Natrix tessellata*	These species are not threatened and are common and widespread.	Low / Lower
Non-threatened Invertebrates		Hymenoptera (Wasps/Bees/Ants) Coleoptera (Beetles) Diptera (True Flies)	Some of the species found are important predators whilst others are important pollinators. However these species are not threatened or endemic and are common and widespread.	Low / Lower

Group	Receptor(s)	Justification	Value
	Lepidoptera (Butterflies/Moths) Hemiptera (True Bugs) Blattodea (Cockroaches) Scorpiones (Scorpions) Scolopendromorpha (Centipedes)		

7.3 Potential Impacts, Mitigation, Management & Residual Impacts

7.3.1 Construction Phase

7.3.1.1 Ecosystem Function Degradation

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.

Habitat loss affects both vegetation and wildlife species that currently use the affected areas 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 regionally. Ecosystem function will be degraded as a result.

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.

A buffer of 30 meters has been calculated around the WTGs and substations to encompass the footprint as well as a buffer for construction activity.

The EPC Contractor will maintain the following to restrict the construction footprint as much as possible:

- The access roads within the wind farm will be a width of 5m. The allowed construction buffer will not exceed 5m to each side of the permanent road footprint.
- The allowed construction buffer for the substation footprint will not exceed 10m buffer from the edges of the permanent built-up area.
- The allowed construction buffer around the wind turbine pads will not exceed a maximum 30m buffer.

Table 7-14 Extent of Habitat Loss

Habitat	Habitat Loss based on 50 m buffer for all WF components (worst case scenario)	Habitat Loss based on 30 m for WTGs and Substation, and 5 m for BOP and Access ROADS (Realistic scenario)
Sandy and sandy loamy desert plains	7.82 km^2	1.69 km^2
Relic Uplands	1.10 km^2	0.27 km^2
Cliffs and Eroded slopes of Saline Depression	0.43 km^2	0.08 km^2
Fixed and Semi-fixed sands	1.70 km^2	0.36 km^2

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; the extent of which is presented in the following table. The Magnitude of loss of each type of habitat has been based on the overall amount of loss, as calculated in the previous table.

Table 7-15 Significance of Unmitigated Habitat Loss

Receptor	Value/ Sensitivity	Magnitude	Significance
Natural Habitats (Sandy and sandy-loamy desert plains)	Medium	Moderate	**Moderate**
Natural Habitats (Cliffs and eroded slopes of saline depression)	High	Minor	**Minor to Moderate**
Natural Habitats (Fixed and semi-fixed sands)	High	Minor	**Minor to Moderate**
Natural Habitats (Relic uplands)	Medium	Minor	**Minor**

Habitat loss impact will be further mitigated by post-construction restoration and compensatory offsets:

- The EPC contractor will commit to the post-construction restoration of all affected areas to natural habitat conditions. Restore habitat post-construction in unused land areas that are not required for O&M maintenance; and
- Compensatory offsets will be applied in adjacent degraded areas to restore and revitalize similar natural habitats subject as the lost habitats.

The above measures will be detailed in the Restoration Action Plan and Compensation Offset Plan respectively.

With post-construction restoration and compensatory restoration of the same amount of land and/or habitats as much as possible, the residual significance is Negligible to Minor.

Table 7-16 Residual Significance of Mitigated Habitat Loss

Receptor	Value/ Sensitivity	Magnitude	Residual
Natural Habitats (Sandy and sandy-loamy desert plains)	Medium	Minor	**Minor**
Natural Habitats (Cliffs and eroded slopes of saline depression)	High	Negligible	**Minor**

Receptor	Value/ Sensitivity	Magnitude	Residual
Natural Habitats (Fixed and semi-fixed sands)	High	Negligible	**Minor**
Natural Habitats (Relic uplands)	Medium	Negligible	**Negligible to Minor**

7.3.1.2 Biodiversity Loss – Direct Mortality and Lowered Survivorship

Clearing, Excavation and Earthworks

Clearing of existing vegetation will result in direct loss and mortality of removed specimens. Further, wildlife such as burrowing rodents and herptiles may be directly crushed during earthworks, or may suffer stress-induced mortality.

The Southern Even-fingered Gecko (CR) and the Russian Tortoise (VU) are both burrowing species considered as Critical and a Priority Biodiversity Feature (PBF), respectively. Active only during a few of months of the spring season, the Russian tortoise spends majority of the year in a dormant state in burrows below ground which makes it all the more susceptible to earthworks.

The Southern Even-fingered Gecko is a particularly sensitive receptor. Recent DNA analysis indicates that this is a new species within Central Uzbekistan. The limited numbers recorded at the Bash WF may be due to its elusive behaviour or low density of this species on site. The impacts of direct loss and mortality due to clearing, excavation and earthworks on this species is considered to be of major significance.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 7-17 Significance of Direct Loss and Mortality

Receptor	Value/ Sensitivity	Magnitude	Significance
Threatened Flora	High	Moderate	**Moderate to Major**
Protected Flora	High	Moderate	**Moderate to Major**
Non-threatened Flora	Low / Lower	Moderate	**Minor**
Non-threatened Mammals	Low / Lower	Moderate	**Minor**
Southern Even-fingered Gecko	Very High	Major	**Major**
Russian Tortoise	High	Major	**Major**
Nationally Important Herptiles	Medium	Moderate	**Moderate**
Non-threatened Herptiles	Low / Lower	Moderate	**Minor**
Non-threatened Invertebrates	Low / Lower	Moderate	**Minor**

The following mitigation measures will be implemented to reduce the impacts on floral species:

- Pre-construction survey to carry out in-situ protection where possible for threatened flora;

- Seed-collection of endangered and threatened flora (during the peak season, chiefly March) such as the perennial *Tulipa lehmanniana* species listed as a category 3 (NT) on the Uzbek RDB.
- Post-construction restoration via seeding, re-planting, and landscaping with native, high-value species such as the perennial *Tulipa lehmanniana* species listed as a category 3 (NT) on the Uzbek RDB.
- Compensatory measures for removal of any saxaul trees as per National Regulatory requirements.

As part of the pre-construction biodiversity management program, a Flora Conservation Action Plan will be prepared, which will outline the locations and timings of pre-construction flora surveys to be undertaken for the purposes of seed collection, demarcation of areas to be protected, and translocation of whole specimens if deemed feasible.

The Flora Conservation Action Plan will include the methodology for seed storage. Collected seeds will be utilized during post-construction restoration, which will be detailed in the Restoration Action Plan.

The following mitigation measures will be implemented to reduce the impacts on fauna species:

- Minimization of the built footprint in design and minimise the construction buffer zone outside of the prime suitable habitat for Southern Even-fingered Gecko as much as possible (see below for further details);
- Setting aside protected reserve areas dedicated for the Southern Even-fingered Gecko; (see below for further details);
- Prior to start of construction, relocation of any Southern Even-fingered Gecko, Russian Tortoise, and Sand Boa; pre-construction survey (during active period, not during hibernation) to suitable release sites. The methodology, timing and scope is detailed in a Reptile Relocation Plan;
- 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.
- Chance Find Procedure will be 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; and
- Post-construction habitat restoration, especially suitable habitat for Southern Even-fingered Gecko;

For non-threatened species such as other herptiles, rodents, and invertebrates, chance-find procedures with individual relocations as deemed necessary may be sufficient.

Southern Even Fingered-Gecko: No Net Loss

As an identified critical species as per the CHA, any impacts on the Southern Even-Fingered Gecko must be mitigated to ensure no net loss (and subsequent net gain positive impact).

As the primary foundation of effective mitigation is avoidance, an exercise has been undertaken to reduce the amount of project development impact within suitable gecko habitat as much as possible.

The suitable habitat for the Southern Even-fingered Gecko lies in the valley adjacent to the lake, whilst the WF BoP and infrastructure are on the highland area. An exposed cliff edge separates the two. Therefore it is not anticipated that any construction activities will directly impact the population of Southern Even-fingered Gecko.

However, a suitable release site has in any case been identified, which will be fenced with livestock exclusion fencing, to create a protected core pocket which will be monitored to measure any impact on the gecko population. Further, relocation surveys will still take place during the applicable seasons so that if any geckos are found in the BoP area, the protected area will be ready for the release of relocated individuals.

More details are provided in the Reptile Relocation Plan, which outlines the exact timings, locations, and methodology to be followed for the identification of release sites, relocation process, and population monitoring for the gecko, tortoise, and other reptiles of concern. The methodology for erection of tortoise-exclusion fencing will also be detailed in the plan, in order to prevent immigration of individuals into the construction corridor post-relocation.

With the above measures, the residual significance is presented in the following table.

Table 7-18 Residual Significance of Direct Loss and Mortality

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Threatened Flora	High	Negligible	**Minor**
Protected Flora	High	Negligible	**Minor**
Non-Threatened Flora	Low / Lower	Minor	**Negligible to Minor**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Minor	**Moderate to Major**
Russian Tortoise	High	Minor	**Minor to Moderate**
Nationally Important Herptiles	Medium	Minor	**Minor**
Non-threatened Herptiles	Low / Lower	Minor	**Negligible to Minor**
Non-threatened Invertebrates	Low / Lower	Minor	**Negligible to Minor**

VEHICULAR COLLISION

Wildlife can be runover or collide with, motorized vehicles and equipment. Vehicle-related death from trucks and machinery are less of a concern for larger mammals such as Gazelle, and Fox which are more likely to disperse in time to avoid collision (as the site vehicles will be traveling under speed restrictions and large equipment movement such as cranes and turbine parts will be very slow).

Small to medium sized wildlife such as to hare, hedgehog and rodents, tortoise, lizards, snakes and amphibians have a higher chance of mortality from vehicular and machinery collisions. This could also apply to endangered, threatened and non-threatened raptors which may scavenge from road-kill.

As per field survey records, road-kill has already been identified as an ongoing issue in some parts of the region. It will be important to ensure that the influx of traffic during construction stage does not exasperate this issue.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 7-19 Significance of Vehicular Collision

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Raptors	Very High	Moderate	**Major**
Threatened Raptors	High	Moderate	**Moderate to Major**
Threatened Groundbirds	High	Moderate	**Moderate to Major**
Nationally Threatened Raptors	Medium	Moderate	**Moderate**
Non-threatened Raptors	Medium	Moderate	**Moderate**
Goitored Gazelle	High	Minor	**Minor to Moderate**
Threatened Mammals	Medium	Moderate	**Moderate**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Minor	**Moderate to Major**
Russian Tortoise	High	Major	**Major**
Nationally Important Herptiles	Medium	Major	**Moderate to Major**
Non-threatened Herptiles (Amphibians, Lizards, Geckos, Snakes)	Low / Lower	Moderate	**Minor**

However, the following mitigation measures will be implemented to reduce the risks from these impacts:

- Strict speed controls which will be enforced by EPC HSE and Security teams; especially during the active period (Late Spring – April) for the Russian Tortoise;
- Ban against driving outside of delineated access roads and restricting driving and machinery operation to daylight hours;
- Protocol for removal of any road-kill carcasses immediately upon observation to at least 10 meters away from the access roads.

With the above measures, the residual significance is presented in the following table.

Table 7-20 Residual Significance of Vehicular Collision

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Raptors	Very High	Negligible	**Minor**
Threatened Raptors	High	Negligible	**Minor**
Threatened Groundbirds	High	Negligible	**Minor**
Nationally Threatened Raptors	Medium	Negligible	**Negligible to Minor**
Non-threatened Raptors	Medium	Negligible	**Negligible to Minor**
Goitored Gazelle	High	Negligible	**Minor**
Threatened Mammals	High	Negligible	**Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Negligible	**Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles (Amphibians, Lizards, Geckos, Snakes)	Low / Lower	Negligible	**Negligible to Minor**

"TAKE" (POACHING, HUNTING, GATHERING)

The presence of site workers can lead to increased hunting, poaching, or gathering on site. Flora and vegetative matter might 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 7-21 Significance of "Take"

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Protected Flora	High	Moderate	**Moderate to Major**
Non-threatened Flora	Low / Lower	Moderate	**Minor**
Endangered Birds (	Very High	Minor	**Moderate to Major**
Threatened Birds	High	Minor	**Minor to Moderate**
Nationally Threatened Birds	Medium	Minor	**Minor**
Non-threatened Birds	Low / Lower	Minor	**Negligible to Minor**
Goitored Gazelle	High	Minor	**Minor to Moderate**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Minor	**Moderate to Major**
Russian Tortoise	High	Minor	**Minor to Moderate**
Nationally Important Herptiles	Medium	Minor	**Minor**

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Non-threatened Herptiles	Low / Lower	Minor	**Negligible to Minor**

However, the following mitigation measures will be implemented to reduce the risk of these potential impacts:

- Strict controls forbidding the gathering, poaching or otherwise disturbance of any flora or fauna on site, included in induction training
- Staff training such as toolbox talks on the importance of ecosystem integrity, especially focused on species of importance such as Russian Tortoise and Southern Even-fingered Gecko

With the above measures, the residual significance is presented in the following table.

Table 7-22 Residual Significance of "Take"

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Protected Flora	High	Negligible	**Minor**
Non-threatened Flora	Low / Lower	Negligible	**Negligible to Minor**
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds)	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Low / Lower	Negligible	**Negligible to Minor**
Goitored Gazelle	High	Negligible	**Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Negligible	**Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**

LITTERING

Improper management of solid 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 7-23 Significance of Littering

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Minor	**Moderate to Major**
Threatened Birds)	High	Minor	**Minor to Moderate**
Nationally Threatened Birds	Medium	Minor	**Minor**

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Non-threatened Birds	Low / Lower	Minor	**Negligible to Minor**
Goitored Gazelle	High	Minor	**Minor to Moderate**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Moderate	**Moderate to Major**
Russian Tortoise	High	Moderate	**Moderate to Major**
Nationally Important Herptiles	Medium	Minor	**Minor**
Non-threatened Herptiles	Low / Lower	Minor	**Negligible to Minor**

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;
- 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 in the following table.

Table 7-24 Residual Significance of Littering

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Low / Lower	Negligible	**Negligible to Minor**
Goitored Gazelle	High	Negligible	**Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Negligible	**Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**

GENERAL 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 the shy Goitored Gazelle and bustard species, although most wildlife which is not already habituated to anthropogenic disturbance is anticipated to be negatively affected. Particularly, breeding birds with colonies present will be negatively affected if works occur during the breeding season.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 7-25 Significance of General Disturbance

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Major	**Major**
Threatened Birds	High	Major	**Major**
Nationally Threatened Birds	Medium	Major	**Moderate to Major**
Non-threatened Birds	Low / Lower	Major	**Minor to Moderate**
All Bats	Medium	Major	**Moderate to Major**
Goitored Gazelle	High	Major	**Major**
Non-threatened Mammals	Low / Lower	Major	**Minor to Moderate**
Southern Even-fingered Gecko	Very High	Major	**Major**
Russian Tortoise	High	Major	**Major**
Nationally Important Herptiles	Medium	Major	**Moderate to Major**
Non-threatened Herptiles	Low / Lower	Major	**Minor to Moderate**

However, the following mitigation measures will be implemented to minimize the magnitude of these potential impacts:

- Minimize construction footprint buffer zones and temporary laydown areas.
- Minimize duration of construction period avoiding most sensitive months/ seasons (e.g bird breeding season) where possible.
  - Houbara Bustard breeding seasons begins in mid-March and lasts until the end of July.
  - Egyptian Vulture's breeding season occurs during summer months (April to July).
- The **Breeding Birds Protection Plan**, which will provide detailed timings, scope and methodology for pre-construction nest-searching in the appropriate seasons and locations; nests for target species will be protected in-situ and no construction works will be allowed throughout the duration of the breeding season within 500m of the nests.

- In addition, the erection of turbines will not be undertaken for any WTGs within 750m of active Tier 1 nests and would be delayed until the nests have been vacated.
- Restore temporary laydown areas and buffer zones post construction with native vegetation and re-seeding with native flora. The detailed methodology for timing, scope, and methods will be prepared in the Restoration Action Plan.

With the above measures, the residual significance is presented in the following table.

Table 7-26 Residual Significance of General Disturbance

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Minor	**Moderate to Major**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Minor	**Minor**
Non-threatened Birds	Low / Lower	Negligible	**Negligible to Minor**
All Bats	Medium	Negligible	**Negligible to Minor**
Threatened Mammals (Goitored Gazelle)	High	Minor	**Minor to moderate**
Threatened Mammals (Brandt's Hedgehog)	High	Minor	**Minor to moderate**
Non-threatened Mammals (Red Fox)	Low / Lower	Negligible	**Negligible to Minor**
Non-threatened Mammals (Asiatic Wildcat)	Medium	Negligible	**Negligible to Minor**
Non-threatened Mammals (Long-eared Hedgehog)	Low / Lower	Negligible	**Negligible to Minor**
Non-threatened Mammals (Asian Badger)	Medium	Negligible	**Negligible to Minor**
Non-threatened Mammals (Rodents & Small Herbivores)	Low / Lower	Negligible	**Negligible to Minor**
Endangered Herptiles (Southern Even-fingered Gecko)	Very High	Minor	**Moderate to Major**
Threatened Herptiles (Russian Tortoise)	High	Minor	**Minor to moderate**
Nationally Important Herptiles (Caspian Monitor)	Medium	Minor	**Minor**
Nationally Important Herptiles (Desert Sand Boa)	Medium	Minor	**Minor**
Non-threatened Herptiles (Amphibians, Lizards, Geckos, Snakes)	Low / Lower	Negligible	**Negligible to Minor**

7.3.1.3 Biodiversity Displacement – Competition and Dispersal

DISPLACEMENT / DISPERSAL

Shyer species may be displaced away from the project area as a result of construction disturbance, having indirect secondary impacts on adjacent territories via increased competition for resources compromising population stability, causing ecosystem imbalances.

However, the surrounding areas on a landscape level seem to support similar habitat types and are not constrained by large-scale urban or industrial developments. Therefore, it is not anticipated that displaced individuals will have a significant impact on adjacent ecosystems.

Figure 7-9 Adjacent Habitat Availability for Potentially Dispersed Species

PROLIFERATION OF GENERALIST SPECIES

The dispersal of shyer species away from disturbed areas can lead to an increase in generalist species such as Red Fox which are well adapted to anthropogenic habitats.

Further, por 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 7-27 Significance of Proliferation

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Major	**Major**
Threatened Birds	High	Moderate	**Moderate to Major**
Non-threatened Birds	Medium	Moderate	**Moderate**
All Bats	Medium	Moderate	**Moderate**
Goitored Gazelle	High	Moderate	**Moderate to Major**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Moderate	**Major**
Russian Tortoise	High	Moderate	**Moderate to Major**
Nationally Important Herptiles (Caspian Monitor)	Medium	Moderate	**Moderate**
Non-threatened Herptiles	Low / Lower	Moderate	**Minor**
Non-threatened Invertebrates	Low / Lower	Moderate	**Minor**

However, the following mitigation measures will be implemented to minimize the magnitude of these potential impacts:

- 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;
- Daily inspections and clean-up of litter by EPC/sub-contractor(s) responsible.
- No provision of food waste for feral cats and dogs

With the above measures, the residual significance is presented in the following table.

Table 7-28 Residual Significance of Proliferation

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
All Bats	Medium	Negligible	**Negligible to Minor**
Goitored Gazelle	High	Negligible	**Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Negligible	**Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to minor**
Non-threatened Invertebrates	Low / Lower	Negligible	**Negligible to minor**

7.3.1.4 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 can allow the spread of invasive, weedy species which outcompete native species. Secondary impacts may occur on wildlife which utilize the reduced native vegetation for foraging or shelter.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 7-29 Significance of Introduced Species

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Major	**Major**
Threatened and Protected Flora	High	Major	**Major**
Non threatened Flora	Low / Lower	Major	**Minor to moderate**
Endangered Birds	Very High	Moderate	**Major**
Threatened Birds	High	Moderate	**Moderate to Major**
Nationally Threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Birds	Medium	Moderate	**Moderate**
Threatened Mammals	High	Moderate	**Moderate to Major**
Nationally Threatened Mammals	Medium	Moderate	**Moderate**
Non-threatened Mammals (Carnivores)	Low / Lower	Moderate	**Minor**
Non-threatened Mammals (Non-carnivores)	Low / Lower	Moderate	**Minor**
Southern Even-fingered Gecko	Very High	Moderate	**Major**
Threatened Herptiles	High	Moderate	**Moderate to Major**
Nationally Important Herptiles	Medium	Moderate	**Moderate**
Non-threatened Herptiles & Invertebrates	Low / Lower	Moderate	**Minor**

However, the following mitigation measures will be implemented to minimize the magnitude of 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.

With the above measures, the residual significance is presented in the following table.

Table 7-30 Residual Significance of Introduced Species

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Negligible	**Minor**
Threatened & Protected Flora	High	Negligible	**Minor**
Non-threatened Flora	Low / Lower	Negligible	**Negligible to minor**
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to minor**
Non-threatened Birds	Medium	Negligible	**Negligible to minor**
Threatened Mammals	High	Negligible	**Minor**
Nationally Threatened Mammals	Medium	Negligible	**Negligible to minor**
Non-threatened Mammals (Carnivores)	Low / Lower	Negligible	**Negligible to minor**
Non-threatened Mammals (Non-carnivores)	Low / Lower	Negligible	**Negligible to minor**
Southern Even-fingered Gecko	Very High	Negligible	**Minor**
Threatened Herptiles	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to minor**
Non-threatened Herptiles & Invertebrates	Low / Lower	Negligible	**Negligible to minor**

7.3.1.5 Environmental Quality

AIR QUALITY

Dust can coat vegetation, reducing photosynthesis and respiration ability, causing desiccation. Emissions of pollutants such as NOx, SOx, PM and CO can lower survivorship and increase susceptibility of affected wildlife to disease.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 7-31 Significance of Air Pollution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Threatened Flora	High	Minor	**Minor to Moderate**
Protected Flora	High	Minor	**Minor to Moderate**
Non-threatened Flora	Low / Lower	Minor	**Negligible to Minor**
Endangered Birds	Very High	Minor	**Moderate to Major**
Threatened Birds	High	Minor	**Minor to Moderate**
Nationally Threatened Birds	Medium	Minor	**Minor**
Non-threatened Birds	Medium	Minor	**Minor**
All Bats	Medium	Minor	**Minor**
Goitored Gazelle	High	Minor	**Minor to Moderate**
Non-threatened Mammals)	Low / Lower	Minor	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Minor	**Moderate to Major**
Russian Tortoise	High	Minor	**Minor to Moderate**
Nationally Important Herptiles)	Medium	Minor	**Minor**
Non-threatened Herptiles	Low / Lower	Minor	**Negligible to Minor**
Non-threatened Invertebrates	Low / Lower	Minor	**Negligible to Minor**

However, the following mitigation measures will be implemented to minimize the magnitude of 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 7-32 Residual Significance of Air Pollution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Threatened Flora	High	Negligible	**Minor**
Protected Flora	High	Negligible	**Minor**

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Non-threatened Flora	Low / Lower	Negligible	**Negligible to Minor**
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
All Bats	Medium	Negligible	**Negligible to Minor**
Goitored Gazelle	High	Negligible	**Minor**
Brandt's Hedgehog	High	Negligible	**Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Negligible	**Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**
Non-threatened Invertebrates	Low / Lower	Negligible	**Negligible to Minor**

NOISE

Construction noise can cause acoustic masking, disturbance and displacement, and general reduction in survivorship and reproductive success in a variety of fauna. Most impacted are acoustic communicators such as bird and bat species.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 7-33 Significance of Noise Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Major	**Major**
Threatened Birds	High	Major	**Major**
Nationally Threatened Birds	Medium	Major	**Moderate to Major**
Non-threatened Birds	Medium	Major	**Moderate to Major**
All Bats	Medium	Major	**Moderate to Major**
Goitored Gazelle	High	Moderate	**Moderate to Major**
Non-threatened Mammals	Low / Lower	Moderate	**Minor**
Southern Even-fingered Gecko	Very High	Moderate	**Major**
Russian Tortoise	High	Moderate	**Moderate to Major**
Nationally Important Herptiles	Medium	Moderate	**Moderate**
Non-threatened Herptiles	Low / Lower	Moderate	**Minor**
Non-threatened Invertebrates	Low / Lower	Moderate	**Minor**

However, the following mitigation measures will be implemented to minimize the magnitude of these potential impacts:

- Refer to noise control measures.
- Minimize noise during sensitive months/ seasons (e.g bird breeding season):
  - Houbara Bustard breeding seasons begins in mid-March and lasts until the end of July.
  - Egyptian Vulture's breeding season occurs during summer months (April to July).
- The Breeding Birds Protection Plan, details the timings, scope and methodology for pre-construction nest-searching in the appropriate seasons and locations; nests for target species will be protected in-situ and no construction works will be allowed throughout the duration of the breeding season within 500m of the nests. Noise barriers, if deemed applicable, will be erected if required to ensure breeding birds are not impacted by excessive noise.
- In addition, the erection of turbines will not be undertaken for any WTGs within 750m of active Tier 1 nests and would be delayed until the nests have been vacated.
- Use of acoustic barriers, dampening, best available technology within construction methodology to reduce noise and vibration as much as possible. Intermittent noise is less desirable than continuous noise as it does not allow for habituation.

With the above measures, the residual significance is presented in the following table.

Table 7-34 Residual Significance of Noise Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Minor	**Moderate to Major**
Threatened Birds	High	Minor	**Minor to moderate**
Nationally Threatened Birds	Medium	Minor	**Minor**
Non-threatened Birds	Medium	Minor	**Minor**
All Bats	Medium	Negligible	**Negligible to Minor**
Goitored Gazelle	High	Minor	**Minor**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Minor	**Moderate to Major**
Russian Tortoise	High	Minor	**Minor to moderate**
Nationally Important Herptiles	Medium	Minor	**Minor**
Non-threatened Herptiles	Low / Lower	Minor	**Negligible to Minor**
Non-threatened Invertebrates	Low / Lower	Minor	**Negligible to Minor**

LIGHT POLLUTION

Night-time lighting can impact nocturnal wildlife behaviour. It can act as an attractant, which can cause congregation and higher predation rates / change movement and migration behaviour; act as a repellent which causes displacement, or 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 7-35 Significance of Light Pollution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Major	**Major**
Threatened Birds	High	Major	**Moderate to Major**
Nationally Threatened Birds	Medium	Major	**Moderate to Major**
Non-threatened Birds	Medium	Major	**Moderate to Major**
All Bats	Medium	Major	**Moderate to Major**
Goitored Gazelle	High	Moderate	**Moderate to Major**
Non-threatened Mammals	Low / Lower	Major	**Minor to Moderate**
Southern Even-fingered Gecko	Very High	Major	**Major**
Russian Tortoise	High	Moderate	**Moderate to Major**
Nationally Important Herptiles	Medium	Major	**Moderate to Major**
Non-threatened Herptiles	Low / Lower	Major	**Minor to Moderate**
Non-threatened Invertebrates	Low / Lower	Major	**Minor to Moderate**

However, the following mitigation measures will be implemented to to minimize the magnitude of potential impact:

- Minimize external lighting as much as possible 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 to prevent skyglow, spill and glare.

With the above measures, the residual significance is presented in the following table.

Table 7-36 Residual Significance of Light Pollution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
All Bats	Medium	Minor	**Minor**
Goitored Gazelle	High	Negligible	**Minor**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Negligible	**Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**
Non-threatened Invertebrates	Low / Lower	Negligible	**Negligible to Minor**

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 7-37 Significance of Contamination

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Natural Habitats (Sandy and sandy-loamy desert plains)	Medium	Moderate	**Moderate**
Natural Habitats (Cliffs and eroded slopes of saline depression)	High	Moderate	**Moderate to Major**
Natural Habitats (Fixed and semi-fixed sands)	High	Moderate	**Moderate to Major**
Natural Habitats (Relic uplands)	Medium	Moderate	**Moderate**
Threatened Flora	High	Moderate	**Moderate to Major**
Protected Flora	High	Moderate	**Moderate to Major**
Non-threatened Flora	Low / Lower	Moderate	**Minor**
Endangered Birds	Very High	Moderate	**Major**
Threatened Birds	High	Moderate	**Moderate to Major**
Nationally Threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Birds	Medium	Moderate	**Moderate**
All Bats	Medium	Moderate	**Moderate**
Goitored Gazelle	High	Moderate	**Moderate to Major**
Non-threatened Mammals	Low / Lower	Moderate	**Minor**

Receptor	Value/ Sensitivity	Magnitude	Significance
Southern Even-fingered Gecko	Very High	Moderate	**Major**
Russian Tortoise	High	Moderate	**Moderate to Major**
Nationally Important Herptiles	Medium	Moderate	**Moderate**
Non-threatened Herptiles	Low / Lower	Moderate	**Minor**
Non-threatened Invertebrates	Low / Lower	Moderate	**Minor**

However, the following mitigation measures will be implemented to to minimize the magnitude of potential impact:

- 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 7-38 Residual Significance of Contamination

Receptor	Value/ Sensitivity	Magnitude	Residual
Natural Habitats (Sandy and sandy-loamy desert plains)	Medium	Negligible	**Negligible to Minor**
Natural Habitats (Cliffs and eroded slopes of saline depression)	High	Negligible	**Minor**
Natural Habitats (Fixed and semi-fixed sands)	High	Negligible	**Minor**
Natural Habitats (Relic uplands)	Medium	Negligible	**Negligible to Minor**
Threatened Flora	High	Negligible	**Minor**
Protected Flora	High	Negligible	**Minor**
Non-threatened Flora	Low / Lower	Negligible	**Negligible to Minor**
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
All Bats	Medium	Negligible	**Negligible to Minor**
Goitored Gazelle	High	Negligible	**Minor**
Brandt's Hedgehog	Medium	Negligible	**Negligible to Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Negligible	**Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**
Non-threatened Invertebrates	Low / Lower	Negligible	**Negligible to Minor**

SOILS

During construction earthworks and vehicle movement, soils may become compacted, which prohibits vegetation regrowth and use for burrowing. 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 7-39 Significance of Soil Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Natural Habitats (Sandy and sandy-loamy desert plains)	Medium	Moderate	**Moderate**
Natural Habitats (Cliffs and eroded slopes of saline depression)	High	Moderate	**Moderate to Major**
Natural Habitats (Fixed and semi-fixed sands)	High	Moderate	**Moderate to Major**
Natural Habitats (Relic uplands)	Medium	Moderate	**Moderate**

However, the following mitigation measures will be implemented to minimize the magnitude of potential impact:

- Minimize construction footprint and strict controls to prevent driving out of designated corridors
- Restore buffer zones post – construction and
- Habitat restoration post-construction inclusive of topsoil replacement if beneficial or soil tilling where deemed necessary to promote regrowth

With the above measures, the residual significance is presented in the following table.

Table 7-40 Residual Significance of Soil Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Natural Habitats (Sandy and sandy-loamy desert plains)	Medium	Negligible	**Negligible to minor**
Natural Habitats (Cliffs and eroded slopes of saline depression)	High	Minor	**Minor to moderate**
Natural Habitats (Fixed and semi-fixed sands)	High	Minor	**Minor to moderate**
Natural Habitats (Relic uplands)	Medium	Negligible	**Negligible to minor**

7.3.2 Operation Phase

7.3.2.1 Ecosystem Function Degradation

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.

The Wind Farm will not be fenced; therefore, there will be no physical barriers to movement. However, turbines may deter migratory avifauna who exhibit macro-scale avoidance behaviour such as waterbirds; longer migratory movements can increase stress and lower survivorship of migrants that expend more energy to navigate around wind farms.

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 7-41 Significance of Habitat Fragmentation

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Threatened Birds (Waterbirds)	High	Minor	**Minor to Moderate**
Nationally Threatened Birds (Waterbirds)	Medium	Minor	**Minor**
Non-threatened Birds (Waterbirds)	Medium	Minor	**Minor**

7.3.2.2 Biodiversity Loss – Direct Mortality and Lowered Survivorship

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.

Quantitative assessment 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 I).

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 7-42 Estimated Rates of Collisions Year for Bird Species at the Bash 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				
Houbara Bustard	6.11	<1	1.22	<1
Egyptian Vulture	0.257	3	0.102	9
Greater Spotted Eagle	0.0543	18	0.0120	83
Steppe Eagle	0.933	1	0.206	4
Golden Eagle	0.339	2	0.075	13
Saker Falcon	0.0412	24	0.0165	60
Cinereous Vulture	0.237	4	0.118	8
Tier 2				
White-tailed Sea Eagle	0.232	4	0.116	8
Little Bustard	0.213	4	0.0425	23
Common Crane	11.1	<1	2.23	<1
Great White Pelican	0.702	1	0.140	7
Eurasian Griffon	0.0131	76	0.00658	151
Booted Eagle	0.0240	41	0.00530	188
Eurasian Marsh-Harrier	1.93	<1	0.386	2
Hen Harrier	2.32	<1	0.464	2
Shikra	0.00924	108	0.00462	216
Eurasian Sparrowhawk	0.289	3	0.144	6
Common Buzzard	0.833	1	0.189	5
Long-legged Buzzard	1.85	<1	0.421	2
Lesser Kestrel	5.35	<1	1.31	<1
Eurasian Kestrel	38.2	<1	7.30	<1
Tier 3				
Mute Swan	0.744	1	0.112	8
Ruddy Shelduck	0.736	1	0.147	6

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
Gadwall	4.70	<1	0.938	1
Mallard	13.3	<1	2.66	<1
Green-winged Teal	0.281	3	0.0561	17
Tufted Duck	10.8	<1	2.15	<1
Pygmy Cormorant	0.341	2	0.0683	14
Great Cormorant	0.709	1	0.142	7
Black-crowned Night-Heron	4.14	<1	1.01	<1

Overall, the results of the CRM analysis indicate that the Bash Wind Farm has a low-moderate level of collision risk for sensitive bird species. No tier 1 target bird species are predicted to experience an annual collision frequency greater than one fatality per 4 years under the empirically-based, most likely collision avoidance rate scenarios modeled.

Among tier 1 target species that were documented during the VP surveys, Greater Spotted Eagle, Steppe Eagle, Golden Eagle, White-tailed Eagle, and Egyptian Vulture, had CRM predicted fatality rates ranging from one per 4 years (Steppe Eagle) to one per 83 years (Greater Spotted Eagle), under the most realistic CA parameter values, suggesting that collision risk is low-moderate for all of these species.

Under the most conservative modeled scenarios, the CRM predicts that collision rates could be as high as 0.933 collisions per year (Steppe Eagle). Though these predicted fatality levels suggest that collision risk is low-moderate for all tier 1 target species, the following factors indicate that potential impacts to these species should be considered an important risk factor to be monitored and managed for the Project:

- the substantial numbers of observations of four tier 1 species at the Project site (Egyptian Vulture, Steppe Eagle, Golden Eagle, White-tailed Eagle),
- the known susceptibility of Golden Eagles to collisions with wind turbines; and
- the presumed susceptibility of the other eagle species, based on their similar size, flight morphology, and behavior.

Egyptian Vultures are the most prevalent in the area during the Spring through Fall seasons, most likely to be breeding within the vicinity of the Project area, and potentially the most likely to be impacted by the Project.

Houbara Bustard and Saker Falcon were not actually observed in flight within the maximum reliable observation radius during the VP surveys, but in order to characterize a "worst case" scenario, we modeled a hypothetical scenario in which a single bird is observed for 15 seconds, flying at rotor swept height during the final hour of survey in each of the four seasons.

Although both of these tier 1 target species are known to occur in the Project area or vicinity, hence collision risk must be considered to be greater than zero, the results of the hypothetical scenarios modeled indicate that the 1410-hour VP survey effort was substantial enough to provide a positive indication that collision risk is truly low for Saker Falcon. For Houbara Bustard, collision rates as high as 1.22 per year cannot be ruled out by the existing data set.

Three tier 2 target species were predicted to experience greater than one fatality per year (Eurasian Kestrel – 7.30 collisions/year; Common Crane – 2.23 collisions/year; Lesser Kestrel 1.31 collisions/year) under the most realistic collision avoidance rate scenarios modeled. Predicted fatality rates fall below one per year for all other tier 2 target species, under the most realistic collision avoidance scenarios modeled. At this level of predicted collision risk, potentially severe, or population-level impacts to the Eurasian Kestrel and Common Crane are unlikely given that they are very abundant, widespread species with very large global populations, and are not classified with an elevated protected/conservation status at either the national or international levels.

Some species classified as tier 2 target species, including White-tailed Sea Eagle, Eurasian Griffon, and Booted Eagle, have elevated conservation/protected status at the national and/or international levels, and belong to taxonomic groups with known susceptibility to wind turbine collisions. Hence they could be considered at a similar level of priority to the species presently classified as tier 1 target species. Of these three species, the highest predicted fatality rate was for Cinereous Vulture, with a prediction of one collision every 8 years under the most realistic collision avoidance rate scenario, while the other two species were very rare, with predicted fatality rates of one per 150 years or rarer.

For Tier 3 bird species, the CRM analysis predicts collision rates of 2.66 collisions per year for Mallard, 2.15 per year for Tufted Duck, 0.938 per year for Gadwall, and 1.01 per year for Black-crowned Night-Heron, using the most realistic CA parameter values. These four species are all very abundant, widespread species with large global and national populations, and no elevated conservation/protected status at national or international levels. Predicted collision rates for all other species under most realistic CA scenarios are below one per 6 years. At this level of predicted collision risk, the project does not raise significant concerns for potential impacts to any of these species.

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 7-43 Significance of Turbine Collision (Birds)

RECEPTOR	CHA STATUS	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Steppe Eagle	PBF	Very High	Minor	**Moderate to Major**
Golden Eagle	PBF	Medium	Minor	**Negligible to Minor**
Egyptian Vulture	PBF	Very High	Minor	**Moderate to Major**

Receptor	CHA Status	Value/ Sensitivity	Magnitude	Significance
Saker Falcon	PBF	Very High	Negligible	**Minor**
Houbara Bustard	Critical	High	Minor	**Minor to Moderate**
Greater Spotted Eagle	PBF	High	Negligible	**Minor**
White-tailed Sea Eagle	-	Medium	Minor	**Minor**
Booted Eagle	-	Medium	Negligible	**Negligible to Minor**
Eurasian Marsh-Harrier	-	Medium	Negligible	**Negligible to Minor**
Hen Harrier	-	Medium	Negligible	**Negligible to Minor**
Eurasian Sparrowhawk	-	Medium	Negligible	**Negligible to Minor**
Shikra	-	Medium	Negligible	**Negligible to Minor**
Common Buzzard	-	Medium	Negligible	**Negligible to Minor**
Long-legged Buzzard	-	Medium	Negligible	**Negligible to Minor**
Eurasian Griffon	-	High	Negligible	**Minor**
Cinereous Vulture	-	High	Negligible	**Minor**
Great White Pelican	-	Medium	Negligible	**Negligible to Minor**
Common Crane	-	Medium	Minor	**Minor**
Eurasian Kestrel	-	Medium	Negligible	**Negligible to Minor**
Lesser Kestrel	-	Medium	Negligible	**Negligible to Minor**
Ruddy Shelduck	-	Low / Lower	Negligible	**Negligible to Minor**
Gadwall	-	Low / Lower	Minor	**Negligible to Minor**
Mallard	-	Low / Lower	Negligible	**Negligible to Minor**
Green-winged Teal	-	Low / Lower	Negligible	**Negligible to Minor**
Mute Swan	-	Low / Lower	Negligible	**Negligible to Minor**
Tufted Duck	-	Low / Lower	Minor	**Negligible to Minor**
Pygmy Cormorant	-	Low / Lower	Negligible	**Negligible to Minor**
Great Cormorant	-	Low / Lower	Negligible	**Negligible to Minor**
Black-crowned Night-Heron	-	Low / Lower	Minor	**Negligible to Minor**

The following mitigation measures will be implemented to further reduce collision risk:

- Project Design; changes in WTG number and layout in order to decrease collision risk. This mitigation measure has been implemented. Refer to Section 2.8 for detailed changes, preliminary and final WTG layout.

- Planned infrastructure within the wind farm will not include elements attractive for birds, such as lattice towers that provide perching possibilities;
- The turbine towers will be painted black from ground level until the beginning of the rotor swept area; a single blade will be painted black from the tip to halfway up the blade to reduce motion smear and increase visibility of moving turbines to birds.
- The Livestock Management Plan will ensure the management of livestock carcasses so as to reduce food availability to vultures in the project footprint in close proximity to the wind turbines
- Post-construction biodiversity management program will include a Post Construction **Fatality Monitoring Plan**; detailed and intensive carcass searches will take place throughout the wind farm. Best international practice will be followed in determining the appropriate level of search efforts as well as formulas for searcher-bias adjustments. The Post-construction Fatality Monitoring Program will be continued for up to 5 years or until the risk to birds is considered 'negligible' in consultatation with the lenders;
- Thresholds will be established for acceptable levels of annual losses, which will be determined on a species-specific basis via the principles of Potential Biological Removal. Should the Fatality Monitoring prove that thresholds for any particular species are reached, this will trigger an upscaling of mitigation. These thresholds will be developed in the **Collision Risk Management Plan**.
- The Collision Risk Management Plan will include all operational measures that can be implemented to reduce collision risk. This plan will include a detailed Shut-down on Demand (SDOD) Program, wherein turbines are shut-down and prevented from moving, allowing birds to pass through the area safely. SDOD can be detection-led (via observer, automated imaging, thermal or radar systems) or conditional upon seasonal and meteorological conditions. Furthermore, shut down triggers can be manual (via operator) or automatic (via the SCADIS). The exact mechanism for proposed SDOD is being deliberated and developed by the project proponent in discussions with financial lenders and lenders technical advisors.

MITIGATION FOR NESTING BIRDS

- Despite the low predicted numbers of collision risk, the presence of nesting raptors, including species of conservation concern within the project area deserve further consideration in relation to the potential risk of collision with operating wind turbines. Further, nest desertion is a concern as a result of the disturbance from operating wind turbines. Although raptor nest searches have been conducted during baseline surveys, a detailed breeding bird and raptor nest surveying effort will be conducted beginning in Spring 2022 and continuing throughout the relevant nesting period for species of concern, namely, Egyptian Vulture. The results of the nesting surveys will be used to develop the criteria for the proposed backup SDOD program in relation to turbines that may be an increased risk for breeding birds.
- A 750m buffer will be implemented for all known nests of Tier 1 species. All WTGs located within 750m of nest sites will be microsited to ensure a 750m buffer is maintained for Tier 1 species nest sites.

- Two turbines, BAS59 and BAS60 were located within 750 m of a known nest (Egyptian Vulture May; 2021) recorded during the baseline surveys. These two WTGs were microsited to ensure a 750m buffer from the nest. The following figure shows the old location (yellow markers) and new locations (blue markers) of the microsited turbines

Figure 7-10 Microsited turbines BAS59 & BAS60 (Blue markers) from Egyptian Vulture nest

- Turbine BAS-62 was located within 750m of an active Eastern Imperial Eagle (IUCN VU; Tier 1 species) nest recorded during the Spring 2022 nesting surveys. This turbine has been microsited to ensure the 750m buffer is maintained from the nest. The following figure shows the old location (yellow marker) and new location (blue marker) of the microsited turbine.

Figure 7-11 Microsited turbine BAS62 (Blue marker) beyond 750m buffer of Eastern Imperial Eagle Nest

- The turbine BAS-70 was located 720 m from an active Golden Eagle (IUCN LC; Tier 1 species) nest recorded during the Spring 2022 nesting surveys. This turbine has been microsited to ensure a 750m buffer is maintained from the nest. The following figure shows the old location (yellow marker) and new location (blue marker) of the microsited turbine.

Figure 7-12 Microsited turbine BAS70 (Blue marker) beyond 750m buffer of Golden Eagle Nest

A 2km buffer will be implemented between the lake and nearest WTGs. Three wind turbines were located within 2km of the Ayakagytma Lake. These turbines have been microsited to ensure the 2km buffer is maintained. The following figure shows the old (yellow pins) and new (blue pins) locations of these three turbines

Figure 7-13 Three microsited turbines maintaining 2km buffer from Lake Ayakagytma

If Tier 1 species are impacted by the remaining turbines in the WF area, mitigation will be upscaled as per the Contingency Plan detailed in the Collision Risk Management Plan.

With the above measures, the **residual** significance is presented in the following table.

Table 7-44 Residual Significance of Turbine Collision (Birds)

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Steppe Eagle	Very High	No change	**Neutral**
Golden Eagle	Medium	No change	**Neutral**
Egyptian Vulture	Very High	No change	**Neutral**
Saker Falcon	Very High	No change	**Neutral**
Houbara Bustard	High	No change	**Neutral**
Booted Eagle	Medium	No change	**Neutral**
Eurasian Marsh-Harrier	Medium	No change	**Neutral**
Hen Harrier	Medium	No change	**Neutral**
Eurasian Sparrowhawk	Medium	No change	**Neutral**
Shikra	Medium	No change	**Neutral**
Common Buzzard	Medium	No change	**Neutral**
Long-legged Buzzard	Medium	No change	**Neutral**

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Eurasian Griffon	High	No change	**Neutral**
Cinereous Vulture	High	No change	**Neutral**
Great White Pelican	Medium	No change	**Neutral**
Common Crane	Medium	No change	**Neutral**
Eurasian Kestrel	Medium	No change	**Neutral**
Lesser Kestrel	Medium	No change	**Neutral**
Ruddy Shelduck	Low / Lower	No change	**Neutral**
Gadwall	Low / Lower	No change	**Neutral**
Mallard	Low / Lower	No change	**Neutral**
Green-winged Teal	Low / Lower	No change	**Neutral**
Mute Swan	Low / Lower	No change	**Neutral**
Tufted Duck	Low / Lower	No change	**Neutral**
Pygmy Cormorant	Low / Lower	No change	**Neutral**
Great Cormorant	Low / Lower	No change	**Neutral**
Black-crowned Night-Heron	Low / Lower	No change	**Neutral**

TURBINE COLLISION (BATS)

Bat fatalities from wind turbine collisions are documented world-wide. However, the driving impetus behind this (when considering that bats rarely collide with other man-made structures) is still unknown and being researched. 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 *Nyctalus noctula* (25-200 m, majority activity at 50-100 m (Voigt etal., 2021)) are a high-flying species;
    - Eptesicus and Pipistrellus species (5-65 m and above (Wellig et al., 2018)) are a medium-flying species;

- Rhinolophus is a low-flying species - a few meters above the ground (Roemer et al., 2017).

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 7-45 Significance of Turbine Collision (Bats)

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Vespertilio murinus	Medium	Major	**Moderate to Major**
Pipistrellus pipistrellus	Medium	Major	**Moderate to Major**
Eptesicus bottae	Medium	Major	**Moderate to Major**
Eptesicus serotinus	Medium	Major	**Moderate to Major**
Plecotus sp.	Medium	Major	**Moderate to Major**
Nyctalus noctula	Medium	Major	**Moderate to Major**
Rhinolophus bocharicus	Medium	Minor	**Minor**

The following mitigation measures will be implemented to reduce collision risk:

- Prevention of elements that may attract bats, or insects and therefore bats:
  - All wind turbines, particularly the nacelles, will be designed, constructed and maintained in such a manner that they do not support roosting bats – all the gaps and interstices will be made inaccessible to bats;
  - Use lighting only as needed and use wavelengths and designs 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. 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.
- Post-construction biodiversity management program will include a Post Construction **Fatality Monitoring Plan**; detailed and intensive carcass searches will take place throughout the wind farm. Best international practice will be followed in determining the appropriate level of search efforts as well as formulas for searcher-bias adjustments (Rodrigues *et al*., 2015a). The Post-construction Fatality Monitoring Program will be continued for up to 5 years or until the risk to bats is considered 'negligible' in consultation with the lenders;
- Thresholds will be established for acceptable levels of annual losses, which will be determined on a species-specific basis via the principles of Potential Biological

Removal. Should the Fatality Monitoring prove that thresholds for any particular species are reached, this will trigger an upscaling of mitigation. These thresholds will be developed in the **Collision Risk Management Plan**.

- The Collision Risk Management Plan will include all operational measures that can be implemented to reduce collision risk. This plan will include a detailed Cut-in Curtailment Program, wherein turbines are shut-down and prevented from moving, during periods of high bat activity.
- Stopping turbine blades from operating during low wind speeds provides a proven strategy to reduce collision risk at a minimal cost to energy generation. An effective minimisation measure is thus to in- crease the wind speed at which turbines become operational (the 'cut-in speed'). Below this speed, depending on the model, turbine blades are either stopped from rotating, or 'feathered' (pitched parallel with the wind direction), spinning very slowly, if at all, with no energy output. Free-wheeling must be avoided.
- The exact parameters for proposed cut-in curtailment are being deliberated and developed by the project proponent in discussions with financial lenders and lenders technical advisors. It is considered that as per the relatively low bat activity indicies registered, this will not be needed for the project. However, cut-in curtailment will be implemented for high-risk timings and/or areas, if ongoing fatality monitoring prove that accepted loss thresholds are being exceeded. The mechanism for this will be outlined in the Collision Risk Management Plan.

With the above measures, the **residual** significance is presented in the following table.

Table 7-46 Residual Significance of Turbine Collision (Bats)

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Vespertilio murinus	Medium	Negligible	**Negligible to minor**
Pipistrellus pipistrellus	Medium	Negligible	**Negligible to minor**
Eptesicus bottae	Medium	Negligible	**Negligible to minor**
Eptesicus serotinus	Medium	Negligible	**Negligible to minor**
Plecotus sp.	Medium	Negligible	**Negligible to minor**
Nyctalus noctula	Medium	Negligible	**Negligible to minor**
Rhinolophus bocharicus	Medium	Negligible	**Negligible to minor**

7.3.2.3 Biodiversity Displacement – Competition and Dispersal

DISPLACEMENT / DISPERSAL

Shyer species may be displaced away from the project area, having indirect secondary impacts on adjacent territories via increased competition for resources compromising population stability, causing ecosystem imbalances.

However, the surrounding areas on a landscape level support similar habitat types and are not constrained by large-scale urban or industrial developments. Therefore, it is not anticipated that displaced individuals will have a significant impact on adjacent ecosystems.

Figure 7-14 Adjacent Habitat Availability for Dispersed Species

PROLIFERATION OF SPECIES

The dispersal of shyer species away from disturbed areas can lead to an increase in generalist species such as Red Fox which are well adapted to anthropogenic habitats.

Further, 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 7-47 Significance of Proliferation

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Major	**Major**
Threatened Birds	High	Major	**Moderate to Major**
Non-threatened Birds	Medium	Moderate	**Moderate**
All other Birds	Low / Lower	Moderate	**Minor**
Goitored Gazelle	High	Moderate	**Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to minor**
Southern Even-fingered Gecko	Very High	Moderate	**Major**

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Russian Tortoise	High	Moderate	**Moderate to Major**
Nationally Important Herptiles	Medium	Moderate	**Moderate**
Non-threatened Herptiles	Low / Lower	Moderate	**Minor**
Non-threatened Invertebrates	Low / Lower	Moderate	**Minor**

However, the following mitigation measures will be in place, to minimize the potential risks:

- Development of a solid waste management strategy
- Strict waste management controls in place
- Zero tolerance for littering on site
- Regular inspections and clean-up of litter
- Ban of keeping domestics or providing food for domestic species (i.e. feral cats, dogs)

With the above measures, the residual significance is presented in the following table.

Table 7-48 Residual Significance of Proliferation

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds(Raptors, Waterbirds, Groundbirds, Songbirds)	High	Negligible	**Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
All Bats	Medium	Negligible	**Negligible to Minor**
Goitored Gazelle	High	Negligible	**Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Negligible	**Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**
Non-threatened Invertebrates	Low / Lower	Negligible	**Negligible to Minor**

7.3.2.4 Environmental Quality

NOISE

Operational noise created by the rotation of the turbines and power generator can cause acoustic masking, disturbance and displacement, and general reduction in survivorship and reproductive success in a variety of fauna. Most impacted are typically acoustic communicators such as bird and bat species.

The noise studies undertaken for the project site found that existing ambient noise in the overall project location is mostly driven by wind.

- At daytime wind speeds of 2 m/s, the typical ambient background noise is between 10-25 dB, whilst at wind speeds of 10 m/s the typical levels were between 25-30 dB.
- At night-time wind speeds of 2 m/s the typical ambient background noise was between 15-25 dB , whilst at wind speeds of 10 m/s the typical levels were approximately 25-45 dB or lower.

Noise modelling assessment results indicate that modelled receptors, the closest of which is located 500m away from the nearest turbine, will be exposed to an increase in noise as follows:

- Day/night average existing baseline levels of 37/22 may increase to 37.5 dB when turbines are spinning at 5 m/s.
- Day/night average existing baseline levels of 37/22 may increase to 47.9 dB when turbines are spinning at 10 m/s.

Although the increase in ambient noise is major with higher wind speeds, the resultant effects on wildlife may be less pronounced. For one, the characteristic of the noise is not intermittent, as it will gradually build up and decrease depending on wind speed, rather than cause short, sporadic sounds. Wildlife have been known to habituate to stable conditions, which can include high ambient operational noise.

Studies show that wildlife behaviour is impacted at dB levels of 40, but this is in contrast to lower background levels. As higher wind speeds are correlated with naturally occurring noise elvels of 40 dB and higher, it is not anticipated that the addition of operational turbine noise will be significant on biodiversity.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 7-49 Significance of Noise Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Moderate	**Major**
Threatened Birds	High	Moderate	**Moderate to Major**
Nationally Threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Birds	Medium	Moderate	**Moderate**
All Bats	Medium	Moderate	**Moderate**
Goitored Gazelle	High	Minor	**Minor to Moderate**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Minor	**Moderate to Major**
Russian Tortoise	High	Minor	**Minor to Moderate**
Nationally Important Herptiles	Medium	Minor	**Moderate**

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Non-threatened Herptiles	Low / Lower	Minor	**Negligible to Minor**
Non-threatened Invertebrates	Low / Lower	Minor	**Negligible to Minor**

LIGHT POLLUTION

Night-time lighting can impact nocturnal wildlife behaviour. It can act as an attractant, which can cause congregation and higher predation rates / change movement and migration behaviour; act as a repellent which causes displacement, or interfere with the circadian cycle and cause lower survivorship and reproductive success.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 7-50 Significance of Light Pollution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Major	**Major**
Threatened Birds	High	Major	**Major**
Nationally Threatened Birds	Medium	Major	**Moderate to Major**
Non-threatened Birds	Medium	Major	**Moderate to Major**
All Bats	Medium	Major	**Moderate to Major**
Goitored Gazelle	High	Moderate	**Moderate to Major**
Non-threatened Mammals	Low / Lower	Moderate	**Minor**
Southern Even-fingered Gecko	Very High	Major	**Major**
Russian Tortoise	High	Moderate	**Moderate to Major**
Nationally Important Herptiles	Medium	Major	**Moderate to Major**
Non-threatened Herptiles	Low / Lower	Moderate	**Minor**
Non-threatened Invertebrates	Low / Lower	Major	**Minor to Moderate**

However, the following mitigation measures will be in place, to minimize the potential risks:

- Ensure lighting is fit for purpose and duration of lighting to be controlled and minimized as much as possible.
- Lights will be shielded to prevent skyglow, spill and glare

With the above measures, the residual significance is presented in the following table.

Table 7-51 Residual Significance of Light Pollution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Nationally Threatened Birds (	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
All Bats	Medium	Negligible	**Negligible to Minor**
Goitored Gazelle	High	Negligible	**Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Southern Even-fingered Gecko	Very High	Negligible	**Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**
Non-threatened Invertebrates	Low / Lower	Negligible	**Negligible to Minor**

7.3.3 Decommissioning

A Decommissioning Plan will be prepared at least 18 months prior to planned decommissioning and submitted to the Regulator for review and approval. No decommissioning works can be commenced without a permit from the Regulator. The Plan will detail the site and surrounding environment and receptors and will likely require new baseline studies to assess the condition of the site, adjacent areas and the overall area of influence including designated sites. Based on the details outlined in this Report, the measures will likely relate to the following:

- Removal of all Project related components and wastes and appropriate disposal method that adopts the waste hierarchy and maximises re-use and recycling of materials;
- Restoration of terrestrial ecology habitats within the Project footprint including access roads e.g. re-seeding and re-vegetation using local indigenous species; and
- Remediation and/or scarification of any compacted soils.

7.4 Implementing Mitigation: Planning, Management and Monitoring

The mitigation measures applied to reduce significant impacts will require a number of management plans to detail the implementation and action items needed, as well as monitoring and reporting requirements to ensure compliance.

7.4.1 Design

The following outline the mitigation requirements during design phase:

- Integration of design mitigation into WTG design related to lighting design and specifications, painting specifications, and exclusion of roosting and perching opportunities.

7.4.2 Pre-Construction

The following outline the mitigation requirements pre-construction:

- Review of Construction Methodology and Schedule by environmental consultant especially in regards to:
  - Site Clearance and Layout;
  - Timing and method of works;
  - Lighting Strategy; and
  - Solid Waste Management Strategy.
- Preparation of Biodiversity Action Plan, inclusive of Species-specific Action Plans, which outlines the CHA process, findings and illustrates the pathway to no net loss:
  - Preparation of Reptile Relocation Plan;
  - Preparation of Flora Conservation Action Plan; and
  - Preparation of Breeding Bird Protection Plan;
- Carry out preconstruction survey and implementation of actions as per the above plans.
- Preparation of CEMP, inclusive of:
  - General Site Controls;
  - Solid Waste Control Plan;
  - Chance Find Procedure;
  - Air Quality Control Plan;
  - Dust Control Plan;
  - Noise Control Plan;
  - Lighting Control Plan;
  - Hazardous Materials Control Plan;
  - Emergency Action Plans:
  - Spill Prevention and Clean-up Procedures

7.4.3 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 understood and fully implemented.
- Implementation of CEMP:
  - Daily Checklist;
  - Weekly Inspection;
  - Monthly Reporting; and

- Quarterly Auditing.

- Biodiversity Monitoring and Evaluation Programme BMEP for ongoing monitoring of translocation/relocation success, chance find procedures, target species impacts, etc.

7.4.4 Post-Construction

The following outline the mitigation requirements post-construction:

- Preparation of Restoration Action Plan;
- Carrying out restoration works;
- Post-restoration survey;
- Compensation Offset Plan;
- Habitat restoration offset works; and
- Biodiversity Monitoring and Evaluation Programme BMEP.

7.4.5 Operation

The following outline the mitigation requirements during operation:

- Preparation and Implementation of OEMP, inclusive of:
  - General Site Controls;
  - Noise Control Plan;
  - Lighting Control Plan;
  - Chance Find Procedure;
  - Fatality Monitoring Plan;
  - Collision Risk Management Plan which includes PBR thresholds, proposed SDOD mechanism, and cut-in Curtailment criteria; and
  - Compensation Offset Plan
- Compliance checks and reporting include:
  - Daily Checklist;
  - Weekly Inspection;
  - Monthly Reporting; and
  - Quarterly Auditing.
- Biodiversity Monitoring and Evaluation Programme BMEP.

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8 AIR QUALITY

8.1 Observation and Baseline Conditions

8.1.1 Local Meteorological Conditions

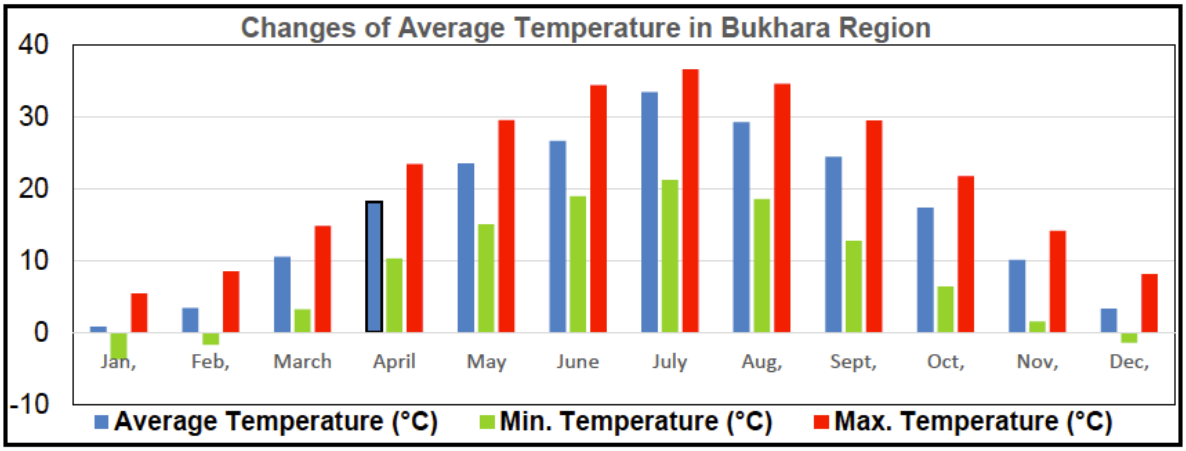
The climatic characteristics of the Project area are monitored by the observation post of Bukhara station located approximately 104km from the Bash Project site (UzAssystem 2021b). The table and figures below present the monthly temperature, humidity, rainfall, wind speed and wind direction for the period of 20 years (2000 – 2020) as obtained from the Hydrologic and Hydraulic Technical Report prepared by UzAssystem (UzAssystem, 2021b).

Table 8-1 Monthly Average Temperature of Bukhara Region (UzAssystem, 2021b)

TEMP (°C)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Avr	0.8	3.4	10.5	18.2	23.5	26.6	33.4	29.2	24.4	17.3	10.1	3.3	16.7
Min	-3.7	-1.7	3.2	10.3	15	18.9	21.2	18.5	12.7	6.4	1.5	-1.4	8.4
Max	5.4	8.5	14.8	23.4	29.5	34.3	36.5	34.5	29.4	21.7	14.1	8.1	21.7

From the table above, the average annual temperature in the Bukhara region from 2000 – 2020 is 16.7°C. The average monthly temperature changes from 0.8°C in January and rises to 33.4°C in July at the middle desert part of the basin. A graphical representation of monthly average, minimum and maximum temperature at the Bukhara Region is given in the figure below.

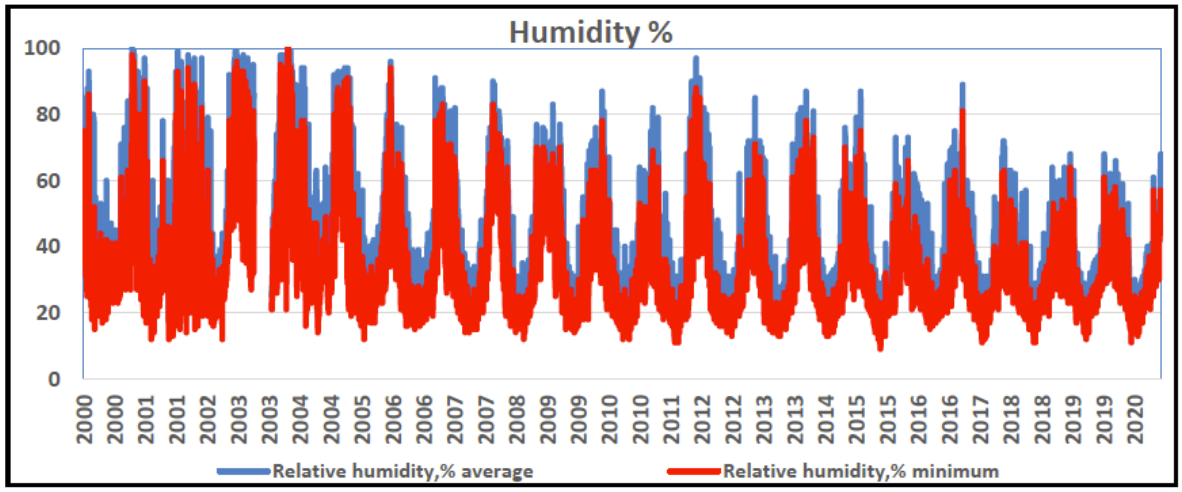
Figure 8-1 Monthly Average, Minimum and Maximum Temperature at the Bukhara Region (UzAssystem, 2021b)



The climate of the Bukhara region changes from the moderately humid areas, located at higher elevations (between 450 m and 550 m asl), to arid areas, at the lower elevations (between 150 m and 250 m).

The average relative humidity at the Bukhara region from 2000 to 2020 is approximately 43%. Between the years 2000 and 2005, the average relative humidity changes from 75% to 100%, changed to between 12% and 69% in 2020.

Figure 8-2 Average Relative Humidity at the Bukhara Region (UzAssystem, 2021b)



The mean monthly, mean annual and wind speed data are presented in the figures below.

Figure 8-3 Mean Monthly Wind Speed at the Bukhara Region (UzAssystem, 2021b)

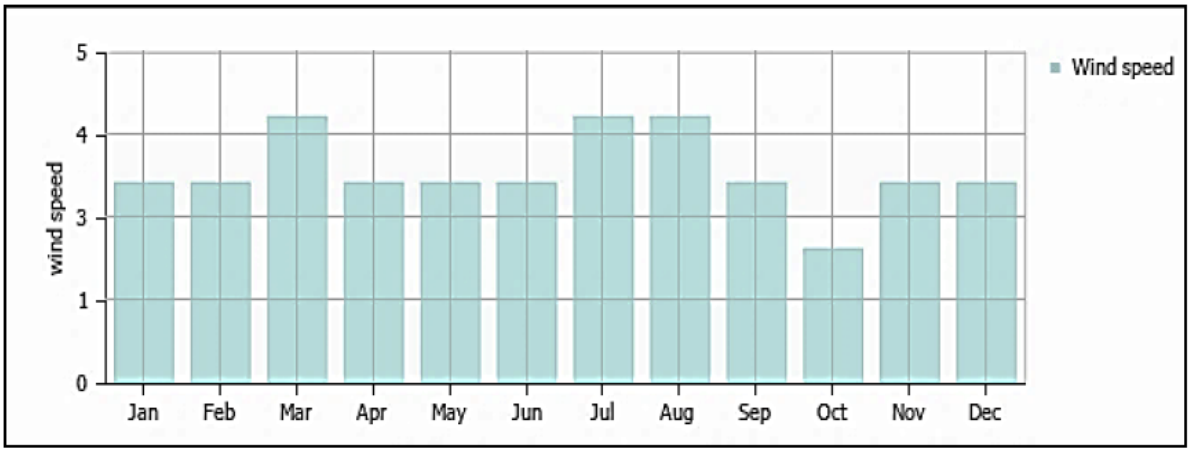
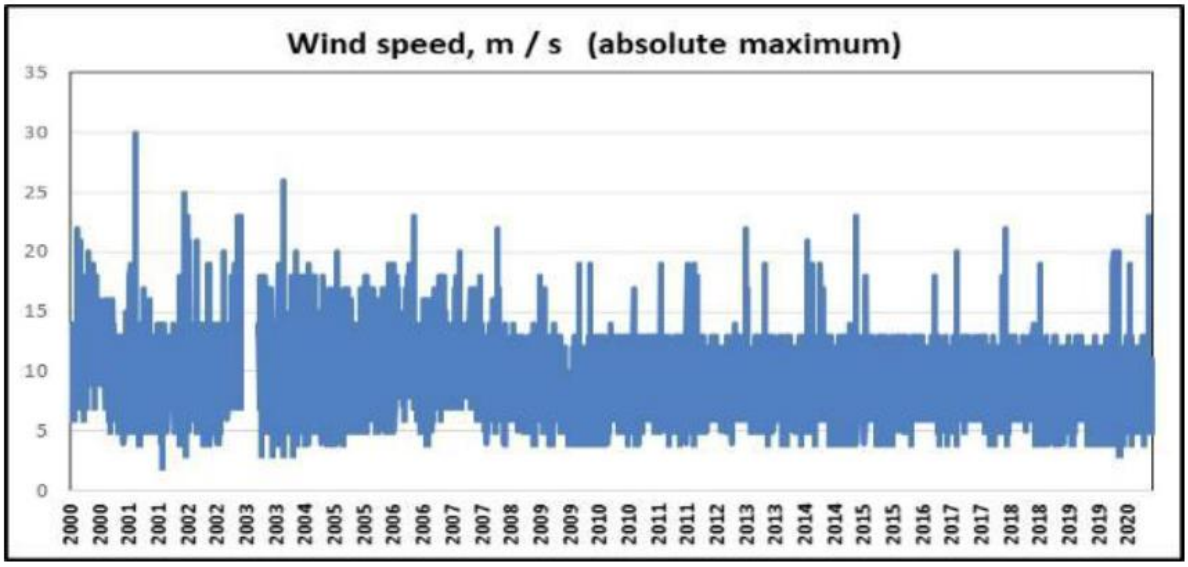


Figure 8-4 Mean Annual Wind Speed at the Bukhara Region (UzAssystem, 2021b)



The average annual precipitation, which usually falls in the autumn and winter, and spring periods, is 159-235 mm at the Project area (see figure below).

Figure 8-5 Annual Precipitation in Bukhara Basin (UzAssystem, 2021b)

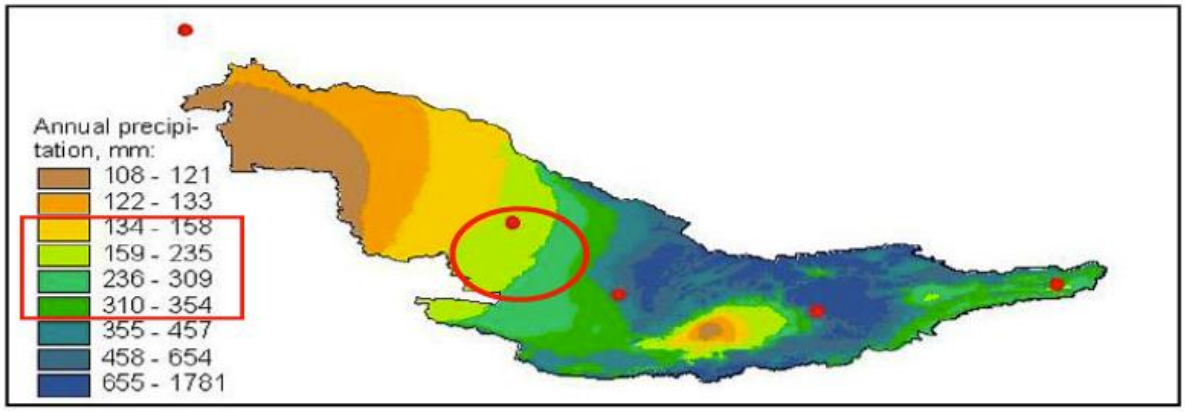
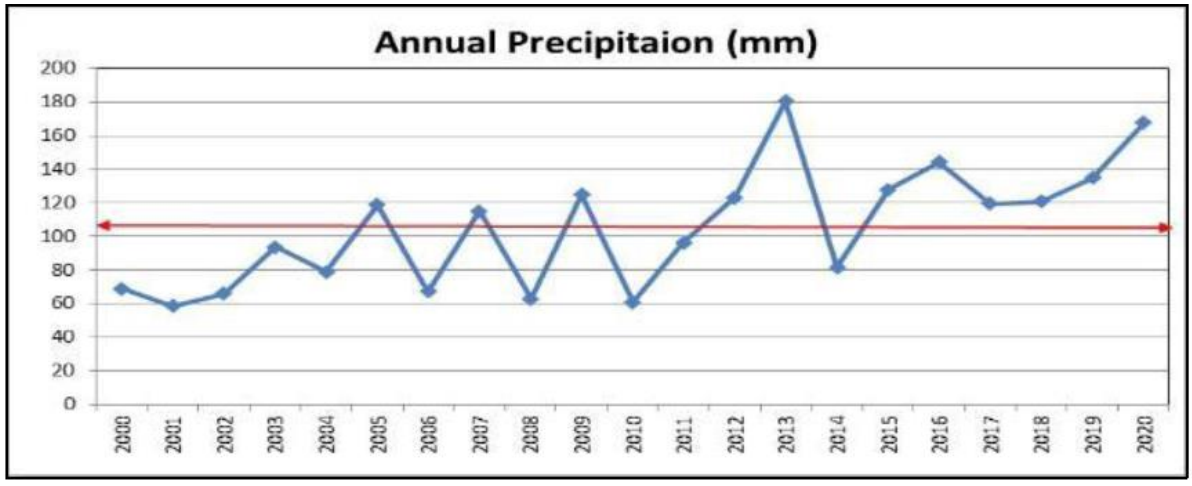


Figure 8-6 The average annual rainfall Values of the Bukhara Basin Between 2000 & 2020



8.1.2 Influences on Air Quality

Air quality and in particular instances of poor air quality are 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 is located in a remote region of Uzbekistan away from major population clusters. The nearest population clusters of significance are in the agricultural areas approximately 40km to the south of the Project area. There are not expected to be regional air quality influences due to these distant communities.

Besides a railway line that crosses the Project area, there are few (if any) point sources of any emissions. Occasional locomotive emissions are expected to be the principal emission source from within the boundary of the Project, but this would only occur at times of railway use as shown in the image below.

Plate 8-1 Smoke & dust generate by a passing train

Due to the isolated nature of the Project area, there are only a handful of land users and very few vehicles that are active in the area. These vehicles use the access road found within the Project site and unpaved areas. Livestock are kept and herded within the Project boundary. These local activities are not expected to result in discernible impacts to ambient air quality.

Gas storage facilities belonging to Asia Trans Gas are located approximately 1.5km south-east of the south-east corner of the Project boundary. There are also inactive mining areas approximately 1.4km east and 0.9km west of the Project site. If mining activities were to re-commence at the two (2) mines, such activities may have the potential to result in an increase in Particulate Matter (i.e., $PM_{2.5}$ & PM_{10}) concentrations in the local air shed.

Overall, the existing 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.

8.1.3 Ambient Air Quality Monitoring

As determined during the E&S Scoping stage, baseline studies for ambient air quality were not conducted on the basis that quantitative assessment will not be required, to assess the limited expected potential impacts upon receptors and ambient air quality during both construction and operations phases of the Project.

8.2 Receptors

In relation to ambient air quality impacts from the project, the only impacts may potentially occur during construction. As such, the expected range of impacts are likely to be within a zone of 1km with impacts related to dust generation during site preparation, excavation works, vehicle movements on unpaved surfaces and exhaust fumes from construction vehicles and equipment use. These activities are only expected to cause discernible impacts to nearby receptors (e.g. <200m for gaseous emissions, <500m for particulate emissions <100m for odour & VOC emissions).

Findings from the numerous site visits and desk-based review have identified commercial & ecological receptors within 1km of the proposed wind farm Project site that may be susceptible to changes in ambient air quality. It is noted that consideration of receptors within 1km is a precautionary approach in order to account for any cumulative impacts that might occur if mining activities at mining area 2 are commissioned during the construction phase of the Project.

Such receptors included an IBA; the Ayakagitma lake approximately 500m west of the Bash site, and animal holding area with accommodation structures approximately 175m north east of the site, Mining Area 2 with accommodation approximately 900m west (it is noted this mining area is currently inactive) and a water well used by herders approximately 700m west.

An existing unpaved access road from A-397 highway leading to the Wind Farm Site will be used for transporting equipment, materials, employees, and waste. At the time of writing, there are no plans for access road construction or improvement activities. Impacts on air quality will result from the increased traffic on the access road, which may potentially impact the

identified air quality receptors located along the route. These include residents and visitors of Kuklam village approximately 20m from the road and the herders structures and animals holding areas located approximately 130m to 360m from the access road.

Table 8-2 Potential Air Quality Receptors – Wind Farm

RECEPTOR ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
R15	Ayakagitma lake	Ecological	**High**	Fishermen & other users of this lake including biodiversity will be particularly vulnerable to changes in ambient air quality
R22	Animal Holding Area with accommodation area	Structure & Residential	**High**	Livestock kept at this holding area and herders that use this accommodation will be particularly vulnerable to changes in ambient air quality.
R28	Water well	Ecological	**Medium**	Users of the water well will be relatively vulnerable to changes in ambient air quality as they are at the water well for a short duration.
Mining Area 2	Mining area (including mine workers)	Industrial	**Low**	If mining activities resumes before or during project construction, workers will unlikely be overly sensitive to project impacts due to the dusty nature of such works they are exposed to from the mining facilities.
	Worker accommodation area	Residential	**High**	If operations at the mine resume, workers at the worker accommodation camps will be particularly vulnerable to changes in ambient air quality.
Access Road				
R12	Kuklam Village	Residential	**High**	Residents and visitors of the village will be vulnerable to changes in ambient air quality resulting from increased traffic.
R33	Herder's structure and animal holding area	Residential	**High**	Herders using the structure and Livestock kept at this holding area will be vulnerable to changes in ambient air quality resulting from increased traffic.
R34	Herder's structure	Residential	**High**	Potential herders using the structure and their Livestock will be vulnerable to changes in ambient air quality resulting from increased traffic.
R35	Herder's structure and animal holding area	Residential	**High**	Herders using the structure and Livestock kept at this holding area will be vulnerable to changes in ambient air quality resulting from increased traffic.

***Note**: The settlement on-site will not be at the project site during construction and as such they have not been identified as receptors to construction phase impacts. The relocation of these herders will be in accordance with the Project's Resettlement Action Plan (RAP).*

Figure 8-7 Location of Air Quality Receptors within 1km of the Project Site

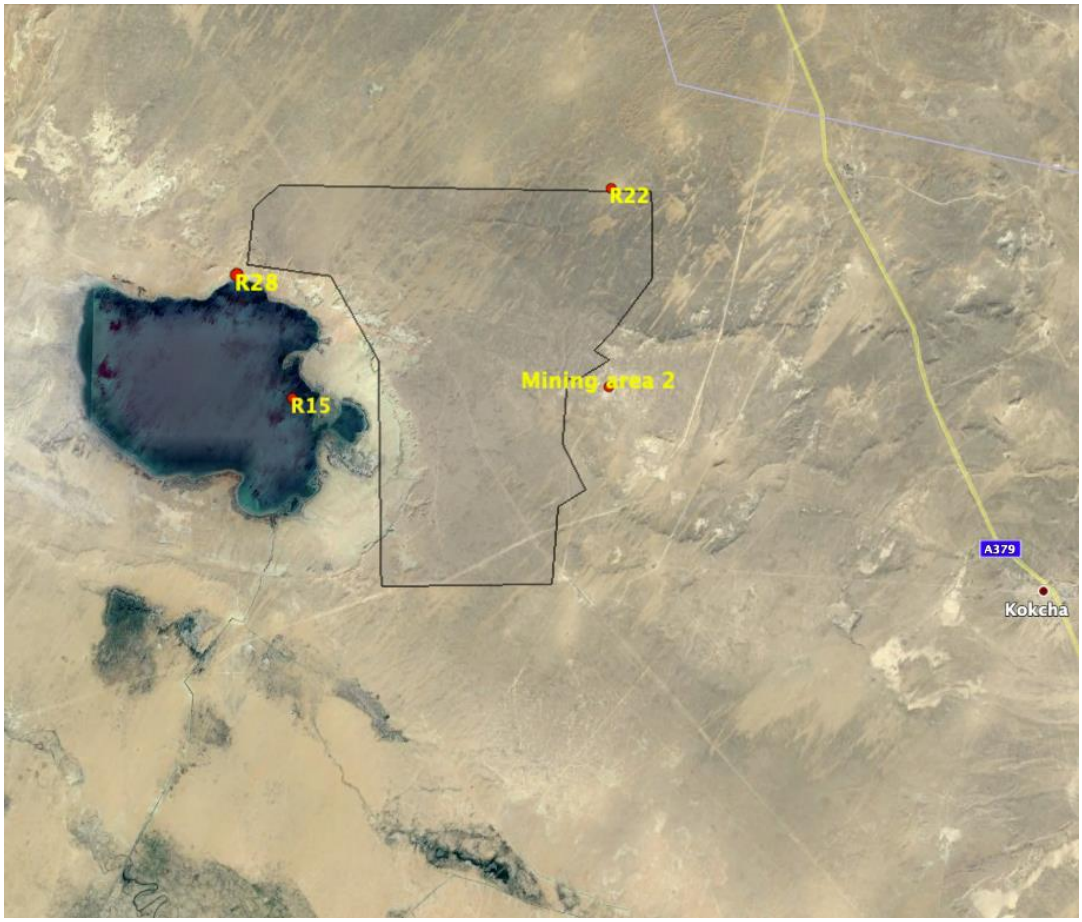
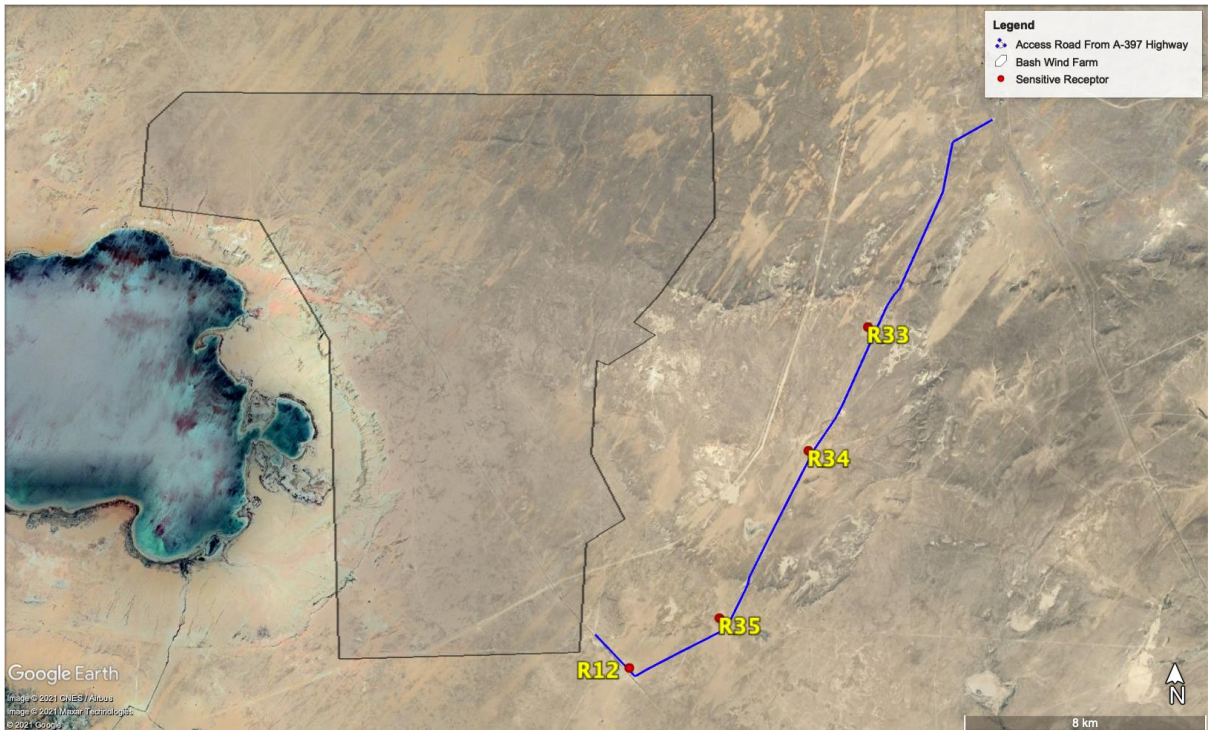


Figure 8-8 Location of Air Quality Receptors Along the Access Road



8.3 Potential Impacts, Mitigation, Management & Residual Impact

8.3.1 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, sulphur dioxide, carbon monoxide, carbon dioxide, VOCs, particulates and BTEX.

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

- Excavations and earthworks, such as ground breaking, cutting, filling and levelling;
- Vehicle movements on unpaved, or compacted surfaces;
- Particulate matter dispersion from uncovered truckloads and from materials/aggregates at the batching plant (if uncovered);
- Vehicle and Construction equipment emissions (e.g. NO_x, SO_x and CO, CO_2, VOCs, particulates 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).

8.3.1.1 Dust Generation

The principle sources of dust and particulate emissions during construction will be:

- Excavations and earthworks, such as ground breaking, cutting, filling and levelling;
- Vehicle movements on unpaved, or compacted surfaces; and
- Particulate dispersion from uncovered truckloads and materials/aggregates at the batching plant (if uncovered).

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, there are no human receptors within 350m of the nearest WTG. As such, there is no potential for impacts relating to dust emissions as a result of site preparatory activities upon receptors.

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. 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). At this stage the exact location of the batching plant is unknown however it is expected that it will be located more than 500m from the worker accommodation camp which is also located on site and at a distance of more than 500m from local communities. Based on the above, there will be no human receptors within 350m of the batching plant. As such, there is no potential for impacts relating to dust emissions & particulate dispersion upon receptors as a storage of batching plant materials.

8.3.1.2 Gaseous Emissions

The principle 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. (see table below). The quantity of gaseous emissions from this equipment will depend on the numbers deployed on site and the hours of operation & efficiency.

Table 8-3 Vehicles & Construction Equipment During the Construction of the Wind Farm

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

NAME	QUANTITY	TYPE OF FUEL
Concrete pump truck	3	Electrical
Concrete delivery truck	6	Electrical
Piling machine	4	Diesel

***Note**: The equipment/machinery listed above has only been estimated for the EPC Contractor and the sub-contractors are expected to have additional equipment/machinery depending on their area of work.*

Under normal operating conditions, emissions from the above listed construction vehicles, plant 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. With regard to the Project, the animal holding area with accommodation is located within 200m from the project boundary. Receptors within 50m of local access road include Kuklam village approximately 20m from the road as well as the herders and their livestock.

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

8.3.1.3 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.

8.3.1.4 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 such as the animal holding area & accommodation (R22).

Table 8-4 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 within 500m of the Project boundary – Generated as a result of site preparatory works, movement of vehicles on unpaved surfaces and storage of batching plant materials	**Minor Negative**	Kuklam Village **(R12)**	High	**Minor to 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.	**Minor**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					• 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 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.	
Gaseous emissions – From vehicle exhaust	**Minor Negative**	Animal holding area with accomm odation	High	**Minor to 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
		structure **(R23)**			• 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.	
		Ayakagitma lake **(R15)**	High	**Minor to Moderate**		**Minor**
		Animal Holding Area with accommodation area **(R22)**	High	**Minor to Moderate**		**Minor**
		Water well **(R28)**	Medium	**Minor**		**Negligible**
		Mining area 2 (including mine workers)	Low	**Negligible to Minor**		**Negligible**
		Worker accommodation area (of mining area 2)	High	**Minor to Moderate**		**Minor**
Gaseous emissions – From vehicle	**Negligible Negative**	Kuklam Village **(R12)**	High	**Minor**	• Deliveries of equipment/plant to the site will be efficiently managed to reduce the number of trips.	**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
exhaust along access roads		Herder's structure and animal holding area **(R33)**	High	**Minor**	• 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). • 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**
		Herder's structure **(R34)**	High	**Minor**		**Negligible**
		Herder's structure and animal holding area **(R35)**	High	**Minor**		**Negligible**
Emissions of VOCs and other hazardous volatiles	**Negligible Negative**	Animal holding area with accommodation **(R23)**	High	**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.	**Negligible**
		Ayakagitma lake **(R15)**	High	**Minor**		**Negligible**
		Animal Holding Area with accommodation	High	**Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
		area **(R22)**			• 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.	
		Water well **(R28)**	Medium	**Negligible to Minor**		**Negligible**
		Worker accommodation area (of mining area 2)	High	**Minor**		**Negligible**
Odour from onsite sanitary facilities	**Negligible Negative**	Animal holding area with accommodation **(R23)**	High	**Minor**	• Adequate and sufficient sanitary facilities for site workers must be provided in accessible locaitons 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**
		Ayakagitma lake **(R15)**	High	**Minor**		**Negligible**
		Animal Holding Area with accommodation area **(R22)**	High	**Minor**		**Negligible**
		Water well **(R28)**	Medium	**Negligible to Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
		Worker accommodation area (of mining area 2)	High	**Minor**		**Negligible**

8.3.2 Operational Phase

As the operation of the wind farm will not include combustion related activities, they 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.

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

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impact
Gaseous Emissions from Vehicles	**Negligible Negative**	Kuklam Village **(R12)**	High	**Minor**	• 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.	**Negligible**
		Herder's structure and animal holding area **(R33)**	High	**Minor**		**Negligible**
		Herder's structure **(R34)**	High	**Minor**		**Negligible**
		Herder's structure and animal holding area **(R35)**	High	**Minor**		**Negligible**

8.3.3 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.

8.4 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 8-6 Air Quality Monitoring Requirements

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
Construction			
Dust Generation & Dispersion	Dust	General visual observation for dust emissions to be undertaken on a daily basis. To be monitored quantitatively if generation is considered to be excessive or complaints/grievances are received.	Access Road to the Project site, Construction site and laydown areas, Batching plant, Dispersion to external receptors from point of generation.
Emissions from engines	Vehicle Emissions	General 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
Sanitary Facilities & Hazardous Material stores	Odour & VOCs	Daily olfactory observations – 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.
Operation			

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
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.

9 NOISE AND VIBRATION

9.1 Observation and Baseline Conditions

9.1.1 Noise

The project site is remote and is located away from major population clusters and key infrastructure. As such, there are few noise sources in the project area.

Notable anthropogenic noise sources will be noise emanating from the intermittent passing of locomotives and their trains along the railway line that crosses the Project area. The movement of locomotives results to discernible noise levels but for short periods. Given the remote nature of the Project area, there are a handful of land users and very few vehicles that are active in the area and use visible vehicle tracks. Small-scale seasonal farming practices (primarily the herding of animals during spring and summer) are present in some parts of the site. Both the vehicle use and farming practices generate noise but such noise are not expected to result in discernible noise influences.

Based on observations made during initial 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.

9.1.1.1 Noise Monitoring Survey Methodology

Two (2) different noise surveys were undertaken at the Project site to establish baseline for construction impacts and for operational noise modelling purposes (following preliminary noise modelling). A brief description of the monitoring methodology for the construction noise baseline survey is presented below. A more detailed noise survey for the operational noise modelling is included in sub section 9.3.2.1.

CONSTRUCTION NOISE MONITORING

Construction noise monitoring survey was conducted from 16th to 19th April 2021 within and outside the Project site in order to quantify existing noise levels at the Project site and at receptor location. Due to the lack of noise sources within or outside the site (with the exception of railway & local dirt road), noise monitoring was undertaken at four (4) locations within the site and two (2) locations outside the site. 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. An anemometer was installed to measure wind speed and direction during the noise monitoring survey. The noise survey was carried out with sound level meter Class 1 (Type 1), which corresponds to IEC 61672 (Calibration

certificate provided in Appendix J). The noise meter was arranged at a height of 1.5m above the ground level and was placed at least 3m away from any obstructing or reflecting surfaces.

Ambient noise levels were monitored for 10-minute segments 5 times per hour for a 24-hour period at each monitoring location, whilst taking note of noise influences from the surrounding environment (see table below for site observations).

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-11pm to 7am) and those of WHO Noise standard (Daytime-7am to 10pm and Night-10pm to 7am).

The A-weighted continuous equivalent sound level (LAeq) along with LAmax, LAmin, LA10, LA 50, LA90 and LA95 were logged for 24 Hours at each location. The monitoring locations are provided in the figure below. The coordinates of the monitoring locations as well as site observations are presented in the table below

Figure 9-1 Noise Monitoring Locations

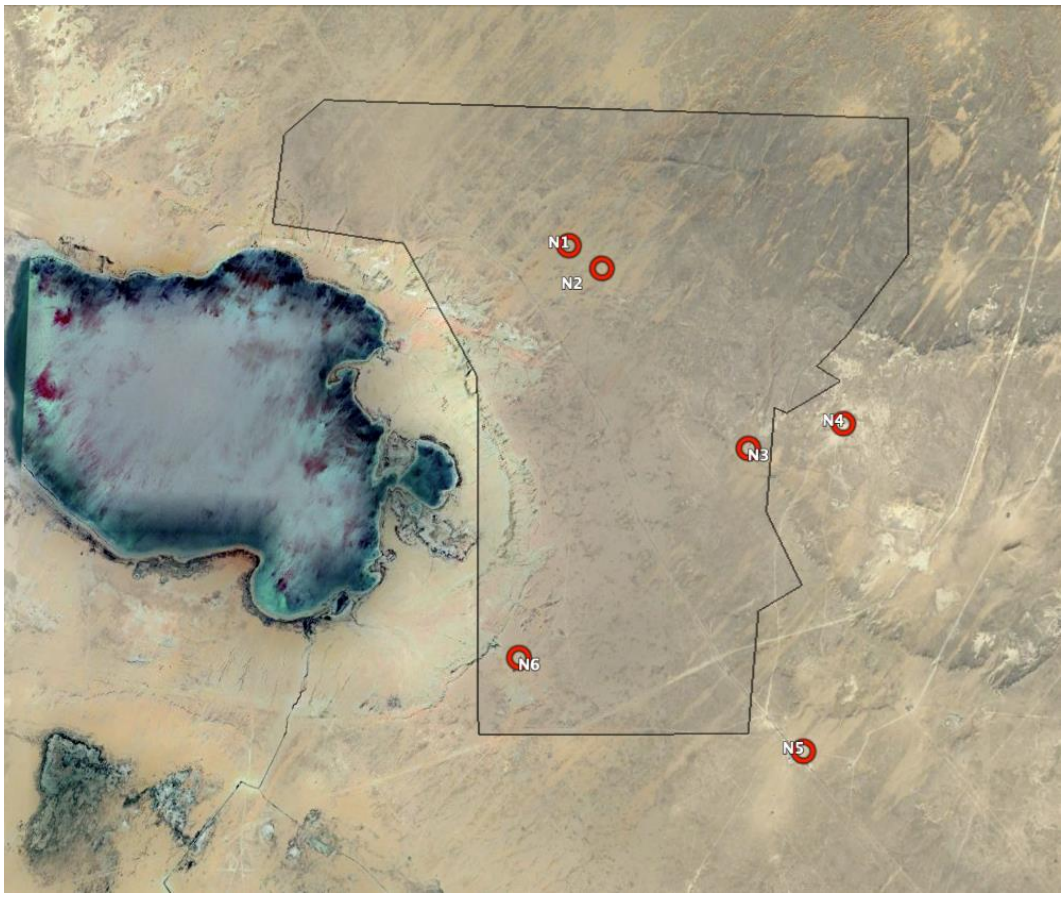


Table 9-1 Noise Monitoring Locations and Site Observations

ID	Location	Coordinates		Photos	Site Observation
		Northing	Easting		
N1	At herder settlement within the site	40.667744°	64.656688°	 **View of Noise meter**	The monitoring location is generally quiet. However, an infrequent source of noise at this location was observed from the herder's car which he used to transport livestock during the monitoring campaign, train which passed by at night time and operation of a pump generator during daytime hours. Noise from livestock (goats, sheep, donkeys and dogs) was also discernible at this location.
N2	The primary source of noise at this location is from the herder's car which he used to transfer livestock during the monitoring campaign. Noise from livestock (goats, sheep,	40.661835°	64.668501°	 **View of Noise meter**	-

ID	Location	Coordinates		Photos	Site Observation
		Northing	Easting		
	donkeys and dogs) was also discernible at this location.				
N3	At herder settlement within the site	40.614686°	64.721237°	 **View of Noise meter**	Noise from livestock (goats, sheep, donkeys and dogs) was discernible at this location.

ID	Location	Coordinates		Photos	Site Observation
		Northing	Easting		
N4	At the mining area	40.621839°	64.754319°	 **View of Noise meter**	During the noise monitorng campaign, mining activities at the mine was on pause due to breakdown of excavator. As such, noise was not discernible at this location during the monitoring.

ID	Location	Coordinates		Photos	Site Observation
		Northing	Easting		
N5	At residential area in front of railway and fuel tanks	40.535035°	64.742387°	 **View of Noise meter**	The monitoring location is generally quiet. However, occasional source of noise at this location was from the passing of train along the railway. Noise from livestock (goats, sheep, donkeys and dogs) was also discernible at this location. Vibration was slightly noticeable at this location only during rail transit.

ID	Location	Coordinates		Photos	Site Observation
		Northing	Easting		
N6	At herder settlement within the site	40.557838°	64.642867°	 **View of Noise meter**	The monitoring location is generally quiet. However, occasional source of noise at this location was from the herder's car and from livestock (goats, sheep, donkeys and dogs) was also discernible at this location.

Plate 9-1 Pump Generator at Monitoring Location N1

Plate 9-2 Train Along the Railway near Monitoring Location N5 (ref. Red Arrow)

OPERATIONAL MODELLING NOISE MONITORING

Kindly refer to sub-section 9.3.2.1 for a more detailed noise survey to inform the operational noise modelling

9.1.1.2 Noise Monitoring Survey Results – Construction Noise

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 at noise monitoring location N1 is presented below

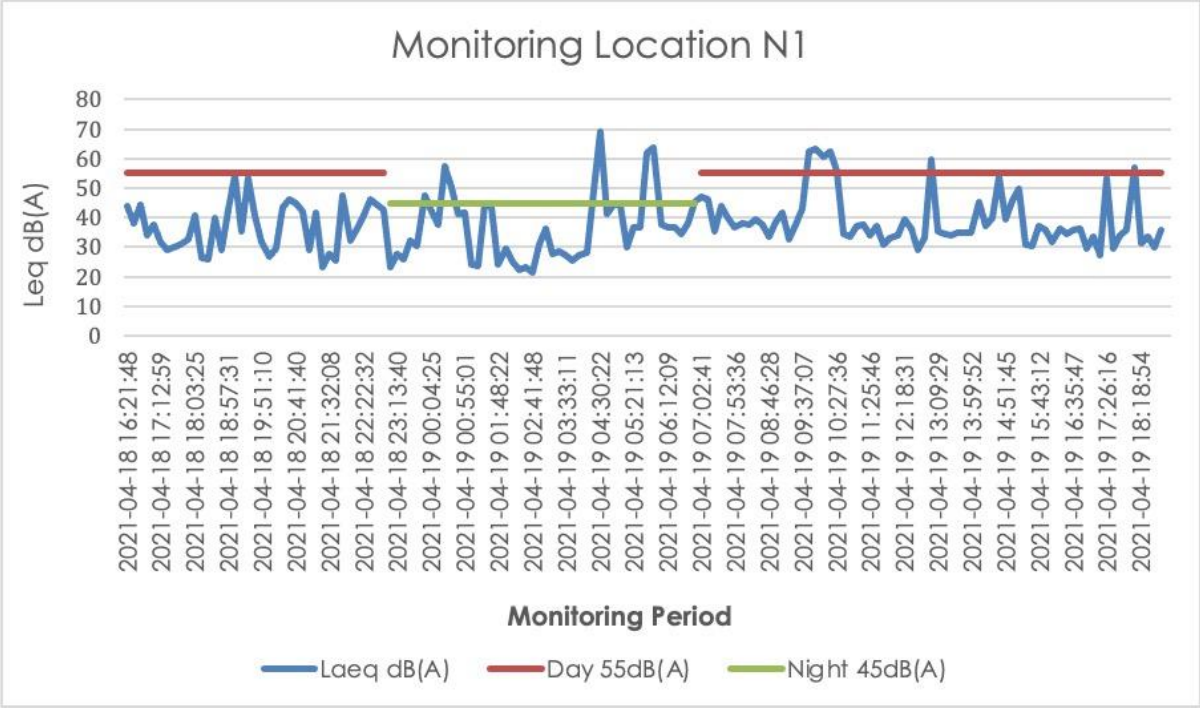
Table 9-2 Summary of Daytime and Night time Noise Results at N1

Monitoring Period	Leq dB(A)	Lmax dB(A)	La90 dB(A)
Average			
Daytime	38.4	60.7	22.3
Night time	36.7	61.2	21.4
Minimum			
Daytime	23.2	43.3	17.6
Night time	21.4	46.5	17.5
Maximum			
Daytime	63.5	81.1	61.3
Night time	69.1	99.1	61.4

The noise results (Leq) obtained at monitoring location N1 ranged from 23.2dB(A) to 63.5dB(A) between the daytime hours of 07:02am to 22:53pm and ranged from 21.4dB(A) to 69.1dB(A) between the night-time hours of 23:03pm to 06:52am (see figure below). Upon comparison of the average Leq results obtained with Uzbekistan day and night time standard, the average daytime noise level of 38.4dB(A) and night time noise level of 36.7dB(A) were well below the limit of 55dB(A) and 45dBA respectively. These results are consistent with the observations made on site (of a generally quiet location).

The noise levels recorded at noise monitoring location N1 is presented in the figure below.

Figure 9-2 Noise Monitoring Result at N1



From the figure above, peaks in noise were recorded above limit six (6) times during daytime and five (5) times during night time. During the period when high noise levels were recorded either during the day or night time, noise from train, pump generator and livestock was noted.

The highest noise level of 63.5 dB(A) was recorded at 09:57am on 19th April 2021. During the 10-minute monitoring period when this high noise level was recorded, dogs were barking and the pump generator was operating in proximity to this noise monitoring location.

Table 9-3 Summary of Daytime and Night time Noise Results at N2

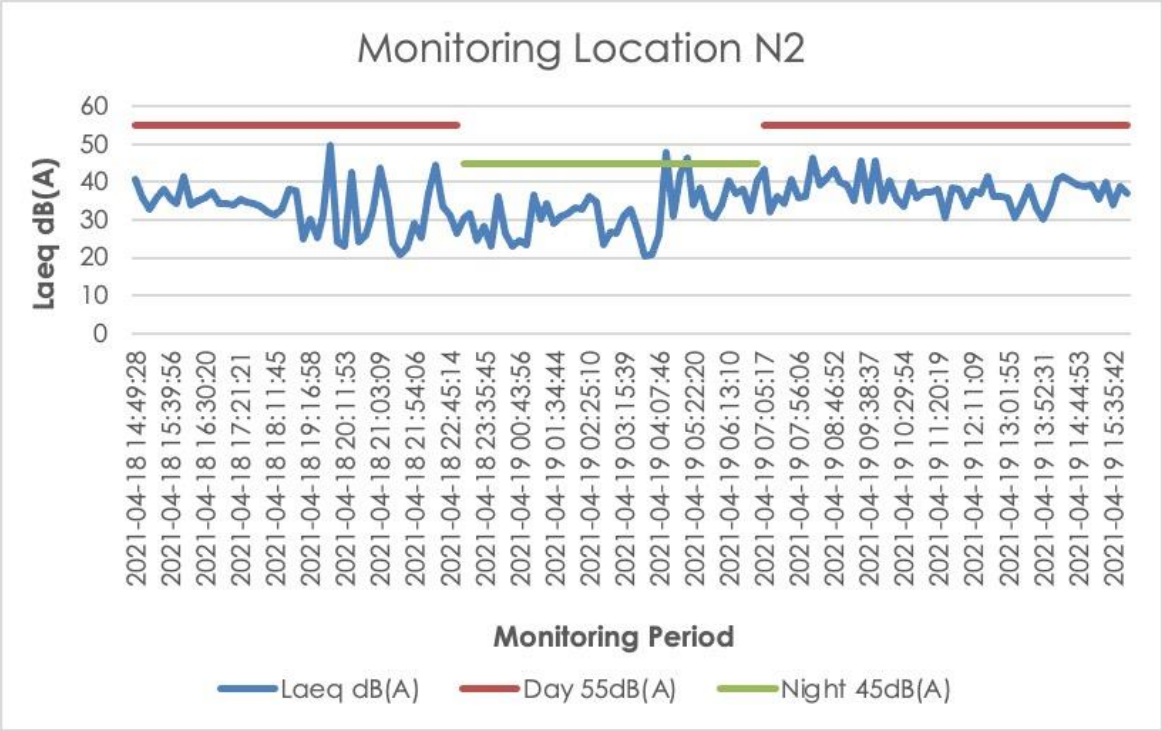
MONITORING PERIOD	LEQ DB(A)	LMAX DB(A)	LA90 DB(A)
Average			
Daytime	35.4	59.3	21.0
Night time	31.6	59.1	19.4
Minimum			
Daytime	20.8	46.6	16.8
Night time	20.2	43	16.8
Maximum			
Daytime	49.6	75.4	30.9
Night time	47.9	76.9	29.3

The noise results (Leq) obtained at this monitoring location ranged from 20.8dB(A) to 49.6dB(A) between the daytime hours of 07:05am to 22:55pm and ranged from 20.2dB(A) to 47.89dB(A) between the night-time hours of 23:05pm to 06:53am (see figure below). Upon comparison of the average Leq results obtained with the Uzbekistan day and night time standard, the

daytime & night time noise level at this location were well below the limit of 55dB(A) and 45dBA respectively.

The noise levels recorded at noise monitoring location N2 is presented in the figure below.

Figure 9-3 Noise Monitoring Result at N2



From the figure above, peaks in noise level recorded at this location were not identified during the daytime but peaks in noise were recorded two (2) times at night-time . The highest Leq noise level of 47.9dB(A) was recorded at 04:07am on 19th April 2021. However, during the 10-minute monitoring period when this high noise level was recorded, no observation was made in regards to any noise influences at this monitoring location.

Table 9-4 Summary of Daytime and Night time Noise Results at N3

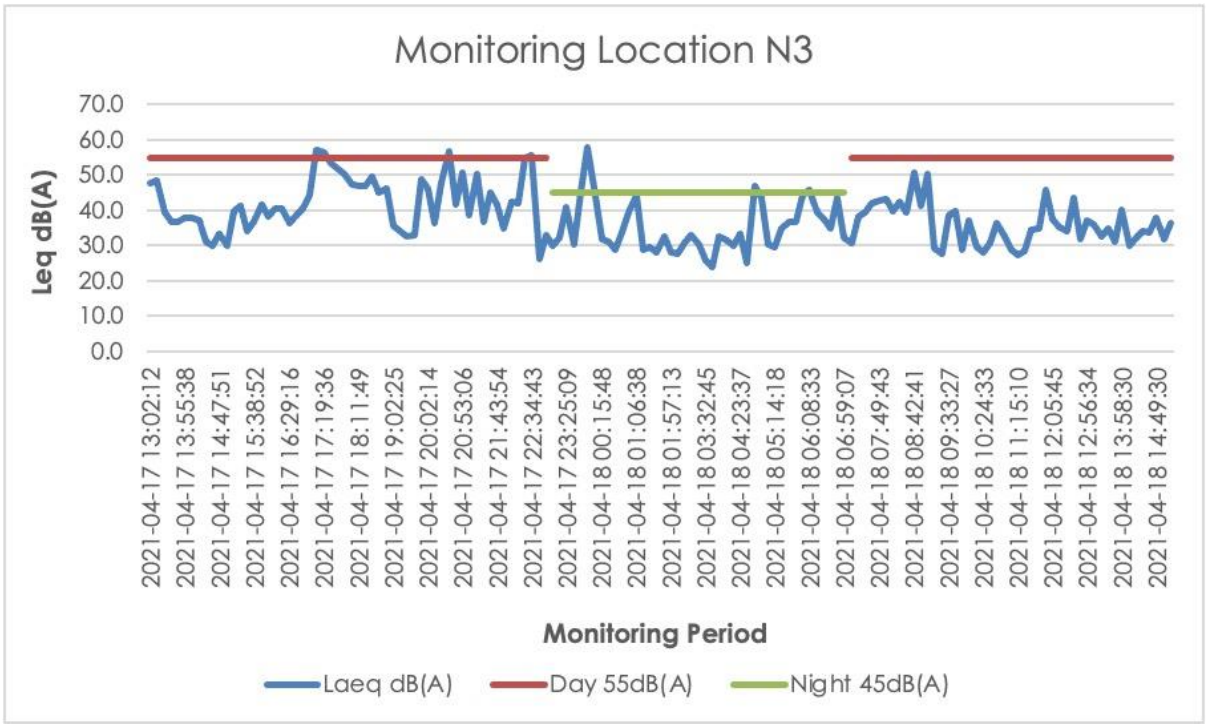
MONITORING PERIOD	LEQ DB(A)	LMAX DB(A)	LA90 DB(A)
Average			
Daytime	39.2	60.7	44.4
Night time	34.8	61.1	21.5
Minimum			
Daytime	26.0	45.6	18.2
Night time	23.7	50.1	17.9
Maximum			
Daytime	57.0	84.7	84.7
Night time	57.9	80.9	28.3

The noise results (Leq) obtained at this monitoring location ranged from 26dB(A) to 57dB(A) between the daytime hours of 07:09am to 22:54pm and ranged from 23.7dB(A) to 57.9dB(A)

between the night-time hours of 23:05pm to 06:59am (see figure below). Upon comparison of the Leq results obtained with the Uzbekistan day and night time standard, the average daytime and night time noise level of 39.2dB(A) and 34.8 dB(A) were well within the established Uzbekistan noise limit of 55dB(A) and 45dB(A) respectively.

The noise levels recorded at noise monitoring location N3 is presented in the figure below.

Figure 9-4 Noise Monitoring Result at 3



From the figure above, peaks in noise level at this location were recorded to occur two (2) times during the the daytime and three (3) times at night time.

Table 9-5 Summary of Daytime and Night time Noise Results at N4

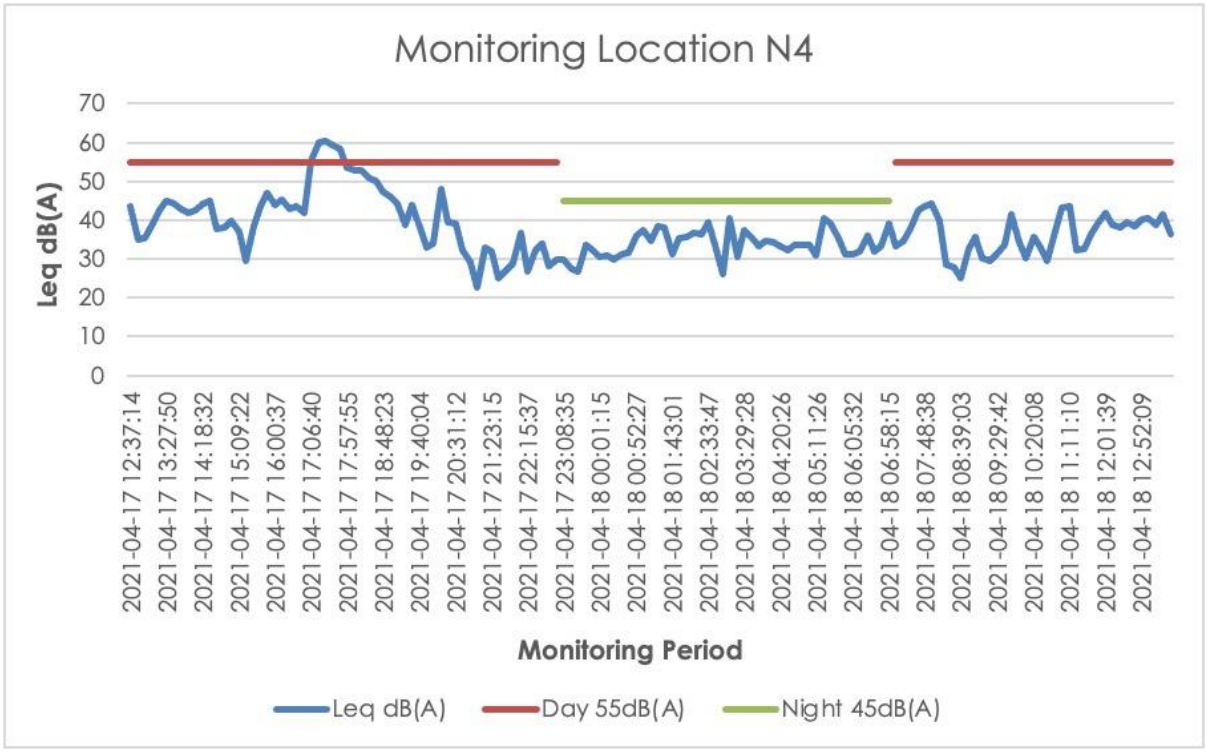
Monitoring Period	Leq dB(A)	Lmax dB(A)	La90 dB(A)
Average			
Daytime	39	59.7	27.7
Night time	33.8	61.0	22.1
Minimum			
Daytime	22.7	47.7	18.9
Night time	26	45.7	19.4
Maximum			
Daytime	60.2	81.5	52.6
Night time	40.6	68.9	30.3

The noise results (Leq) obtained at this monitoring location ranged from 22.7dB(A) to 60.2dB(A) between the daytime hours of 07:08am to 22:58pm and ranged from 26dB(A) to 40.6dB(A) between the night-time hours of 23:08pm to 06:58am (see figure below). Upon comparison of

the average Leq results obtained with the Uzbekistan day and night time standard, the average daytime noise level of (39dB(A) & night time noise level 33.8dB(A) were well below the limit of 55dB(A) and 45dBA respectively.

The noise levels recorded at noise monitoring location N4 is presented in the figure below.

Figure 9-5 Noise Monitoring Result at N4



From the figure above, peaks in noise level at this location was recorded four (4) times during the daytime only. The highest Leq noise level of 60.2dB(A) was recorded at 17:26pm on 17th April 2021. However, during the 10-minute monitoring period when peak in noise level was recorded, no observation was made in regards to any noise influences at this monitoring location.

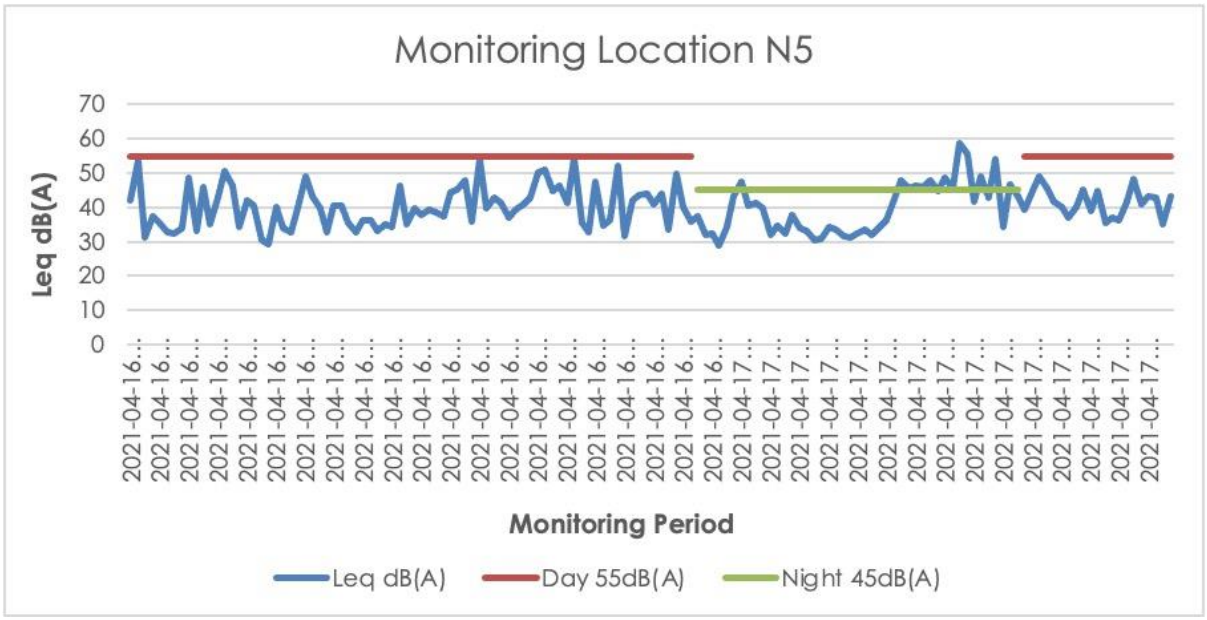
Table 9-6 Summary of Daytime and Night time Noise Results at N5

MONITORING PERIOD	LEQ DB(A)	LMAX DB(A)	LA90 DB(A)
Average			
Daytime	40.4	61.4	26.3
Night time	39.6	59.2	27.1
Minimum			
Daytime	29.2	49.8	19.5
Night time	28.7	47.2	18.8
Maximum			
Daytime	54.6	82.6	42.4
Night time	58.8	79.3	37.3

The noise results (Leq) obtained at this monitoring location ranged from 29.2dB(A) to 54.6dB(A) between the daytime hours of 07:03am to 22:56pm and ranged from 28.7dB(A) to 58.8dB(A) between the night-time hours of 23:06pm to 06:53am (see figure below). Upon comparison of the average Leq results obtained with the Uzbekistan day and night time standard, the daytime noise level of 40.4dB(A) & night-time noise level of 39.6dB(A) were well below the limit of 55dB(A) and 45dBA respectively.

The noise levels recorded at noise monitoring location N6 is presented in the figure below.

Figure 9-6 Noise Monitoring Result at N5



From the figure above, peaks in noise level were not recorded at this location during the daytime but were recorded at night time a total of ten (10) times. During the times when peaks in noise level was recorded at night time, noise from livestock and local people talking was noted.

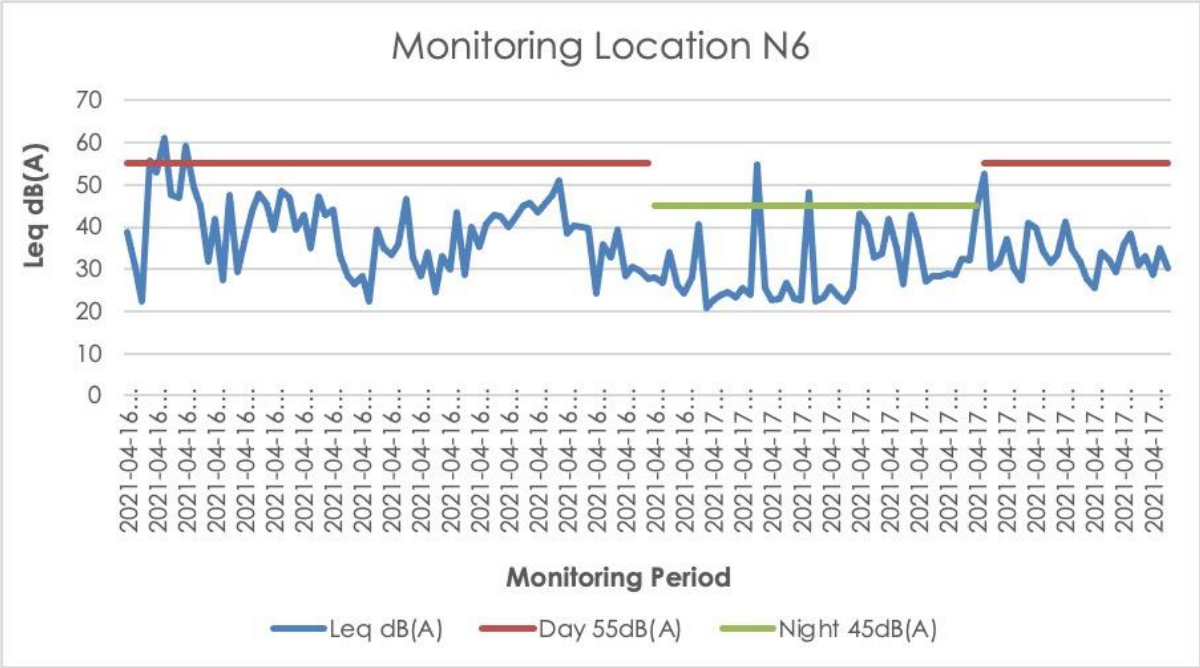
Table 9-7 Summary of Daytime and Night time Noise Results at N6

Monitoring Period	Leq dB(A)	Lmax dB(A)	La90 dB(A)
Average			
Daytime	37.5	63.8	19.2
Night time	29.9	57.3	18.5
Minimum			
Daytime	22.3	44.2	17.8
Night time	20.7	45.1	17.6
Maximum			
Daytime	61.2	84.7	28.6
Night time	54.8	77.2	23.4

The noise results (Leq) obtained at this monitoring location ranged from 22.3dB(A) to 61.2dB(A) between the daytime hours of 07:01am to 22:57pm and ranged from 20.7dB(A) to 54.8dB(A) between the night-time hours of 23:08pm to 06:51am (see figure below). Upon comparison of the average Leq results obtained with the Uzbekistan day and night-time standard, the average daytime noise level of 37.5dB(A) & night time noise level of 29.9dB(A) were well below the limit of 55dB(A) and 45dBA respectively.

The noise levels recorded at noise monitoring location N6 is presented in the figure below.

Figure 9-7 Noise Monitoring Result at N6



From the figure above, peak in noise levels at this location was recorded three (3) times during daytime and two (2) times at night time. During the times when noise level exceeded the limit, noise from livestock and vehicle movement was noted.

9.1.1.3 Conclusion of Construction Noise Baseline

The average noise levels (Leq) recorded at all noise monitoring locations are well within the established limits. The minimum noise levels at all monitoring locations is below 30dB(A) which indicates limited noise influences. The short duration peaks in noise can be said to be representative of the worst-case ambient noise levels at the Project area and receptor location due to vehicle movement, noise from grazing livestock, and residential noise. However, these peaks in noise are not recorded as having significant impact on the average noise levels (Leq).

9.1.2 Vibration

During the site survey undertaken in April 2021, vibration was slightly noticeable at the monitoring location situated near the railway line i.e. monitoring location N5 only at times of rail transit. Besides this slightly noticeable vibration impact from the train, 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.

9.2 Receptors

In relation to noise impacts from the wind farm, the expected range of impacts are likely to be within a zone of 2km. Findings from the numerous site visits and review of satellite imagery has identified residential, commercial & ecological receptors within 2km of the proposed Project site and within 2km from each wind turbine that may be susceptible to changes in noise levels.

These included Kuklam village approximately 1.6km south east, , the Ayakagitma lake approximately 500m west, animal holding area with accommodation approximately 175m north east and 1.25km north west, herder accommodation area 1.2km north west, animal holding area 1.2km west, Fishermen accommodation structure approximately 1.5km north west, water wells approximately 700m west & 1.3km north west, Mining area 1 approximately 1.4km east & Mining area 2 approximately 0.9km west.

An existing unpaved access road will be used for transporting equipment, materials, employees, and waste. Therefore, noise impact on sensitive receptors located along the access road will be limited to noise generated from increased traffic. Sensitive receptors include residents and visitors of Kuklam village approximately 20m from the road and the herders structures and animals holding areas located approximately 130m to 360m from the access road.

Table 9-8 Potential Noise Receptors

Receptor ID	Receptor	Receptor Type	Sensitivity	Justification
-	Wind Farm Site Workers	Construction Workers	**High**	The construction workers at the site will be directly impacted by exposure to increases in ambient noise levels at the project location.
R12	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.
R15	Ayakagitma lake	Ecological	**High**	Fishermen & other users of this lake including biodiversity will be particularly vulnerable to increase in ambient noise levels.

Receptor ID	Receptor	Receptor Type	Sensitivity	Justification
R22	Animal Holding Area with accommodation area	Structure & Residential	**High**	Livestock kept at this holding area and herders that use this accommodation will be particularly vulnerable to increase in ambient noise levels.
R23	Animal Holding Area and Accommodation area	Structure	**High**	Livestock kept at this holding area and herders that use this accommodation will be particularly vulnerable to increase in ambient noise levels.
R24	Herder Accommodation Area	Residential	**High**	Herders that use this accommodation will be particularly vulnerable to increase in ambient noise levels.
R25	Fishermen Accommodation Structure	Structure	**Medium**	Fishermen that use this accommodation will be relatively vulnerable to increase in ambient noise levels as the structure will only be used for a short duration.
R26	Animal holding area	Structure	**High**	Livestock kept at this holding area will be particularly vulnerable to increase in ambient noise levels.
R28	Livestock Water wells - A	Infrastructure	**Medium**	Users of the water well will be relatively vulnerable to increase in ambient noise levels.as they are at the water well for a short duration.
R29	Livestock Water wells - B	Infrastructure	**Medium**	Users of the water well will be relatively vulnerable to increase in ambient noise levels.as they are at the water well for a short duration.
Mining area 1	Mining area (including mine workers)	Industrial	**Low**	Mining activities generate noise and as such workers at the mine will unlikely be sensitive to project impacts due to the noisy nature of works they are exposed to from the mining facilities.
Mining area 2	Mining area (including mine workers)	Industrial	**Low**	Mining activities generate noise and as such workers at the mine will unlikely be sensitive to project impacts due to the noisy nature of works they are exposed to from the mining facilities.
	Worker accommodation area	Residential	**High**	If operations at the mine resume, workers at the worker accommodation camps will be particularly vulnerable to increase in noise levels.
Access Road				
R33	Herder's structure and	Residential	**High**	Herders using the structure and Livestock kept at this holding area

Receptor ID	Receptor	Receptor Type	Sensitivity	Justification
	animal holding area			will be vulnerable to increase in ambient noise levels.
R34	Herder's structure	Residential	**High**	Potential herders using the structure and their Livestock will be vulnerable to increase in ambient noise levels.
R35	Herder's structure and animal holding area	Residential	**High**	Herders using the structure and Livestock kept at this holding area will be vulnerable to increase in ambient noise levels.

Figure 9-8 Location of Noise Receptors within 2km of the Project Site

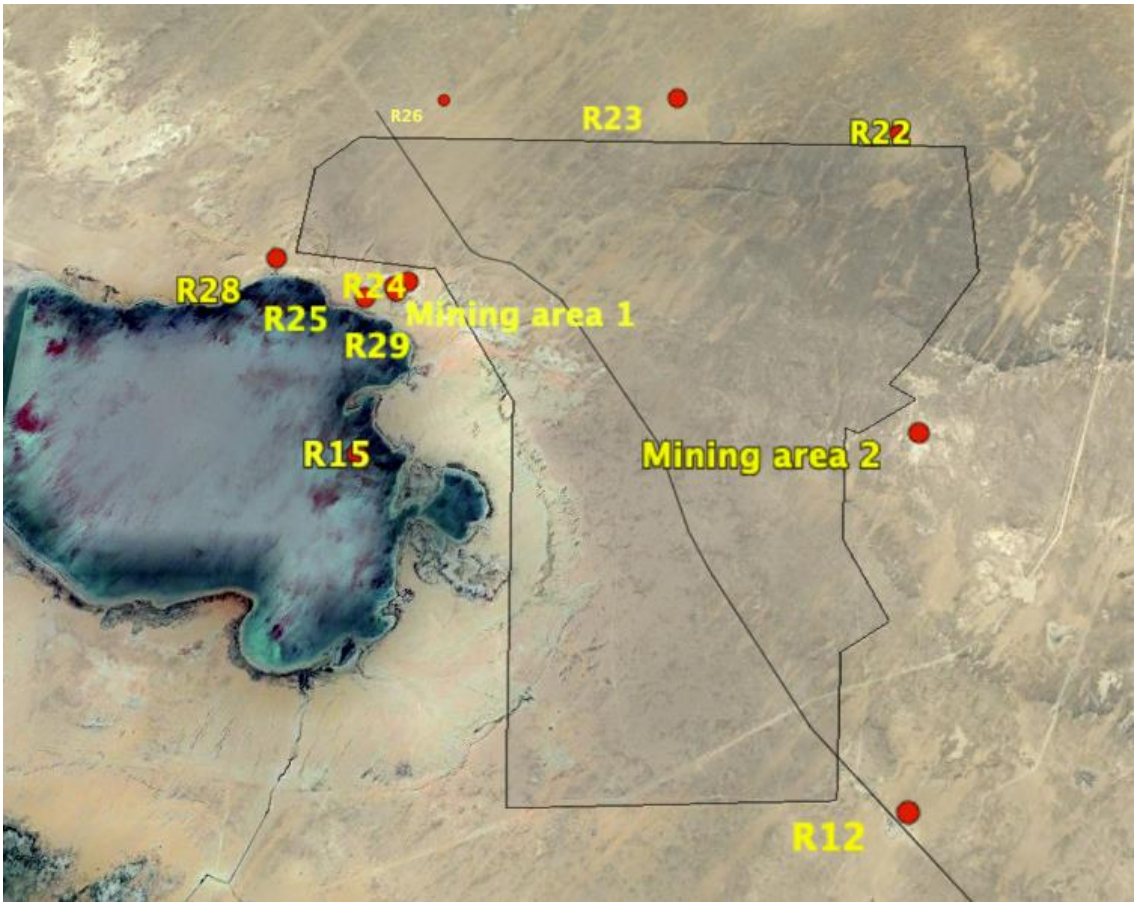
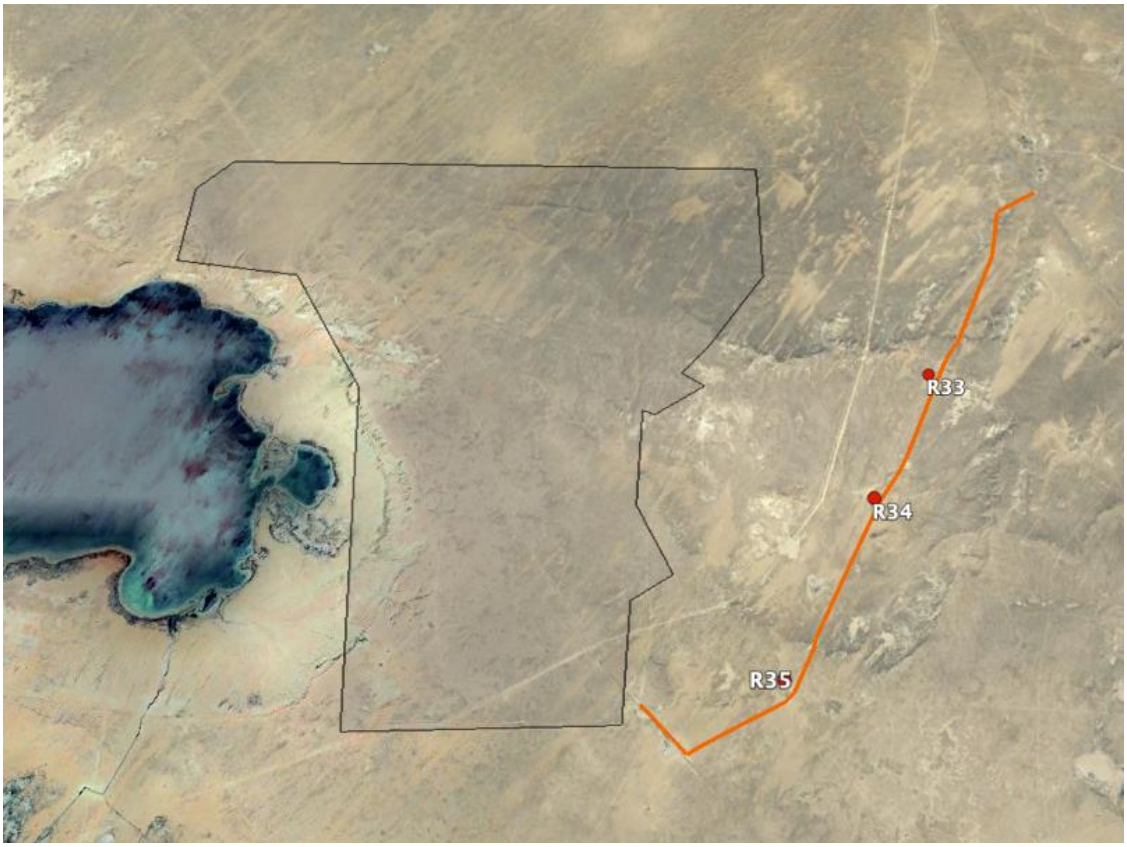


Figure 9-9 Location of Noise Receptors Along the Access Road



9.3 Potential Impacts, Mitigation, Management & Residual Impacts

9.3.1 Construction Phase

9.3.1.1 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; and

- 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 receptors within 2km of a wind turbine include: Ayakagitma lake (R15), Animal Holding Area and Accommodation area (R23), Herder Accommodation Area (R24), Animal holding area (R26), livestock water well A(R28), livestock water well B (R29), Mining area 1 and Mining area 2.

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

Table -9-9 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
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

EQUIPMENT	BS 5228-1:2009 REFERENCE	SPL DB (A)
Truck	Table C.4, 62	66
Forklift	Table D.7 96	77

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. The phases of construction have been splits (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 (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 mechanical and installation works shown in the table below. The adjustment due to ground absorbance has been made based on all nearby receptors being >25m from source and using the equation '25*LOG(10/Distance to receptor)+2'. **Note:** 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 9-10 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.*

Site Prep, Earth & Civil Works

Where all equipment is operating at the same location for 50% of the working day, the continued cumulative noise level would be 86.9dB(A) as perceived at 10m distance.

Table 9-11 Summary of Site Prep, Earth & Civil 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	
		Day	Night		Day	Night	Day	Night
R15	N1	38.4	36.7	46.4	47.0	46.8	8.6	10.1
Mining area 2- includes worker accommodation areas	N4	39.0	33.8	40.0	42.5	40.9	3.5	7.1

In accordance with the ABC method, as the daytime & night time ambient noise level at mining area 2 (when rounded to the nearest 5dB(A)) is less than category A values, this means Category A threshold values are applicable to this residential receptor.

The day time & night time noise impacts at mining area 2 is below the threshold value of 65dB(A) for daytime & 45dB(A) for night time

As R15 is not a residential receptor, the ABC assessment is not applicable to these receptor as such, the cumulative noise level at this receptor location is compared with established Uzbekistan noise limit of 55dB(A) for daytime and 45dB(A) for night time. Upon comparison, it is evident that site preparation, earth & civil works impacts from the Project to this receptor would not be discernible both at daytime & night time as the cumulative noise level at this receptor location is well below the established limit.

The table below shows the anticipated noise levels for those receptors located away from baseline noise monitoring locations

Table 9-12 Site Preparation, Earth & Civil Works Noise Attenuation by Distance

Receptor	Distance from Source	Predicted Noise Level
Source Noise: 86.9dB(A) (at 10m)		
R23	1850	32.2
R24	1300	36.0
R25	1700	33.1
R26	1250	36.4
R28	1950	31.6
R29	1500	34.5
Mining Area 1	1300	36.0

Building and Foundation Works

Where all equipment is operating at the same location for 50% of the working day, the continued cumulative noise level would be 87.6dB(A) as perceived at 10m distance.

Table 9-13 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	
		Day	Night		Day	Night	Day	Night
R15	N1	38.4	36.7	47.1	47.6	47.5	9.2	10.8

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	
		Day	Night		Day	Night	Day	Night
Mining area 2- includes worker accommodation areas	N4	39.0	33.8	40.8	43.0	41.6	4.0	7.8

In accordance with the ABC method outlined above, as the daytime & night time ambient noise level at mining area 2 (when rounded to the nearest 5dB(A)) is less than category A values, this means Category A threshold values are applicable to this residential receptor. The day time & night time noise impacts at mining area 2 is well below the threshold value of 65dB(A) for daytime & 45dB(A) for night time.

As R15 is not a residential receptor, the ABC assessment is not applicable to this receptor as such, the cumulative noise level at this receptor location is compared with established Uzbekistan noise limit of 55dB(A) for daytime and 45dB(A) for night time. Upon comparison, it is evident that building and foundation works impacts from the Project to this receptor would not be discernible both at daytime & night time as the cumulative noise level at this receptor location is well below the established limits.

The table below shows the anticipated noise levels for those receptors located away from baseline noise monitoring locations

Table 9-14 Building & Foundation Works Attenuation by Distance

Receptor	Distance from Source	Predicted Noise Level
Source Noise: 87.6dB(A) (at 10m)		
R23	1850	32.9
R24	1300	36.8
R25	1700	33.8
R26	1250	37.2
R28	1950	32.4
R29	1500	35.2
Mining Area 1	1300	36.8

Where all equipment is operating at the same location for 50% of the working day, the continued cumulative noise level would be 81.5dB(A) as perceived at 10m distance.

Table 9-15 Summary of Mechanical & Installation 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	
		DAY	NIGHT		DAY	NIGHT	DAY	NIGHT
R15	N1	38.4	36.7	41.0	42.9	42.4	4.5	5.7
Mining area 2- includes worker accommodation areas	N4	39.0	33.8	34.6	40.3	37.2	1.3	3.4

In accordance with the ABC method outlined above, as the daytime & night time ambient noise level at mining area 2 (when rounded to the nearest 5dB(A)) is less than category A values, this means Category A threshold values are applicable to this residential receptor. . The day time & night time noise impacts at mining area 2 is well below the threshold value of 65dB(A) for daytime & 45dB(A) for night time.

As R15 is not a residential receptors, the ABC assessment is not applicable to these receptors as such, the cumulative noise level at this receptor location is compared with established Uzbekistan noise limit of 55dB(A) for daytime and 45dB(A) for night time. Upon comparison, it is evident that mechanical & installation works impacts from the Project to these receptors would not be discernible both at daytime & night time as the cumulative noise level at these receptor locations is well below the established limits.

The table below shows the anticipated noise levels for those receptors located away from baseline noise monitoring locations

Table 9-16 Mechanical & Installation Works Attenuation by Distance

RECEPTOR	DISTANCE FROM SOURCE	PREDICTED NOISE LEVEL
Source Noise: 81.5dB(A) (at 10m)		
R23	1850	26.8
R24	1300	30.6
R25	1700	27.7
R26	1250	31.0
R28	1950	26.2

Receptor	Distance from Source	Predicted Noise Level
R29	1500	29.1
Mining Area 1	1300	30.6

9.3.1.2 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 boundary 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 dirt road which runs parallel to the railway line at the Project site has a very 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 A-397 highway 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.

9.3.1.3 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, although some vibration may be discernible at the boundaries of the Project site.

As such, vibratory impacts at the animal holding area with accommodation (R22) at the north eastern extent of the Project boundary will likely be negligible only If site works are undertaken in proximity of the wind farm boundary while impacts at receptor location over 500m are not expected to be discernible due to the large attenuation of vibration over distance.

With respect to the fauna, vibration associated with construction may trigger a flight response for fauna at the Important Bird Area lake (Ayakagitma lake) approximately 500m west of the Project site. This is assessed further in the Terrestrial Ecology Chapter in Part A of this ESIA.

9.3.1.4 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

9.3.1.5 Noise Impacts at Accommodation Facilities Located on Site

Some of the EPC construction workers will live at the accommodation camp that will be located at the Project site. This will potentially expose the workers to construction phase noise levels especially in the event that workers are required to work in shifts (day and night). Currently, the exact location of the accommodation facilities has not been determined at this point. As such, the EPC Contractor will be required to undertake further consideration of noise impacts and implement any required mitigations once the location of accommodation facilities is confirmed by suing a similar method to that outlined above.

Table 9-17 Noise and Vibration- 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 –Noise generated from general construction activities	**Negligible Negative**	Ayakagitma lake **(R15)**	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.	**Negligible**
		Animal Holding Area and Accommodation area **(R23)**	High	**Minor**		**Negligible**
		Herder Accommodation Area **(R24)**	High	**Minor**		**Negligible**
		Fishermen Accommodation Structure **(R25)**	Medium	**Negligible to Minor**		**Negligible**
		Animal holding area **(R26)**	High	**Minor**		**Negligible**
		Livestock Water wells – A **(R28)**	Medium	**Negligible to Minor**		**Negligible**
		Livestock Water wells – B **(R29)**	Medium	**Negligible to Minor**		**Negligible**
		Mining area 1 (including mine workers)	Low	**Negligible to Minor**		**Negligible**
		Mining area 2 (including mine workers)	Low	**Negligible to Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					• 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 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- Noise from movement of construction vehicles	**Minor Negative**	Kuklam Village **(R12)**	High	**Minor to Moderate**	• Limit unnecessary usage of vehicles/equipment – No idling – Equipment to be shut or throttled down when in intermittent use.	**Negligible to Minor**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
		Ayakagitma lake **(R15)**	High	**Minor to Moderate**	• 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 to Minor**
		Animal Holding Area and Accommodation area **(R23)**	High	**Minor to Moderate**		**Negligible to Minor**
		Herder Accommodation Area **(R24)**	High	**Minor to Moderate**		**Negligible to Minor**
		Fishermen Accommodation Structure **(R25)**	Medium	**Minor**		**Negligible**
		Animal holding area **(R26)**	High	**Minor to Moderate**		**Negligible to Minor**
		Livestock Water wells – A **(R28)**	Medium	**Minor**		**Negligible**
		Livestock Water wells – B **(R29)**	Medium	**Minor**		**Negligible**
		Mining area 1 (including mine workers)	Low	**Negligible to Minor**		**Negligible**
		Mining area 2 (including mine workers)	Low	**Negligible to Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
		Herder's structure and animal holding area **(R33)**	**High**	**Minor to Moderate**	• Speed limits established in the Traffic Management Plan will be adhered to.	**Negligible to Minor**
		Herder's structure **(R34)**	**High**	**Minor to Moderate**		**Negligible to Minor**
		Herder's structure and animal holding area **(R35)**	**High**	**Minor to Moderate**		**Negligible to Minor**
Construction vibration impacts (including vehicle vibration)	**Negligible Negative**	Animal Holding Area with accommodation area **(R22) -** only If site works are undertaken in proximity of the wind farm boundary	**High**	**Minor**	• The Contractors will, at all times, carry out all work in such a manner as to keep any disturbance from vibration to a minimum. • Where practical, all vibratory generating equipment and activities will be sited away from the Project boundary and away from the contractor camp • Vibrating equipment/machinery will be switched off when not in use.	**Negligible**
Impacts to Construction Workers	**Moderate Negative**	Wind Farm Site Workers	**High**	**Moderate to Major**	• 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	**Minor to Moderate**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					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.	
Impacts at the accommodation areas located at the Project site	**To Be Determined**	Construction Workers living on site	To Be Determined	**To Be Determined**	• The Occupational H&S Plan will include measures to reduce the risk of potential sleep disturbance to workers (who may work both day and night shifts). Where practical the benchmark for noise in the sleeping areas will be taken against the WHO Guidelines for Community Noise (2011) of 30dB (LAeq,8h). • Worker accommodation facilities will be located further away from the construction areas and facilities such as canteens and laundry rooms positioned in a way that creates a buffer zone between the sleeping areas and construction areas. • The accommodation camp will be constructed with considerations for noise attenuation (which may include noise barriers, additional sound proofing and acoustical window treatments such as	**To Be Determined**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					double glazed windows, noise cancelling shutters or blinds, etc.). • If necessary, solid walls (rather than wire fences) may be required to fence the accommodation area. • Where noisy activities are located in close proximity to the EPC accommodation facilities, stockpiling of materials could be considered between the source of noise and the camp so as to provide acoustic screening.	

9.3.2 Operational Phase

9.3.2.1 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 IMMI2020 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).

RESULTS

The results of the noise model for the Wind Farm are shown in the table below.

Table 9-18 Noise Levels at Receptors (rounded) - First Floor (4m above ground)

RECEPTOR	RECEPTOR TYPE	NEAREST TURBINE	DISTANCE TO NEAREST TURBINE (M)	5M/S	6M/S	7M/S	8M/S	9M/S	10M/S
				$L_{A90,T}$ DB					
R5	Structures – Residential Use	BAS32	265	49.1	51.5	54.9	57.7	59.1	59.4
R6	Structures – Residential Use	BAS32	1047	34.8	37.3	40.6	43.5	44.9	45.2
R7	Structures – Residential Use	BAS76	3038	27.5	29.9	33.3	36.1	37.5	37.8
R12	Residential	BAS71	4720	18.8	21.2	24.6	27.4	28.8	29.1
R15	Ecological	BAS63	382	41.8	44.2	47.6	50.4	51.8	52.1
R18	Structures – Residential Use	BAS49	4605	22.1	24.6	27.9	30.8	32.2	32.5
R21	Structures – Residential Use	BAS1	1434	30.0	32.4	35.8	38.6	40.0	40.3
R22	Structures – Residential Use	BAS56	730	38.2	40.6	44.0	46.8	48.2	48.5
R23	Structures – Residential Use	BAS19	3696	25.3	27.8	31.1	34.0	35.4	35.7
R24	Structures – Residential Use	BAS40	1804	30.3	32.7	36.1	38.9	40.3	40.6
R25	Structures – Fishermen Shelter	BAS39	2492	27.6	30.0	33.4	36.2	37.6	37.9
R28	Ecological	BAS35	3015	25.0	27.4	30.8	33.6	35.0	35.3
R29	Ecological	BAS40	1882	29.8	32.3	35.6	38.5	39.9	40.2
R30	Structures –	BAS68	5236	16.5	18.9	22.3	25.1	26.5	26.8

Receptor	Receptor Type	Nearest Turbine	Distance to Nearest Turbine (m)	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
				$L_{A90,T}$ dB					
	Residential Use								

Based on the table above, predicted noise emissions from wind turbines at the assessed receptors ranged between approximately 26.8dB(A) to 59.4dB(A) at 10m/s. The predicted noise levels at the majority of the receptors (with the exception of two locations) were above the 35dB L_{A90} noise limit established by the IFC EHS Guidelines: Wind Energy, indicating that detailed modelling was required for 12 receptors.

The figures below present the noise dispersion plots centred at wind speeds 5m/s and 10m/s

Figure 9-10 Noise Contour at the Project site R24, R25, R28, R29 (5m/s Wind Speed)

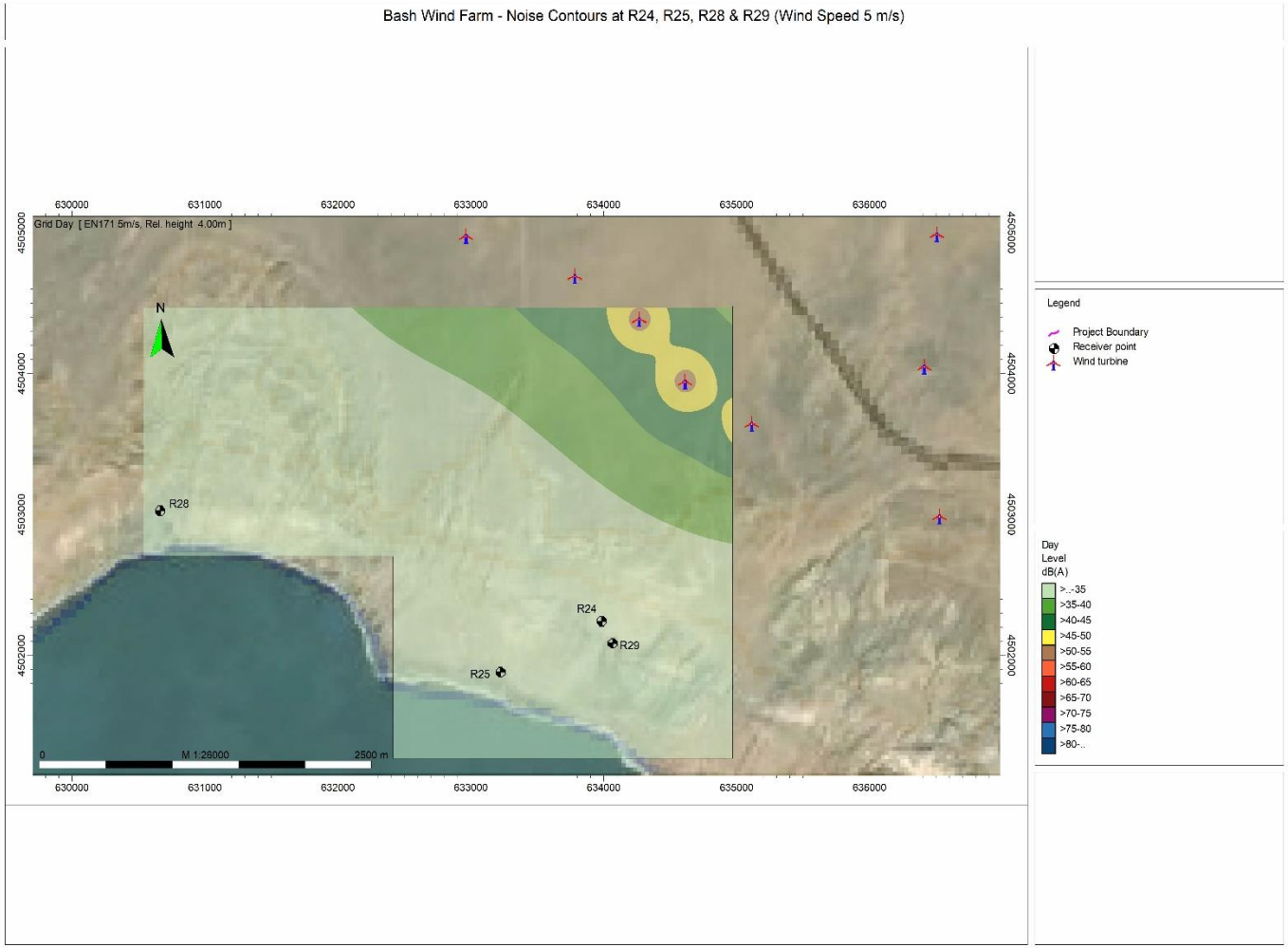


Figure 9-11 Noise Contour at the Project site R5, R6 (5m/s Wind Speed)

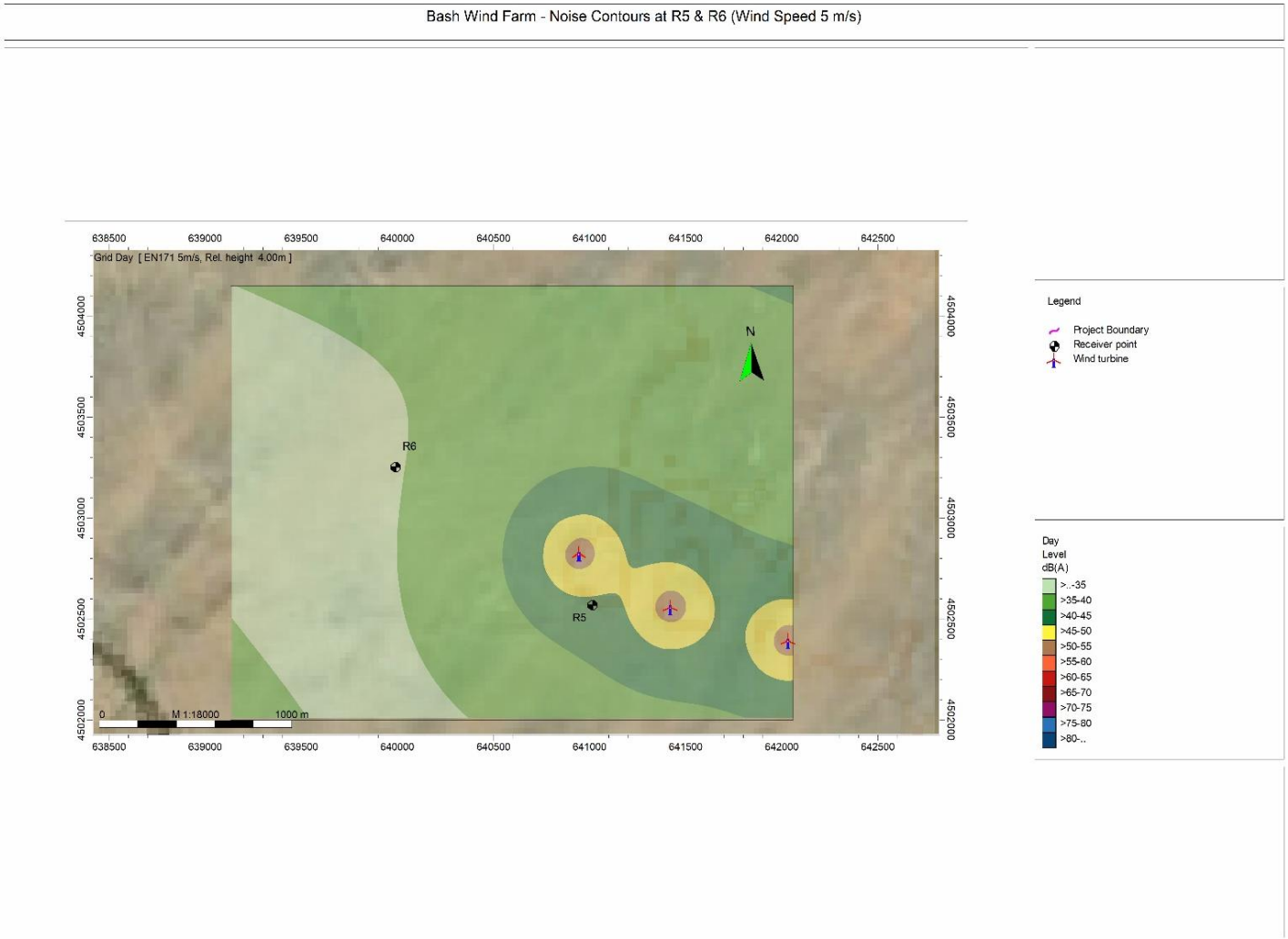


Figure 9-12 Noise Contour at the Project site R7 (5m/s Wind Speed)

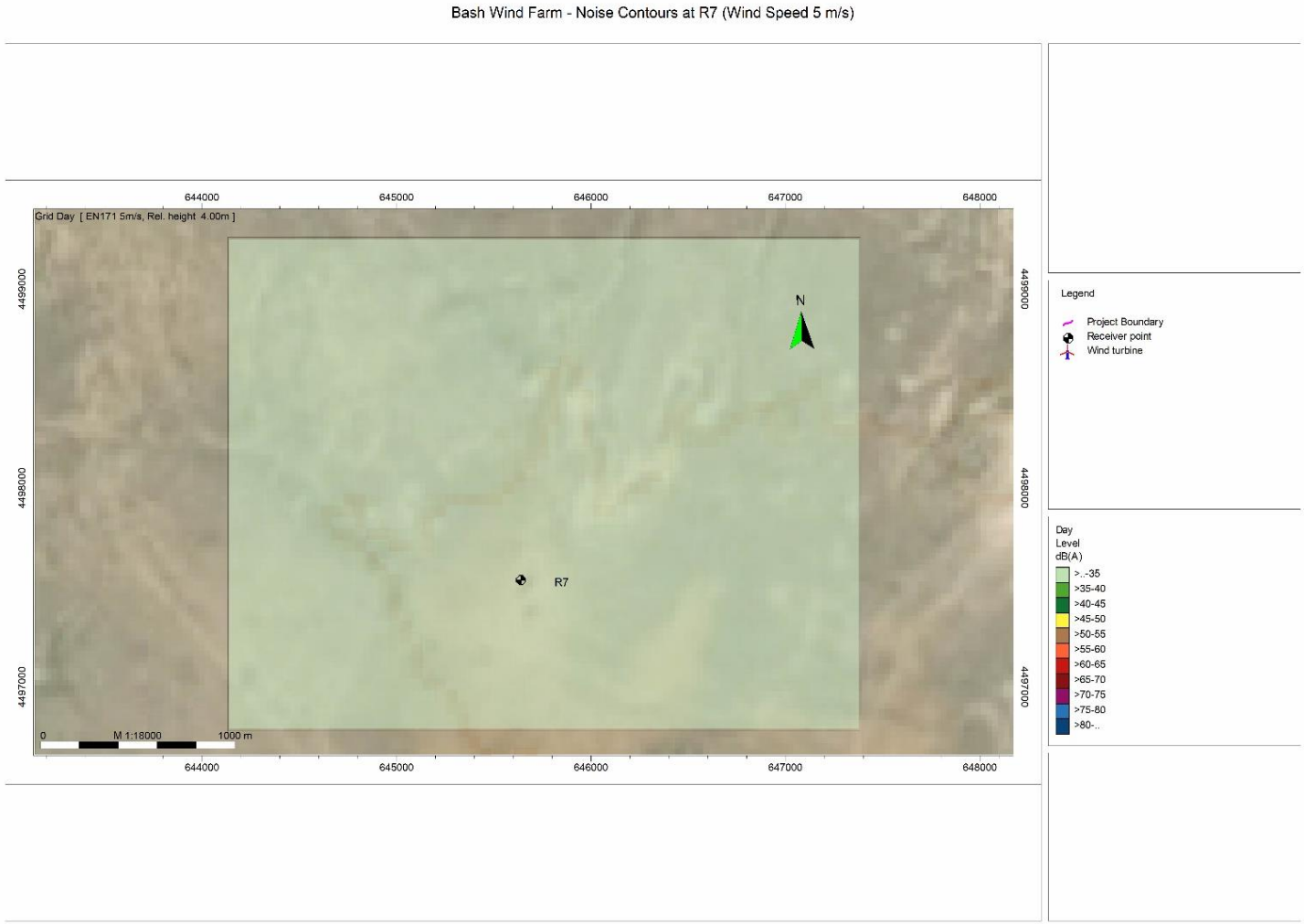


Figure 9-13 Noise Contour at the Project site R18 and R21 (5m/s Wind Speed)

Figure 9-14 Noise Contour at the Project site R22 (5m/s Wind Speed)

Figure 9-15 Noise Contour at the Project site R23 (5m/s Wind Speed)

Figure 9-16 Noise Contour at the Project site R24, R25, R28, R29 (10m/s Wind Speed)

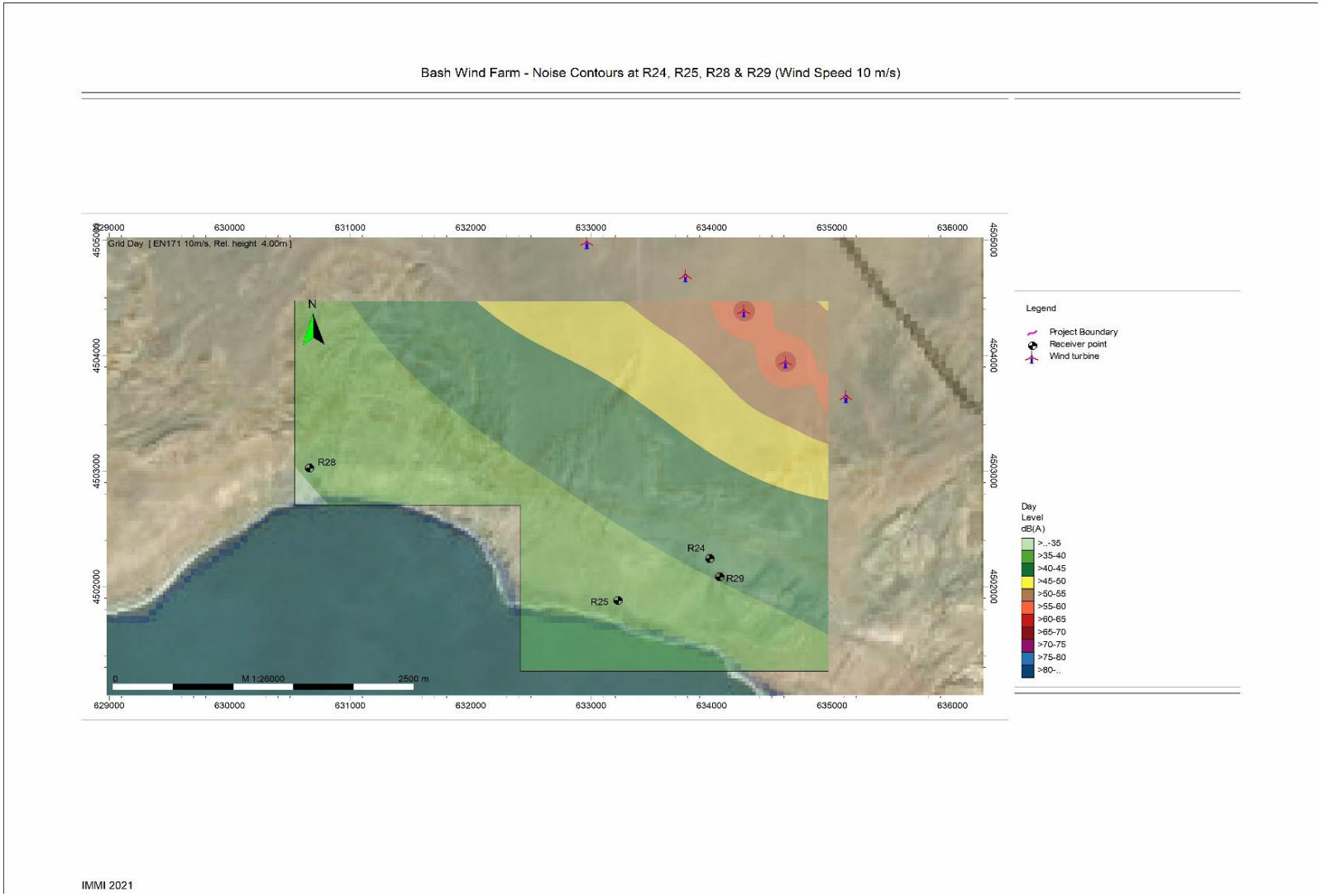


Figure 9-17 Noise Contour at the Project site R5, R6 (10m/s Wind Speed)

Figure 9-18 Noise Contour at the Project site R7 (10m/s Wind Speed)

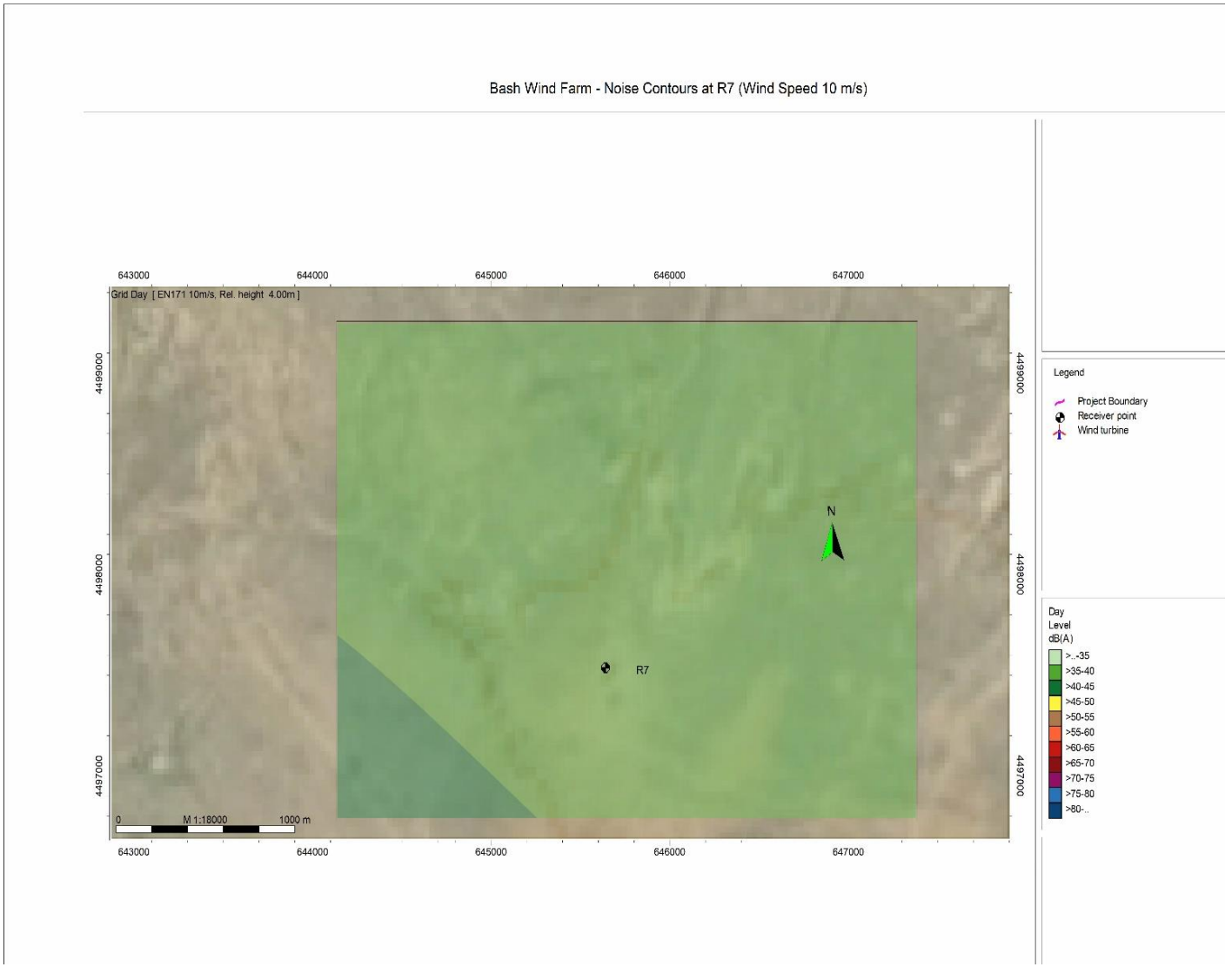


Figure 9-19 Noise Contour at the Project site R18 and R21 (10m/s Wind Speed)

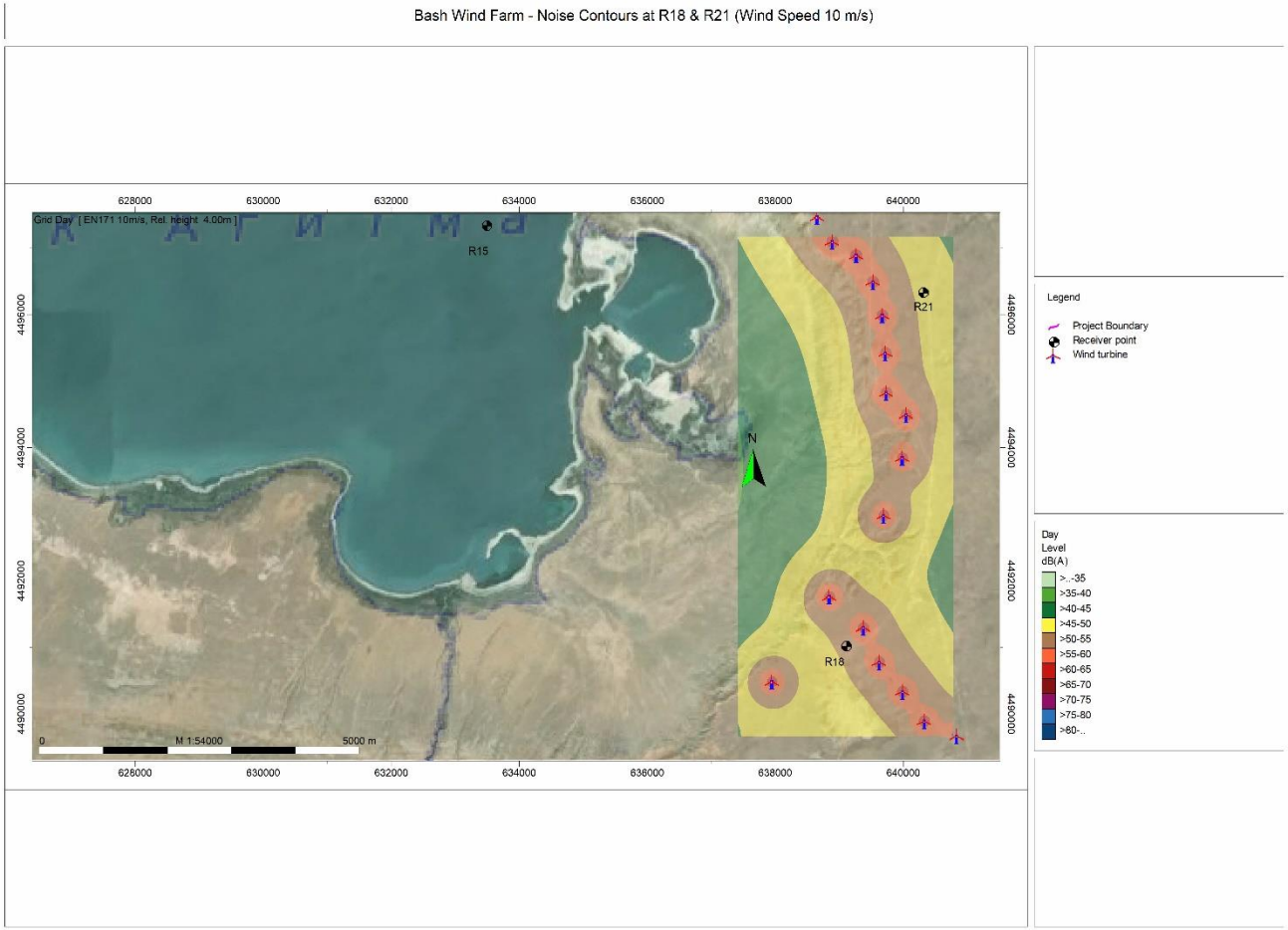


Figure 9-20 Noise Contour at the Project site R22 (10m/s Wind Speed)

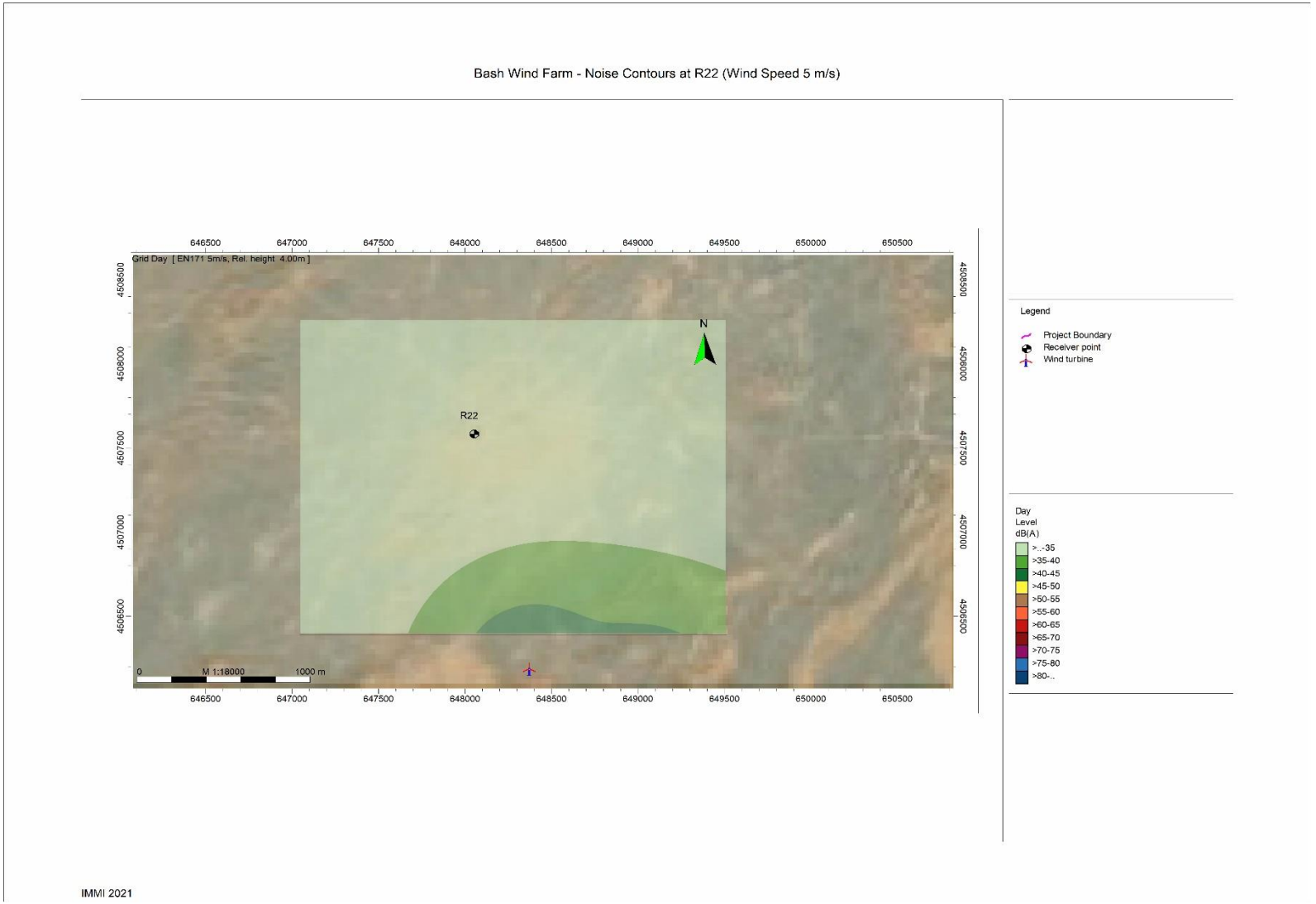


Figure 9-21 Noise Contour at the Project site R23 (10m/s Wind Speed)

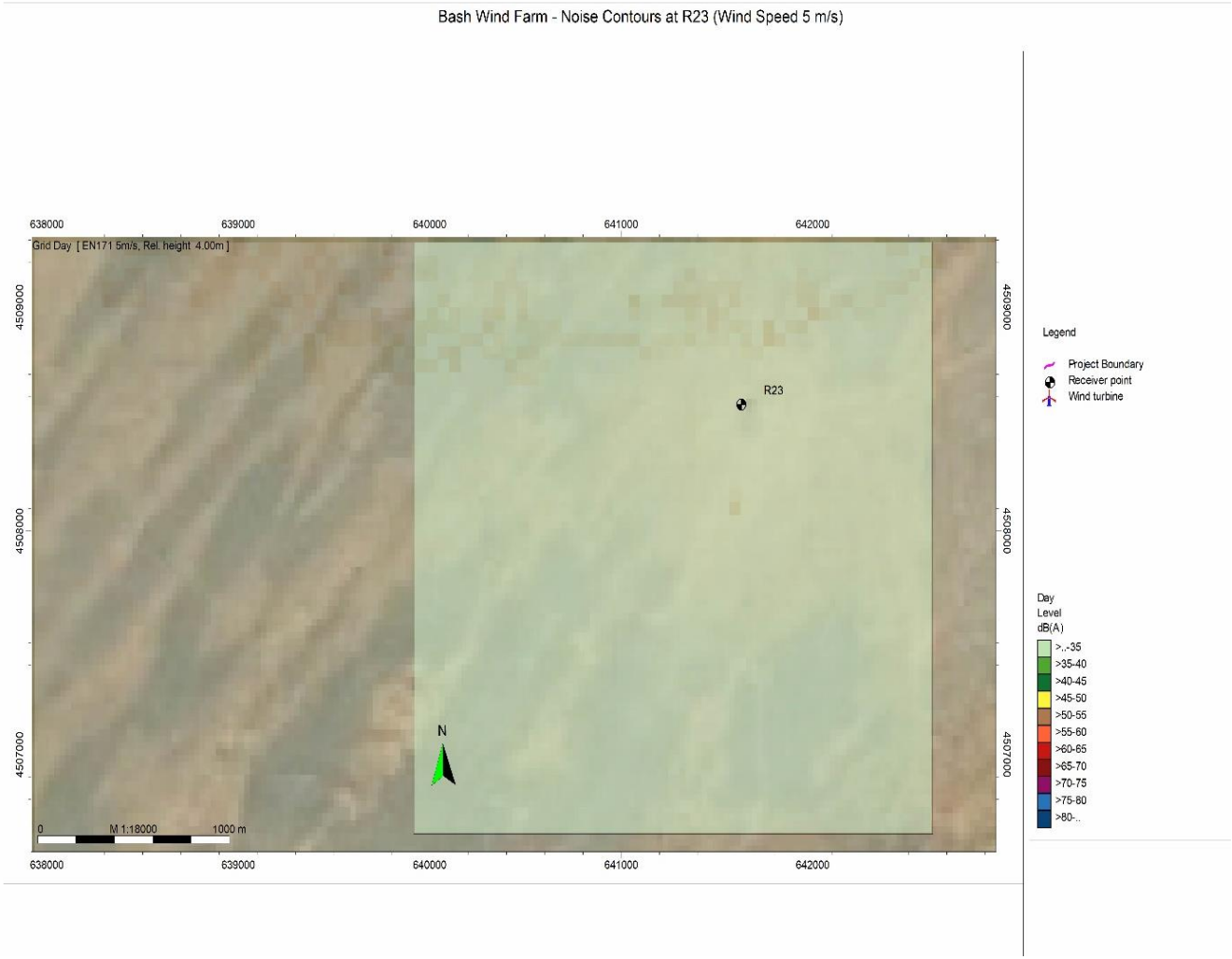


Table 9-19 Compliance Status with IFC/Uzbekistan Assessment Limits

Receptor	Receptor Type	Compliance Status		
		Initial IFC 35 dB $L_{A90,T}$ criterion	IFC General / Uzbekistan Daytime 53 dB criteria	IFC General / Uzbekistan Night-time 43 dB criteria
R5	Structures – Residential Use	N	N	N
R6	Structures – Residential Use	N	Y	N
R7	Structures – Residential Use	N	Y	Y
R12	Residential	Y	Y	Y
R15	Ecological	Y	Y	Y
R18	Structures – Residential Use	N	N	N
R21	Structures – Residential Use	N	Y	N
R22	Structures – Residential Use	N	Y	Y
R23	Structures – Residential Use	N	Y	Y
R24	Structures – Residential Use	N	Y	Y
R25	Structures – Fishermen Shelter	N	Y	Y
R28	Ecological	N	Y	Y
R29	Ecological	N	Y	N
R30	Structures – Residential Use	Y	Y	Y

Note: Y: Yes and **N:** No

As can be seen from the table above only two (2) receptors complied with the WBG/IFC's initial 35dB LA90,T criterion and as such, further detailed assessment including noise surveys was required for other receptors.

The detailed noise modelling undertaken for the 12 receptors is described below.

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 L_{A90} 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 $L_{A90,\,T}$ criterion, a more detailed modelling, including background ambient noise measurements were required.

Between the 10th of August 2021 and 9th September 2021, continuous background noise monitoring was conducted at four (4) proxy locations, NM1 to NM4. The four proxy locations, as shown in the figure below were chosen to represent the twelve (12) receptors identified in the preliminary model. Receptor R5 and R6 will have to be resettled regardless and as such no further monitoring were done at R5&R6 location. Noise data were recorded in ten-minute intervals, with $L_{A90,10min}$ readings synchronised with the on-site wind mast data.

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 IMMI2020, using the methodology outlined in ISO9613 (ISO 9613-2 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation") which describes a detailed procedure to calculate sound levels from point/line/area sources.

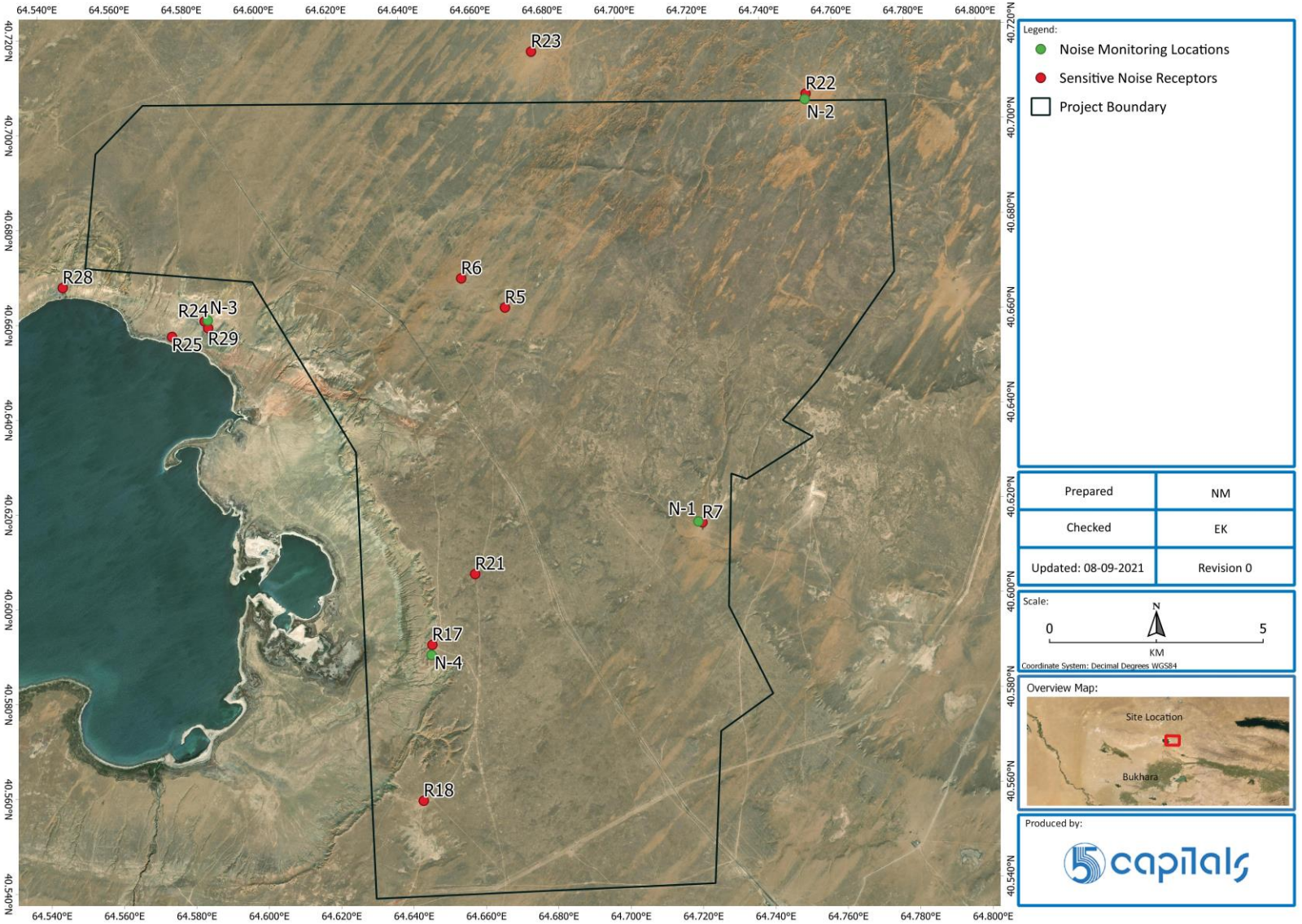
ISO 9613-2 computes long-term average sound levels including downwind conditions (favourable propagation of sound with significant positive wind from source to the receiver). The guidance given by ISO 9613-2 on how to determine the meteorological correction term C0 is rather unsatisfactory and therefore the following global parameters are also included in the noise model:

- Temperature 10°C; relative Humidity 70% (worst-case for sound propagation);
- Light downwind propagation towards the receptor (standard ISO9613 application); and
- Ground attenuation factor 0 (worst-case).

Noise attenuation from buildings and significant plant on/off-site has been included in the noise model. The model also incorporates the layout of the wind turbines on the project site.

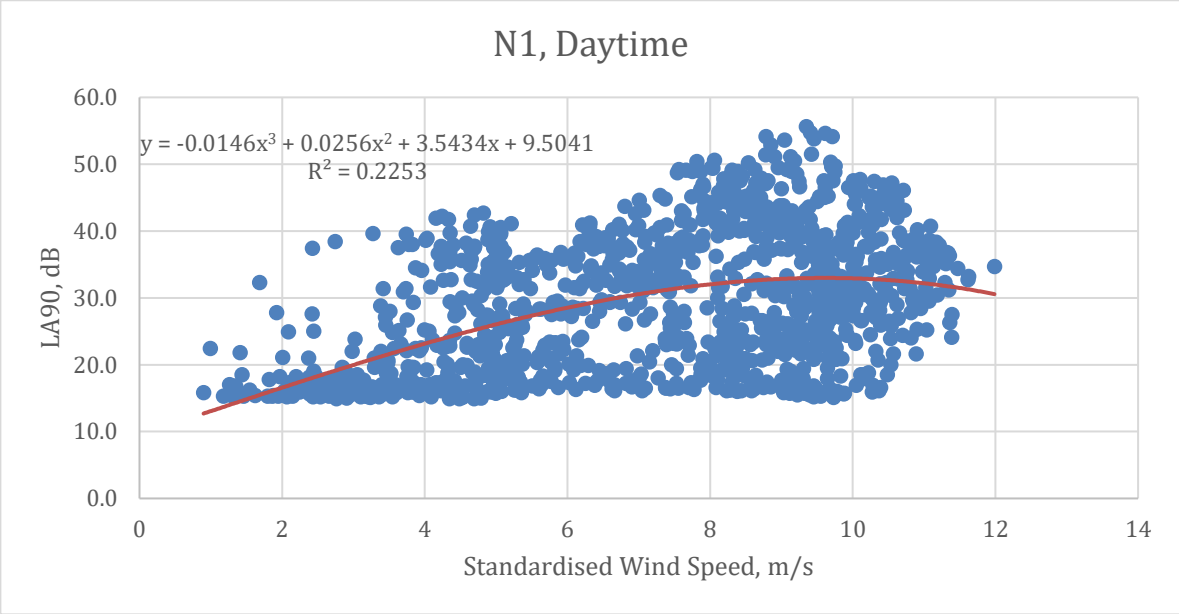
All acoustic measurement equipment conformed to Type 1 specification of British Standard 61672: 2013: Electroacoustics. Sound level meters. Part 1 Specifications. Furthermore, equipment was calibrated at the start and end of each measurement period, with no significant drift in calibration observed.

Figure 9-22 Detailed Noise Monitoring Locations



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 9-23 Regression Analysis at Survey Location N1



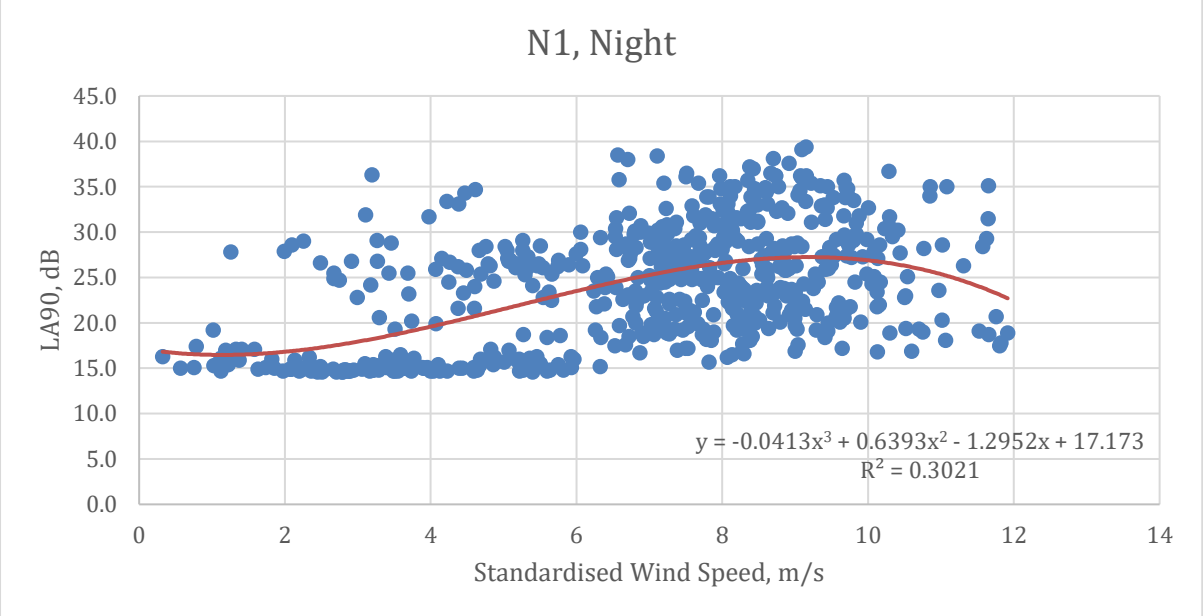
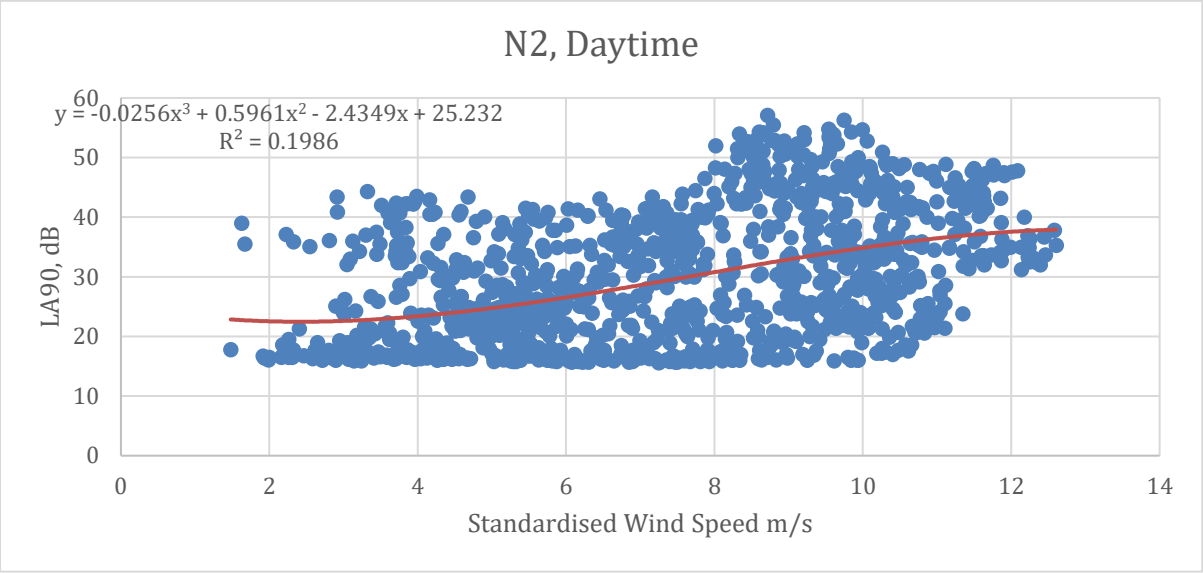


Figure 9-24 Regression Analysis at Survey Location N2



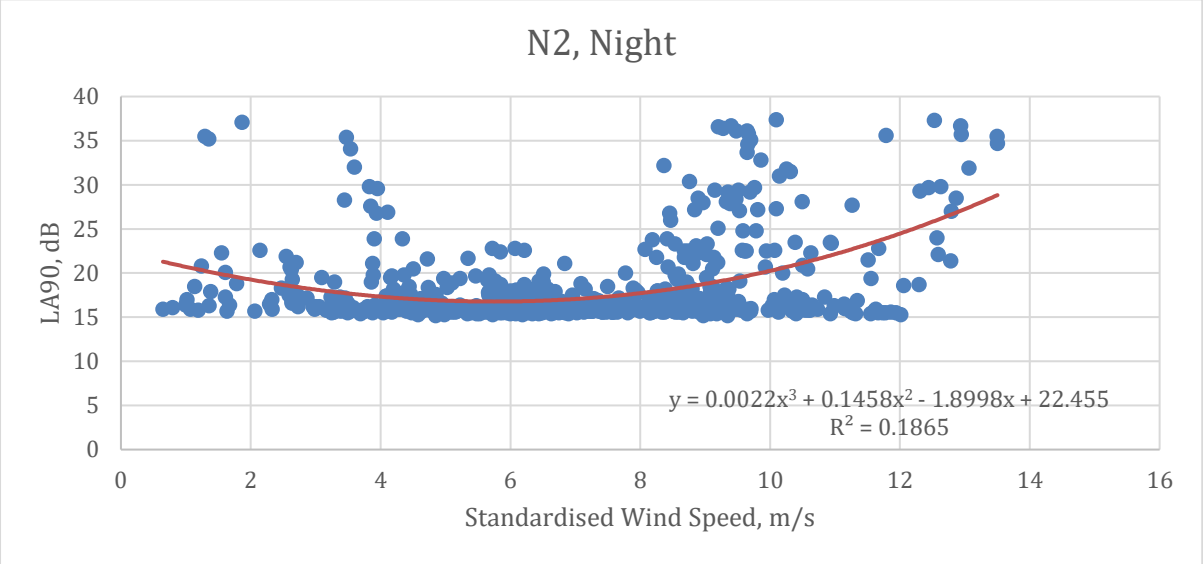
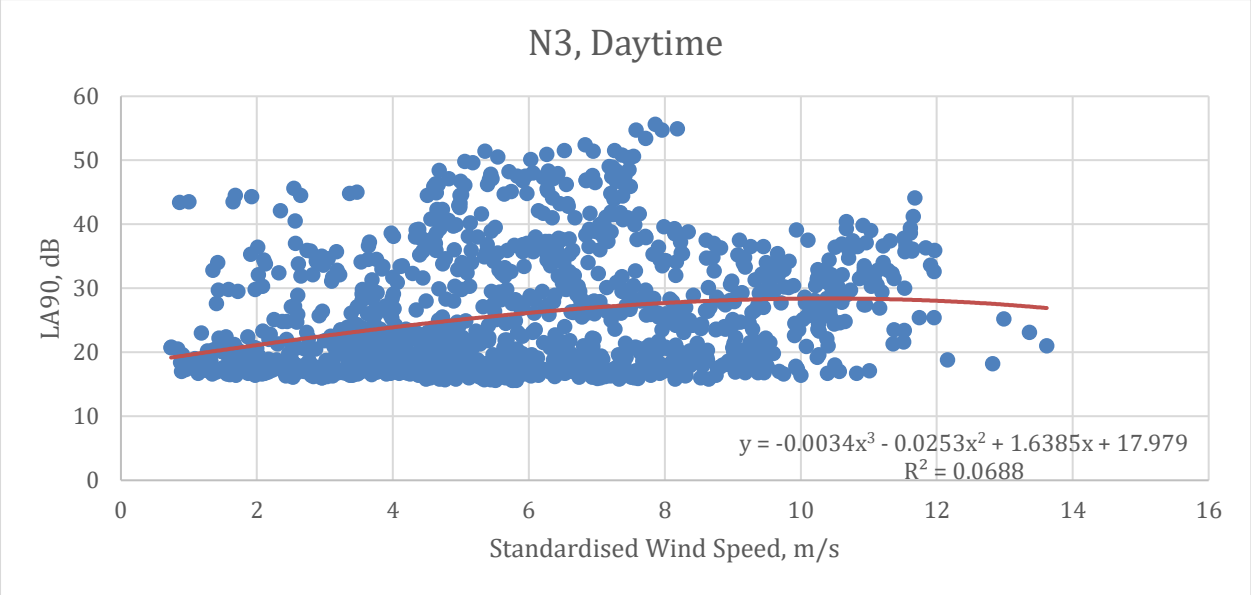


Figure 9-25 Regression Analysis at Survey Location N3



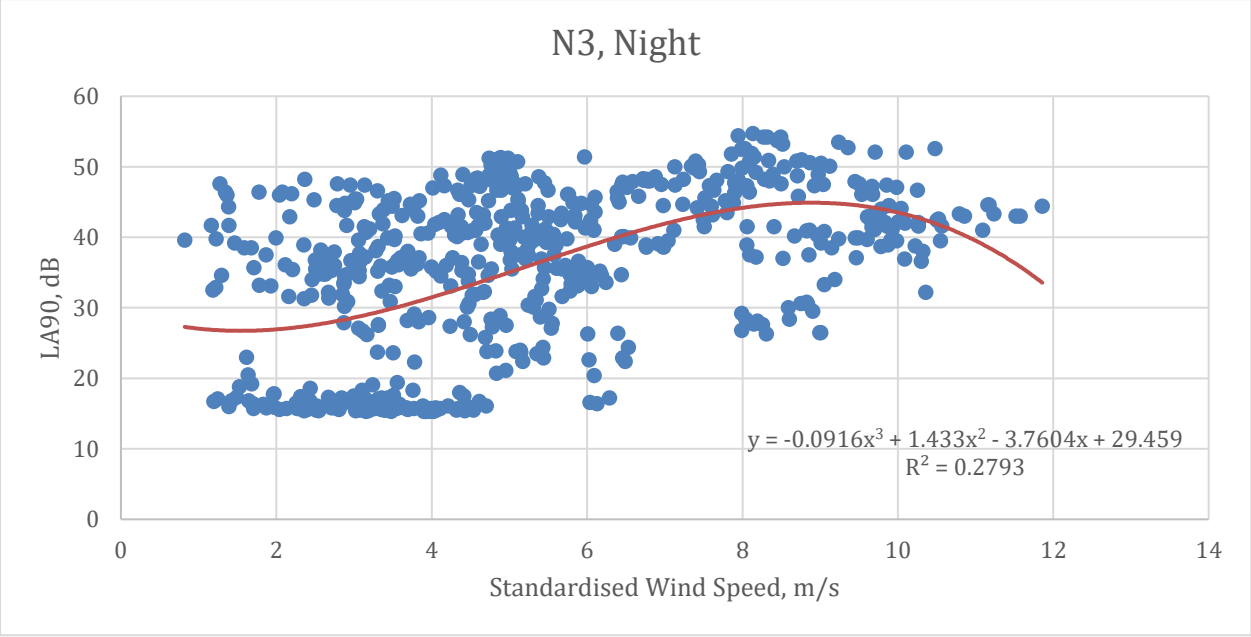
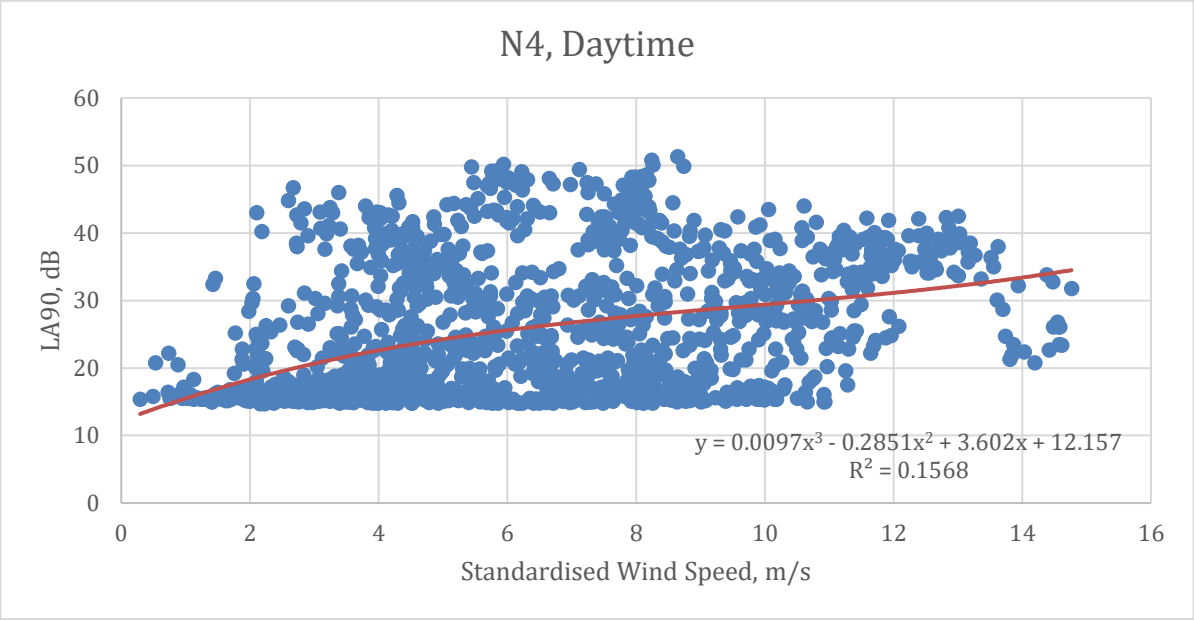
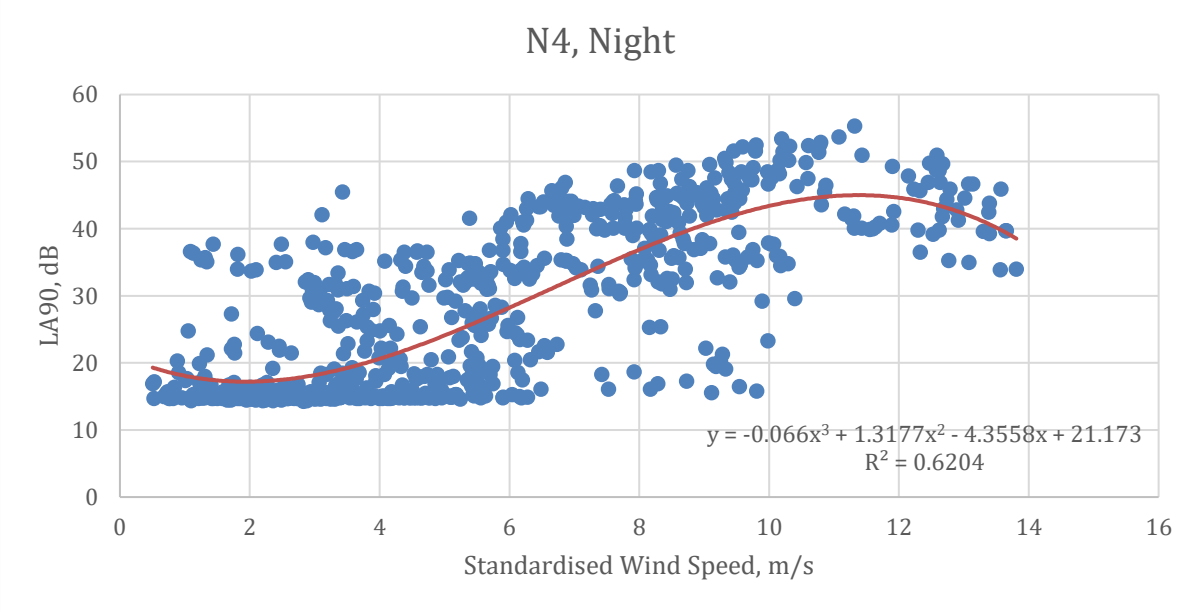


Figure 9-26 Regression Analysis at Survey Location N4





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 receptor locations.

Table 9-20 Derived Background Noise Limits

Location	Noise Level at Reference Wind Speed (10 m/s at 10m), $L_{A90,T}$ dB Day/Night	Derived Criteria based on Background Noise levels, $L_{A90,T}$ dB (10 m/s) Day/Night	Predicted Noise Levels
R5	28/39	53/43	**59.4**
R6	28/39	53/43	**45.2**
R7	33/27	53/43	37.8
R12	33/27	53/43	29.1
R15	29/43	53/43	32.5
R18	29/43	53/43	**52.1**
R21	29/43	53/43	**48.5**
R22	29/43	53/43	40.3
R23	29/43	53/43	35.7
R24	28/39	53/43	40.6
R25	28/39	53/43	37.9
R28	28/39	53/43	35.3
R29	28/39	53/43	40.2
R30	29/43	53/43	26.8

As presented in the table above, noise contributed from the WTGs is 59.4 dB(A) and 52.1 dB(A) at R5 and R18 respectively which are higher than the day & night time background noise (53 dB(A) & 43 dB(A)). Noise contributed from the WTGs at R6 and R21 are 45.2 dB(A) and 48.5 dB(A) respectively and are higher than the night time background noise (43 dB(A)).

It is important to note that R5, R6, R18, and R21 are residential structures located within the Project site and used by herders therefore, the sensitivity of these receptors is considered to be 'High'.

The magnitude of impact at 10m/s wind speed is anticipated to be Moderate for R5, R6, R18, and R21 and Negligible for other receptors.

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.

The noise modelling study is presented in Appendix K.

9.3.2.2 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.

Table 9-21 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**	Structures – Residential Use **(R5)**	High	**Moderate to Major**	• Relocation of R5, R6 R18 and R21 will be undertaken in accordance with the Project specific Resettlement Action Plan (RAP). • Third parties/ herders will have access to a grievance mechanism in order to make any complaints regarding noise during the operation phase.	**n/a**
	Moderate Negative	Structures – Residential Use **(R6)**	High	**Moderate to Major**		**n/a**
	Negligible Negative	Structures – Residential Use **(R7)**	High	**Minor**		**Negligible**
	Negligible Negative	Ecological **(R15)**	Medium	**Negligible to Minor**		**Negligible**
	Moderate Negative	Structures – Residential Use **(R18)**	High	**Moderate to Major**		**n/a**
	Moderate Negative	Structures – Residential Use **(R21)**	High	**Moderate to Major**		**n/a**
	Negligible Negative	Structures – Residential Use **(R22)**	High	**Minor**		**Negligible**
	Negligible Negative	Structures – Residential Use **(R23)**	High	**Minor**		**Negligible**
	Moderate Negative	Structures – Residential Use **(R24)**	High	**Moderate to Major**		**Negligible**
	Negligible Negative	Structures – Fishermen Shelter **(R25)**	High	**Minor**		**Negligible**
	Negligible Negative	Ecological **(R28)**	Medium	**Negligible to Minor**		**Negligible**
	Minor Negative	Ecological **(R29)**	Medium	**Minor**		**Negligible**
Operational Vehicle Noise	**Negligible Negative**	Wind Farm Operation Workers	High	**Minor**	• Limit unnecessary usage of vehicles/equipment – No idling – Equipment to be shut or throttled down when in intermittent use.	**Negligible**
	Negligible Negative	Kuklam Village **(R12)**	High	**Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
	Negligible Negative	Herder's structure and animal holding area **(R33)**	High	**Minor**	• 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 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	**Negligible**
	Negligible Negative	Herder's structure **(R34)**	High	**Minor**		**Negligible**
	Negligible Negative	Herder's structure and animal holding area **(R35)**	High	**Minor**		**Negligible**

9.3.3 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.

9.4 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 9-22 Noise Monitoring Requirements

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
Construction			
Day time noise	Leq(A)	Weekly for 10-15 minutes periods at each location	Receptor location, at the project accommodation camp.
Night time noise			
Operation			
Day & night noise from wind farm	Leq(A)	Quarterly for 10 days at each location	If complaints are received from receptors regarding wind turbine noise, monitoring will be undertaken at complainant's locations

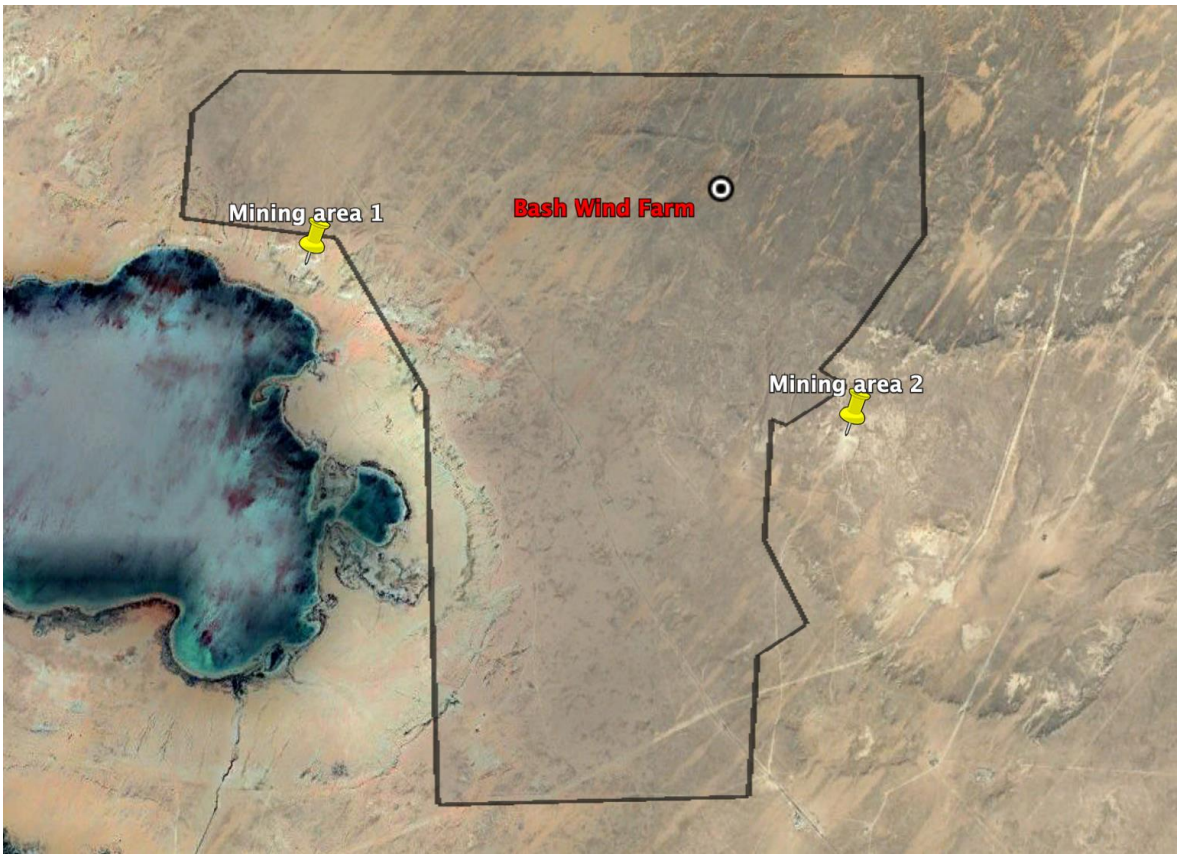
10 SOILS, GEOLOGY, GROUNDWATER & SURFACE WATER

10.1 Observation and Baseline Conditions

10.1.1 Mining Activities at the Project Site

There are two mining areas approximately 1.4km to the east (Mining area 1) and 0.9km west (Mining area 2) of the Project site. The mining areas belong to Lucent Centre LLC and Novoi Sanoat Sadvo LLC respectively. According to the PPA, the Project site activities should keep a distance from these existing mining activities. Visits to these mining areas revealed that no mining activities are being undertaken

Figure 10-1 Mining Areas Near the Project Site



Additionally, consultation letters were sent to the State Committee of the Republic of Uzbekistan for Geology and Mineral Resources on 29th March 2021 requesting for information about the nature of the mining activities, workers involved, use of the Project site, additional stakeholders involved in the mining activities etc. A response was provided by the Committee on 20th May 2021.

Table 10-1 Response from State Committee on Geology & Mineral Resources

CLARIFICATION REQUESTED BY 5 CAPITALS	RESPONSE BY STATE COMMITTEE
Mining Area 1	
When did the mining activities begin?	The license for extraction was obtained in 2020 for the extraction of gypsum.
What type of materials are extracted in these areas?	For gypsum extraction
Would you please confirm whether the mining activities are complete?	For the time being extraction work is still being carried out. *It is noted that no mining activities have been observed during several visits to the mining areas.*
Would you please clarify if the mining activities will be restarted in this area?	The license for extraction work has been granted until 2076 but Lucent Centre LLC which was granted the license is still looking for funding.
How many workers are involved in the mining activities?	For further information please contact Lucent Centre LLC. *Contact details of the LLC were provided for further consultations.*
Would you please confirm the location of the accommodation facilities for the workers working in this mine?	
Do the workers use the Project site? - As an access route - Transportation of raw materials/minerals - Other uses (please clarify)	
Mining Area 2	
When did the mining activities begin?	License for mining was obtained in 2020 for gypsum extraction.
What mines are extracted from this area?	Gypsum extraction.
Which company is responsible for the mining activities?	Navoi Sanoat Saydo LLC is responsible for mining activities on "Qorasigir Mining".
Mining areas were observed to be abandoned during the site visit but accommodation facilities and smelting machines were also observed. Would you please confirm what periods/months the mining is undertaken?	For further information please contact Navoi Sanoat Saydo LLC
When are mining activities in this area expected to be completed?	Extraction license for mining is valid until 2040.

After the receipt of information on the operators of the mining areas 1 & 2 from the Geology and Mineral Resources Committee, consultation letters were sent to Lucent Centre LLC and Novoi Sanoat Sadvo LLC on 26th May 2021 and subsequent telephone follow ups were made in June and July requesting for additional information about their mining activities, workers and waste management practices etc. Navoi Sanoat Saydo (Mining Area 2), provided copies of their business license, certificate and coordinates of their mining areas. However, responses to specific questions relating to their operations were not provided.

A response was received from the Lucent Centre LLC on 24th September 2021 stating that licence was obtained on 8th May 2021 for mining activities at the mining area 1 ' Sanjar' Gypsum Mining Area and mining works will commence in 2022. The following responses were provided to specific questions relating to the operation of the mine.

CLARIFICATION REQUESTED BY 5 CAPITALS	RESPONSE BY LUCENT CENTRE LLC
How many workers are involved in the mining activities?	27
Would you please confirm the location of the accommodation facilities for workers who work in mining area 1?	Within the mining area
Could you please provide us a cadastral map of mining area?	We have the licence
Do the workers in area one uses the project site: As an access route Transportation of the mined raw materials/minerals Other uses (please clarify)	For transportation of the mined raw materials/minerals
Where do the mining area dispose its waste including any wastewater, hazardous materials etc?	For waste disposal municipality allocates a separate land plot
Do the mining area employ any local residences from Ayakagytma village or any other communities within the project area? If yes, would you please provide us with an estimate?	Yes, 7-8 people
Would you please clarify whether the mining area rely on the local communities for the following: - Source of water (please provide the source and volume) - Waste disposal - Local medical clinic - Food supply - Other (please clarify)	Yes, for source of water 10 tons per month and for food supply
Which access roads are used in the transportation of the raw materials from the mining areas?	Raw materials are taken to the point of goods delivery of train departure
Does the mining area use any of the project site i.e., an access road, transportation of mined materials etc?	For transportation of mined materials only

CONSULTATION WITH STATE COMMITTEE ON GEOLOGY & MINERAL RESOURCES

A consultation meeting was held on 17th July 2021 with the State Committee on Geology and Mineral Resources in order to discuss the following main issues:

- Existing mining areas around Bash and Dzhankeldy project sites;
- Existing mining areas along the proposed corridors of the OHTLs (Dzhankeldy-Bash-Karakul);
- Future plans for the Committee in conducting mining activities near the Bash and Dzhankeldy Project sites;
- The requirements of conducting construction works near existing mining areas (i.e., buffer zones etc).

The outcome of the meeting is as summarised in the table below.

Date of Consultation	17th July 2021
Time	15:30-17:00
Venue	Main Office of the State Committee of the Republic of Uzbekistan for Geology and Mineral Resources
Language	Uzbek
Number of Participants	4
Representatives from State Committee on Geology	Specialist in department of precious and non-ferrous metals
Project Representatives	Business Manager (ACWA Power) Social Consultant (Juru Energy) Chief OHTL engineer
Materials used	Kmz files related to the Project
Main Outcomes	

- Two mining areas are located near the Bash Project site and these are operated by Navoi Sanoat Saydo LLC and the Lucent Centre LLC. Mining by Navoi Sanoat Sadvo is conducted between April to November when the weather is conducive. Workers at the mine live in mobile vans during mining period. The gypsum mined by the Navoi Sanoat Sadvo is transported on local roads and the waste generated is transported to the nearest waste collection points
- The State Committee requested that people and machinery are kept at a minimum of 300m away from the mine to prevent explosive work impacts, 400m away to prevent destructive impacts from explosive works upon buildings and 500m away to prevent destructive impacts to people.
- Due to the potential of air pollution as a result of emission of dust and other harmful particles from mining activites, the committee suggested that it is necessary to keep a buffer of 1km
- The Committee informed ACWA Power that it is not possible to inform mine owner not to use explosive works when mining operation commence.

In August 2021, the State Committee on Geology & Mineral Resources provided copies of letters sent to the Ministry of Energy dated 12th June 2020. The letter states that the State Committee on Geology has no objection for additional land allocation for wind turbines in the area identified in Gijduvan district in Bukhara region.

Reference Appendix L for letters sent to Lucent Centre LLC and Novoi Sanoat Sadvo LLCs and correspondence with the Committee for Geology & Mineral Resources.

Ministry of Water Resources of the Republic of Uzbekistan

In addition to the consultations with the State Committee on Geology, ACWA Power obtained NOC from the Ministry of Water Resources of the Republic of Uzbekistan on 5th August 2021. The letter states:

"Due to the absence of irrigation facilities on the territories of projected wind farms by ACWA Power Bash Wind LLC in Gijduvan district in Bukhara region, the Ministry of Water Resources of the Republic of Uzbekistan states it has no objection to the construction of the wind farm".

10.1.2 Project Site Conditions

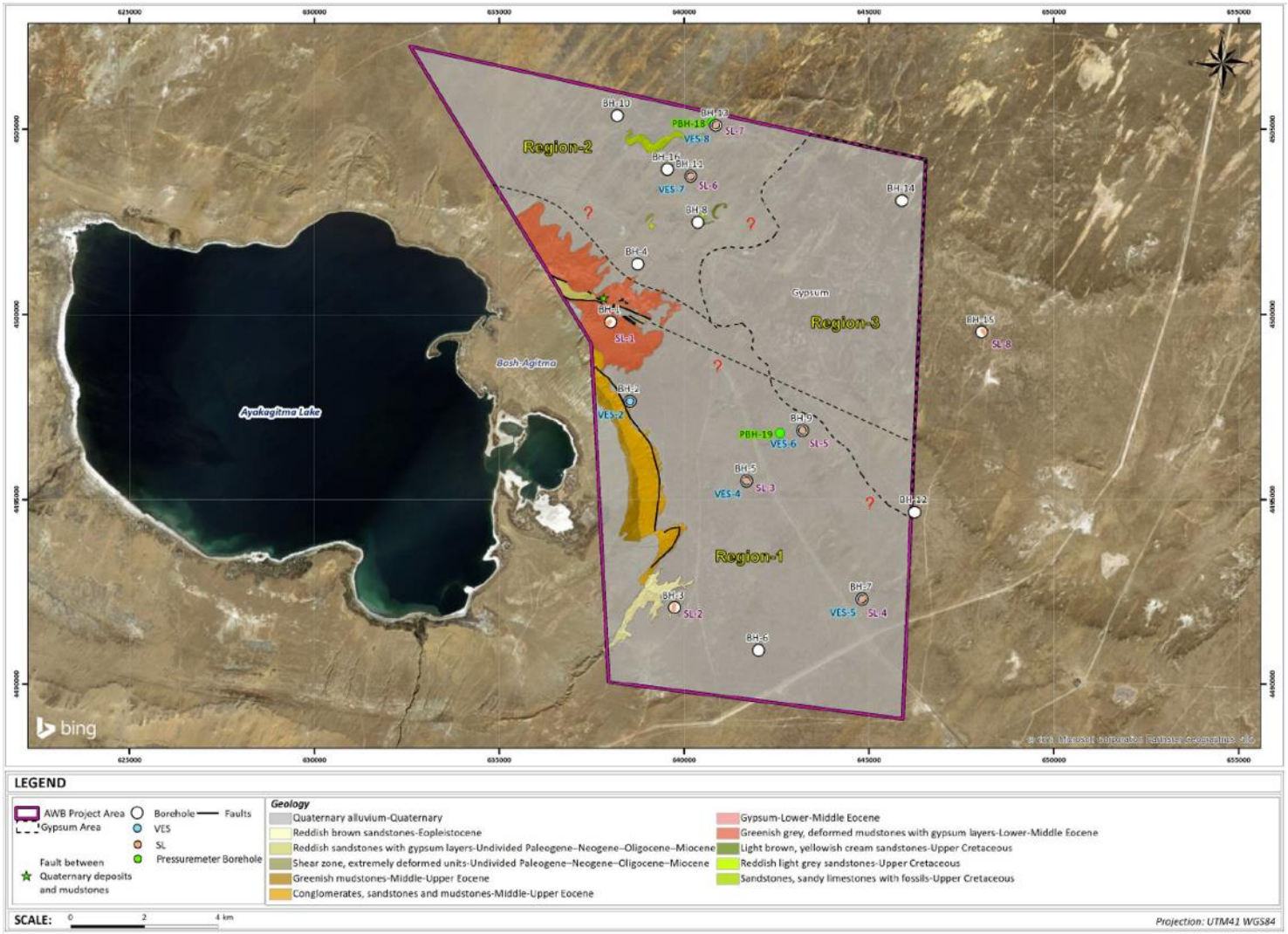
10.1.2.1 Geology

A geotechnical site investigation was undertaken by UzAssystem in April 2021 (UzAssystem, 2021a) in order to understand the geology & physical properties of the project site. This investigation included geological observations, geotechnical drilling works and geophysical field tests.

During field work, eleven (11) different geological units were observed. A map showing the location of these geological units are shown in the figure below.

Note: The Project site layout in the figure below (as extracted from the geotechnical report) is different from the final project layout as shown across different Chapters of this report. This is due to the change made to the layout in March 2021 in order to minimise potential environmental & social impacts and minimise interferences with existing settlements and accommodation area. See the Project Alternatives Chapter for more details.

Figure 10-2 Geological Map of the Project Site (Adapted from UzAssystem, 2021a)



The majority of the Bash Project site is covered with in-situ alluvium consisting of completely weathered units and residual soil containing 1mm to 10cm sized polygenetic angular / sub-angular gravels of the surrounding rocks. Geological map and rock unit descriptions shown in the figure above are based on the few outcrops observed in the project area.

These units are classified as rocks but most of them are classified as extremely to completely weathered, very weak, weakly cemented and behave like soils, even in subsurface according to the borehole data. The extreme to complete weathering and the soil-like behaviour of these units can be explained by the regional tectonism such as uplifting and the tectonic deformation of the area due to the regional compressional tectonics and / or its depositional setting. Extreme physical weathering and desertification also play an important role in the weakening of these geological units. Additionally, the weak cementation of these units may be due to the lack of the further sedimentation and lithification around the area.

10.1.2.2 Topography

The site area is vast but the topography of the Project site comprises of an extensive sand plain with low lying shrubs in some areas and remnant low mountains/cliffs at the western extent of the site. The site is steppe, homogenous and arid.

The site area includes some existing infrastructure including overhead transmission lines, railway line, railway station, gas pipeline and a dirt road that runs parallel to the railway line. Besides this existing infrastructure, the site is generally undeveloped.

Plate 10-1 View of the Sand Plains with Low Lying Shrubs

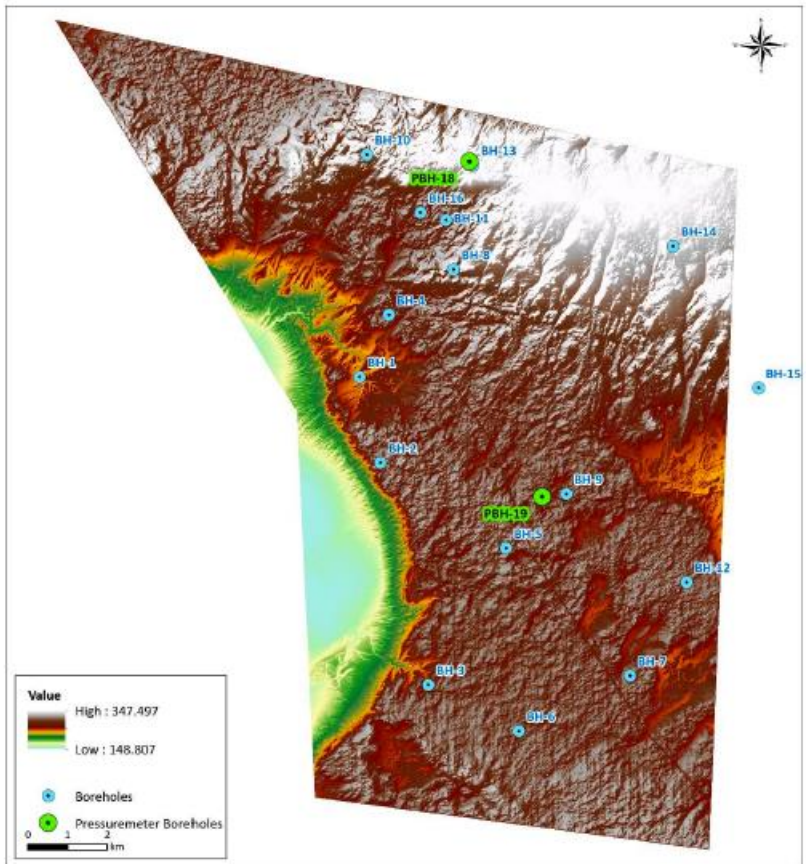
Plate 10-2 View of the Railway Line

Plate 10-3 View of the Gas Pipeline (buried)

a) Latitude: 40°34'35.04"N.
Longitude: 64°44'4.52"E
b) Latitude: 40°32'43.10"N.
Longitude: 64°39'43.67"E
c) Latitude: 40°32'31.49"N.
Longitude: 64°38'8.54"E

According to the topographical survey report prepared by UzAssystem in April 2021 (UzAssystem, 2021c), the elevation of the Bash site varies from approximately 350m above sea level (asl) to about 250m asl at the northern and southern part of the project area. According to the geotechnical site investigation report (April 2021) due to the North to South trending escarpment located at the West of the project area, the elevation at the site drop rapidly to 155m in south western extent of the site which is where the lowest elevation is recorded. The highest elevation is recorded in the north east extent of the site. Besides this escarpment, the general topography of the project area is mainly flat with hills having height of 40m-50m.

Figure 10-3 Digital Elevation Model of the Project Site (UzAssystem, 2021c)



Note: The Project site layout in the figure above (as extracted from the topography report) is different from the final project layout as shown across different Chapters of this report. This is due to the change made to the layout in March 2021 in order to minimise potential environmental & social impacts and minimise interferences with existing settlements & accommodation area. See the Project Alternatives Chapter for more details.

10.1.2.3 Soil

During the site visit undertaken 11th March 2021, it was observed that the soil at the project site is mainly desert sandy and dark brown in colour. During project specific soil survey undertaken on 6th April 2021, it was observed that the surface of the desert sandy soils were covered with vegetation; mainly grass & shrubs with a few stones/ rocks were present .

EXISTING INFLUENCES ON SOIL QUALITY

There are no specific areas of soil contamination were observed during the numerous site visits. However, the presence of existing infrastructure including the railway line and dirt road at the Project 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. The animal stables have also led to the discolouration of the soils from the organic materials from animal waste.

Other legacy pollutants may be located in the soils from the construction and/or operations of such infrastructure. Isolated impacts may occur at the seasonally used structures on-site for herders.

10.1.2.4 Surface Water

There are no permanent, or perennial surface water features at the Project site. The only permanent surface water in the vicinity of the Project site is the Ayakagytma lake which is a fresh water lake approximately 500m west of the Project site.

10.1.2.5 Groundwater

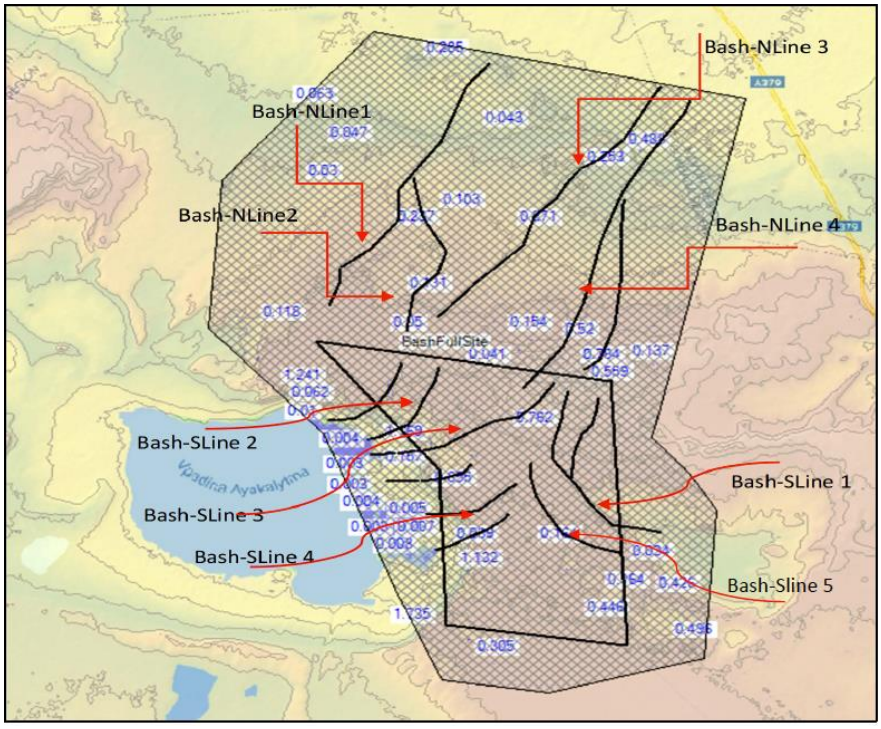
During the site visit on 11th March 2021, groundwater sources was not seen at any time during the visit. According to the geotechnical site investigation report, groundwater table was not observed at the Project site during the drilling investigations having depths down to 50 m.

10.1.2.6 Flood Risk Assessment

Hydraulic modelling was undertaken by UzAssystem (2021b) to identify the potential for flood at the Project site. Daily precipitation data for Bash drainage areas from the period of January 1st 2000 to December 31st 2020 was used in the model. The infiltration ratios from rainfall were modelled throughout each pathway for 6-hour & 24-hour periods.

The cross section in the figure below shows variations of the water depth, the velocities and the flow rates separately either for T=100 years or T-50 years for the Bash Site.

Figure 10-4 Pathways of Surface Runoff Indicated in the Hydraulic Model at Bash Project Area (UzAssystem, 2021b)



As can be seen from the figure above, the water runoff is mainly South West to North East

The flood hazard rating for the project site is presented in the table below. This was calculated using the results of the water depths and velocities obtained from the T=50 year and T=100 year precipitation analysis.

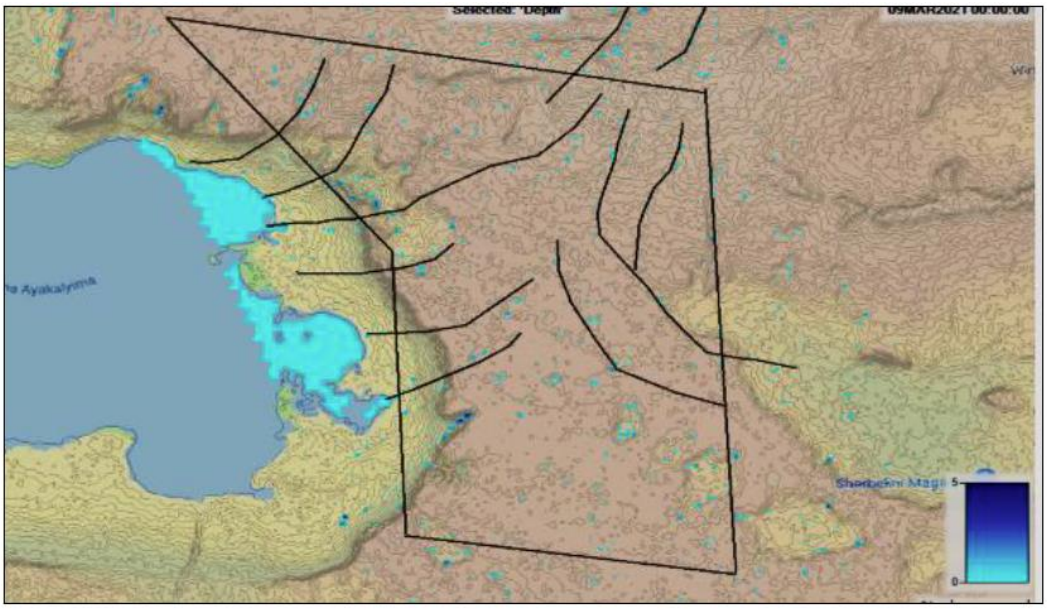
Table 10-2 Flood Hazard Rating at the Project Site (UzAssystem, 2021b)

Periods	Flood Hazard Rating for Bash Site					
	Flow Paths	S-Line 1	S-Line 2	S-Line 3	S-Line 4	S-Line 5
T=50 Years	24-Hour Precipitation	0.52	0.72	0.85	0.55	0.54
	6-Hour Precipitation	0.66	0.56	1.01	0.61	0.56
T=100 Years	24-Hour Precipitation	0.69	0.64	1.08	0.74	0.59
	6-Hour Precipitation	0.75	0.75	1.18	0.79	0.59

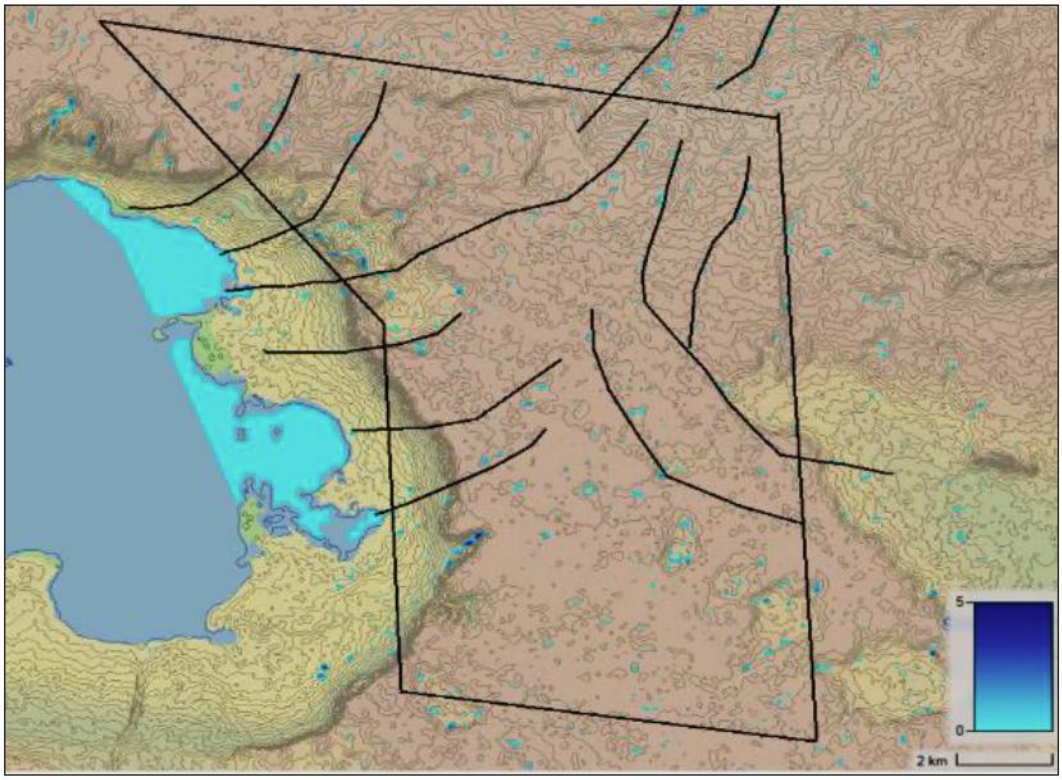
The results of the Flood Hazard Rating show that there is low or very low hazard risk at the Bash site for selected northern and southern pathways. The results show that there is a very low hazard at S-Line 1, S-Line 2 and S-Line 4. However, there is a moderate hazard risk at the pathway S-Line 3.

The flood risk map showing the flood extent are presented below

Figure 10-5 Flood Risk Map at the Project Site for 50-Year; 6-hour & 24-hour (UzAssystem, 2021b)

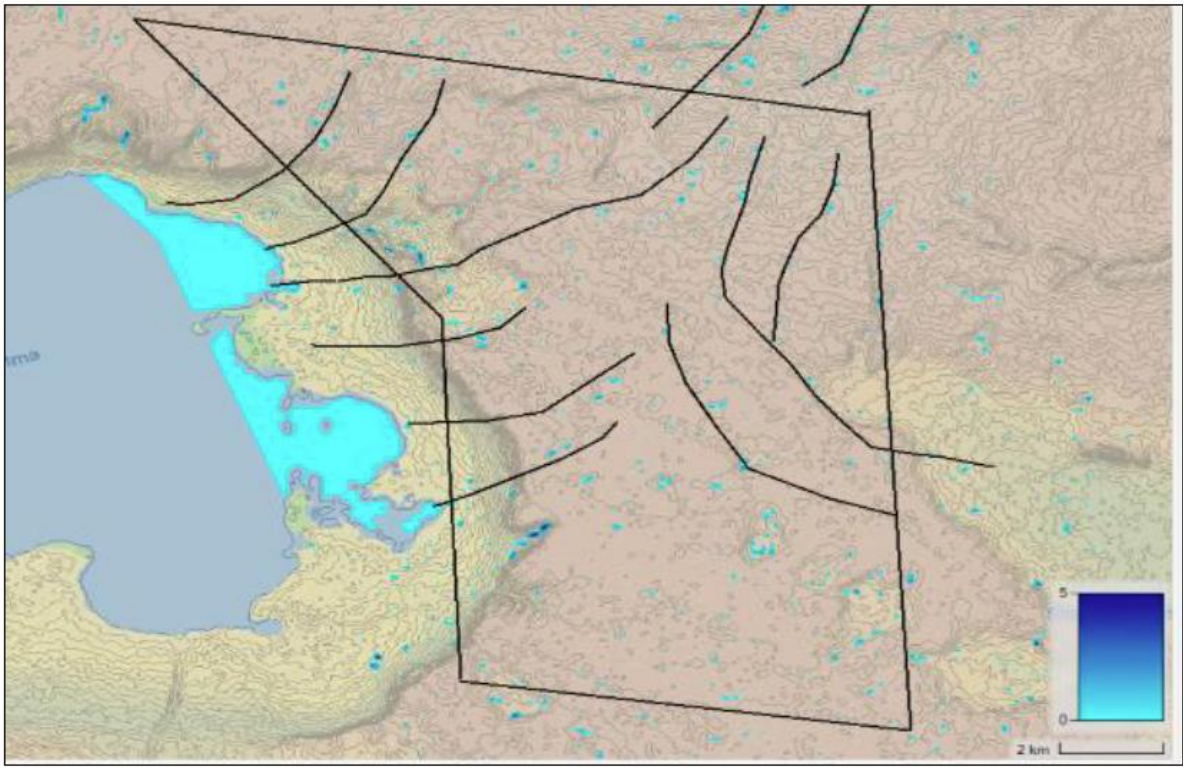


6-Hour

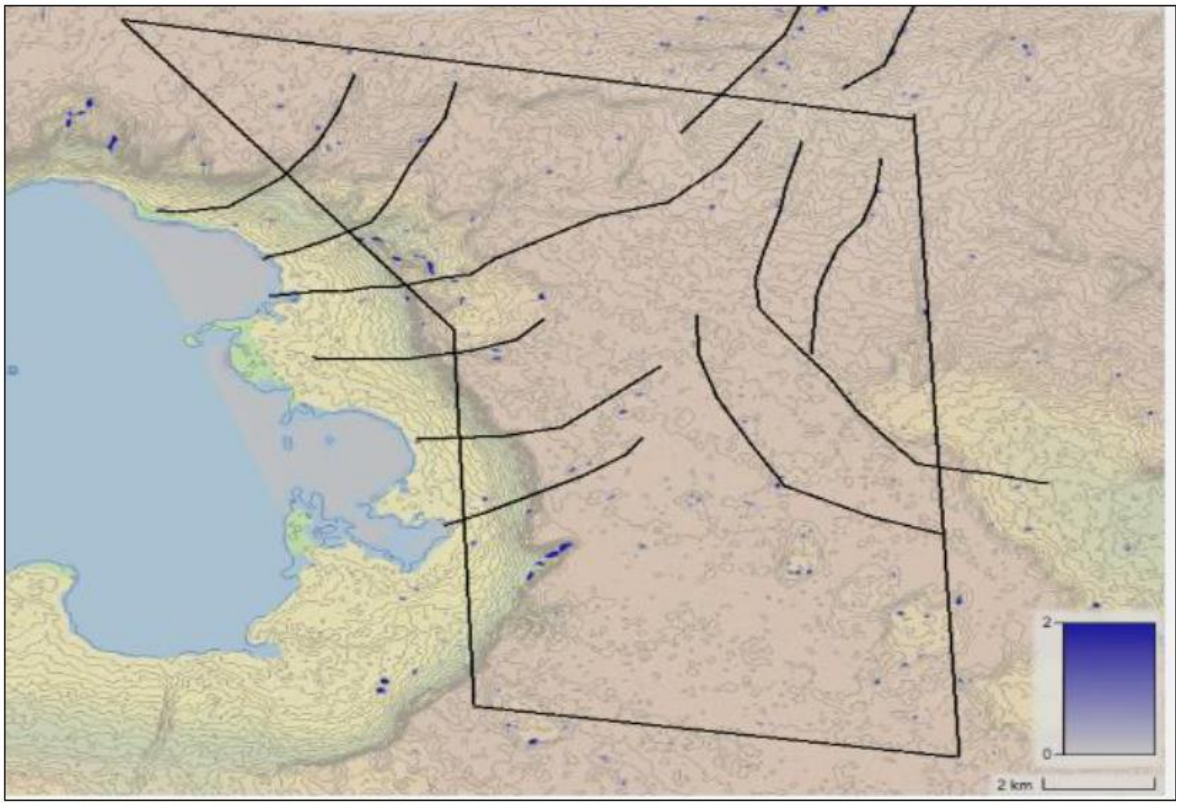


24-hour

Figure 10-6 Flood Risk Map at the Project Site for 100-Year; 6-hour & 24-hour (UzAssystem, 2021b)



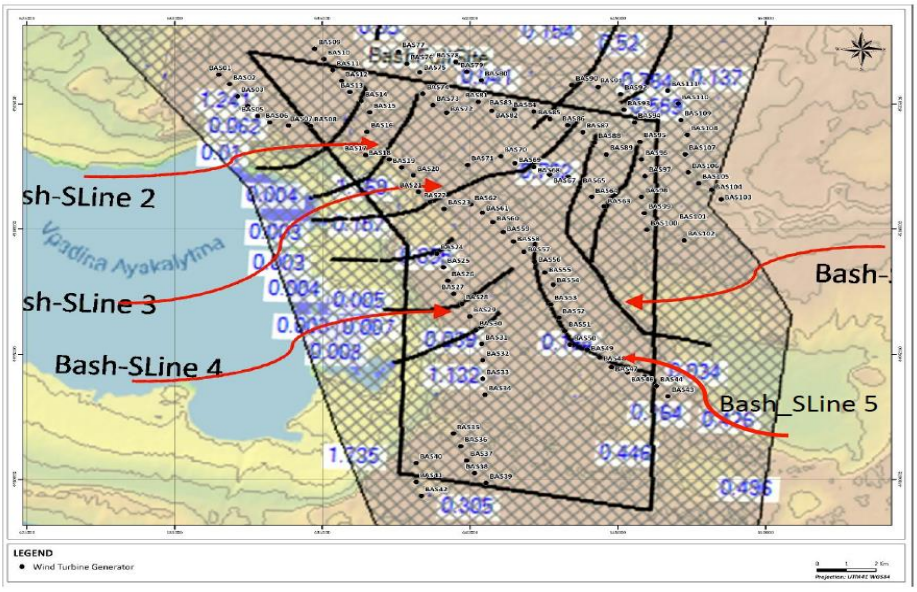
6-Hour



24-hour

Although majority of the WTGs are located away from the drainage pathways at the site, 23 WTGs including BA14; BA 19, BA 22, BA 24; BA 28, BA 30, BA 45, BA 46, BA 47, BA 48, BA 49, BA 50, BA51, BA 52, BA 53, BA 56, BA 63, BA 65, BA 85, BA 86, BA 88, BA 90 and BA 95 are aligned along these pathways (S-Line 2 to S-Line 5) or located at very close to them (see figure below). As stated above, the degree of flood hazard is designated as "moderate" only for S-Line 3. Only WTG BA22, BA 68 and BA 86" are within this pathway.

Figure 10-7 WTG Location in Relation to Drainage Pathway at the Project Site (UzAssystem, 2021b)



10.1.3 Soil Quality Analysis

Following the scoping report prepared for the Project, a site survey for evidence of potential contamination on-site in the soils was carried out. It is noted that this was a precautionary approach to establish the baseline soil quality condition within the Project site.

10.1.3.1 METHODOLOGY

Soil investigation at the Project site was conducted on 6th April 2021 to identify existing soil quality conditions & characteristics and to ascertain the presence of potential soil subsurface contamination. During the survey, surface soil samples were collected from eight (8) sampling locations within the proposed Project site by a certified laboratory.

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 using a stainless steel shovel at a depth of 0.1m (10cm) using the scoop method (after scraping away the immediate surface layer).

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

Table 10-3 Soil Sampling Location

ID	COORDINATES	
	NORTHING	EASTING
SQ1	40.678374°	64.603904°
SQ2	40.657039°	64.653990°
SQ3	40.643303°	64.700523°
SQ4	40.626497°	64.725644°
SQ5	40.552418°	64.653035°
SQ6	40.622771°	64.654993°
SQ7	40.587550°	64.715565°
SQ8	40.667283°	64.722731°

Figure 10-8 Soil Sampling Locations

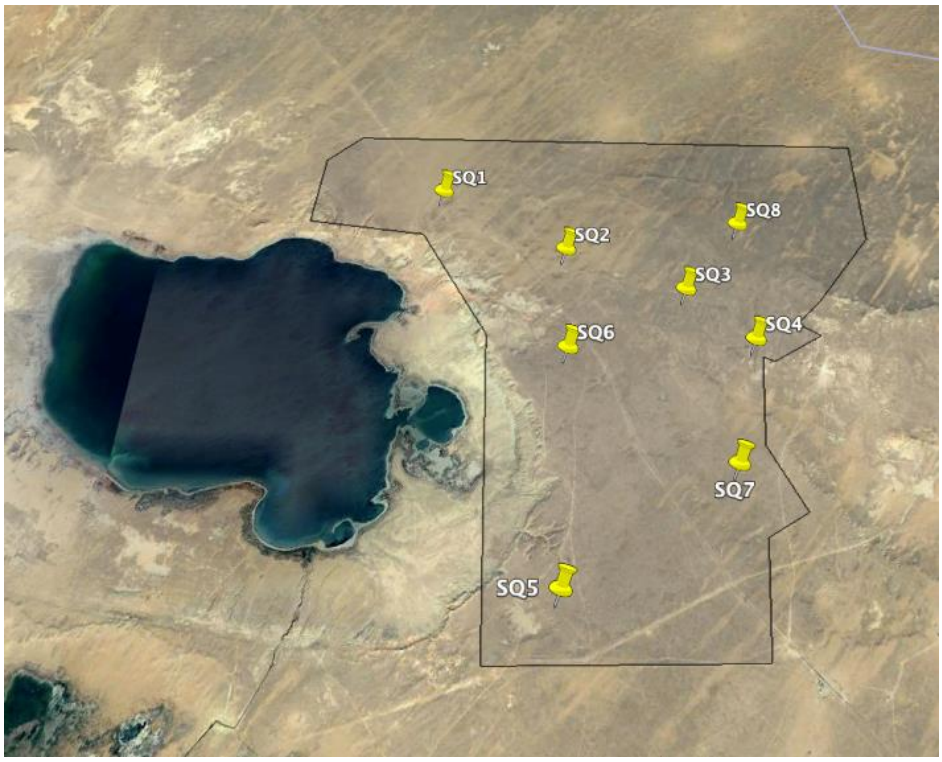


Plate 10-4 Evidence of Soil Sampling at the Site

10.1.3.2RESULTS

The results of the soil laboratory analysis are presented in the table below and have been compared with the Uzbekistan SanPiN № 0191-05 "Maximum allowable concentrations (MPC) and the Dutch Soil Quality Standards.

Table 10-4 Soil Analysis Results

PARAMETERS	SAMPLE NUMBER								DETECTABLE LIMITS IN MG/L	SANPIN № 0191-05 MPC	DUTCH STANDARDS (INTERVENTION VALUE)
	SQ1	SQ2	SQ3	SQ4	SQ5	SQ6	SQ7	SQ8			
pH	7.70	7.80	7.80	7.60	7.80	7.80	7.70	7.75	1-14	-	-
Chloride (as Cl), %	0,014	0,032	0,021	0,014	0,04	0,01	0.01	0,014	N/A	-	-
Chloride (as Cl) mg/l	7	16	11	7	7	5	5	7		-	
Nitrate (NO_3), mg/dm^3	1	1	2	2	2	1	2	12	10^{-6}-100* mg/kg	130 (gross content)	-
Sodium (Na), mg/kg	8100	9500	9500	9592	9669	9074	11193	11199	40-110000mg/kg	-	-
Magnesium (Mg), mg/kg	2100	8300	16000	18288	13730	11446	11250	9898	40-110000mg/kg	-	-
Potassium, mg/kg	22000	19000	15000	16558	16055	18455	18579	18233	80-300000 mg/kg	-	-
Lead (Pb), mg/kg	13	14	15	13.4	13.8	14.9	13.3	13.2	0.1-4000 mg/kg	32	530
Manganese (Mn), mg/kg	68	380	520	648	478	457	423	393	20-100000 mg/kg	1,500 (gross content)	-
Copper (Cu), mg/kg	19	22	25	178	134	124	98	89.2	1.0-4000 mg/kg	3	190
Zinc (Zn), mg/kg	21	35	49	48.8	48.5	52.9	44.0	42.5	1.0-4000 mg/kg	23	720
Chromium (Cr), mg/kg	45	54	61	61.8	54.7	67.9	65.8	64.7	1.0-4000 mg/kg	6	380
Iron (Fe), mg/kg	10000	13000	19000	22645	22350	25476	22319	20159	60-3000000 mg/kg	-	-
Mercury (Hg), mg/kg	0.330	0.100	0.180	0.070	0.120	0.090	0.070	0.070	*	2.1	36
Nickel (Ni), mg/kg	47	51	41	37.9	39.1	64.8	66.3	33.3	1.0 -4000	4.0	210
Cadmium (Cd), mg/kg	0.031	0.028	0.064	0.067	0.086	0.066	0.087	0.070	0.005-4000 mg/kg	-	12
Aluminum (Al), mg/kg	34000	50000	63000	65295	63.927	66918	64680	63510	20-200000 mg/kg	-	-
Arsenic (As) mg/kg	47	18	20	32.1	52.4	47.6	31.8	47.4	0.1-4000 mg/kg	-	55

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 not been color coded, this is because there are no established SanPiN № 0191-05 "Maximum allowable concentrations (MPC) and/or Dutch Intervention Value for such parameters.

The pH of the soil ranges between 7.60 – 7.80 which means the site has a slightly alkaline pH. Sample SQ8 is noted to have nitrate concentration which is 10 times higher than nitrate concentration in other samples

Although the results obtained for parameters for which standards are established were well below the Dutch standard value, upon comparing with the Maximum Permissible Values established in SanPiN № 0191-05, the results exceed the maximum permissible values for Cu, Zn, Cr & Ni in all samples.

The soil chemistry of the Kyzyllum Desert naturally comprises of metals and as such the high concentration of Cu, Zn, Cr & Ni can be said to be attributed to the potential mineral and metal reserves in the Kyzllum Desert where the wind farm is located. This cannot be therefore attributed to anthropogenic or human influences.

The full sets of the soil analysis results from the laboratory as well as the laboratory certificate are presented in Appendix M.

10.2 Receptors

Table 10-5 Soils, Geology & 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.
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.

10.3 Potential Impacts, Mitigation, Management & Residual Impacts

10.3.1 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 as well as groundwater contamination thereby degrading soil and groundwater.

10.3.1.1 Excavation or Removal of Soils

The Project will require excavation activities in order to establish foundations for the wind turbines, building structures etc. This may result in the interaction with the geology of the site which could potentially provide direct pathways for contamination of groundwater during the

construction phase. On the other hand, the soil characteristics within the project site will be impacted directly through soil compaction activities to provide structural stability for the structures.

10.3.1.2 Spills and Leaks Associated with Construction

Soil 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. However, it is noted that there will be very few chemicals, fuels and in relatively small quantitates.

As the wind turbines will likely require deep foundation works, soil quality can be susceptible to contamination from various construction sources, for example, usage of fuels, chemicals during the construction process. 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 contamination.

Given the depth of groundwater, it is not anticipated that pollutants will reach groundwater. As such pollution to groundwater is not anticipated.

The above highlighted risk to soil and any risk to groundwater will be managed through the implementation of the project CESMP and associated Management Plans and Procedures.

10.3.1.3 Inadequate Waste and Wastewater Management

Construction of the wind farm 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 the Solid Waste & Wastewater Chapter of this report

Table 10-6 Geology, Soils 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
Cross-Contamination of soil during construction	**Minor Negative**	Soil Quality	Low	**Negligible to Minor**	• Training - Contractor staff to be able to identify signs of potential contamination (smell of hydrocarbons, staining). • 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. • Where concrete washout areas will be established onsite, these areas will be located away from storm drainage and water runoff areas and will be designed with adequate holding capacity. The wastewater will be contained within the designated impervious bund. • Washout of concrete trucks will be performed in designated concrete washout areas at the site. • 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	**Negligible to Minor**
Pollution from Accidental Leaks or Spillage	**Minor Negative**	Soil Quality	Low	**Negligible to Minor**	• 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	**Negligible to Minor**
	Negligible Negative	Groundwater Quality	High	**Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					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.. • 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. • 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. • Spill kits will be made available at chemical storage areas and fully stocked with appropriate absorbent materials. • 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. • Availability of suitable containment and spill clean-up materials/equipment at specific	

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					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. • No storage of hazardous chemicals, oils or fuels within 100m of waterways or water flow path at the Project site. • 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.	
Inadequate waste management	**Minor Negative**	Soil Quality	Low	**Negligible to 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	**Negligible to Minor**
	Negligible Negative	Groundwater Quality	High	**Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					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.	

10.3.2 Operational Phase

Specific project impacts to soil, geology 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 i.e. soil & groundwater. Potential risks of concern during the operational phase are expected to be limited to the management and storage of hazardous materials/wastes/wastewater, chemicals and fuels and sanitary provision.

10.3.2.1 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 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.

Table 10-7 Geology, Soils 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 to Minor**	• 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.	**Negligible**
	Negligible Negative	Groundwater	High	**Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					• If used in landscaped areas, the application of fertilisers and pesticides must be limited and monitored. • 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.	

10.3.3 Decommissioning Phase

Potential impacts relating to decommissioning of the wind farm will be similar to those encountered during the construction phase and operational 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, machinery lubricants and paints) associated with both construction & operational phase 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 the Solid Waste &~ Wastewater Management Chapter in Part A of this ESIA.

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10.4 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 10-8 Monitoring Requirements

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
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
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

11 TRAFFIC AND TRANSPORTATION

11.1 Observation and Baseline Environment

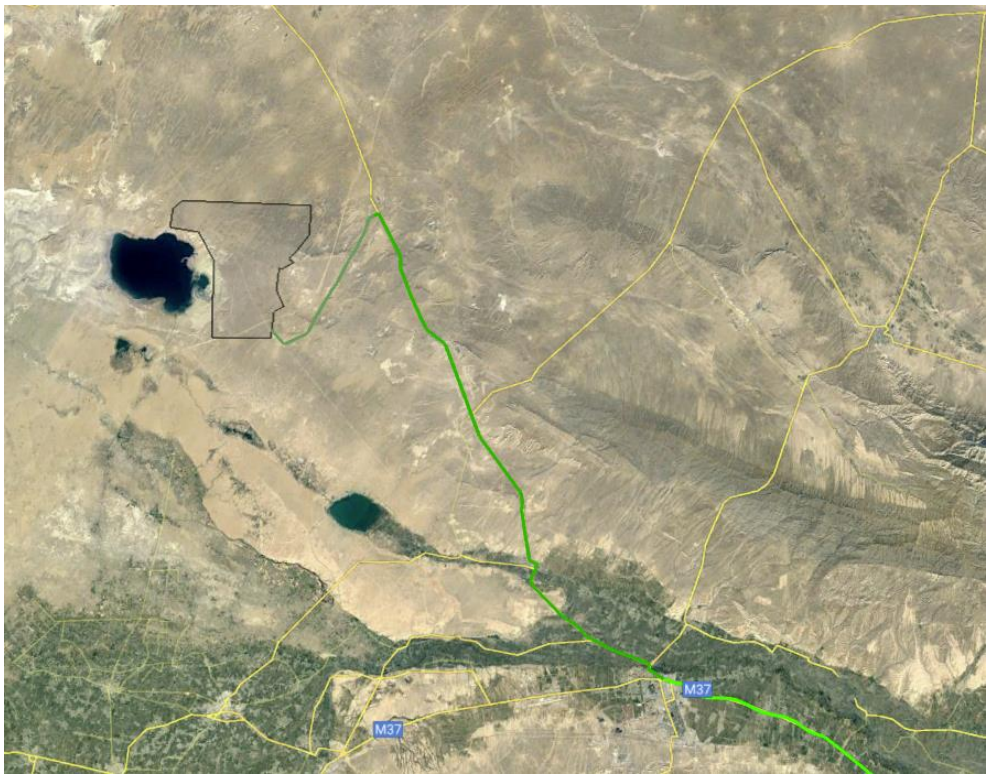
11.1.1 Project Site Observations

The access road from A-379 has been the primary route used by Juru Energy Experts to access the Bash Project site for the various ESIA related surveys. Additionally, a survey along the route was conducted by 5 Capitals and Juru Energy on 30th July 2021.

The access road is approximately 27.5km from the A-379 highway to the Project boundary. The road was observed to be unpaved and has low traffic at approximately 8 – 12 vehicles per hour. The areas near the access road is steppe and open with good visibility of hills in the horizon.

Plate 11-1 View of the Access Road Connecting A-379 Highway to the Project Site

Figure 11-1 Location of Access Road Connecting the Project Site to Highway A379 (ref. Green Line)



According to the route survey report, some modifications will be required along this access road in order to allow for the transportation of wide loads i.e., removal of electric poles at specific locations etc. As such, all the conclusions of the route report will be implemented in accordance with Uzbek law.

11.1.2 Project Logistics

11.1.2.1 Transportation Route from the China – Kazakhstan -Uzbekistan Border

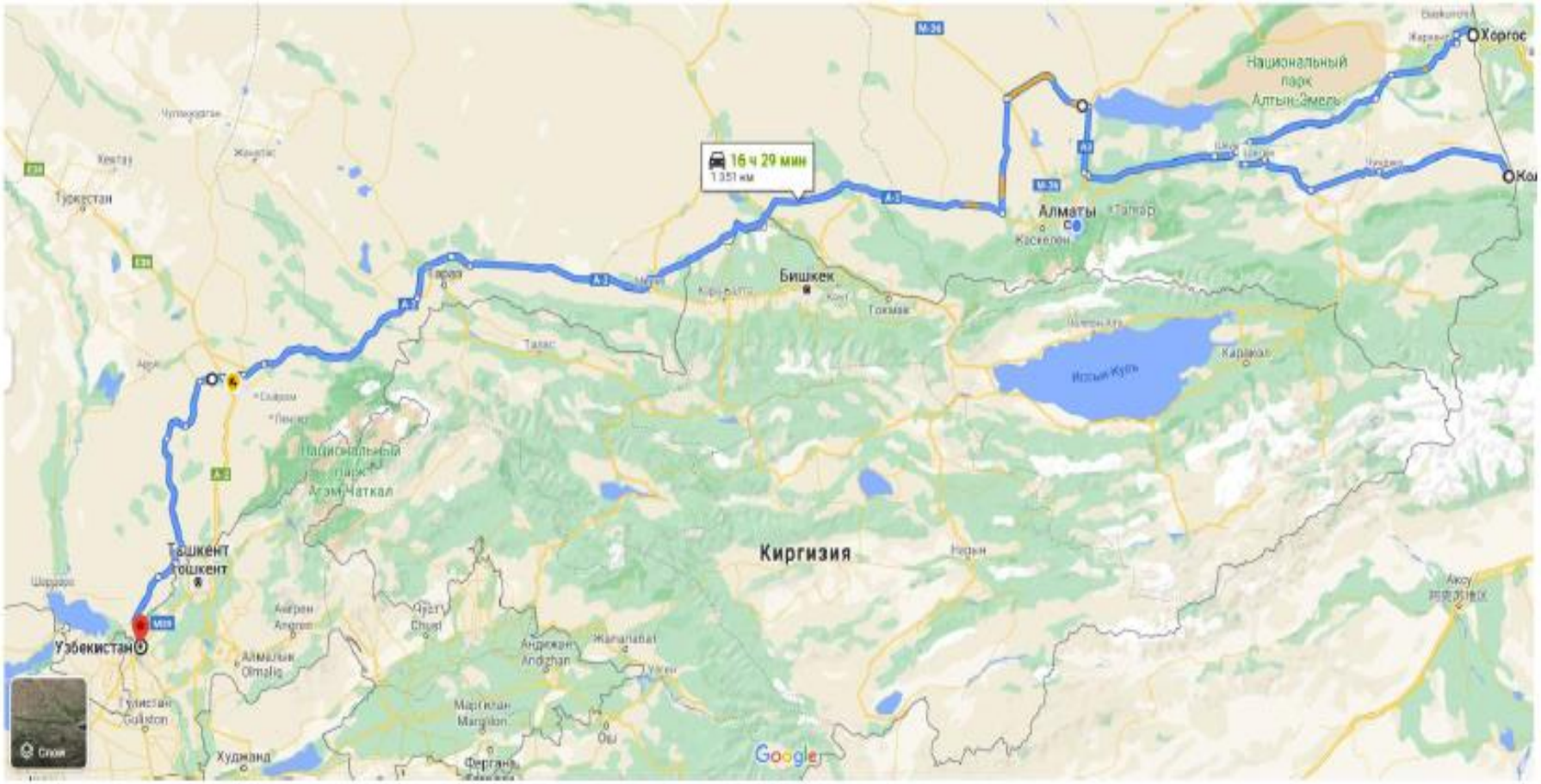
Transportation route surveys were undertaken by ACWA Power in August 2021 for the transportation of heavy project component. The table below provides a list of the most critical WTG components considered during the Route Survey.

Table 11-1 WTG Components Considered During Route Survey

WTG Components	Length (mm)	Width (mm)	Height (mm)	Net Weight (kg)	Gross Weight (kg)	Volume (m3)
Generator	5,500	5,500	4,180	123,000	126,000	12645
Nacelle	8,768	5,450	4,190	44,500	46,000	20022
Hub	5,220	4,640	4,186	59,900	62,900	10139
Blade	81,000	4,800	3,600	24,720	24,720	139968

The Project anticipates to transport the project components from either Dulata, Khorgos or Alanshankhou borders in China and from either of these borders to custom points at Nur Zholy/ Kolzhat in Kazakhstan. From Nur Zholy/ 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 11-2 General Transportation Route Surveyed



Source: *Route Survey Report for ACWA Power Wind PP Project*

Based on the findings from the survey, the roads in Kazakhstan will be used to transport both heavy & oversized cargos from the selected border/custom point at Kazakhstan (Nur Zholy/ Kolzhat) 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 1391km and the following obstacles are present along the way.

- 2 railway crossing
- 1 railway bridge
- 38 road bridges (road junctions)
- 9 pedestrian bridges
- 19 Electric transmission lines (ETL)
- 12 arches of control cameras
- 17 Arches of road signs
- 12 gas pipelines
- 3 payment terminals (toll gates) and;
- 1 bridge over Illi river

In order to overcome these obstacles, the route survey team recommended the following:

- Route "R-321" : Khorgos – Chundzha – Pedestrian bridge Chilik (height 5.26m)
  - Lay a bypass road on the right side of the pedestrian bridge for goods with a height of more than 5.26m due to height restrictions
- Highway "A-352" : Kolzhat – Chundzha
  - Dismantling of curbs and backfilling of the road on a roundabout is required
- Route "A-352, A-351" : Chundzha- Kolpek-Chilik
  - Lay a bypass road on the right side of the pedestrian bridge for goods with a height of more than 5.26m due to height restrictions. In addition, the routes connect in Chilik to the border with the Republic of Uzbekistan. There is no opportunity to exit to the highway "A-2" Khorgos-Almaty. In this connection, movement through Chundzhu- Kokpek-Chilik is required
- Route "A-3" : Kapchagai-Karaganda bridge. There is no opportunity to enter the Karaganda highway P-18
  - Need to move along the Kapchagai highway to the Bakanas junction. Turn right towards the Recreation Area and make a U-turn. Then move out in the opposite direction in the oncoming lane. Drive into your own lane. Coordination with the traffic police is required
- Route "R-18" : Karaganda highway – Kurty village.
  - On the road section from 1.1km to 63.6km the mobilization of road equipments is required to expand and fill the road due to the reconstruction of the road with many turns and "S" shaped ramps

- Kazbek Bek station – There is a narrow, extended, crooked bridge with left and right turns. Width 7m
  - A two-way full bridge coverage is required. With the approval of the traffic police
- Kazbek Bek – Uzynagash-hishway "A-2" Almaty-Bishek
  - It is required to overlap the highway "A-2" with the approval of the traffic police
- Highway "A-2" Merke-Taraz-Shymkent
  - Without obstacles
- Highway "A-2" City of Shymkent
  - A detour from the A-2 highway to the M-32 highway through Badam with a length of 38km is required due to the inability to turn onto the A-2 highway
- Route "R-25" Bdam – Kazykurt-Saryagash: Without obstacles
- Route "A-2" Abay-Kaplanbek: Without obstacles.
- The customs point "Kaplanbek" on the Kazakh side has a sharp right turn at 90 degrees. Maximum free area 80m
  - Approval with customs authorities is required for dismantling and subsequent installation of fences and gates at the entrance
- Customs point "Yallama" to the highway "M-39" at turn No.5 at the exit to the highway "M-39" the narrowing of theroad passes
  - It is required to dismantle the curb or build an embankment to drive over the curb

11.1.2.2 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.

The proposed route is as shown in the figure below

Figure 11-3 General Transportation Route from KZ-UZ Border to the Project site

Source: *Route Survey Report for ACWA Power Wind PP Project*

The 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. Additional road surveys are expected to be undertaken before the commencement of delivery of Project equipment, machinery and materials.

CONSULTATIONS WITH THE MINISTRY OF TRANSPORTATION

A consultation letter was sent to the Ministry of Transportation on 4th May 2021 informing them about the Project and enquiring on whether the Ministry of Transportation 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 27th May 2021 stating that the Project is required to secure a special permit for the transportation of bulky and heavy cargo in accordance with the regulation "*Ensuring traffic safety during the transportation of bulky and heavy cargo*", approved by the Cabinet of Ministers of the Republic of Uzbekistan No.342 dated December 26, 2011. According to the Ministry of Transportation, the application for the special permit can be applied for online through http://okn.elcspertiza.uz.

Reference Appendix N for consultation with the Ministry of Transportation.

11.2 Receptors

Table 11-2 Traffic & Transportation – Receptor Sensitivity

RECEPTOR	SENSITIVITY	JUSTIFICATION
Highways A379 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. In addition, the Route survey report shows that several sections of the road and some bridges will potentially require infrastructure improvement, electricity shutdown etc. This will increase the pressure on the road infrastructure and electricity supply when conducting the improvements and shut downs. Additionally, the access road from A-379 to the Project site is used by other vehicles from the nearby communities and Asia Trans Gas. 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 WF and along the access road including children and vulnerable groups	**High**	Given that residents including children and vulnerable groups, herders together with livestock will use the dirt road when moving back & forth, they are particularly vulnerable to an increase in vehicular flow on the dirt road.

11.3 Potential Impacts, Mitigation, Management & Residual Impact

1.1.1 Construction Phase

11.3.1.1 Transportation of Project Components, Construction Materials and Equipment

The major components for the construction of the wind farm are turbine components (blades, heavy turbine tower sections, transformers, nacelle, etc.) that can only be assembled at the site and as such they have to be transported to the site individually. Such 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 turbine components as well as equipment and construction materials will arrive by road from China to Kazakhstan and then to the Kazakhstan-Uzbekistan border. The current transportation route survey indicate that the current road infrastructure has some limitations which may hinder the transportation of the Project materials.

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.

11.3.1.2 Increased Vehicular Flow and Traffic Congestion

Construction activities will likely result in an increase vehicular flow on local roads & highways and this may result in road traffic associated with the transportation of materials & wind turbine components to the Project site, project staff transportation and Heavy Goods Vehicle (HGV) movements. Findings from the transport survey 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 A-379 to the Project site access road due to the fact that very few vehicles currently use the existing access road.

11.3.1.3 Safety of Residents

The highways that will be used for the Project in both Kazakhstan and Uzbekistan are used by residents in cities and towns extending from Mangistau region in Kazakhstan to Navoi region in Uzbekistan. Additionally, the road from Navoi to the Project site is mainly used by local communities and herders. Based on site observations, approximately one(1) vehicle drives through this local road every 15 minute but this will require verification through the completion of the route survey. However, it can be concluded that the local communities using the local road are not accustomed to a lot of traffic and might take time to adjust to the new increased vehicular flow.

As such, an 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.

11.3.1.4 Loss of Access Route/Tracks through the Project site

There is an access road and vehicle tracks in the proposed Project site used by herders and other local communities. Due to the movement of machinery and equipment access to the access road 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 (i.e. grazing areas and other communities). The use of these alternative unpaved routes will potentially increase the travel time of the herders and local communities between the different grazing areas and settlements by approximately 40-45 minutes as advised by the local consultant (Juru Energy)

The figure below shows the alternative routes that can be used by local road users.

Figure 11-4 Alternative Unpaved Access Route

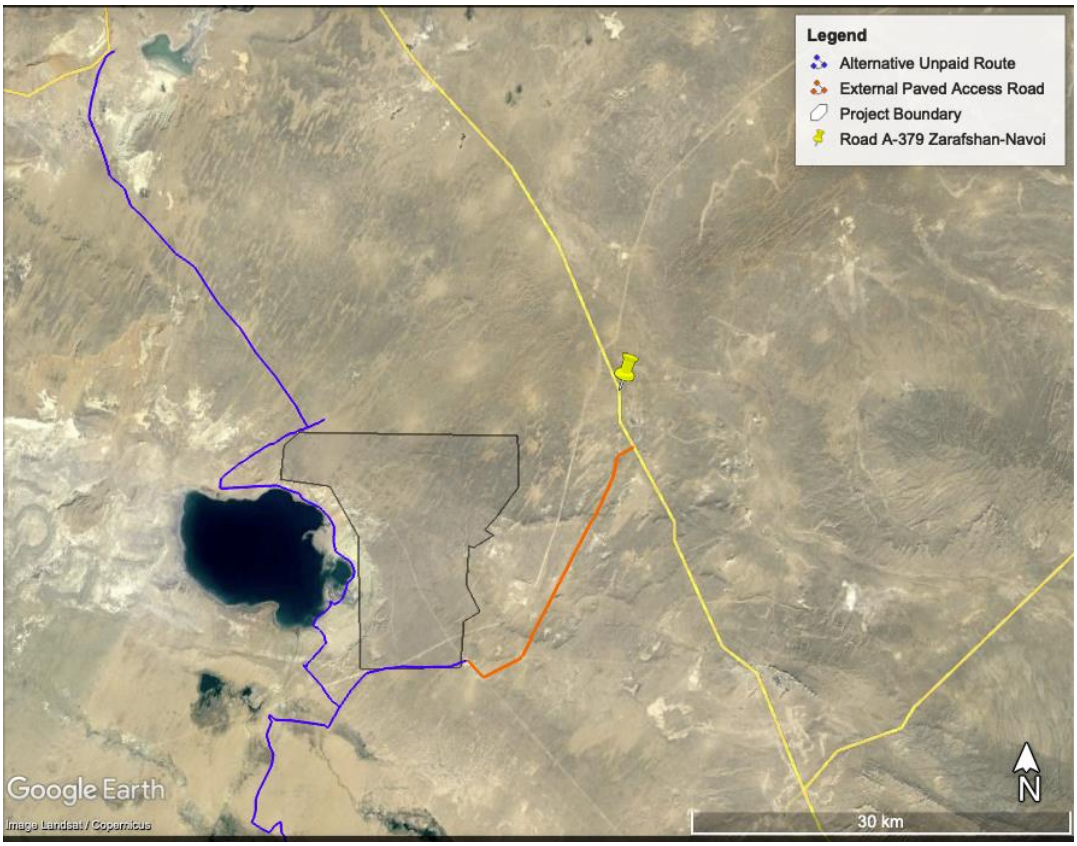


Table 11-3 Traffic & Transportation Impact Significance, Mitigation & Management Measures and Residual Impacts – Construction

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
Impact on Road Infrastructure	**Moderate Negative**	Highways A379 and access road to the Project site	High	**Moderate to Major**	• The Project Company will ensure that the Project Route Survey is completed based on the port, highway and local roads to be used in the transportation of the Project materials before the start of the construction phase and/or transportation of any project materials. • The Route Survey will also determine the carrying capacity of the roads (including local access roads), condition and if any modifications/rehabilitation is required before transportation of project materials etc • Implement the conclusions and recommendations of the Route Survey report such as sections of the road that will require to be upgraded, need for electricity shutdown etc. • 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	**Minor to Moderate**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					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 of project traffic. This will include obtaining relevant approvals/permits to undertake such works.	
Increased vehicle flow on highway and local roads	**Moderate Negative**	Highways A379 and access road to the Project site	High	**Moderate to 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	**Minor to Moderate**
Safety of Residents of nearby villages & herders	**Minor Negative**	Residents of nearby villages and herders (near the WF and	High	**Minor to Moderate**		**Minor**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
		along the access road) including children and vulnerable groups			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. • 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.	

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					• 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 WF and along the access road)	High	**Moderate to Major**	• 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. • Project activities will not encroach on any land or access routes outside the Project boundary.	**Minor**

11.3.2 Operational Phase

11.3.2.1 Increased Vehicle Flows

Transportation impacts during operations are not expected to be significant, as the operation of the wind farm will not require continuous delivery of materials, or other equipment in order to operate.

Operation & 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, such 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 11-4 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**

11.3.3 Decommissioning Phase

Potential impacts during decommissioning phase of the wind farm 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.

11.4 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 11-5 Traffic and Transportation Monitoring Requirements (Construction)

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
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
Grievances received	Record of grievances received, response period, close-outs	On-going	Roads used by Project vehicles
Permits & licenses	Validity and renewal of permits & licenses	As required by law	Document control office – EPC Contractor
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
Condition of roads (including local access roads)	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.

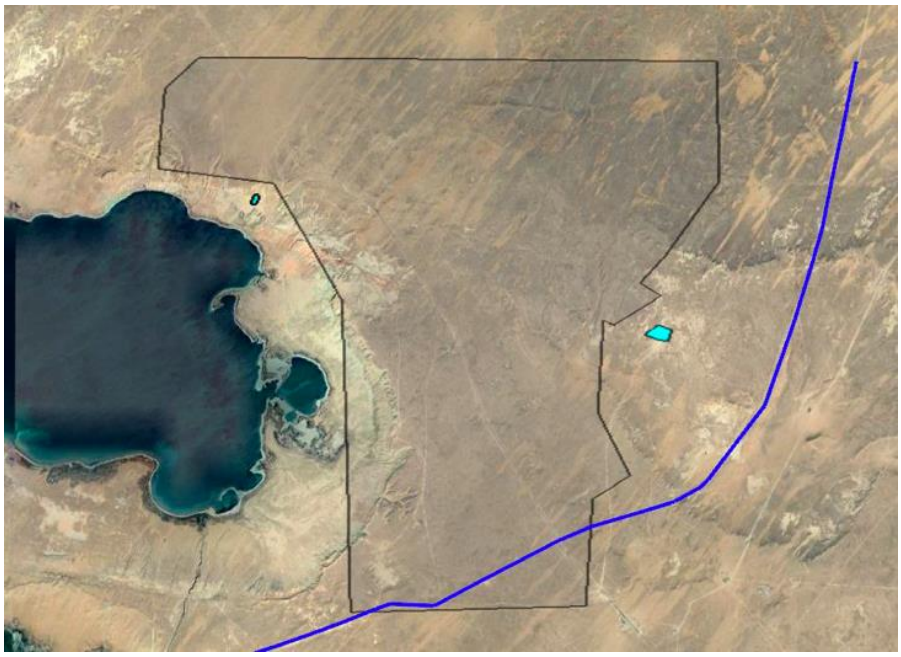
12 INFRASTRUCTURE AND UTILITIES

12.1 Observation and Baseline Environment

12.1.1 Project Site Observations

The Project site comprises of existing infrastructure corridor for a gas pipeline, OHTLs and a railway line. The gas pipeline runs through the southern section of the Project site and is operated by Asia Trans Gas.

Figure 12-1 Location of the gas pipeline

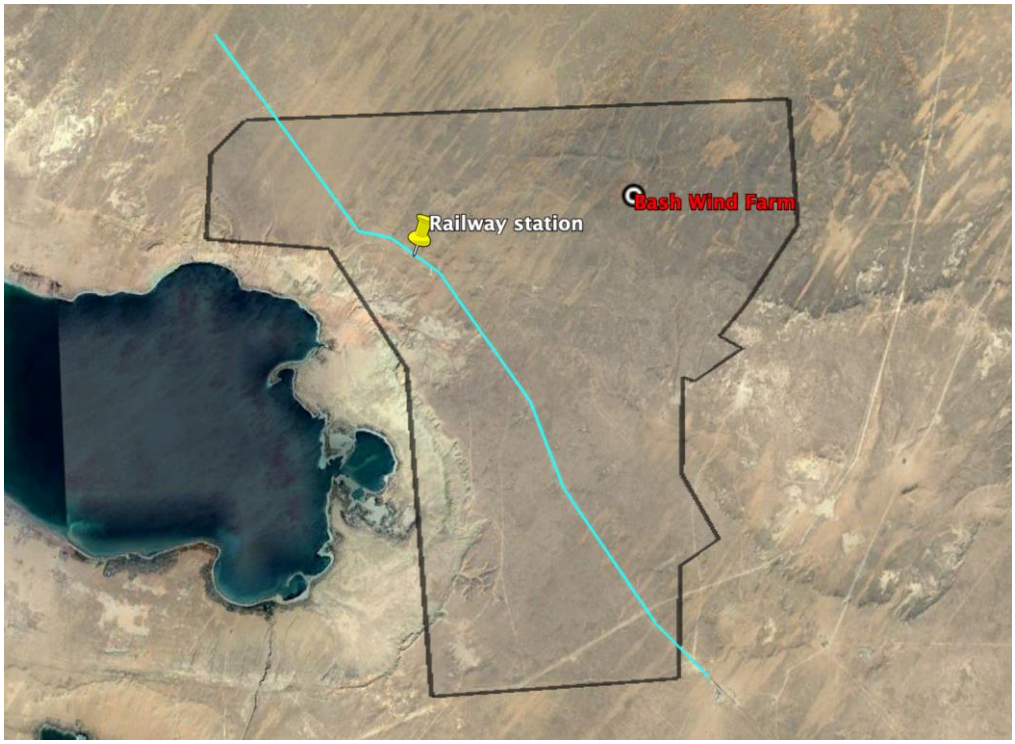


Source: Appendix A of the PPA

Plate 12-1 Gas facilities at the project site

There is also a small railway station located towards the north-west of the site and a railway line that splits the site in a south-east to north-west direction. The railway line connects the city of Navoi to Zarafshan city. In addition, there are 10kV communication lines running parallel to the railway line which connect Tinchilik and Uchkuduk railway stations (both outside the Project site). The railway line and the communication lines are under the management of Uzbekistan Railway Authority.

Figure 12-2 Location of the railway line crossing the site



Source: Google Earth

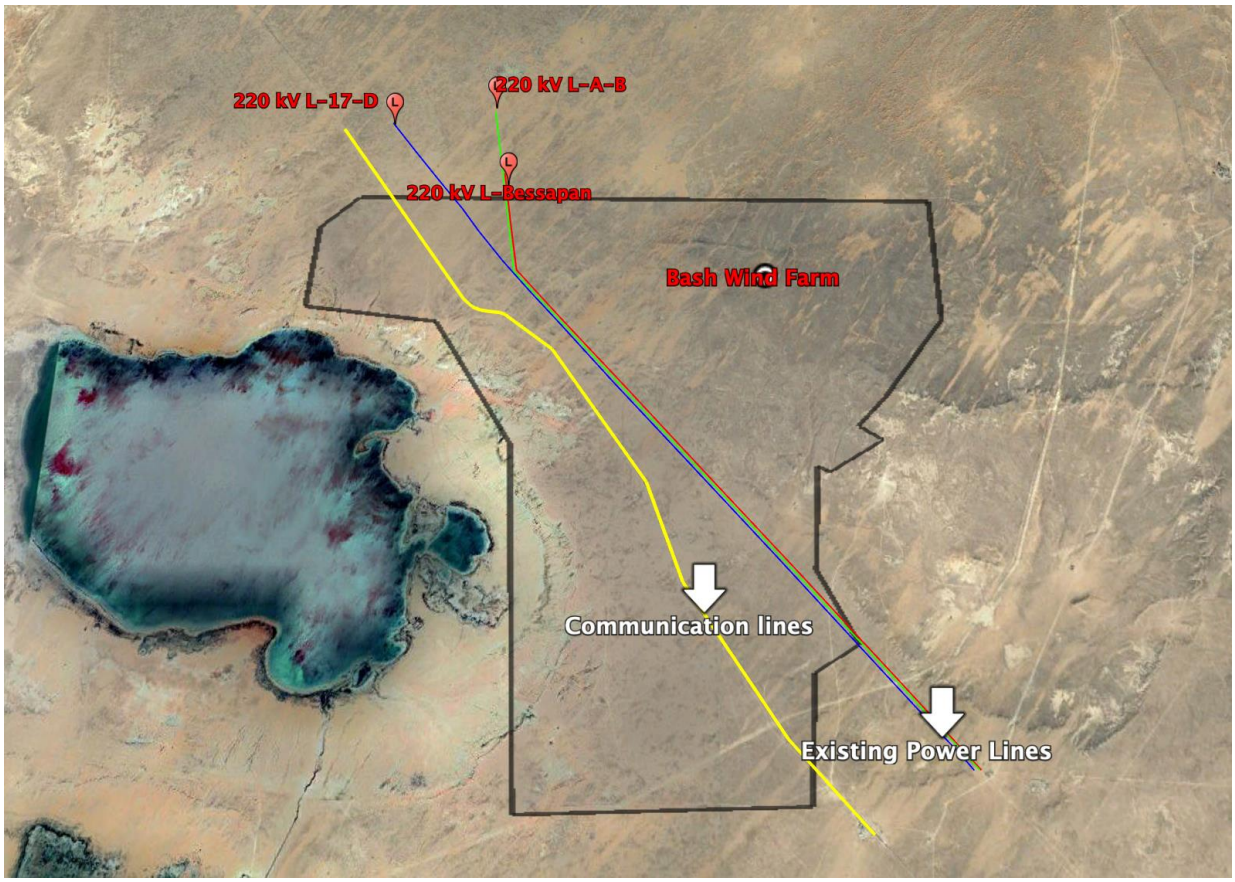
Plate 12-2 Railway line crossing the site inlcuding the communication lines

In addition, there are three (3) OHTLs running through the north central area of the Project site which include:

- 220kV line between Novoi TPP – Bessapan SP (L-Bessapan);
- 220kV line between Substation A – Bessapan SP (L-A-B)
- 220kV line between Navoi TPP -Substation D (L-17-D)

Plate 12-3 OHTLs in the Project Site

Figure 12-3 Location of the 3 existing OHTLs at the Project site



In depth consultations have been undertaken with Asia Trans Gas, O'zbekiston temir yo'llari (Railway Authority of Uzbekistan) and NEGU in order to inform them about the Project and establish the location of buried and above ground facilities/infrastructure within the Project boundary including any additional requirements for the Project. These consultations have been undertaken through letters, phone calls and through on-line meetings details of which are provided below.

12.1.2 Asia Trans Gas

A consultation letter was sent to Asia Trans Gas on 5th April 2021 informing them about the Bash Wind Projects and providing them with the coordinates for the Project boundary. In addition, a questionnaire was attached to the letter requesting for clarifications on the nature of any gas facilities buried or above ground within the Project site.

In response to the consultation letter, Asia Trans Gas requested for a meeting with ACWA Power, 5 Capitals and Juru Energy which was arranged over a Zoom call. The summary of the call is as provided below.

DATE OF CONSULTATION	19th April 2021
TIME	14:00 -15:20
VENUE	Zoom

LANGUAGE	Russian, Chinese & English
NUMBER OF PARTICIPANTS	16
REPRESENTATIVES FROM ASIA TRANS GAS	13 Asia Trans Gas personnel
PROJECT REPRESENTATIVES	Mr. Sherzod Onarkulov – Senior Manager (ACWA Power) Ms. Eva Muthoni Kimonye – Senior Environmental Consultant (5 Capitals) Ms. Umida Rozumbetova – Acting Head of E&S Group (Juru Energy)
MATERIALS USED	Discussion of content of consultation letter send to Asia Trans Gas on 5th April 2021 Ref JEC-OUT-21-54
COVID-19 PRECAUTION IMPLEMENTED	N/A

KEY OUTCOMES

- 5 Capitals/ Juru Energy informed Asia Trans Gas (ATG) that they would inform ACWA Power about the potential safety risks to ATG pipelines as this was ATGs main concern.
- ATG informed 5 Capitals and JE that a 10m buffer zone should be maintained between the grounding of the OHTL and any of the gas facilities and access road do not cross over the gas pipeline at any point. Where the latter is unavoidable, ATG requested that are notified when vehicles are crossing over the gas pipeline especially during the delivery of heavy wide loads.
- ATG also informed that a 9m fibre optic underground cable is present within the project boundary and there are plans to expand pipelines in the future
- At the end of the meeting, It was agreed that ATG would respond to the other clarifications requested in the consultation letter by mail while 5C/JE would inform ACWA Power of the concerns/issues raised by ATG and provide a response.

After the meeting held on 19th April 2021, 5 Capitals receives written responses from Asia Trans Gas on 20th April 2021 and 28th April 2021 stating the following:

RESPONSE FROM 20TH APRIL 2021

- Based on the ACWA Power project coordinates, approximately 24km of trunk gas pipeline, 3 block valve stations and 8 km communication cable are found within the Project boundary.
  - In order to avoid mutual influence by the wide range crossings, ATG suggested that the project should be located to the north side of the existing trunk pipeline belonging to ATG.
- Considering the damage to the WF facilities caused by accidental natural gas trunk line bursts and the planning for future trunk line route parallel to the existing pipeline, a 300m minimum distance should be observed as per code KMK 2.05.06-97. However, a minimum of 450m buffer zone should be observed due to future plans for expansion.
- The pressure of the pipeline is 9.8MPa with a diameter of 1,067mm for AB and 1,219mm for line C.

- The average depth of the gas pipeline (up to the upper wall of the pipe) is 1m and the fibre optic is 1m.
- The average distance between lines A & B is 16m on the left side of the gas pipeline and a 25m from B to C.
- The fibre optic cable line is located at a distance of 8m to the left of line A along the gas line.

- It is strictly forbidden to cross the gas pipeline with any equipment on unequipped crossings. The location of equipment, residential buildings and/or other objects must be in accordance with KMK 02.05.06-97.
- There are plans to construct 4 pipelines parallel to the ABC lines next to line C.
- ATG has patrol cars which use a road that runs parallel to the China main gas pipeline (UChMP). The patrol is conducted by 3 patrol men.

RESPONSE FROM 28TH APRIL 2021

- The minimal distance from the axis to the nearest has pipeline to the project structures will be determined by the requirements set in KMK 2.05.06-97 table 4 & 5. The design pressure of JV gas pipeline is 9.8MPa and the area near the gas pipeline is considered a hazardous production area.
  - In order to preserve the wind turbines and other structures on the territory in force-major situations with the gas pipeline ATG would recommend that the borders of the WTGs territory is set at least 1km from the axis of the nearest gas pipeline when designing.
  - ATG would also like for their representative to be included in the committee for site selection for the construction of the Bash WF.
  - ATG also requested copies of ordinances of Khokimiyats for establishing a committee on the site selection and stated that topographic materials for the final site selection must be submitted to them for approval.
- The coordinates of the gas pipeline and other facilities are confidential and ATG would recommend that these are requested through Uzbekneftegaz JSC.

The consultations also revealed that pipeline A and B as well as the fibre optic cables were constructed in 2009-2010 while line C was constructed on 2014.

In order to address the concern raised by Asia Trans Gas, a meeting was held on 15th June 2021 between representatives of Asia Trans Gas, Ministry of Energy, UstransGaz, ACWA Power and Juru Energy via a Zoom call. The agenda of the meeting was:

- Address the issues raised by Asia Trans Gas in previous letter and meeting consultations (refer to correspondence above); and
- Request for coordinates of Asia Trans Gas facilities within the Project site.

The summary of the meeting is as provided below.

DATE OF CONSULTATION	15th June 2021
TIME	10:00 to 11:20 am
VENUE	Via Zoom

Language	Russian & Chinese
Number of Participants	13
Ministry of Energy	Head of Renewable Energy Department
UstransGaz	Head of department UztransGas
Asia Trans Gas	General Manager on Constructions issues; Engineer Head Project Implementation Department Representative of Bukhara Branch of ATG Employee of ATG Employee of ATG As well as other Uzbek and Chinese representatives of Asia Trans Gaz
ACWA Power	Mr. Sherzod Onarkulov – Senior Manager Mr. Akbar Mavlonov – BD manager
Juru Energy	Mrs. Gulchekhra Nematullayeva – social consultant
Materials used	Agenda based on past correspondence with Asia Trans Gas
COVID-19 Precaution Implemented	N/A
Key Outcomes	
• Based on local regulations as provided in Constructional Measure (KMK) 020506-97), ACWA Power will adhere to a 350m buffer zone with ATG facilities. Although the requirement does not cover issues relating to wind farms, it covers the requirements for gas pipelines as such, the 350m buffer zone considers all emergency and safety issues that may arise. • ATG requested that a protocol of consent be provided in the event that wind turbines overlap gas pipelines and other facilities such as fibre optic cables. The pressure at the gas pipeline is high at 9MPa and this should be considered during the project design stage • Cooridnates of the gas pipelines and buried facilities operated by ATG is confidential and can only be obtained from Uzbekneftgas and/or MoE. • ATG requested that they are informed timely if new access roads will be constructed that will cross the gas pipeline. The same applies to the construction of the OHTL. This is because gas pipelines may be affected by external pressure and these pipelines are of international strategic importance for Uzbekistan, Kazakhstan, Turkmenistan and China *It is noted that Asia Trans Gas was not satisfied with the responses and expressed concerns on the local requirements. Since it is not possible to move the Project layout, ATG asked that relevant authorities are involved and procedures and protocols are prepared with participation of all parties to make proper calculations.*	

On 30th June 2021, Asia Trans Gas sent a letter stating that they had received permission from Uzbekneftgas to share the coordinates of the main gas pipelines and other ATG facilities with the Project. However, before sharing the coordinates, ATG requested the following:

- ATG representatives should be included in the commission selecting the site for the construction of the wind turbines.

  - ATG stated that they were ready to provide a list of representatives upon request.
  - ATG requested copies of the Khokimiyat orders for establishing a commission for the selection of the site.
  - They also stated that the topographic materials for the final site selection must be submitted to ATG for approval.

- In order to provide the exact coordinates of the gas pipelines and other facilities, ATG stated that they would like their representatives to be invited to participate in the survey of the project site.
  - After the survey and determination of the exact crossing areas & upon signing the Survey Act, ATG would provide the coordinates at the crossing areas or outside of the protected gas pipeline of selected site for the design of wind turbines according to the Act.

In response to the above, ACWA Power provided 5 Capitals with letters between the Ministry of Energy and UstransGaz regarding the gas pipeline in Bash Project site. The letter from MoE dated 14th September 2020 states:

"*Taking into account the long-term contracts with investors are expected to be signed, we ask you to provide information (plan-scheme)as shortly as possible on selected land plots where there are high-pressure gas pipelines, as well as where new pipelines are planned*".

On 21st September 2021, UstransGaz responded to the request from MoE stating:

" According to the coordinates provided, it was determined that the Gazli-Chimkent sections 107-118km with a diameter of 1220mm passes near Lake Ayakagitma. According to the "Construction norms and regulations KMK 2.05.06-97" the buffer zone for a gas pipeline with a diameter of 1220 mm established as 350 m on each side."

In addition, UstransGaz provided MoE with a KMZ file showing the location of the gas pipeline which was shared with ACWA Power. It is noted that the coordinates for the fibre optic cable were not provided.

<u>Response to Asia Trans Gas</u>

In order to respond to issues raised by Asia Trans Gas in their letter dated 30th June 2021, ACWA Power sent a response letter on 16th August 2021 stating the following:

- The Bash Project site was approved through a presidential decree and an agreement was issued on 22nd February 2021 and land allotment order issued by the Khokimiyat of Bukhara in March 2021.
  - A copy of the land allotment order was provided as an attachment to ATG.
- The selection of the Project site was done under the directive of the Government of Uzbekistan represented by the Ministry of Energy, Ministry of Investment of Foreign Trade and other government authorities such as State Geology Committee.

- The Bash Project is in advanced stage of development with the finalization of the conceptual design of the wind turbine generators and the balance of the plant including external and internal access roads including cabling.
    - The conceptual design has taken into account the gas pipeline and the required buffer zones as agreed in the meeting held on 15th June 2021.
    - ACWA Power in their letter stated that their intention was to collaborate with ATG in order to make sure that the design takes into account the necessary precautions required in respect to the gas pipeline.
    - ACWA Power also provided ATG with the coordinates of the nearest WTGs to the gas pipeline.

Figure 12-4 Coordinates of the WTGs provided to ATG by ACWA Power

a) Latitude: 40°34'35.04"N.
Longitude: 64°44'4.52"E
b) Latitude: 40°32'43.10"N.
Longitude: 64°39'43.67"E
c) Latitude: 40°32'31.49"N.
Longitude: 64°38'8.54"E

A response letter was received from ATG on 24th August 2021 stating the following:

- They have no objections with the coordinates provided showing the WTGs close to the gas pipeline.
- In order to preserve wind turbines and other technological structures on the territory under force majeure circumstances on the gas pipeline, ATG requested that representatives from ACWA Power & ATG visit the nearest locations of WTGs for research before they could sign the ACT.
- ATG wants their representatives to be included in the site selection committee for the construction of the WTGs. They request ACWA Power to share with them the copies of the orders of khokimiyats for the establishment of the committee for the site selection.
- The drawing of the nearest WTG locations shall be submitted to ATG to be agreed upon.

Note: Consultations between ACWA Power & ATG are still ongoing.

Reference Appendix O for copies of letter correspondence and MoMs with Asia Trans Gas.

12.1.3 Railway Authority of Uzbekistan (JSC "O'zbekiston temir yo'llari")

A consultation letter was sent to the Railway Authority on 5th April 2021 informing them about the proposed Project. In addition, a questionnaire was attached to the letter seeking to establish baseline information regarding the operations of the railway line and station found within the Project site boundary (refer to Appendix P for the full list of clarifications requested).

A response was received from the Authority on 3rd May 2021 with responses to only two (2) out of thirteen (13) requested clarifications. The information provided stated that:

- The railway line crossing the site is operated by the Bukhara Regional Railway Unit – Unitary Enterprise.
    - It is used by passenger and freight trains twice a week on Mondays and Fridays. In addition, the freight trains transport different cargo which includes wide loads.
    - The trains using the railway line do not have a specific schedule.

The Authority stated that the additional information requested was confidential and could not be shared with the Project. As such, ACWA Power requested for additional information through the MoE which provided a response on 11th June 2021. The responses from the MoE are as summarised below:

- Based on KMK 2.10.10-97 "Norms and regulations for allocation of land for railways", 12m buffer zone should be maintained along the railway line and 50m for the railway station.
    - The buffer zone is meant to ensure the safety of trains, stations as well as ensure continuous schedule of trains.
    - Facilities belonging to the wind power plant should be placed on a safe distance from the railway line in order to avoid any damages in case of emergency situations.
- According to existing legislation for urban planning and construction regulations, physical and legal entities, limited liability companies are not allowed to construct any facilities within the railway/station buffer zones.
- Any means of communication that might be established under or above the railways should be agreed with management considering all technical requirements.
- All transportation issues should follow requirements indicated in GOST 9298-83 and the height of transported cargo should not exceed 4.50m.
- While transporting heavy equipment that might cross railways it is necessary to get written permission from the management of "Uzbekistan railways". Application for getting the permission should contain detailed information on transportation route and type of equipment that is being transported 5 days in advance.

- In accordance to the Resolution of Cabinet Ministers 05/83-38 dated on 28.06.2008, any type of constructions near (or at the buffer zone) should be agreed at the planning stage with Uzbekistan Railways.

Reference Appendix P for copies of correspondence with Railway Authority of Uzbekistan and MoE.

12.1.4 NEGU

In order to obtain more information on the existing OHTLs found within the Project site, a letter of consultation was sent to NEGU on 28th July 2021 with a request for the following information:

- The origin of the OHTLs and where they connect i.e., substation etc.
- Rating of the existing OHTLs;
- Buffer zone required between the existing OHTLs and Project facilities;
- Requirements for construction works near the OHTLs;
- Requirements for the movement of equipment and machinery under the OHTLs; and
- Any additional requirements for the Project.

It is noted that no response was received from NEGU even after multiple follow ups. As such, additional consultations will need to be undertaken during the construction phase.

12.1.5 Consultations Conducted by Ministry of Energy

ACWA Power provided 5 Capitals with copies of letters showing correspondence between the Ministry of Energy and different departments in Bukhara Regional Municipality. The consultations were aimed at establishing the presence of communication networks and gas pipelines in the Project area. A summary of the consultations is as provided in the table below.

Table 12-1 Summary of Consultations with Bukhara Municipality

STAKEHOLDER	DATE	OUTCOME
Bukhara Region Municipality	14th July 2021	After conducting their independent investigation, the Bukhara Region Municipality stated that they do not have any communication networks or facilities belonging to "Hududgaz Bukhoro (gas supply branch), Kogon (main gas supply dept), Buxoro power grid enterprise (JSC Bukhara Main Electric Networks Branch) and Bukhara Water Supply LLC.
Hududgaz Bukhoro (Gas supply branch)	6th July 2021	Currently there are no any underground or above ground communication networks belonging to the Hududgaz Bukhoro within the Project site found in the north eastern part of Ayakagitma in Gijduvan district.
Kogon (Main gas pipeline dept)	13th July 2021	During the investigations held by the department, none of the pipelines belong to the main gas pipeline were identified on the Project site.

STAKEHOLDER	DATE	OUTCOME
Bukhoro Power Grid Enterprise	13th July 2021	There are no underground cable networks belonging to Bukhoro Grid Enterprise within the proposed project site.
NEGU JSC – Bukhara Main Electric Network Branch	13th July 2021	There are no OHTLs with rating of 220-500kV within the project site belonging to Bukhara Main Electric Networks.
Uzsuvtaminot JSC (Bukhoro Suv Taminoti LLC (Water Supply)	13th July 2021	The north eastern part of Ayakagitma in Gijduvan district does not have any centralised water supply or waste water systems.

12.1.6 Ministry for Information & Communication Technology Development

A letter from the Ministry for Information & Communication Technology Development to MoE dated 11th August 2021 stated that they do not have any telecommunication networks or communication facilities at the Bash Project site in Gijduvon districts.

12.1.7 Civil Aviation Agency (Uzaviation)

There are three airports in the region which include Bukhara International Airport, Navoi International Airport and Kagan South Air Base (Military Airport). The closest airport to the Project is the Navoi International Airport which is located approximately 60km south east of the Project site. However, this does not mean that the Project site is not located within flight paths[10].

In a letter dated 19th July 2021 (from CAA to ACWA Power), CAA reviewed the application for an issuance of a permit for the placement of objects in the areas of civil and experimental aviation airfields that may threaten the safety of aircrafts. Based on the application, CAA determined:

- The preliminary location of the installation of objects (Project facilities) is located within the surface of the obstacles accounting circle and does not exceed the limiting surfaces.
- Objects (Project facilities) can be reviewed in accordance with the established procedure upon acceptance of an application in accordance with Annex No.3, Resolution of the Cabinet of Ministries No. 226 dated 11.08.2014.
- Project facilities with a height of more than 50m need a permit in coordination with the Ministry of Defence of the Republic of Uzbekistan.

[10] Reference SkyVector for airports and flight paths near the Project site. This data is subject to verification with CAA during the application of a NOC as applicable. https://skyvector.com/?ll=39.775283333,64.482277778&chart=301&zoom=2

CAA concluded that the specified Project facilities are subject to approval by the Agency "Uzaviation" and will be considered in accordance with the established procedures after the Agency receives all the relevant documents.

It is understood from ACWA Power that a preliminary NOC has been received for the entire Project site but the final NOC will be issued by CAA and the Ministry of Defence once the exact location of the wind turbines is determined. The application of this NOC will be completed before the start of construction.

Reference Appendix Q for letters provided by MoE as proof of consultations with CAA, Bukhara Regional Municipality and Ministry of ICT.

12.2 Receptors

Table 12-2 Existing Infrastructure –Receptors

RECEPTOR	SENSITIVITY	JUSTIFICATION
Gas pipeline (R19)	**High**	The gas pipelines are particularly vulnerable to damage from construction work and movement of Project machinery & equipment leading to disruption of gas supply which will impact not only Uzbekistan but Kazakhstan, Turkmenistan and China.
Railway line & station (R4 & R8)	**High**	The railway line will be particularly vulnerable to the movement of machinery and equipment, construction works which could disrupt the movement of passenger and cargo trains and in the worst-case cause accidents.
OHTLs (R1)	**Medium**	The OHTLs are relatively vulnerable to the movement of machinery and equipment which would disrupt the supply of power to consumers.
Aviation & Radar	**Low**	Aviation and radar will not be significantly impacted by the erection of the WTGs.

12.3 Potential Impacts, Mitigation, Management and Residual Impacts

12.3.1 Construction Phase

12.3.1.1 Damage of Existing Infrastructure and Disruption of Services

The construction of the Project may potentially lead to the damage of existing infrastructure which may lead to disruption of services provided by Asia Trans Gas, Railway Authority of Uzbekistan and NEGU.

However, coordination and consultations with relevant stakeholders such as MoE, NEGU, UstransGaz, Uzbekneftgas and Asia Trans Gas will be undertaken to ensure that the Project design meets all relevant legal requirements and construction & movement of machinery, equipment and workers is within the allocated Project footprint.

Since the railway line splits the Project site, uncontrolled movement of vehicles, machinery, equipment and workers may disrupt the movement of passenger and freight trains. In addition, this could result in accidents and loss of life for Project workers and those using the trains. As, such the EPC will be required to conduct a risk assessment before the start of any construction work and obtain the necessary permits from Uzbek Railway Authority before movement of machinery/equipment over the railway line.

During the construction phase, it is anticipated that equipment such as cranes will be used which may pose a risk to workers working near existing OHTLs found within the Project site. This is dependent on the height of the cranes, location of construction areas and other construction equipment and machinery and the footprint of the Project facilities.

Therefore, the construction phase of the Project should adhere to all the required buffer zones with the gas pipelines, railway line & station and OHTLs and ensure continued consultations with the relevant stakeholders in accordance with the Project specific SEP.

12.3.1.2 Aviation and Radar

The installation of the WTGs could have a potential impact on aviation. Such impacts include the WTGs presenting an obstacle on flight routes and hence affecting the safety of flights. However, this would only occur in instances where the aircrafts are flying close to the ground (which is unlikely considering that the nearest known airfield is approximately 60km from the WF) i.e., during take-off and landing or where flights are flying low as with military activities.

In addition, the WTGs may also cause radar and navigational aid interference where the blades appear as "clutter" on radar screens and can be mistaken as aircraft.

Table 12-3 Existing Infrastructure Mitigation & Management Measures - Construction

Impacts	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impact
Damage to existing infrastructure and disruption of services	**Moderate Negative**	Gas pipeline (R19)	High	**Moderate to Major**	• The Project Company will ensure that ongoing consultations are undertaken with MoE, UstransGaz, Uzbekneftgas and Asia Trans Gas in order to ensure that the Project design meets all the legal requirements. • The EPC Contractor will obtain all relevant NoCs before any work affecting existing infrastructure is conducted. • All Project facilities will maintain a buffer zone of 350m with Asia Trans Gas facilities. • The Project Company will notify Asia Trans Gas in advance in case any Project facilities cross through the gas pipelines and their other facilities such as the fibre optic cables. • Construction workers will be forbidden from accessing any facilities belonging to Asia Trans Gas and no construction works will be undertaken within the buffer zone. • The EPC Contractor will prepare an Emergency Preparedness and Response Plan in consultations with relevant stakeholders. • The EPC Company will notify the Project Company and Asia Trans Gas immediately in case of any incidences involving gas infrastructure and corrective action taken in consultation and coordination with relevant stakeholders. • The Project specific Traffic Management Plan will be developed and prepared in consultations with relevant stakeholders including Asia Trans Gas in case the road will go over any of their facilities.	**Minor to Moderate**
	Minor Negative	Railway line & station	High	**Minor to Moderate**	• The Project design & construction will ensure that 12m and 50m buffer zones are maintained between Project	**Minor**

Impacts	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impact
		(R4 & R8)			facilities and the railway line and railway station respectively. • The EPC Contractor will get a written permission from the Railway of Uzbekistan Authority if heavy equipment is required to cross the railway line. The application for permission will be submitted 5 days in advance and will contain detailed information about the transportation route and type of equipment being transported. • The Project Company & EPC Contractor will ensure that any construction work near the buffer zone is agreed with the Railway Authority of Uzbekistan from the planning stage. • No construction work will be undertaken within the designated buffer zones. • Obstruction of the railway line and the station will not be permitted.	
	Minor Negative	OHTLs (R1)	Medium	**Minor**	• No construction work will be undertaken under the OHTLs and existing buffer zones will be observed. • The EPC Contractor will apply for permission from NEGU in case any activities have to be undertaken under the OHTLs or within the buffer zones. • Passage of machinery and equipment under the OHTLs with an overall height of more than 4.5m with or without load within the buffer zones or under the OHTLs will not be allowed.	**Negligible to Minor**
Disruption of aviation services	**Minor Negative**	Aviation & Radar	Low	**Negligible to Minor**	• Apply for the final NOC from CAA and Ministry of Defence before the start of construction. • Once the final WTG details has been selected, their final positioning (coordinates) and height information will be provided to CAA prior to installation/erection of WTGs • If required by CAA, lighting will be installed (to be agreed before the WTGs are erected).	**Negligible**

Impacts	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impact
					• Consultations with CAA will continue in order to establish any additional requirements applicable to the Project.	

12.3.2 Operational Phase

The Project site facilities will be static during the operational phase of the Project. As such, no further excavations are expected to be undertaken and the movement of vehicles will be minimal. However, the movement of maintenance and security vehicles could potentially damage the gas pipelines and the railway lines but the risk is considered minimal.

In relation to aviation and radar interference, no further mitigations measures are envisioned during the operational phase separate to those in the construction phase of the Project.

Table 12-4 Existing Infrastructure Mitigation & Management Measures– Operational Phase

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impact
Damage to existing infrastructure and disruption of services	**Negligible Negative**	Gas pipeline (R19)	High	**Minor**	• The Project Company & O&M Company will ensure ongoing consultations with Asia Trans Gas where any maintenance work impacts the gas pipelines. • O&M workers are forbidden from accessing any facilities belonging to Asia Trans Gas. • The O&M will prepare an Emergency Preparedness and Response Plan in consultations with relevant stakeholders. • The Project specific Traffic Management Plan will be developed and prepared in consultations with relevant stakeholders including Asia Trans Gas in case the road will go over any of their facilities.	**Negligible to Minor**
	Negligible Negative	Railway line & station (R4 & R8)	High	**Minor**	• The O&M Company will get a written permission from the Railway of Uzbekistan Authority if heavy maintenance equipment is required to cross the railway line. • Obstruction of the railway line and the station will not be permitted. • Ongoing consultations with Uzbekistan Railway Authority will be undertaken as applicable.	**Negligible to Minor**
	Negligible Negative	OHTLs (R1)	Medium	**Negligible to Minor**	• O&M Company will apply for permission from NEGU in case any maintenance work will interfere with the operation of the existing OHTLs.	**Negligible**

12.3.3 Decommissioning Phase

The decommissioning of the Project facilities will lead to movement of vehicles, equipment and machinery including removal of heavy loads from the Project site. It is expected that the impacts on existing infrastructure (railway line, gas pipelines, OHTLs) will be similar to the impacts during the construction phase. As such, the Project Company will ensure that the construction mitigation and management measures are implemented including the monitoring requirements.

Additionally, consultations will be held with the operators of the existing infrastructure before any decommissioning work can commence.

12.4 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 12-5 Existing Infrastructure - Monitoring Requirements (construction & operational phases)

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATIONS
Project NOCs	Application and obtaining of relevant permits such as with CAA	As required by law	N/A
Stakeholder Consultations	MoM, letters of correspondence	On-going	Consultations with MoE, UstransGas, Uzbekneftgas, Asia Trans Gas, Railway Authority of Uzbekistan, NEGU and CAA in accordance with the SEP.
Grievances received from relevant stakeholders regarding existing infrastructure	Grievances received	On-going	Project site and from operators of the infrastructure found within the Project boundaries.
Damage of existing infrastructure	Records of correspondence with relevant stakeholders notifying them of any Project work that might potentially affect their facilities and operations.	On-going	Project site

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATIONS
	Records showing application and permission obtained from relevant authorities where buffer zones are not adhered to or Project facilities/equipment crosses over existing infrastructure		
Emergency incidents and near misses	Any classified emergency situations/incidents or near misses involving the existing infrastructure	On-going	At location of existing infrastructure.

13 ARCHAEOLOGY AND CULTURAL HERITAGE

13.1 Observation and Baseline Environment

Extensive consultations have been undertaken with the Ministry of Culture of Republic of Uzbekistan and the Institute of Archaeology in order to establish whether there are any archaeological or cultural sites near or within the proposed Project site.

Based on the consultation with the Tourism Development Committee and Ministry of Culture, there are no tourism objects and tangible cultural heritage items located within the Project boundary or within a 5km radius. Consultation with the Institute of Archaeology revealed that the project area has been studied in the past and items of archaeological importance including a neolithic site was identified during the expedition.

The summary of these consultations is provided below.

13.1.1 Tourism Development Committee

Consultations conducted by Ministry of Energy with the Tourism Development Committee on 17th September 2020 and 23rd September 2020 revealed that there are no tourism objects on the Project site in Gijduvon district. The letter states:

"*The State Committee of the Republic of Uzbekistan for Tourism would like to inform you that there are no tourism objects on the project areas in Peshku and Gijduvon districts of Bukhara region where the construction of Wind Farms are planned.*

It is advised to obtain conclusions of the Department of Cultural Heritage under the Ministry of Culture on the presence or absence of cultural monuments on the land plots allocated for the construction of wind farms in the above-mentioned areas."

13.1.2 Ministry of Culture

On 29th March 2021, a letter of consultation was sent to Bukhara Department of Culture who are the Ministry of Culture regional representatives. The letter requested for assistance in obtaining information on archaeological and cultural objects/sites found within the Project site and within 5km radius of the site.

The Department of Culture provided an official response on 29th April 2021 stating that there are no archaeological and cultural objects/sites located within the Project boundary or within a 5km radius. However, the department recommended that all Project related excavations should be undertaken under archaeological observation.

13.1.3 Institute of Archaeology

A consultation letter was also sent to the Institute of Archaeology under the Academy of Sciences of the Republic of Uzbekistan on 29th March 2021 requesting for clarifications on the following:

- Request for locations of archaeological and cultural sites/objects within the Project site and within a 5km radius of the site.
- Clarification on whether there are any ongoing archaeological/cultural surveys being conducted on or near the Project site.
- If they would be willing to share survey locations, timelines and any other relevant information about such ongoing archaeological/cultural surveys (if present).

A letter of response was received on 6th April 2021 from the Institute of Archaeology stating that the Project site was being studied and researched on the basis of the project "Archaeology of the Stone Age in the north-west, central and southern regions of Uzbekistan" by an Uzbek-French joint expedition. The expedition included a team from the National Archaeological Center of the Academy of Sciences of the Republic of Uzbekistan and the National Centre for Research for France (CNRS, UMR 7041, Central Asia Department).

The studies conducted identified a Neolithic site at the Project site near the cliffs along Lake Ayakagitma as well as samples of cultural materials from the stone age and later periods. Taking account of the presence of ancient stone age settlements, stone-working workshops and cemeteries of ancient nomads and herders, the Institute advised that the Project should conduct preliminary archaeological search and control of the construction works on the Project site.

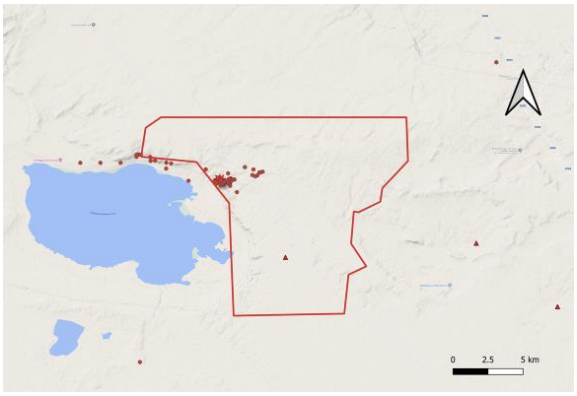
Figure 13-1 Location of the Neolithic site within the Project boundary

Upon receipt of the response above, a follow up letter was sent to the Institute of Archaeology on 12th April 2021 requesting for the following:

- Exact coordinates of the Neolithic site in Ayakagitma including the details of the required buffer zone between this site and construction works;
- Confirmations on whether the Uzbek-French expedition was still conducting active research work within the site or 5km radius of the site;
- Information of the experts who would be involved in the preliminary archaeological survey including the expected timeline; and
- A call between representative from the Institute of Archaeology, ACWA Power, Juru Energy and 5 Capitals.

The Institute of Archaeology confirmed their availability for a Zoom call which was held on 19th April 2021. Additional meetings were held on 27th and 30th April 2021 a summary of which is provided below.

DATE OF CONSULTATION	19th April 2021
TIME	15:30 -16:30
VENUE	Zoom
LANGUAGE	Uzbek
NUMBER OF PARTICIPANTS	4
REPRESENTATIVES FROM INSTITUTE OF ARCHAEOLOGY	Deputy Director & Senior Researcher of Samarkand Branch Institute of Archaeology
PROJECT REPRESENTATIVES	Senior Environmental Consultant (5 Capitals) Acting Head of E&S Group (Juru Energy)
MATERIALS USED	Power point presentation from the Institute of Archaeology
COVID-19 PRECAUTION IMPLEMENTED	N/A
MAIN FINDINGS	
• Representative from the Institute of Archaeology informed ACWA Power that a number of archaeological research has been undertaken within the Kyzilkum desert which is where the project is located. A total of 1600 archaeological finds from the Neolithic period have been discovered so far • The last expedition at the project area was conducted in 2015 along the northern shores of Lake Ayakagitma as well as along the cliffs and archaeological finds are as shown in the figures below • The Institute of Archaeology informed ACWA Power that the archaeological survey to be undertaken at the project site would take one month and an additional one month would be required for laboratory work and preparation of the survey reports.	

 *Location of the surveyed areas in Bash (red dots)*	 *Some of the findings from the Neolithic site within the Project boundary*

DATE OF CONSULTATION	27th April 2021
TIME	18:30-19:00
VENUE	Zoom
LANGUAGE	Uzbek
NUMBER OF PARTICIPANTS	4
REPRESENTATIVES FROM INSTITUTE OF ARCHAEOLOGY	Deputy Director and Senior Researcher of Samarkand Branch Institute of Archaeology
PROJECT REPRESENTATIVES	Senior Manager – Business Development (ACWA Power) Acting Head of E&S Group (Juru Energy)
MATERIALS USED	N/A
COVID-19 PRECAUTION IMPLEMENTED	N/A

MAIN FINDINGS/DISCUSSIONS

- Archaeological survey at the project site will require 2 months (one month for field work and the second month for analysis of the findings from field work. Where items of archaeological or cultural importance are identifies, local legislation requires the establishment of a buffer zone to depending on the size, type of archaeological find
- Large scale construction project are required to conduct preliminary archaeological research. Any item discovered during the research will be put under state protection according to the Constitution of Uzbekistan Such archaeological research cannot be funded by the Government
- A buffer zone will need to be established for each site where an archaeological item of importance was discovered.

DATE OF CONSULTATION	30th April 2021
TIME	11:00 – 11:40
VENUE	National Centre of Archaeology in Tashkent
LANGUAGE	Uzbek
NUMBER OF PARTICIPANTS	7
REPRESENTATIVES FROM INSTITUTE OF ARCHAEOLOGY	Director of National Centre of Archaeology and; Two members of National Centre of Archaeology
PROJECT REPRESENTATIVES	Senior Manager – Business Development (ACWA Power) Business Manager (ACWA Power) Acting Head of E&S Group (Juru Energy) Social Consultant (Juru Energy)
MATERIALS USED	N/A
COVID-19 PRECAUTION IMPLEMENTED	Wearing of masks

MAIN FINDINGS/DISCUSSIONS

- An agreement to undertake archaeological fieldwork/investigation at the project site will be prepared and shared with ACWA Power by 3rd May 2021.
- The Institute of Archaeology informed ACWA Power that the local requirements for the establishment of buffer zone has been amended based on international standards and the buffer zone requirments are:
  - 50 meters from large sites such as ancient settlements and cities etc.
  - 25 meters from small sites such as buildings and artefacts.
- 5 Capitals confirmed to ACWA Power that there are no specific lenders requirements on the required buffer zone for archaeological finds and that the project will be required to adhere to national requirements. In addition, it was agreed that this could be discussed further with the lenders upon completion of the archaeological surveys.

Consultation letters, MOMs and power point presentation by Institute of Archaeology can be found in Appendix R

POLISH RESEARCH TEAM

During a site visit conducted in June 2021, Juru Energy's team observed excavation works being undertaken by a Polish Archaeological Team along the shores of Lake Ayakagytma (outside the Project boundary). The head of the research team requested for Juru Energy to send any request for clarifications on their work via email and he would respond. His response was received on 4th July 2021 as detailed below.

- The Bash Wind Farm site is located in the vicinity of Ayakagytma depression in Central Kyzyl-kums. This territory especially to the south & east Depression yielded dozens of archaeological finds covering the time span from Stone Age/Middle Palaeolithic through the Neolithic and up to historical times/Medieval Ages.

- The surveys were conducted in the seventies, and then in 1995 – 2012 seasons. Most of the documented sites are only surface windblown finds without any cultural layer preserved.

- The Project site is located on the not too vast plateau some 100X70m/ clearly cut from each side by conspicuous, steep gorges.
    - We would suggest to protect the whole area of the plateau having the surrounding gorges as buffer zones.
- The Ayakagytma site (on the shores of the lake) is an archaeological location of crucial importance for all Central Asia, as it is provided the priceless data for the first domestication of cattle, horse, camel, sheep/goats, pigs and dogs/ca 8200-5500 years BP/. It also allows to study in detail the economy, technology and everyday life of the Neolithic people in the part of the world.
    - The site has well preserved cultural layer reaching down to 1.5m and therefore the archaeological artifacts in their primary position and context. At present, there are no visible traces of any constructions, just flint, stone and pottery artifacts scattered around the area. Any earth works would completely disturb this unique preserved context and make further archaeological excavations impossible. This applies to other sites discovered by Uzbekistan archaeologists.
- In 2021, the Polish-Uzbek team visited Ayakagytma and its surroundings and decided to continue the field research for at least 2 -3 coming seasons. Our research is mainly directed to detailed reconstruction of the paleoenvironment in the Late Pleistocene/Early Holocene – some 12,000 to 4,000 years ago. It is also quite possible that the Uzbek team would like to excavate other areas.
- While planning the Bash Wind Farm, we would advise you to bear two aspects in mind:
    - The Ayakagytma Depression and its surrounding areas have huge tourist potential. The beauty of this area should not be spoilt. While the Wind Farm is a reasonable investment, it should be planned in a way that it is well-adjusted to the existing landscape.
    - To avoid the impacts on wildlife especially birds, it would be very useful to apply the proper safety devices in order to protect them.

Refer to Appendix S for the correspondence with Prof. Karol head of the Polish Research Team.

13.1.4 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 territory of the Republic of Uzbekistan" on 4th May 2021. The agreement outlined the terms of engagement between the two parties and required the immediate mobilisation of the Archaeology Team to site.

On 28th May 2021 a research team of 9 experts from the Institute of Archaeology mobilised to the Project site in order to conduct archaeological surveys. The survey was conducted

between 28th May to 21st June 2021 and a summary of their conclusions was received on 29th June 2021.

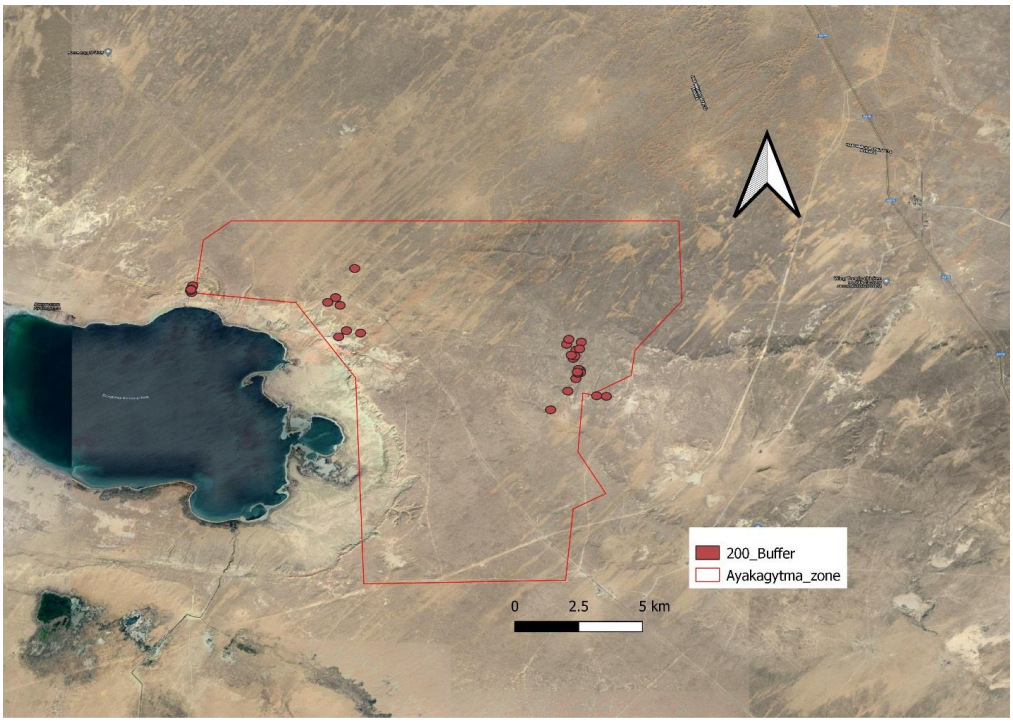
Plate 13-1 Archaeological Team at the Project Site

13.1.4.1 Outcome of the Archaeological Surveys

During the surveys conducted in June one (1) new Neolithic site (6th millennium B.C.) and seven (7) stone processing workshops of Palaeolithic Age (approximately 70,000 years B.C) were encountered. Finds belonging to the classical periods (V-XII ages) were also identified during the survey. During excavations and observations carried out, archaeological finds were divided into 3 groups according to their characteristics:

- Group 1: Archaeological artifacts were scattered within a 200m radius and therefore a protection zone of 200m was established. The protection area was determined on the basis of section 4 of the Resolution of the Cabinet of Ministers No. 265 dated 2019.

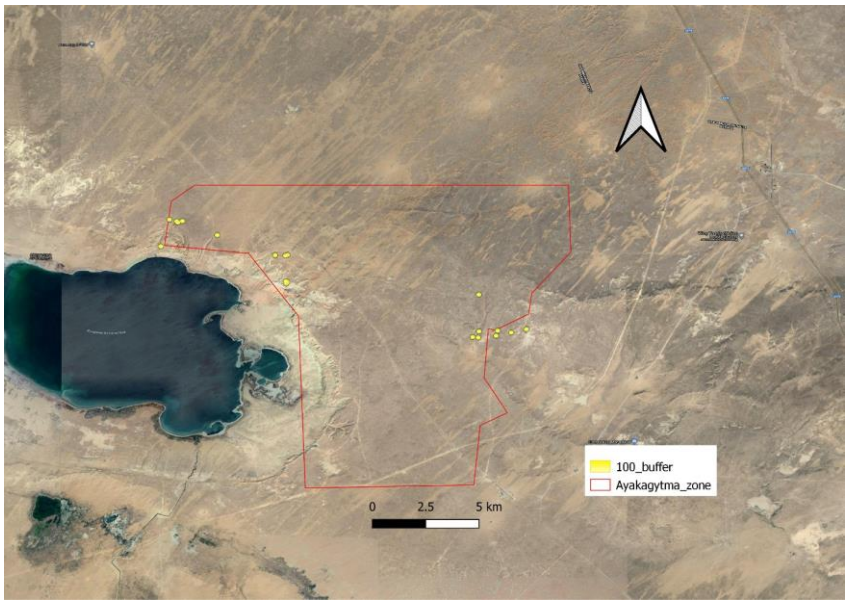
Figure 13-2 Location of Identified Finds near Ayakagytma Depression with 200m Buffer Zone



Source: Institute of Archaeology

- Group 2: 21 stone finds and the remains of ceramic vessels were concentrated but no excavations were carried out as layers without cultural layers were identified as shown in the figure below. In accordance with prevalence of the results obtained, the buffer zone was established as 100m.

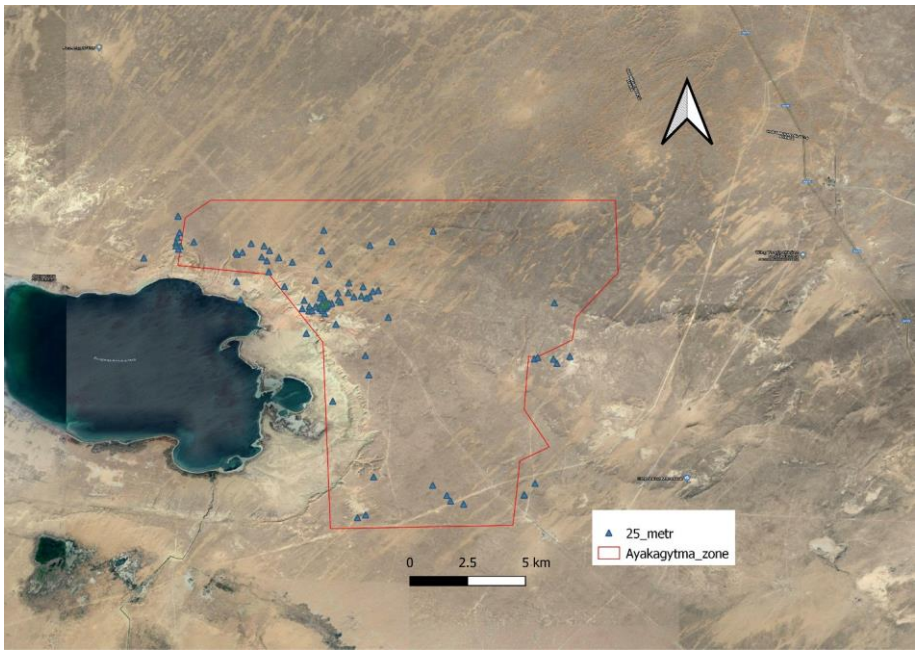
Figure 13-3 Location of Identified Finds near Ayakagytma Depression with 100m Buffer Zone



Source: Institute of Archaeology

- Group 3: This includes 104 low -number finds and do not have cultural layer and a buffer zone of 25m was established.

Figure 13-4 Location of Identified Finds near Ayakagytma Depression with 25m Buffer Zone



The table below shows database of archaeological finds found within the Project site.

Table 13-1 Archaeological Finds at the Project Site

Coordinates			stones	Ceramics	Bones	Buffer Zone (m)	Year of Survey
X	Y	Z					
635043	4503202	242	4	0	-	25	2021
639297.52	4498548.94	318	1	0	-	25	2021
631659	4504977	272	6	0	-	100	2021
631930	4504992	276	3	0	-	100	2021
636874	4503002	241	36	0	-	100	2021
633665.14	4504163.86	332	0	14	-	25	2021
634722	4504034	291	1	1	-	25	2021
630973	4503506	235	0	6	-	200	2021
633606	4504286	264	2	0	-	25	2021
630945	4503423	191	0	12	-	100	2021
631196.14	4504584.37	276	0	3	-	25	2021
631077.62	4505072.73	309	0	2	-	25	2021
631159.98	4505355.49	307	0	10	-	25	2021
630997	4503810	208	0	3	-	200	2021
631014	4503860	209	0	2	-	200	2021
630933	4503600	233	0	1	-	200	2021

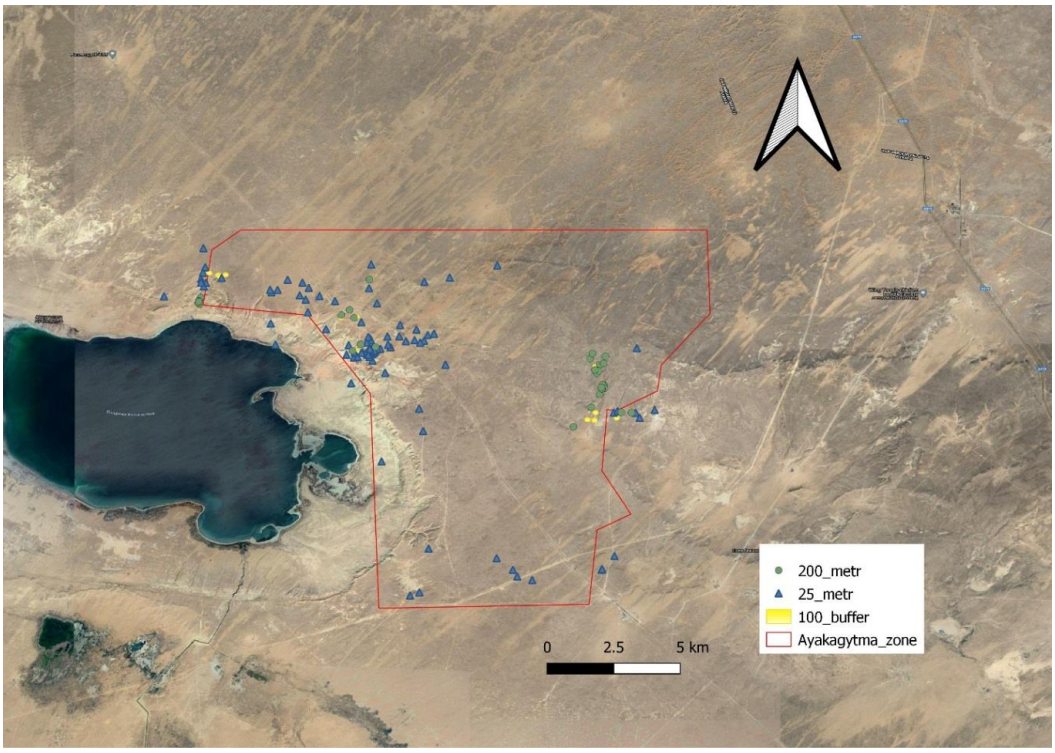
Coordinates			stones	Ceramics	Bones	Buffer Zone (m)	Year of Survey
X	Y	Z					
633860	4501596	162	-	1	-	25	2021
630947	4503683	222	351	4	-	200	2021
631074	4506282	264	0	3	-	25	2021
631122	4504412	217	0	1	-	25	2021
633886	4504291	276	0	3	-	25	2021
631013	4504771	239	0	3	-	25	2021
630947	4503683	222	1	0	-	200	2021
630951	4503659	-	1	0	-	200	2021
631716	4504900.80	-	1	-	-	100	2021
633568.04	4504156.56	-	0	10	-	100	2021
633663.08	4502633.25	-	1	2	-	25	2021
631782.03	4504835.34	270	-	-	-	25	2021
631317.18	4505069.56	-	-	-	-	100	2021
631018.34	4504599.74	239	1	3		25	2021
634255.40	4504794.52	-	0	10	-	25	2021
629638.61	4503896.31	-	3	10	-	25	2021
630449.37	4726999.84	-	1	5	-	25	2021
636783.06	4502956.54	245	27	1	-	200	2021
67019	4502742	240	6	1	-	25	2021
636049.35	4503774.07	248	23	3	-	25	2021
636783.06	4502956.54	261	6	1	-	100	2021
636603	4503352	260	52	2	-	200	2021
636299.33	4502975.41	327	0	5	-	100	2021
636298.46	4503099.40	323	47	22	-	200	2021
637056	4502760	-	4	-	-	25	2021
639380	4504787	313	6	0	-	25	2021
643137.05	4490375.76	253	7	0	-	25	2021
643702.08	4490212.65	303	0	3	-	25	2021
642346.57	4491258.28	304	0	4	-	25	2021
635464.56	4504005.84	-	5	0	-	25	2021
639477	4489529	254	1	0	-	25	2021
639783.65	4491683.61	252	-	-	-	25	2021
642965	4490704	268	0	10	-	25	2021
639132.38	4489369.06	303	0	3	-	25	2021
637311.05	4504432.11		0	0	-	25	2021
646296	4490775	248	0	1	-	25	2021
642095.68	4505638.19	318	0	20	-	25	2021
640325	4505011	310	0	3	-	25	2021

Coordinates			stones	Ceramics	Bones	Buffer Zone (m)	Year of Survey
X	Y	Z					
637317	4504854	254	8	37	-	200	2021
646764	4491454	271	0	10	-	25	2021
638493	4502092	242	0	0	1	25	2021
639469.51	4497454.05	229	-	-	30	25	2021
636729.29	4499749.99	251	0	26	1	25	2021
635054.29	4504405.54	334	0	1	-	25	2021
637608	4501551	222	7	0	-	200	2021
637053.46	4501667.82	239	16	0	-	200	2021
637939.25	4495931.95	253	0	6	-	25	2021
637621	4501452	230	12	0	-	25	2021
637392	4501964	5	-	-	-	25	2021
637593	4501370	227	0	0	-	25	2021
637430	4501898	236	3	0	-	25	2021
638176	4501551	253	2	0	-	25	2021
638048.16	4502071.19		4	0	-	25	2021
637281.46	4501762.72	715	3	0	-	25	2021
638740	4501857	267	1	0	-	25	2021
637626.16	4503699.47	251	0	3	-	25	2021
638079.57	4501670.15	316	0	1	-	25	2021
634950	4503830	-	0	3	-	25	2021
640246.91	4500729.80	232	3	1	-	25	2021
634812.88	4504663.96	331	0	2	-	25	2021
640246.91	4500729.80	241	0	3	-	25	2021
637573.62	4501285.06	211	4	0	-	25	2021
645935	4500415	288	10	12	-	200	2021
647402	4501675	314	3	6	-	25	2021
646032	4500845	288	19	0	-	200	2021
645658	4501130	292	30	0	-	200	2021
645994	4500533	282	19	2	-	200	2021
646230	4501254	258	20	0	-	200	2021
645743	4501387	304	25	0	-	200	2021
645851	4500579	310	12	10	-	200	2021
645101	4497769	241	11	1	-	200	2021
637372	4505596	283	2	3	-	25	2021
645863	4500738	289	8	-	-	100	2021
645888	4498102	327	16	0	1	100	2021
648127	4498661	-	19	-	-	25	2021
646316.56	4490798.37	301	3	-	-	25	2021

Coordinates			stones	Ceramics	Bones	Buffer Zone (m)	Year of Survey
X	Y	Z					
648127	4498661	329	45	0	-	100	2021
646170	4500909	294	9	1		200	2021
646787	4498543	250	38	-	-	100	2021
647264	4498496	221	42	98	-	200	2021
647577.58	4498260.07		11	0	-	25	2021
646215	4499821	268	54	0	-	200	2021
646146	4499860	331	12	0	-	200	2021
646598	4498493	225	2	-	-	25	2021
647419	4498499	343	7	0	-	25	2021
647423	4498443	202	13	-	-	100	2021
646885	4498522	254	31	8	-	200	2021
646740.55	4498582.23	250	0	5	-	25	2021
646057	4499383	262	21	0	-	200	2021
645755.95	4498738.71	359	19	0	-	200	2021
646717.88	4498230.11	342	18	-	-	100	2021
645622.67	4498127.16	330	18	-	-	100	2021
646228	4499686	332	51	1	-	200	2021
645915	4498483	244	9	0		100	2021
646130	4499657	252	29	1		200	2021
646112	4499719	279	21	0		200	2021
The Coordinates below are from surveys conducted by Uzbek-Polish (1996-2005) and Uzbek-French (2006-2015) Expedition Teams							
636754.68	4501346.92	208	100,000	300	-	200	1996 - 2015
639554.44	4502170.89	244	7	0	0	25	Uzb-Fr-2008
639418.75	4501890.72	247	11	0	0	25	Uzb-Fr-2008
639788.12	4502237	239	0	4	0	25	Uzb-Fr-2008
639279.58	4501795.57	246	3	0	0	25	Uzb-Fr-2008
638511.99	4502644.93	252	0	2	0	25	Uzb-Fr-2008
639126	4502440.49	243	6	0	0	25	Uzb-Fr-2008
639065	4501914.95	247	8	0	0	25	Uzb-Fr-2008
637460	4501207.24	248	15	0	0	25	Uzb-Fr-2012
637495	4501188.82	237	7	0	0	25	Uzb-Fr-2012
637303	4501165	218	0	3	0	25	Uzb-Fr-2012
637566	4501520.27	224	13	0	0	25	Uzb-Fr-2012
635734	4502387	245	10	0	0	25	Uzb-Fr-2012
637658	4501432	228	12	0	0	25	Uzb-Fr-2012
637794	4501465	225	14	0	0	25	Uzb-Fr-2012
637134	4501273	223	8	0	0	25	Uzb-Fr-2012
636601	4501619.29	233	18	0	0	25	Uzb-Fr-2012

Coordinates			Stones	Ceramics	Bones	Buffer Zone (m)	Year of Survey
X	Y	Z					
637992	4500288.55	262	4	0	0	25	Uzb-Fr-2012
637524	4501569.53	223	7	0	0	25	Uzb-Fr-2012
636847	4501258	211	27	0	0	100	Uzb-Fr-2012
637329	4502033.77	257	3	1	0	25	Uzb-Fr-2012
636808	4501023	237	22	0	0	25	Uzb-Fr-2012
637502	4500880.15	247	11	1	0	25	Uzb-Fr-2012
636895	4501330.44	212	37	0	0	100	Uzb-Fr-2012
636825	4501265	210	7	0	0	25	Uzb-Fr-2012
637253	4501232	215	1	3	0	25	Uzb-Fr-2012
637391	4501061	217	9	0	0	25	Uzb-Fr-2012
637489	4501517	211	0	2	0	25	Uzb-Fr-2012
637565	4501378	225	5	0	0	25	Uzb-Fr-2012
637398	4501260	216	12	0	0	25	Uzb-Fr-2012
636845	4501393	216	17	0	0	100	Uzb-Fr-2012
636824	4501388	211	31	0	0	100	Uzb-Fr-2012
636528	4501144.79	205	16	0	0	25	Uzb-Fr-2012
637511	4501244.62	212	8	0	0	25	Uzb-Fr-2012
636946	4501049	202	7	0	0	25	Uzb-Fr-2012
637325.33	4501177.10	215	6	0	0	25	Uzb-Fr-2012
637352	4501162.10	213	4	0	0	25	Uzb-Fr-2012
637509	4501316	227	7	1	0	25	Uzb-Fr-2012
637435	4501448.87	229	4	0	0	25	Uzb-Fr-2012
637673	4501470.28	231	7	0	0	25	Uzb-Fr-2012
637565	4501378	221	7	0	0	25	Uzb-Fr-2012
637408	4501444	227	16	0	0	25	Uzb-Fr-2012
637387	4501501	223	14	0	0	25	Uzb-Fr-2012
637089	4501250	224	5	0	0	25	Uzb-Fr-2012
637400	4501447	226	3	1	0	25	Uzb-Fr-2012
Total			**101,736**	**747**	**33**	n/a	n/a

Figure 13-5 Location of all Findings Identified by the Archaeological Team



Source: Institute of Archaeology

Plate 13-2 Some of the Archaeological Finds at the Project Site

Plate 13-3 Ayakagitma Neolithic Site (Excavation 1)

In the conclusions provided by the Institute of Archaeological it is stated that if construction and excavation works will be carried out on the territory of the finds belonging to the 3 groups above, the works should be carried out directly under an archaeological supervision. It is also understood from the Director of National Centre of Archaeology that the research team collected samples of the findings as collection of all finds would require more time and more excavations. However, it is expected that a representative of the archaeological team will be present during the construction phase in order to identify any finds during ongoing works.

Following submission of the conclusions of the archaeological surveys to ACWA Power a meeting was held between the National Centre of Archaeology, ACWA Power & Juru Energy on 9th July 2021 in order to discuss the outcome of the archaeological surveys at the Bash Wind Farm. The representative of the National Centre of Archaeology advised that they are obligated by Uzbek regulations to submit findings of the archaeological survey to the Agency of Conservation of Cultural Heritage. He also indicated that whilst the National Centre of Archaeology recommends the size of preliminary buffer zone that might be applicable to the archaeological findings, the Agency of Conservation of Cultural Heritage can decide to changes the size of the buffer zone or suggest new buffer zones upon reading the archaeological report.

After laboratory analysis of the archaeological finds, a detailed archaeological survey report was received from the Institute of Archaeology at the end of March 2022 and a summary of this is presented in Appendix T.

13.1.5 Agency of Conservation of Cultural Heritage

After the meeting with the National Centre of Archaeology, ACWA Power sent an application to the Agency of Conservation of Cultural Heritage (Agency) under the Ministry of Tourism and Sports in order to register the archaeological sites and corresponding buffer zones. The following information was included in the application:

- General information about the Project;
- Preliminary conclusions from the Institute of Archaeology; and
- Kmz files showing the location of the finds and recommended buffer zones.

The application requested the Agency to provide the Project with the final conclusions on the proposed protection/buffer zones. The Agency of Conservation of Cultural Heritage responded on 7th September 2021 stating the following:

"According to the Paragraph 332 of Chapter XII "Protection of cultural heritage sites in the construction of settlements" of Article 12 of the Law of the Republic of Uzbekistan, development and construction of projects should not lead to relocation, demolition or change of status of cultural heritage sites. Moreover, distances from cultural heritage sites to transport and engineering communications must be at least:

- The carriageways of high-speed and non-stop highways to shallow-built metro lines are set to be 100m in complex relief conditions and 50m in flat relief."

Based on the above statement, the new established buffer zones of 50m for flat relief and 100m for complex relief areas supersedes the preliminary buffer zones of 25m & 200m recommended by the National Centre of Archaeology.

Follow up consultations were undertaken with the Agency in order to fully understand which buffer zones corresponded to which site as identified by the Institute of Archaeology (refer to table 13-1 above). A response was received on 14th September 2021 detailing the applicable buffer zones for the different archaeological zones and clusters. The updated buffer zones applicable to the Project are as provided in the table below (table 13-2).

Additional consultations were undertaken between ACWA Power and the Cultural Heritage Agency in November 2021 regarding the established buffer zones and construction requirements. In a letter dated 23rd November 2021, the Bukhara Regional Dept. of Cultural Heritage Agency stated that construction works can be undertaken within the buffer zones but under the supervision of an archaeologists and specialists from the Cultural Heritage Agency.

13.1.6 UNESCO

A consultation letter was sent to UNESCO on 31st August 2021 requesting for confirmation on whether they have any recognised cultural heritage objects within the Project site (and within

5km radius of the Project site) and along the OHTL. In a letter response dated 29th September 2021, UNESCO sated that the Project should contact the Cultural Heritage Agency under the Ministry of Tourism and Sports for more details. It is noted that consultations have already been undertaken with the Cultural Heritage Agency.

Table 13-2 Information on Coordinates of the Finds at Bash Site & Final Buffer Zones

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
1	635043	4503202	242	4	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
2	639297.52	4498548.94	318	1	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
3	631659	4504977	272	6	0	0	100	Uzb-2021	50	3 was clustered with archaeological site ID 25 with a non-standard buffer zone of 50m from the most extreme outer point of the clustered points is required.
4	631930	4504992	276	3	0	0	100	Uzb-2021	112	Initial buffer zone established by archaeologists was 100 m, The Cultural Agency established 62 +50m buffer zone. So, the final buffer zone is 112 m
5	636874	4503002	241	36	0	0	100	Uzb-2021	191	Initial buffer zone established by archaeologists was 100 m. Agency have clustered 5, 35, 38. Cultural Agency established 141 +50m buffer zone. So, the final buffer zone is 191 m
6	633665.14	4504163.86	332	0	14	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
7	634722	4504034	291	1	1	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
8	630973	4503506	235	0	6	0	200	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. The Agency clustered archaeological sites 8, 15, 14, 18, 23, 24, 16, 10 with a non-standard buffer zone of 50m from the most extreme outer point of the clustered points.
9	633606	4504286	264	2	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
10	630945	4503423	191	0	12	0	100	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. The Agency has clustered 8, 15, 14, 18, 23, 24, 16, 10 and a non-standard buffer zone of 50m from the most extreme outer point of the clustered points is now required.
11	631196.14	4504584.37	276	0	3	0	25	Uzb-2021	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 11, 12, 13, 20, 22, 31, and non-standard buffer zone of 50m is required for these clustered zones.
12	631077.62	4505072.73	309	0	2	0	25	Uzb-2021	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 11, 12, 13, 20, 22, 31, and non-standard buffer of 50m is required from the most extreme point of the clustered archaeological zones.
13	631159.98	4505355.49	307	0	10	0	25	Uzb-2021	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 11, 12, 13, 20, 22, 31, and non-standard buffer zone of 50m is required from the most extreme point of the clustered archaeological zones.

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
14	630997	4503810	208	0	3	0	200	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 8, 15, 14, 18, 23, 24, 16, 10 and non-standard buffer zone of 50m is required from the most extreme point of the clustered archaeological zones.
15	631014	4503860	209	0	2	0	200	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 8, 15, 14, 18, 23, 24, 16, 10 and non-standard buffer zone of 50m is required from the most extreme point of the clustered archaeological zones.
16	630933	4503600	233	0	1	0	200	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 8, 15, 14, 18, 23, 24, 16, 10 and non-standard buffer zone of 50m is required from the most extreme point of the clustered archaeological zones.
17	633860	4501596	162	0	1	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
18	630947	4503683	222	351	4	0	200	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 8, 15, 14, 18, 23, 24, 16, 10 and non-standard buffer zone of 50m is required from the most extreme point of the clustered archaeological zones.
19	631074	4506282	264	0	3	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										Agency added + 50 m. So, the final buffer zone is 75 m
20	631122	4504412	217	0	1	0	25	Uzb-2021	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 11, 12, 13, 20, 22, 31, and non-standard buffer zone of 50m is required from the most extreme point of the clustered archaeological zones.
21	633886	4504291	276	0	3	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
22	631013	4504771	239	0	3	0	25	Uzb-2021	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 11, 12, 13, 20, 22, 31, and non-standard buffer zone of 50m is required from the most extreme point of the clustered archaeological zones.
23	630947	4503683	222	1	0	0	200	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 8, 15, 14, 18, 23, 24, 16, 10 and non-standard buffer zone of 50m is required from the most extreme point of the clustered archaeological zones.
24	630951	4503659	223	1	0	0	200	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 8, 15, 14, 18, 23, 24, 16, 10 and non-standard buffer zone of 50m is required from the most extreme point of the clustered archaeological zones.
25	631716	4504900.80	227	1	0	0	100	Uzb-2021	50	25 was clustered with 3 and non-standard buffer zone of 50m is required

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										from the most extreme point of the clustered archaeological zones.
26	633568.04	4504156.56	218	0	10	0	100	Uzb-2021	143	Initial buffer zone established by archaeologists was 100 m, Cultural Agency established 93 +50m buffer zone. So, the final buffer zone is 143 m
27	633663.08	4502633.25	251	1	2	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
28	631782.03	4504835.34	270	0	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
30	631317.18	4505069.56	243	0	3	0	100	Uzb-2021	115	Initial buffer zone established by archaeologists was 100 m, Cultural Agency established 65 +50m buffer zone. So, the final buffer zone is 115 m
31	631018.34	4504599.74	239	1	3	0	25	Uzb-2021	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 11, 12, 13, 20, 22, 31, and non-standard buffer zone and non-standard buffer zone of 50m is required from the most extreme point of the clustered archaeological zones.
32	634255.40	4504794.52	252	0	10	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
33	629638.61	4503896.31	288	3	10	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										Agency added + 50 m. So, the final buffer zone is 75 m
34	630449.37	4726999.84	239	1	5	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
35	636783.06	4502956.54	245	27	1	0	200	Uzb-2021	191	Initial buffer zone established by archaeologists was 100 m. Agency have clustered 5, 35, 38. Cultural Agency established 141 +50m buffer zone. So, the final buffer zone is 191 m
36	67019	4502742	240	6	1	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
37	636049.35	4503774.07	248	23	3	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
38	636783.06	4502956.54	261	6	1	0	100	Uzb-2021	191	Initial buffer zone established by archaeologists was 100 m. Agency have clustered 5, 35, 38. Cultural Agency established 141 +50m buffer zone. So, the final buffer zone is 191 m
39	636603	4503352	260	52	2	0	200	Uzb-2021	210	Initial buffer zone established by archaeologists was 200 m, Cultural Agency established 160 +50m buffer zone. So, the final buffer zone is 210 m
40	636299.33	4502975.41	327	0	5	0	100	Uzb-2021	180	Initial buffer zone established by archaeologists was 100 m. Agency have clustered 40 and 41. Cultural

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										Agency established 130 +50m buffer zone. So, the final buffer zone is 180 m
41	636298.46	4503099.40	323	47	22	0	200	Uzb-2021	180	Initial buffer zone established by archaeologists was 100 m. Agency have clustered 40 and 41. Cultural Agency established 130 +50m buffer zone. So, the final buffer zone is 180 m
42	637056	4502760	244	4	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
43	639380	4504787	313	6	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
44	643137.05	4490375.76	253	7	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
45	643702.08	4490212.65	303	0	3	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
46	642346.57	4491258.28	304	0	4	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
47	635464.56	4504005.84	309	5	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
48	639477	4489529	254	1	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										Agency added + 50 m. So, the final buffer zone is 75 m
49	639783.65	4491683.61	252	1	1	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
50	642965	4490704	268	0	10	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
51	639132.38	4489369.06	303	0	3	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
52	637311.05	4504432.11	244	0	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
53	646296	4490775	248	0	1	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
54	642095.68	4505638.19	318	0	20	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
55	640325	4505011	310	0	3	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
56	637317	4504854	254	8	37	0	200	Uzb-2021	150	Initial buffer zone established by archaeologists was 200 m,

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										Cultural Agency established 100 +50m buffer zone. So, the final buffer zone is 150 m
57	646764	4491454	271	0	10	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
58	638493	4502092	242	0	0	1	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
59	639469.51	4497454.05	229	0	0	30	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
60	636729.29	4499749.99	251	0	26	1	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
61	635054.29	4504405.54	334	0	1	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
62	637608	4501551	222	7	0	0	200	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 62, 65, 126, 128, 133, 143, 156 and a non-standard buffer zone of 50m is required from the most extreme point of the clustered archaeological zones.
63	637053.46	4501667.82	239	16	0	0	200	Uzb-2021	177	Initial buffer zone established by archaeologists was 200 m, Cultural

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										Agency established 127 + 50 m. So, the final buffer zone is 177 m
64	637939.25	4495931.95	253	0	6	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
65	637621	4501452	230	12	0	0	25	Uzb-2021	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 62, 65, 126, 128, 133, 143, 156 and non-standard buffer zone will be applied.
66	637392	4501964	225	5	0	0	25	Uzb-2021	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 66, 68, 135 and non-standard buffer zone will be required.
67	637593	4501370	227	2	0	0	25	Uzb-2021	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone will be applied.
68	637430	4501898	236	3	0	0	25	Uzb-2021	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 66, 68, 135 and non-standard buffer zone of 50m will be applied.
69	638176	4501551	253	2	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
70	638048.16	4502071.19	233	4	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										Agency added + 50 m. So, the final buffer zone is 75 m
71	637281.46	4501762.72	215	3	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
72	638740	4501857	267	1	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
73	637626.16	4503699.47	251	0	3	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
74	638079.57	4501670.15	316	0	1	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
75	634950	4503830	259	0	3	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
76	640246.91	4500729.80	232	3	1	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
77	634812.88	4504663.96	331	0	2	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
78	640246.91	4500729.80	241	0	3	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										Agency added + 50 m. So, the final buffer zone is 75 m
79	637573.62	4501285.06	211	4	0	0	25	Uzb-2021	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
80	645935	4500415	288	10	12	0	200	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 80, 84, 87, 90 and non-standard buffer zone will be applied.
81	647402	4501675	314	3	6	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
82	646032	4500845	288	19	0	0	200	Uzb-2021	203	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 82, 95 and non-standard buffer zone will be applied.
83	645658	4501130	292	30	0	0	200	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 86, 83 and non-standard buffer zone will be applied.
84	645994	4500533	282	19	2	0	200	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 80, 84, 87, 90 and non-standard buffer zone will be applied.
85	646230	4501254	258	20	0	0	200	Uzb-2021	210	Initial buffer zone established by archaeologists was 200 m. Agency have established non-standard buffer zone.

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
86	645743	4501387	304	25	0	0	200	Uzb-2021	50	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 86, 83 and non-standard buffer zone will be applied.
87	645851	4500579	310	12	10	0	200	Uzb-2021	286	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 80, 84, 87, 90 and non-standard buffer zone was applied.
88	645101	4497769	241	11	1	0	200	Uzb-2021	150	Initial buffer zone established by archaeologists was 200 m, Cultural Agency established 100 +50m buffer zone. So, the final buffer zone is 150 m
89	637372	4505596	283	2	3	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
90	645863	4500738	289	8	0	0	100	Uzb-2021	286	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 80, 84, 87, 90 and non-standard buffer zone was applied.
91	645888	4498102	327	16	0	1	100	Uzb-2021	111	Initial buffer zone established by archaeologists was 100 m, Cultural Agency established 61 +50m buffer zone. So, the final buffer zone is 111 m
92	648127	4498661	244	19	0	0	25	Uzb-2021	50	Initial buffer zone established by the archaeologists was 25m. However, the Agency clustered 92 and 94 and a non-standard buffer zone will be applied.
93	646316.56	4490798.37	301	3	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										Agency added + 50 m. So, the final buffer zone is 75 m
94	648127	4498661	329	45	0	0	100	Uzb-2021	50	Initial buffer zone established by archaeologists was 100 m. Agency have clustered 92, 94 and non-standard buffer zone will be required.
95	646170	4500909	294	9	1	0	200	Uzb-2021	203	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 82, 95 and non-standard buffer zone was applied.
96	646787	4498543	250	38	0	0	100	Uzb-2021	122	Initial buffer zone established by archaeologists was 100 m, Cultural Agency added 75 + 50 m. So, the final buffer zone is 122 m
97	647264	4498496	221	42	98	0	200	Uzb-2021	166	116 meters around place of finding and plus 50 meters buffer zone
98	647577.58	4498260.07	267	11	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
99	646215	4499821	268	54	0	0	200	Uzb-2021	254	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 99, 100, 110, 112, 113, and non-standard buffer zone was applied.
100	646146	4499860	331	12	0	0	200	Uzb-2021	254	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 99, 100, 110, 112, 113, and non-standard buffer zone was applied.
101	646598	4498493	225	2	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										Agency added + 50 m. So, the final buffer zone is 75 m
102	647419	4498499	343	7	0	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
103	647423	4498443	202	13	0	0	100	Uzb-2021	104	Initial buffer zone established by archaeologists was 100 m, Cultural Agency added 54 + 50 m. So, the final buffer zone is 104 m
104	646885	4498522	254	31	8	0	200	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
105	646740.55	4498582.23	250	0	5	0	25	Uzb-2021	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
106	646057	4499383	262	21	0	0	200	Uzb-2021	161	Initial buffer zone established by archaeologists was 200 m, Cultural Agency established 111 +50m buffer zone. So, the final buffer zone is 161 m
107	645755.95	4498738.71	359	19	0	0	200	Uzb-2021	169	Initial buffer zone established by archaeologists was 200 m, Cultural Agency established 119 +50m buffer zone. So, the final buffer zone is 169 m
108	646717.88	4498230.11	342	18	0	0	100	Uzb-2021	50	Initial buffer zone established by archaeologists was 100 m, non-standard buffer zone will be applied as required by the Cultural Agency.

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
109	645622.67	4498127.16	330	18	0	0	100	Uzb-2021	105	Initial buffer zone established by archaeologists was 100 m, Cultural Agency established 55 +50m buffer zone. So, the final buffer zone is 105 m
110	646228	4499686	332	51	1	0	200	Uzb-2021	254	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 99, 100, 110, 112, 113, and non-standard buffer zone was applied.
111	645915	4498483	244	9	0	0	100	Uzb-2021	115	Initial buffer zone established by archaeologists was 100 m, Cultural Agency established 65+50m buffer zone. So, the final buffer zone is 115 m
112	646130	4499657	252	29	1	0	200	Uzb-2021	254	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 99, 100, 110, 112, 113, and non-standard buffer zone was applied.
113	646112	4499719	279	21	0	0	200	Uzb-2021	254	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 99, 100, 110, 112, 113, and non-standard buffer zone was applied.
114	636754.68	4501346.92	208	100000	300	0	200	1996-2015	50	Initial buffer zone established by archaeologists was 200 m. Agency have clustered 114, 138, 139, 146, 147 and non-standard buffer zone of 50m will be applied.
Coordinates of the finds of the researchers 1996-2005 Uzbek-Poland Expedition and 2006-2015 Uzbek-French expedition in Ayakagytma site										
116	639554.44	4502170.89	244	7	0	0	25	Uzb-Fr-2008	50	Initial buffer zone established by archaeologists was 25 m. Agency

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										have clustered 116, 117, 118, 119, 121, 122 and non-standard buffer zone of 50m will be applied.
117	639418.75	4501890.72	247	11	0	0	25	Uzb-Fr-2008	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 116, 117, 118, 119, 121, 122 and non-standard buffer zone of 50m will be applied.
118	639788.12	4502237	239	0	4	0	25	Uzb-Fr-2008	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 116, 117, 118, 119, 121, 122 and non-standard buffer zone of 50m will be applied.
119	639279.58	4501795.57	246	3	0	0	25	Uzb-Fr-2008	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 116, 117, 118, 119, 121, 122 and non-standard buffer zone of 50m will be applied.
120	638511.99	4502644.93	252	0	2	0	25	Uzb-Fr-2008	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
121	639126	4502440.49	243	6	0	0	25	Uzb-Fr-2008	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 116, 117, 118, 119, 121, 122 and non-standard buffer zone of 50m will be applied.
122	639065	4501914.95	247	8	0	0	25	Uzb-Fr-2008	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 116, 117, 118, 119, 121, 122 and non-standard buffer zone of 50m will be applied.
123	637460	4501207.24	248	15	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
124	637495	4501188.82	237	7	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
125	637303	4501165	218	0	3	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
126	637566	4501520.27	224	13	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 62, 65, 126, 128, 133, 143, 156 and non-standard buffer zone of 50m will be applied.
127	635734	4502387	245	10	0	0	25	Uzb-Fr-2012	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
128	637658	4501432	228	12	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by the archaeologist was 25m. The Agency has clustered 62, 65, 126, 128,133, 143, 156 and non-standard buffer zone of 50m will be applied.

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
129	637794	4501465	225	14	0	0	25	Uzb-Fr-2012	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
130	637134	4501273	223	8	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
131	636601	4501619.29	233	18	0	0	25	Uzb-Fr-2012	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
132	637992	4500288.55	262	4	0	0	25	Uzb-Fr-2012	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
133	637524	4501569.53	223	7	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 62, 65, 126, 128, 133, 143, 156 and non-standard buffer zone of 50m will be applied.
134	636847	4501258	211	27	0	0	100	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m, Cultural Agency has established a buffer zone of 50m.
135	637329	4502033.77	257	3	1	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 66, 68, 135 and non-standard buffer zone of 50m will be applied.

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
136	636808	4501023	237	22	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
137	637502	4500880.15	247	11	1	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
138	636895	4501330.44	212	37	0	0	100	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 100 m. Agency have clustered 114, 138, 139, 146, 147 and non-standard buffer zone of 50m will be applied.
139	636825	4501265	210	7	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 114, 138, 139, 146, 147 and non-standard buffer zone of 50m will be applied.
140	637253	4501232	215	1	3	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
141	637391	4501061	217	9	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125,

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
143	637489	4501517	211	0	2	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 62, 65, 126, 128, 133, 143, 156 and non-standard buffer zone of 50m will be applied.
144	637565	4501378	225	5	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
145	637398	4501260	216	12	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
146	636845	4501393	216	17	0	0	100	Uzb-Fr-2012	184	Initial buffer zone established by archaeologists was 100 m. Agency have clustered 114, 138, 139, 146, 147 and non-standard buffer zone was applied.
147	636824	4501388	211	31	0	0	100	Uzb-Fr-2012	184	Initial buffer zone established by archaeologists was 100 m. Agency have clustered 114, 138, 139, 146, 147 and non-standard buffer zone was applied.

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
148	636528	4501144.79	205	16	0	0	25	Uzb-Fr-2012	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
149	637511	4501244.62	212	8	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
150	636946	4501049	202	7	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
151	637325.33	4501177.10	215	6	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
152	637352	4501162.10	213	4	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
153	637509	4501316	227	7	1	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
155	637435	4501448.87	229	4	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
156	637673	4501470.28	231	7	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 62, 65, 126, 128, 133, 143, 156 and non-standard buffer zone of 50m will be applied.
157	637565	4501378	221	7	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
158	637408	4501444	227	16	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
159	637387	4501501	223	14	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149,

ID	X	Y	Z	Stone	Ceramic	Bone	Initial Buffer Zone	Year of Survey	Final Buffer Zone (m)	Comments
										150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
160	637089	4501250	224	5	0	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.
161	637400	4501447	226	3	1	0	25	Uzb-Fr-2012	50	Initial buffer zone established by archaeologists was 25 m. Agency have clustered 67, 79, 123, 124, 125, 130, 136,137, 140, 141, 144, 145, 149, 150, 151, 152, 153, 155, 157, 158, 159, 160, 161 and non-standard buffer zone of 50m will be applied.

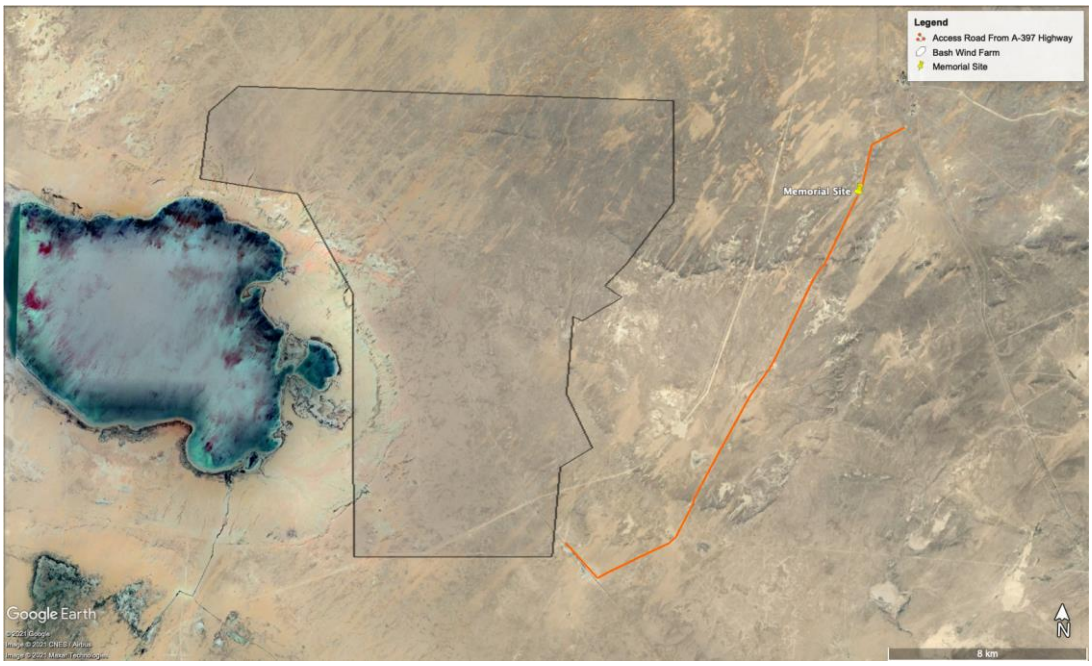
Note: A kmz file was also made available to ACWA Power showing the location of applicable buffer zones.

13.1.7 Access Road

The existing unpaved access road from A-397 highway leading to the Wind Farm Site will be used for delivering equipment and materials, transporting employees, and transferring waste. At the time of writing, there are no plans for road construction or improvement activities. Therefore, archaeological survey along the access roads were scoped out.

However, a Memorial Site was identified along the access road as shown in the figure below. Memorial sites are built in commemoration of the locations where road accidents resulted in the loss of lives and are considered of high cultural importance in Uzbekistan.

Figure 13-6 Memorial Site Located Near the Access Road



13.2 Intangible Cultural Heritage

As discussed in section 6.4 there are 4 elements of intangible cultural heritage occurring across Uzbekistan while the others are mainly region specific. 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 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 Receptors

Table 13-3 Archaeology & Cultural Heritage –Receptors

RECEPTOR	SENSITIVITY	JUSTIFICATION
Known items of cultural or archaeological significance	**High**	Archaeological finds from Neolithic, Palaeolithic Age and classical periods (V-XII ages) have been found within the Project site and some are under Category 1 (high importance). Archaeological finds in Category I are of high importance and rarity with limited potential for substitution.
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 were conducted during the surveys conducted by the Institute of Archaeology.
Intangible cultural heritage	**High**	The Proposed project site is located within communities that practice 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.
Access Road		
Memorial Site	**High**	The Memorial Site is of high cultural importance and is vulnerable to damage resulting from project vehicles.

13.4 Potential Impacts, Mitigation, Management and Residual Impacts

13.4.1 Construction Phase

13.4.1.1 Indirect Impact to Existing Finds of Archaeological or Cultural Importance

The surveys undertaken on the Project site identified the presence of archaeological finds from Neolithic, Palaeolithic Age and classical periods (V-XII ages). The exact location of the WTGs has not been finalised neither has that of other Project facilities such as the switchyard, access roads and cable routes etc. All these facilities and associated infrastructure will require careful consideration in terms of siting taking into account the following:

- Archaeological sited identified during the surveys.
- The buffer zone/distance requirements that will be set by the Cultural Heritage Agency.
- On-going consultations and engagement with the Institute of Archaeology in Uzbekistan.

During the surveys, finds considered to be Category I (high importance) were discovered including Category II and III. The presence of archaeological finds at the Project is high 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 construction phase to monitor the work being undertaken. The archaeologist on site will also be included in conducting induction sessions and tool box talks for the workers.

In addition to the above, if road traffic and transportation is not managed properly, the Memorial Site along the access road will be impacted. Based on the road survey conducted in July 2021, the route will not require road improvement and is sufficient to allow access of large vehicles carrying the Project components and therefore, moving the Memorial Site will not potentially be required. However, in the event that the memorial site will be impacted, it will be moved in consultations with the relevant authorities and the next of kin where they are identifiable.

13.4.1.2 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 in an area of archaeological significance, 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.

13.4.1.3 Impact on Intangible cultural Heritage

Elements of intangible cultural heritage in Uzbekistan are identified in section 6.4 four of which are present in communities near the Project site. 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 (reference Chapter 31 on Influx Impact Assessment. In addition, the two intangible culture elements are practiced across 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 13-4 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**	**Moderate to Major**	**Design:** • The siting of turbines, cable routes, roads and other associated infrastructure will avoid archaeological sites identified during the surveys; and take into consideration the required buffer zones as set by the Cultural Heritage Agency provided in section 3.1.5 above. • 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. • The Institute of Archaeology and National Centre of Archaeology will be consulted in the finalisation of the Project design so that there is agreement on the most appropriate mitigation measures especially for the areas with archaeological finds of high importance. **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 undertaken within the archaeological buffer zones.	**Minor to Moderate**
	Moderate Negative	Unknown items of cultural or archaeological significance	**High**	**Moderate to Major**		**Minor to Moderate**

Impacts	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					• In addition to the archaeologist from the Cultural heritage Agency, the project will engage an archaeologist to be present at the site during the construction phase. • 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. • 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.	

Impacts	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
Impact on Memorial site	**Minor Negative**	Memorial site	**High**	**Minor to Moderate**	• All drivers will be notified of the memorial site and its location during induction including its cultural importance. • Install clear markings along the road to notify drivers about the Memorial Site. • Include the Memorial Site into the drivers' training program (highlight the location of the Memorial Site, width clearance available near it, measures to be taken in case it got affected etc.) • If required, the relocation of the Memorial Site will be conducted through consultation in coordination and agreement with the relevant local authorities and family members of the deceased. • Any complaints regarding the status of the memorial will be addressed in accordance with SEP requirements.	**Minor**
Accidental destruction of unknown archaeological resources buried within the Project site	**Moderate Negative**	Unknown Buried archaeological artefacts or remains	**High**	**Moderate to Moderate**	• An archaeological "Chance Find Procedure" will be developed prior to commencement of any construction activities. This will include protocols and procedures to stop work and methods to preserve potential finds as well as reporting and co-ordination requirements with the Institute of Archaeology and the National Centre of Archaeology and Cultural Heritage Agency. • A Cultural Management Plan will be developed to include locations and procedures to ensure protection of these archaeological sites. • In addition to the archaeologist from the Cultural heritage Agency, the project will engage an archaeologist to be present at the site during the construction phase. • Where artefacts or archaeological remains are encountered, the site will be clearly signed/delineated	**Minor to Moderate**

Impacts	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					with high visibility flagging to impede access and prevent any damage or loss of the artefacts which have just been found. • The Cultural Heritage Agency and Institute of Archaeology will immediately be notified of any potential archaeological finds. • Raising awareness among construction workers of how potential archaeological finds may look like and the actions required if they uncover any likely historical artefacts during site excavations. Also, to be informed during morning toolbox meeting about any suspected archaeological finds to avoid disturbance. • Removal of any archaeological artefacts from the site or areas outside the Project site by site workers will be strictly prohibited.	
Impact on intangible cultural heritage	**Minor Negative**	Communities who practice the elements of Palov & Nawrouz, Art of Miniature & Bakshi art	**High**	**Minor to Moderate**	• 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**

13.4.2 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 13-5 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 to Moderate**	• 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.	**Minor**

13.4.3 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 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.

13.5 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 13-6 Cultural Heritage and Archaeology - Monitoring Requirements

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
Construction			
Archaeological Resources & Artefacts	Existing archaeology sites	Daily continued visual observations by site staff involved in excavations and the archaeologist on site (when construction is undertaken within buffer zones).	Archaeological sites within the project site as identified by the Institute of Archaeology during the site surveys.
	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 memorial site	Memorial site	Resolution of any complaints received regarding the memorial site. Monthly visual inspection of the site	Memorial site
Operation			
Archaeological Resources & Artefacts	Archaeological sites within the Project site	Annual visual observations by O&M staff or while carrying out any maintenance activities near archaeological buffer zones.	Known archaeological sites within the Project site.

14 LANDSCAPE AND VISUAL AMENITY

This chapter aims to identifies aspects of the landscape character and visual receptors that are further considered in the Landscape and Visual Impact Assessment, including:

- Topography and landform, land cover, distribution and type of land use;
- Vegetation distribution and variation;
- Development/settlement patterns and scale;
- Transport routes including surfaced roads and principal unsurfaced tracks;
- Touristic/recreational destinations; and
- Landscape character typology and specific viewpoints.

Based on numerous site visits undertaken to date and review of satellite imagery, few significant anthropogenic contributions to the landscape of the Project area were identified. In addition, receptors that may be susceptible to changes in landscape character were observed. As such, a landscape & visual impact survey was undertaken at the Project site, surrounding area, local access roads and along the proposed OHTL route. The impact on the OHTL will be discussed further in Chapter 26 in Part B of this ESIA.

14.1 Observation and Baseline Conditions

14.1.1 Methodology

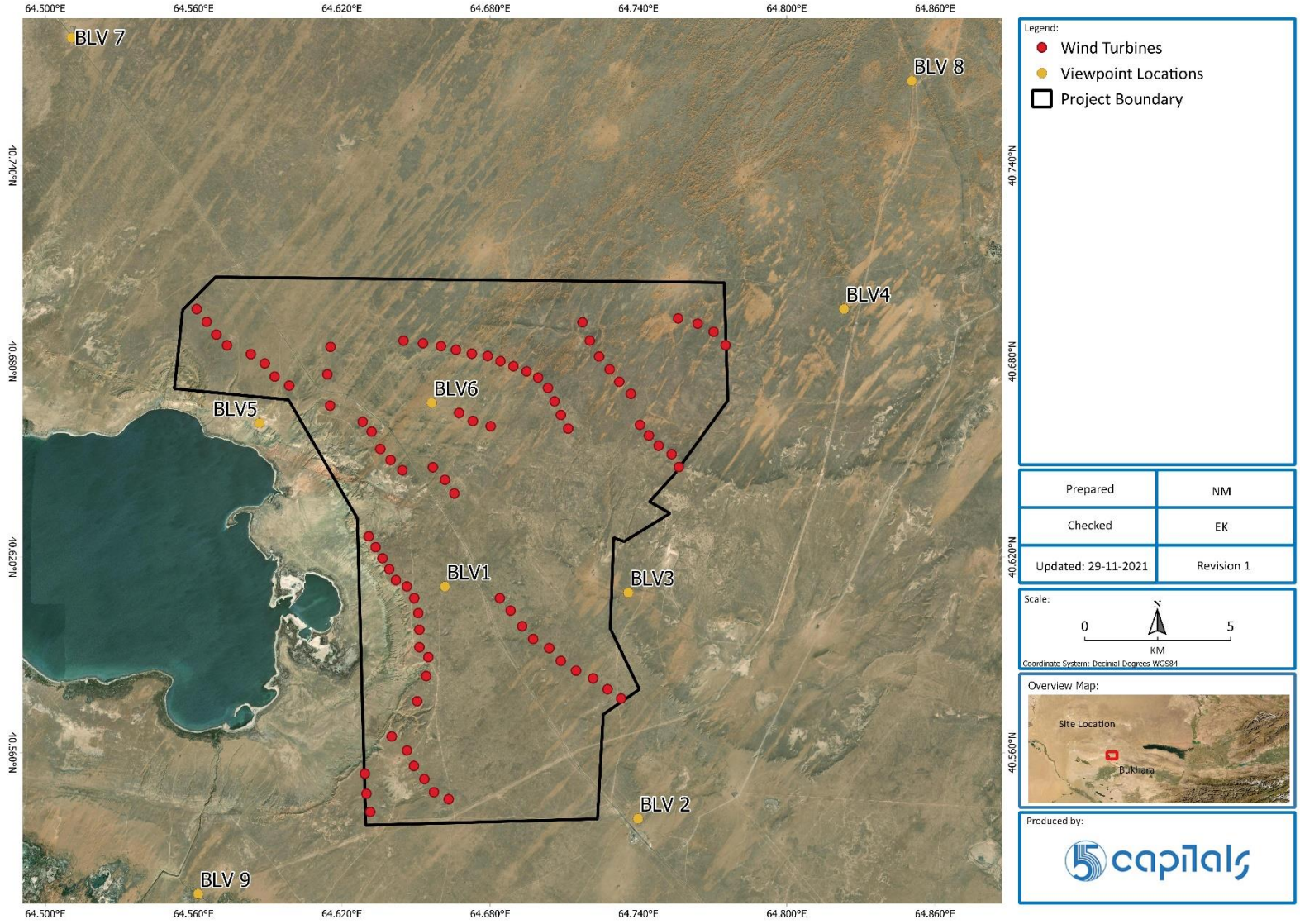
During desktop study of the Project area, a Geographic Information System (GIS) was used to conduct a Viewshed or Zone of Theoretical Visibility (ZTV) Assessment of the project site. The assessment provides an accurate geographical representation of the project site and the surrounding areas where visibility may be impacted. With the data collected by the ZTV, it is possible to highlight the areas from which the wind turbines are most likely to be visible. Using the ZTV data, nine (9) 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 (BLV1 to BLV9) 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 14-1 Viewpoint Locations

VIEWPOINT ID	COORDINATES		DESCRIPTION
	LONGITUDE	LATITUDE	
BLV1	64.661717	40.610996	Located in the middle of the project site, with proposed wind turbines within 2km all around the location. This location represents the views as seen from Receptors R17 and R21.
BLV 2	64.73984798	40.5397453	Located on the southern boundary of the site, this location represents the view from the receptors R14, R12, R16, R35 and R13. As well as the views are seen from the access road just before entering the site.
BLV3	64.735919	40.60914	Located on the eastern boundary of the site, this location represents the views as seen from the receptor R7 as well as the mining areas.
BLV4	64.823224	40.696099	Located on the northeast boundary of the project site. The location represents the view from the receptor R22, but due to accessibility issues, the location could not be closer.
BLV5	64.586675	40.661115	Located on the Northwest boundary of the project and represents the views as seen from receptors R24, R25, R29 and Mining Area 1.
BLV6	64.656378	40.667334	Located in the middle of the site and represents the views as seen from the receptors, R1, R2, R3, R4, R5, R6, R9 and R20.
BLV 7	64.510663	40.779179	Located 9km Northwest of the project site, this location represents the views as seen from the railway tracks as well as the small village
BLV 8	64.850627	40.765976	Located on Highway A-397 to the Northeast of the project site and represents the views as seen by the motorist driving on the highway.
BLV 9	64.561849	40.516608	Located 6km Southwest of the project site, this location represents the views as seen from the nearby farmer/herder accommodation as well as the views as seen by a motorist driving on the small dirt track.
Notes: *BLV = Bash Landscape and Visual Viewpoint Locations* *Coordinate System = WGS 1984, Decimal Degrees*			

Figure 14-1 ZTV Viewpoint Locations



The field survey was undertaken on 30th July 2021 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 BLV1 to BLV9 and;
- Conducting extensive drive-through around the study area to consider potential effects on the landscape character of the area

Photographs from the chosen Viewpoints was 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.

14.1.2 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).

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

Land use at the project site and surrounding areas consist of an undeveloped, open desert landscape with significant anthropogenic influences on the landscape. Anthropogenic influences include the existing overhead transmission line that runs through the north-central area of the Project site, a railway line that splits the plot in the southeast to the northwest direction and a gas pipeline that runs through the southern extent of the Project site.

Furthermore, there are five (5) herder structures that are understood to be used seasonally particularly during the spring and summer seasons.

There is also an existing OHTL which presents a vertical anthropogenic intrusion into the existing project site landscape. The railway is also slightly raised above the ground level.

Plate 14-1 Railway Tracks

Plate 14-2 Existing Overhead Transmission Lines

SETTLEMENTS

Other than the few structures used seasonally by herders, there are no settlements within the project boundary. However, to the north and south of the project boundary, there are two small settlements next to the railway. The settlement to the south is Kuklam village while the settlement to the north is Chulobod village.

Both settlements are small and built in a linear pattern along the railway. In the village to the north of the Project site, there is no formal road connections but rather multiple informal dirt tracks while in Kuklam village, 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 14-3 Village to the South of the Project (Kuklam Village)

LANDFORM AND TOPOGRAPHY

The topography in the study area is typical of the Uzbekistan desert region and consists of slight undulating shrub-covered hills, with steeper cliffs/hills from the edge of the Ayakagytma depression on the western boundary. The elevation ranges from around 350 m above sea level in the northeast corner of the project boundary to 180m above sea level inside the depression on the shores of Ayakagytma lake.

Plate 14-4 Steep Hills/Cliffs from the Edge of the Ayakagytma Depression

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 farm but were observed in and around the villages located north (Chulobod) and south (Kuklam) of the project boundary.

Plate 14-5 Typical Shrub Vegetation at Project Site

Based on the desktop study using google earth and observations made during numerous site visits including the landscape survey, there are three (3) access roads to the project site. However, it should be noted there are several dirt tracks across the site that may also serve as access routes.

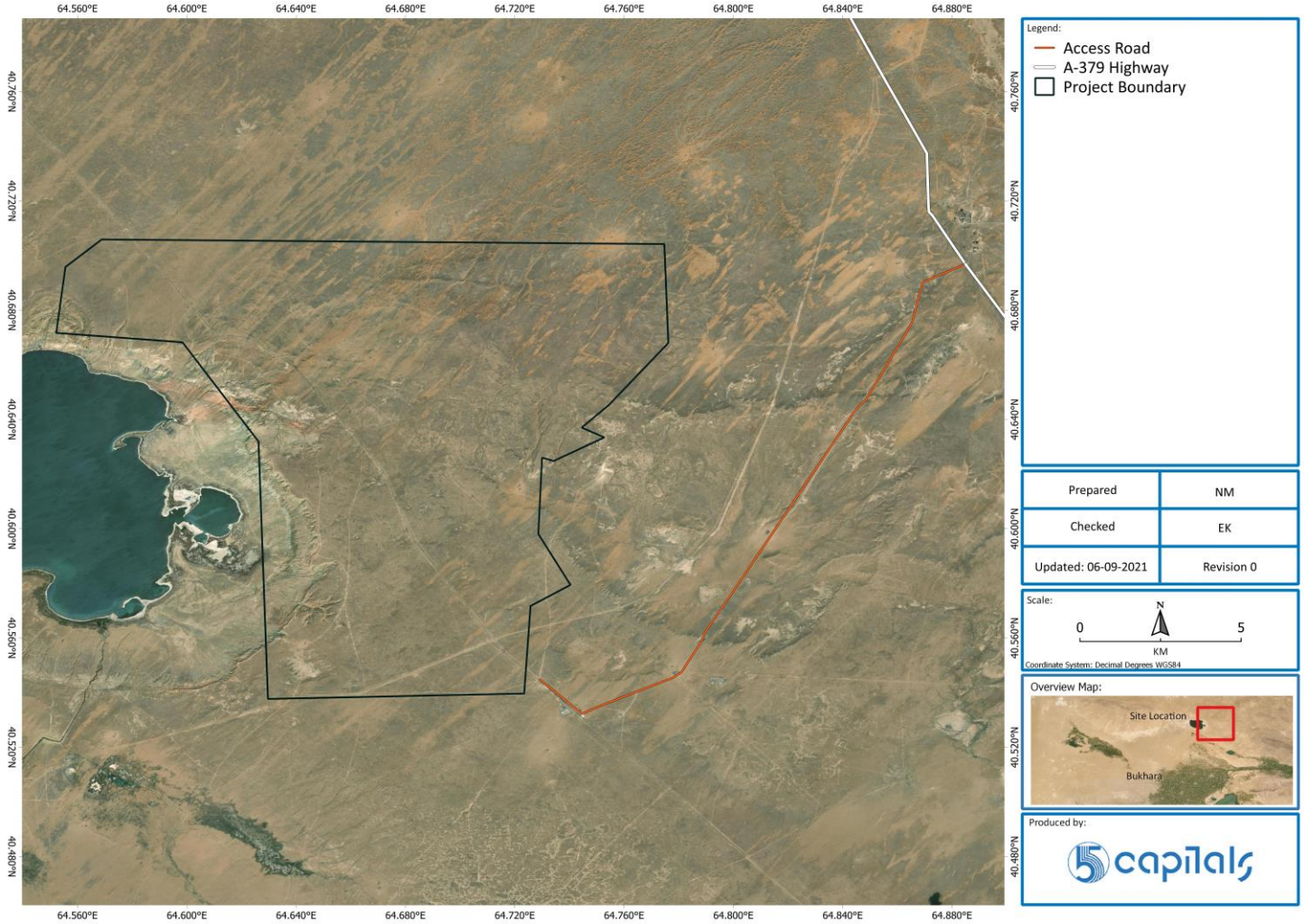
The main access road, as shown below interfaces with the A379 highway to the east of the project. To the north of this gravel road, there is a smaller dirt road that runs parallel to the main access road approximately 8km north and connects with the A379 highway. Lastly, a small dirt road follows parallel with the railway tracks north where it connects with the R-61 road near Chengeldy village.

Other than the main gravel access road, all other roads are small dirt tracks.

Plate 14-6 The Main Gravel Access Road

Plate 14-7 Typical Dirt Track on Site

Figure 14-2 Transport Route & Site Access Roads/



LANDSCAPE CHARACTER AREAS

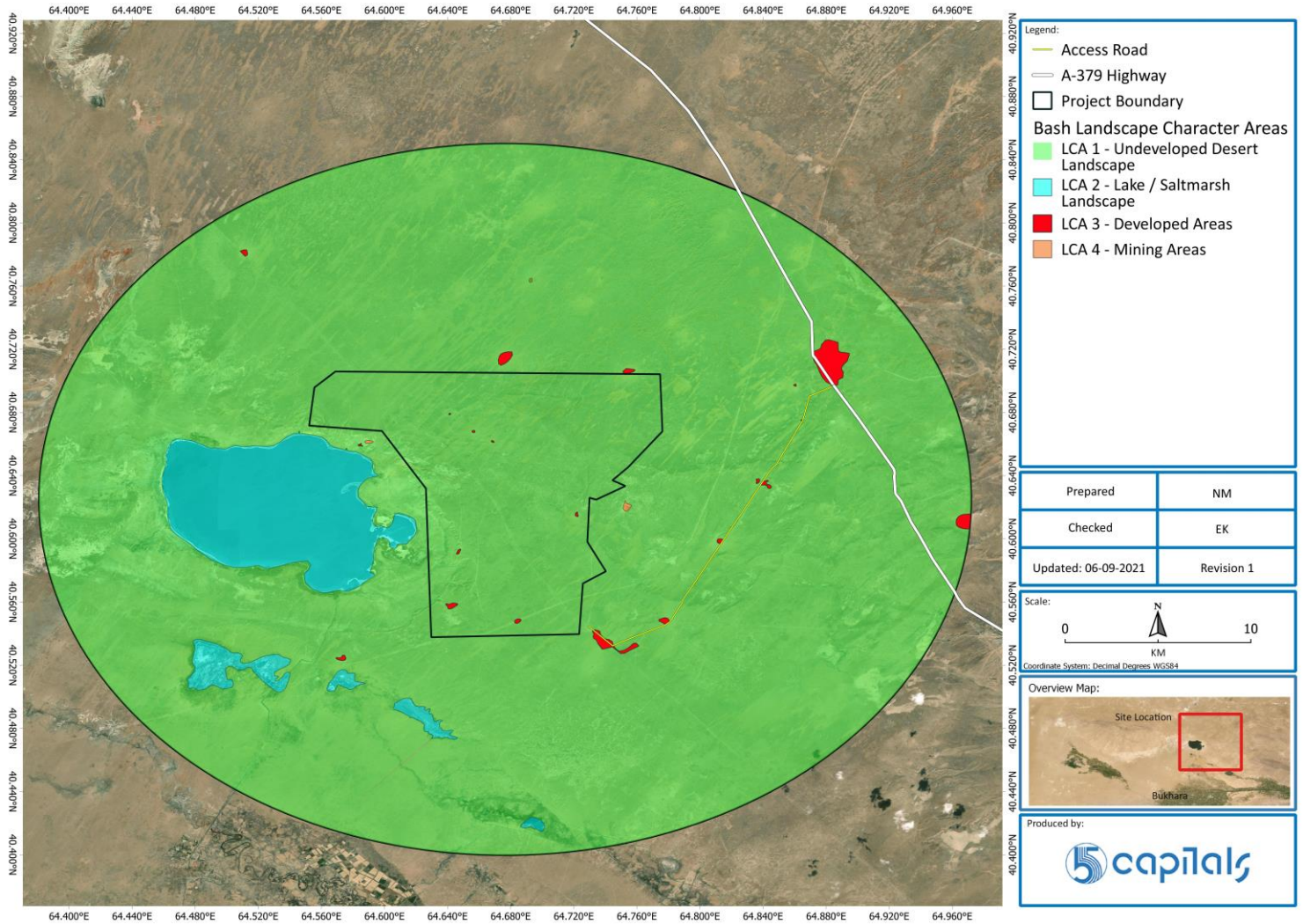
Through a combination of desktop study and fieldwork surveys, the landscape is classified into units of distinct and broadly homogenous characteristics referred to as Landscape Character Areas (LCAs). Within the study area, there are four (4) distinct LCAs and these are shown in the following table and figure.

Table 14-2 Landscape Character Areas

ID	NAME	DESCRIPTION	VALUE	SENSITIVITY
LCA 1	Undeveloped Desert Landscape	Mostly undeveloped and undisturbed desert landscape with shrubs. While some undulating hills are present, it does not have the distinct character of the neighbouring mountains/hills.	The area lacks any recognised features of local or national value and has few distinctive characteristics. The landscape is untouched and without interesting features hence, it is of low value.	Low
LCA 2	Lake / Saltmarsh Landscape	Towards the Southwestern side of the project site lies the Ayakagytma depression. Within the depression, a range of salt marshes can be observed, with the saline Ayakagytma Lake at the deepest part of the depression.	There are no anthropogenic features in this LCA. It is undeveloped and in good, natural condition. However as an Important Bird Area (IBA) with species of conservative value, this area has a very high value.	Very High
LCA 3	Developed Areas	The flatter, lower elevation plains have several small developed areas that include agriculture (grazing areas), residential areas and public infrastructure (roads, railway & existing OHTL)	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 low value	Low
LCA 4	Mining Areas	Two (2) mining areas are located outside the eastern & western extent of the Project boundary	Mining areas are known to cause significant damage to the natural enjoinment and as such, the landscape value of the mining areas is considered very low.	Very Low

Note: The sensitivity of each Landscape Character assigned using the criteria as described in "Table 4-5 Environmental Value of Receptor or Resource"

Figure 14-3 Landscape Character Areas



14.1.3 Visual Quality 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.

RESULTS

Besides views of the OHTL, railway line, gas pipeline and herders' structures 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.

A photographic record of each of the viewpoints (BLV1 to BLV9) 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. All baseline photographs comprise of high-resolution images taken with a digital single-lens reflex (SLR) full-frame sensor camera with a 50 mm lens. 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 14-3 Views from Viewpoint Locations

Visual Receptors and Sensitivity	Description of View
BLV 1 - North	
Northern view as seen from receptor R21 as well as the view as seen by motorists driving on the small dirt track. **Sensitivity:** High	While driving north from receptor R21, the wind farm will be visible 360 degrees all around. At this distance, several wind turbines will be visible within 3km. As shown in the photograph below, there are no structures, trees or hills obstructing the view.

Distance From Nearest Turbine	Approximately 1.3 Km
Survey Date	30st July 2021
Camera and Lens	NIKON D750 with 50mm lens
Orientation	0 Degrees North
Prepared	NM
Checked	EK
26-08-2021	Revision 0

5 capitals

Visual Receptors and Sensitivity	Description of View
BLV 1 - South	
Southern view as seen from receptor R21 as well as the view as seen by motorists driving on the small dirt track. **Sensitivity:** High	While driving South towards receptor R21, the wind turbines will be visible 360 degrees all around. At this distance, multiple wind turbines will be visible within a range of 3km. As shown in the photograph below, there are no structures, trees or hills obstructing the view.

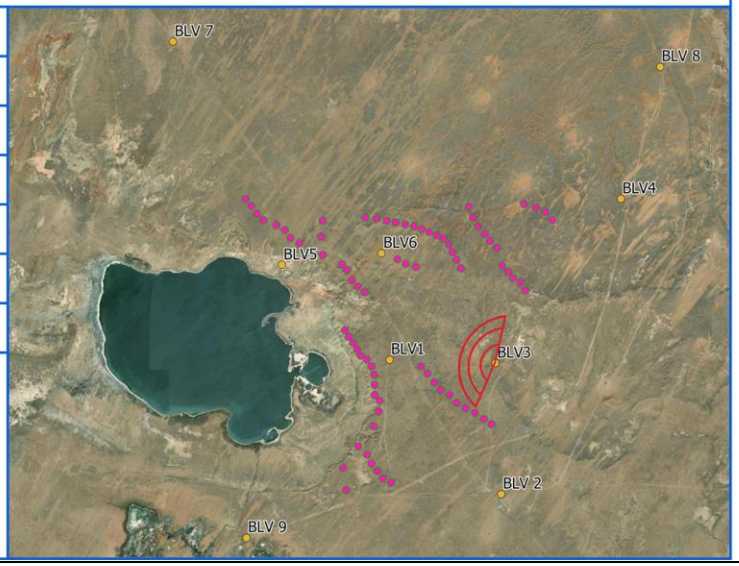
Distance From Nearest Turbine	Approximately 1.3 Km
Survey Date	30st July 2021
Camera and Lens	NIKON D750 with 50mm lens
Orientation	180 Degrees South
Prepared	NM
Checked	EK
26-08-2021	Revision 0

Visual Receptors and Sensitivity	Description of View
BLV 2	
Receptors R12, R13, R14, R16 and R35. Including the small village near the oil and gas facilities **Sensitivity:** High	Located on the southern boundary of the site, this location represents the northwestern view as seen from the receptors R12, R13, R14, R16, and R35. As well as the views as seen from the access road just before entering the site.

Distance From Nearest Turbine	Approximately 4.3 Km
Survey Date	30th July 2021
Camera and Lens	NIKON D750 with 50mm lens
Orientation	320 Degrees Northwest
Prepared	NM
Checked	EK
29-08-2021	Revision 0

Visual Receptors and Sensitivity	Description of View
BLV 3	
Mining Areas and receptor R7. **Sensitivity**: High	Located on the eastern boundary of the site, this location represents the views as seen from the receptor R7 as well as the mining area located west of the project site. At this distance, several turbines will be clearly visible.

Distance From Nearest Turbine	Approximately 2.2 Km
Survey Date	30th July 2021
Camera and Lens	NIKON D750 with 50mm lens
Orientation	290 Degrees West
Prepared	NM
Checked	EK
29-08-2021	Revision 0



Visual Receptors and Sensitivity	Description of View
BLV 4	
Receptor R22 and secondary access road. **Sensitivity:** High	Located on the northeastern boundary of the project site. The location represents the view from the receptor R22, but due to accessibility issues, the photographs could not be taken closer. At this distance, with the obstruction from undulating hills, only the upper parts of the wind turbines will likely be visible. However, poor atmospheric conditions on windy days may obscure wind turbines completely.

Distance From Nearest Turbine	Approximately 6.9 Km
Survey Date	30th July 2021
Camera and Lens	NIKON D750 with 50mm lens
Orientation	220 Degrees West
Prepared	NM
Checked	EK
29-08-2021	Revision 0

Visual Receptors and Sensitivity	Description of View
BLV 5	
Receptors R24, R25, R29 and Mining Area. **Sensitivity**: High	Located on the Northwestern boundary of the project and represents the views as seen from receptors R24, R25, R29 and Mining Area 1. From this location, several turbines will be visible within 2km. However, the hill/cliff from the Ayakagytma depression is likely to obscure parts of the turbines.

Distance From Nearest Turbine	Approximately 1.2 Km
Survey Date	30th July 2021
Camera and Lens	NIKON D750 with 50mm lens
Orientation	80 Degrees East
Prepared	NM
Checked	EK
29-08-2021	Revision 0

Visual Receptors and Sensitivity	Description of View
BLV 6 - East	
Receptors, R1, R2, R3, R4, R5, R6, R9 and R20. **Sensitivity:** High	Located in the middle of the site and represents the eastern views as seen from the receptors, R1, R2, R3, R4, R5, R6, R9 and R20. At this location, one will be surrounded by wind turbines, due to the proximity several turbines are likely to be fully visible.

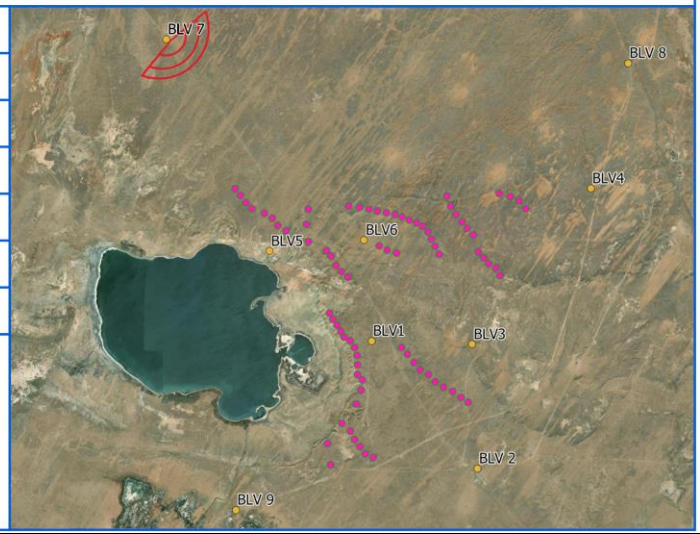
Distance From Nearest Turbine	Approximately 1.1 Km
Survey Date	30th July 2021
Camera and Lens	NIKON D750 with 50mm lens
Orientation	80 Degrees East
Prepared	NM
Checked	EK
29-08-2021	Revision 0

Visual Receptors and Sensitivity	Description of View
BLV 6 - West	
Receptors, R1, R2, R3, R4, R5, R6, R9 and R20. **Sensitivity**: High	Located in the middle of the site and represents the western views as seen from the receptors, R1, R2, R3, R4, R5, R6, R9 and R20. At this location, one will be surrounded by wind turbines, due to the proximity several turbines are likely to be fully visible.

Distance From Nearest Turbine	Approximately 2.2 Km
Survey Date	30th July 2021
Camera and Lens	NIKON D750 with 50mm lens
Orientation	260 Degrees West
Prepared	NM
Checked	EK
29-08-2021	Revision 0

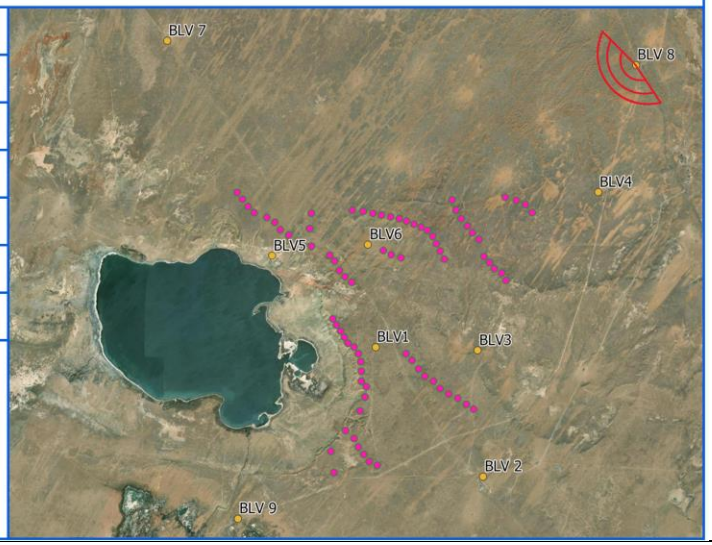
Visual Receptors and Sensitivity	Description of View
BLV 7	
Village residents, train passengers and motorists on the dirt track coming from Chengeldy village. **Sensitivity**: High	Located 9km Northwest of the project site, this location represents the views as seen from the railway tracks and the small village next to the tracks. Parallel to the railway tracks is also a small dirt track connecting Chengeldy village with the Project site.

Distance From Nearest Turbine	Approximately 10.8 Km
Survey Date	30th July 2021
Camera and Lens	NIKON D750 with 50mm lens
Orientation	140 Degrees Southeast
Prepared	NM
Checked	EK
29-08-2021	Revision 0



Visual Receptors and Sensitivity	Description of View
BLV 8	
Motorists travelling on the A-397 highway **Sensitivity**: Low	Located on Highway A-397 to the Northeast of the project site and represents the views as seen by the motorist driving on the highway. At this distance, wind turbines will only be partially visible.

Distance From Nearest Turbine	Approximately 13.8 Km
Survey Date	30th July 2021
Camera and Lens	NIKON D750 with 50mm lens
Orientation	240 Degrees Southwest
Prepared	NM
Checked	EK
29-08-2021	Revision 0



Visual Receptors and Sensitivity	Description of View
BLV 9	
Motorists travelling on a small dirt track and herders/farmer accommodation. **Sensitivity:** Low	Located 6km Southwest of the project site, this location represents the views as seen from the nearby farmer/herder accommodation as well as the views as seen by motorists driving on the small dirt track.

Distance From Nearest Turbine	Approximately 6.6 Km
Survey Date	30th July 2021
Camera and Lens	NIKON D750 with 50mm lens
Orientation	40 Degrees Northeast
Prepared	NM
Checked	EK
29-08-2021	Revision 0

14.1.4 Lighting Survey

METHODOLOGY

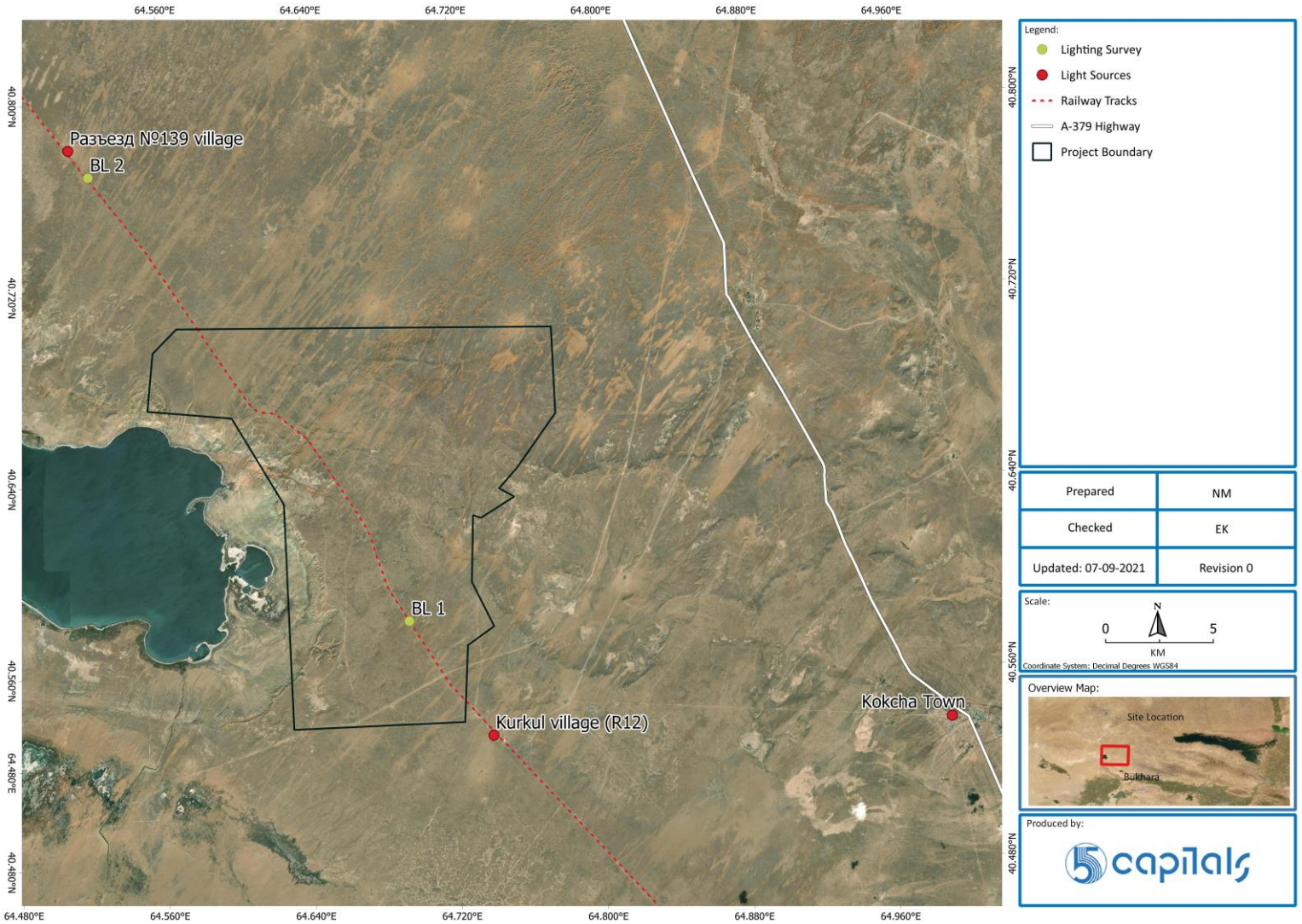
A baseline lighting survey was conducted in August 2021 to understand local sky brightness and existing light sources at the Project site and surrounding areas. Due to the rural nature of the site and the dangers involved with driving off-road at night, the survey was only conducted along the primary onsite road parallel with the railway tracks.

A Nikon D750 camera was set up inside the site boundary, just north from Kuklam village (R12) and at Chulobod village just outside the northern boundary of the Project site. The camera was situated on a tripod at a mid-lens height of 1.5 m. The camera settings for the images and location are shown in the table below.

Table 14-4 Lighting Survey Camera Settings

SURVEY LOCATION		CAMERA SETTINGS	COORDINATES	
ID	DESCRIPTION		LONGITUDE	LATITUDE
BL 1	Outside Kuklam village (R12)	Exposure: 5 Seconds F16 Iso 5000	64.69408	40.58124
BL 2	Outside Chulobod village	Exposure: 5 Seconds F16 Iso 5000	64.52147	40.76877

Figure 14-4 Lighting Survey



The night sky brightness or sky glow was measured using the Dark Sky iPhone application (app), a Sky Quality Meter (SQM) App recommended by the International Dark-Sky Association. The SQM app measures how much light strikes the camera sensor. The app then converts that amount of light into units of magnitudes per square arc-second. The larger the number reads on the meter display, the darker the sky. Using the Bortle scale, the SQM reading can be used to classify the night-sky brightness in one (1) of nine (9) classes as shown in the table and figure below.

Table 14-5 Bortle Scale Classes

CLASS	TITLE	APPROX SQM
1	Excellent dark-sky site	21.99–22.0
2	Dark Sky site	21.89–21.99
3	Rural sky	21.69–21.89
4	Rural/suburban transition	20.49–21.69
5	Suburban sky	19.50–20.49
6	Bright suburban sky	18.94–19.50
7	Suburban/urban transition	18.38–18.94
8	City sky	<18.38
9	Inner-city sky	<18.38

Figure 14-5 Bortle Scale

RESULTS

The project site is located in a rural part of Uzbekistan and as such intrinsically dark. The biggest source of light was the train station/ oil facility with a small village on the southern boundary of the project site. Further away the lights from Kuklam village was also visible.

During the survey, no lights were observed on the site, however Kuklam village (R12) on the southern boundary of the project site was the biggest source of light visible from within the project boundary. Kuklam village (R12) consist of residential buildings, a train station and an oil facility. The majority of residents in Kuklam village only had internal lights inside their residences. Only a few street lights were observed along the main road through the village, with several external lights also observed around the oil/gas facility.

In the wider region outside the project boundary, the biggest light sources was from the Chulobod village approximately 10km north of the project site. This village is a small settlement with very little external lights, and no paved or properly constructed roads, there were no street lights visible. The majority of light came from the small train station and internal lights from inside residences.

Plate 14-8 Main Light Source in the Area from Kuklam Village

Plate 14-9 Secondary Light Source from Chulobod Village

Plate 14-10 Kokcha Town – Distant Light Source

Plate 14-11 Train – Intermittent Light Source

During the lighting survey, an SQM reading was taken from within the project boundary. To minimise the influence of celestial lighting (sun and moon) and ensure an accurate reading, the SQM should be taken no more than an hour after sunset but before the moonrise. The lighting survey was conducted at 02:00 hours in the morning on the 3rd of August 2021. As shown in the table below, the SQM reading was relatively high, as can be expected from a dark rural sky with only a few light sources.

Table 14-6 Lighting Survey SQM and Bortle Scale Results

LOCATION	SQM	BORTLE SCALE
Outside Kuklam village (R12)	21.46	**Rural/suburban transition (class 4)**

14.2 Receptors

The potential landscape and visual receptors are presented in the table below.

Table 14-7 Landscape and Visual Impacts – Sensitive Receptors

ID	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.
		Lake / Saltmarsh Landscape **(LCA 2)**	**Very High**	This landscape comprise of an Important Bird Area (IBA) with species of conservative value as such it is of very high importance with limited potential for substitution
		Developed Areas **(LCA 3)**	**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
		Mining Areas **(LCA 4)**	**Very Low**	The landscape value of the mining areas is of very low importance.
R5	Structure used by herders located towards the north of the site	Seasonal 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.
R6	Structure used by herders located towards the north of the site	Seasonal Residential	**High**	If herders are present at the Project site, the herders using the structure will have direct visibility of the WTGs and as such will be particularly vulnerable to changes on landscape character.
R7	Structure used by herders located to the east of the site	Seasonal Residential	**High**	If herders are present at the Project site, the herders using the structure will have direct visibility of the WTGs and as such will be particularly vulnerable to changes on landscape character.
R18	Structure used by herders found to the south west of the project site.	Seasonal Residential	**High**	If herders are present at the Project site, the herders using the structure will have direct visibility of the WTGs and as such will be particularly vulnerable to changes on landscape character.
R21	Structure used by herder found to the south west of the project site.	Seasonal Residential	**High**	If herders are present at the Project site, the herders using the structure will have direct visibility of the WTGs and as such will be particularly

ID	Receptor	Receptor Type	Sensitivity	Justification
				vulnerable to changes on landscape character.
R22	Animal holding areas houses used for accommodation all year round.	Residential	**High**	The herders using the animal holding areas and accommodation area will have direct visibility of the WTGs and as such will be particularly vulnerable to changes on landscape character.
R23	Animal holding areas houses used for accommodation all year round.	Residential	**High**	If herders are present at the Project site, the herders using the animal holding areas will have direct visibility of the WTGs and as such will be particularly vulnerable to changes on landscape character.
R24	Herder's accommodation area	Residential	**High**	The herders using the accommodation area will have direct visibility of the WTGs and as such will be particularly vulnerable to changes on landscape character.
R25	Accommodation structure used for shelter by fishermen in Lake Ayakagitma	Residential	**High**	Fishermen using the accommodation structure will have direct visibility of Project site and as such will be particularly vulnerable to changes on landscape character as the Project WTGs and some project buildings will be visible to them whenever the accommodation structure is in use
-	Mining Areas 1 & 2 (including mine workers)	Industrial	**Low**	If mining activities commences before the installation of the WTGs, workers at the mines located 1.4km east & 900m west will have direct visibility of the WTGs and as such will be relatively vulnerable to changes on landscape character.

14.3 Potential Impacts, Mitigation, Management and Residual Impacts

14.3.1 Construction Phase

14.3.1.1 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.

14.3.1.2 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.

14.3.1.3 Addition of Lighting

It is understood that night time 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 and the nigh time environment is a "Rural/suburban transition: Class 4", the use of lighting across the site during construction phase will introduce light spill & glare and result in a night time 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 14-8 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**	Landscape character of the entire Project site **(LCA 1 & LCA 3**)	Low	**Negligible to Minor**	• 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 to Minor**
Disturbance to Visual Envelope of Receptors	**Moderate Negative**	Accommodation structure used for shelter by fishermen in Lake Ayakagitma **(R25)**	High	**Moderate to 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 in Part A 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.	**Moderate to Major**
	Minor Negative	Mining Areas **(Mining Area 1 & 2** including mine workers)**)**	Low	**Negligible to Minor**		**Negligible to Minor**
Addition of Lighting	**Moderate**	Accommodation structure used for shelter by	High	**Moderate to Major**	• Any flood lights required during night time construction activities will be directed onto the working areas, with a maximum position angle of	**Moderate to Major**

Potential Impact	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
		fishermen in Lake Ayakagitma **(R25)**			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.	
	Minor Negative	Mining Areas **(Mining Area 1 & 2** including mine workers)**)**	Low	**Negligible to Minor**		**Negligible to Minor**

14.3.2 Operational Phase

14.3.2.1 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.

14.3.2.2 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.

14.3.2.3 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. As such significance has not been re-assessed. The mitigation and management measures with regards to light pollution will be the same as construction phase. This will include the deployment of red aircraft light on the hub/blade tips of the WTG, the deployment of lighting for safety and security that seeks to avoid light spill, skyglow and glare and will utilise efficient low energy systems where appropriate. Lighting impacts will also be minimised through the compliance with UK CIBSE Lighting Guidance (or international equivalent).

Table 14-9 Landscape and Visual Amenity 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
Changes in landscape character	**Moderate Negative**	Landscape character of the entire Project site **(LCA 1 & LCA 3**)	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**
Disturbance to Visual Envelope of Receptors and Addition of Lighting	**Moderate Negative**	Herders that use structures within the site **(R5, R6, R7, R18 & R21)**	High	**Moderate to Major**	• Herders with structures within the Project boundary will be relocated in accordance with the Project specific RAP. • 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.	**Moderate to Major**
	Moderate Negative	Herders that use animal holding areas& accommodation areas within the site **(R22 & R23**)	High	**Moderate to Major**		**Moderate to Major**
	Moderate Negative	Herders that use accommodation areas outside the site **(R24)**	High	**Moderate to Major**		**Moderate to Major**
	Moderate Negative	Accommodation structure used for shelter by fishermen in Lake Ayakagitma **(R25)**	High	**Moderate to Major**		**Moderate to Major**
	Minor Negative	Mining Areas **(Mining Areas 1 & 2** including mine workers)**)**	Low	**Negligible to Minor**		**Negligible to Minor**

15 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.

15.1 Observation and Baseline Environment

There is no baseline information for shadow flicker.

15.2 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 171m and therefore the area of influence for shadow flicker is 1710m 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 location within a 2,500m radius.

The sensitive receptors considered for the Shadow Flicker Assessment are shown in the table and figure below.

Table 15-1 Shadow Flicker Assessment – Receptors

RECEPTOR ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
R5	Structure used by herders (within the project site)	Structure	**Medium**	Whenever herders use this structure, they will be relatively vulnerable to shadow flicker effect
R6	Structure used by herders (within the project site) (within the project site)	Structure	**Medium**	Whenever herders use this structure, they will be relatively vulnerable to shadow flicker effect

Receptor ID	Receptor	Receptor Type	Sensitivity	Justification
R7	Structure used by herders (within the project site)	Structures	**Medium**	Whenever herders use this structure, they will be relatively vulnerable to shadow flicker effect
R18	Structure used by herders (within the project site)	Structures	**Medium**	Whenever herders use this structure, they will be relatively vulnerable to shadow flicker effect
R21	Structure used by herders	Structures	**Medium**	Whenever herders use this structure, they will be relatively vulnerable to shadow flicker effect
R23	Structure used by herders (within the project site)	Structures	**High**	Herders at the accommodation area will be particularly vulnerable to shadow flicker effect
R24	Herder Accommodation Area	Structures - Residential	**High**	Herders at the accommodation area will be particularly vulnerable to shadow flicker effect

15.3 Potential Impacts, Mitigation and Management Measures and Residual Impacts

15.3.1.1 Shadow Flicker Analysis/Modelling

Shadow flicker modelling was undertaken using WindPRO (v3.5), an industry-leading software package for the design and planning of wind energy projects. The modelling considered the 79 Envision EN171 (6.5MW 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).

Table 15-2 Turbine Details

Turbine Model	Rotor Diameter (m)	Hub Height (m)	Rotor tip height (m)	Rotor Swept Area (m^2)	Rotor Speed Range (rpm)
EN171 (6.5MW)	171	100	-	22964	7.1 – 9.94

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);
- 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 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 15-3 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

15.3.1.2 Results

The modelling predicted that under worst-case scenario the structures used by herders located north-west of the site (R5 & R6) and the structure used by herders located south-west of the site (R18) all of which are within the Project site and R21 which is located outside the project boundary 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.

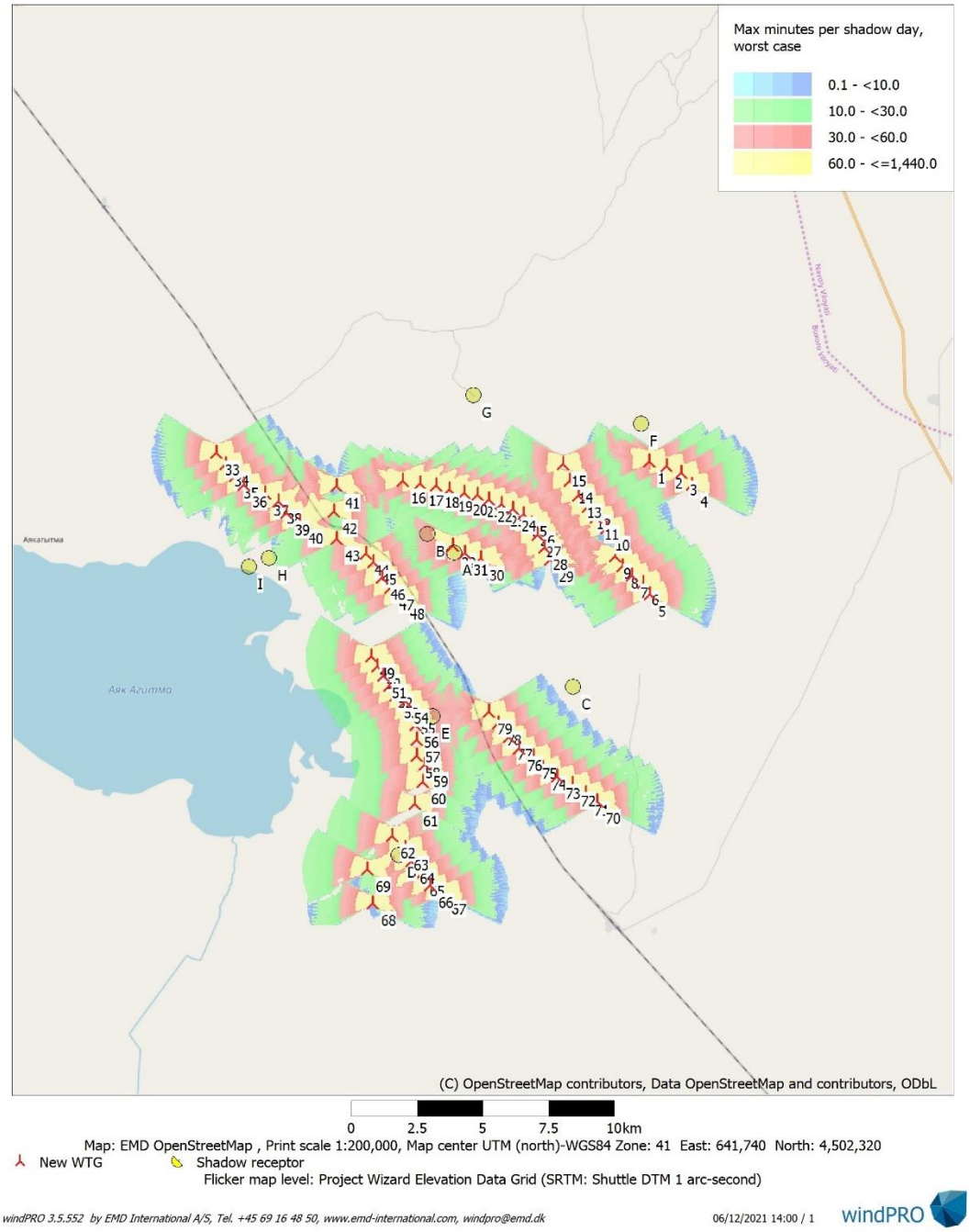
The modelling also predicts exceedance in IFC recommended limit in the real case scenario for R5, R18, and R21. The calculated shadow flicker at all identified residential receptor location is presented in the table below.

Table 15-4 Shadow Flicker Occurrence at Each Receptor

Receptor ID	Description	Receptor Type	Location WGS84 (Zone41N) UTM	Nearest WTG	Distance to Nearest WTG (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
R5	Structure used by herders (within the project site)	Structures	641017 E, 4502568 N	BAS32	265	**172:26**	**114:45**	**01:35**
R6	Structure used by herders (within the project site) (within the project site)	Structures	639992 E, 4503251 N	BAS32	1047	**34:58**	16:53	**00:42**
R7	Structure used by herders (within the project site)	Structures	645640 E, 4497536 N	BAS76	3038	00:00	00:00	00:00
R18	Structure used by herders (within the project site)	Structures	639117 E, 4491014 N	BAS63	382	**141:44**	**65:16**	**01:40**
R21	Structure used by herders	Structures	640321 E, 4496325 N	BAS56	730	**121:36**	**74:52**	**00:56**
R23	Animal Holding Area with accommodation area	Structures	641627 E 4508654 N	BAS19	3696	00:00	00:00	00:00
R24	Herder Accommodation Area	Structures	633986 E, 4502242 N	BAS40	1804	00:00	00:00	00:00

The figures below show the extent of shadow flicker effect on receptors from nearest WTG locations.

Figure 15-1 WBG/IFC Worst Case Maximum Minutes per Shadow Day



The detailed shadow flicker assessment report is presented in Appendix U.

Figure 15-2 WBG/IFC Worst Case Shadow Hours Per Year

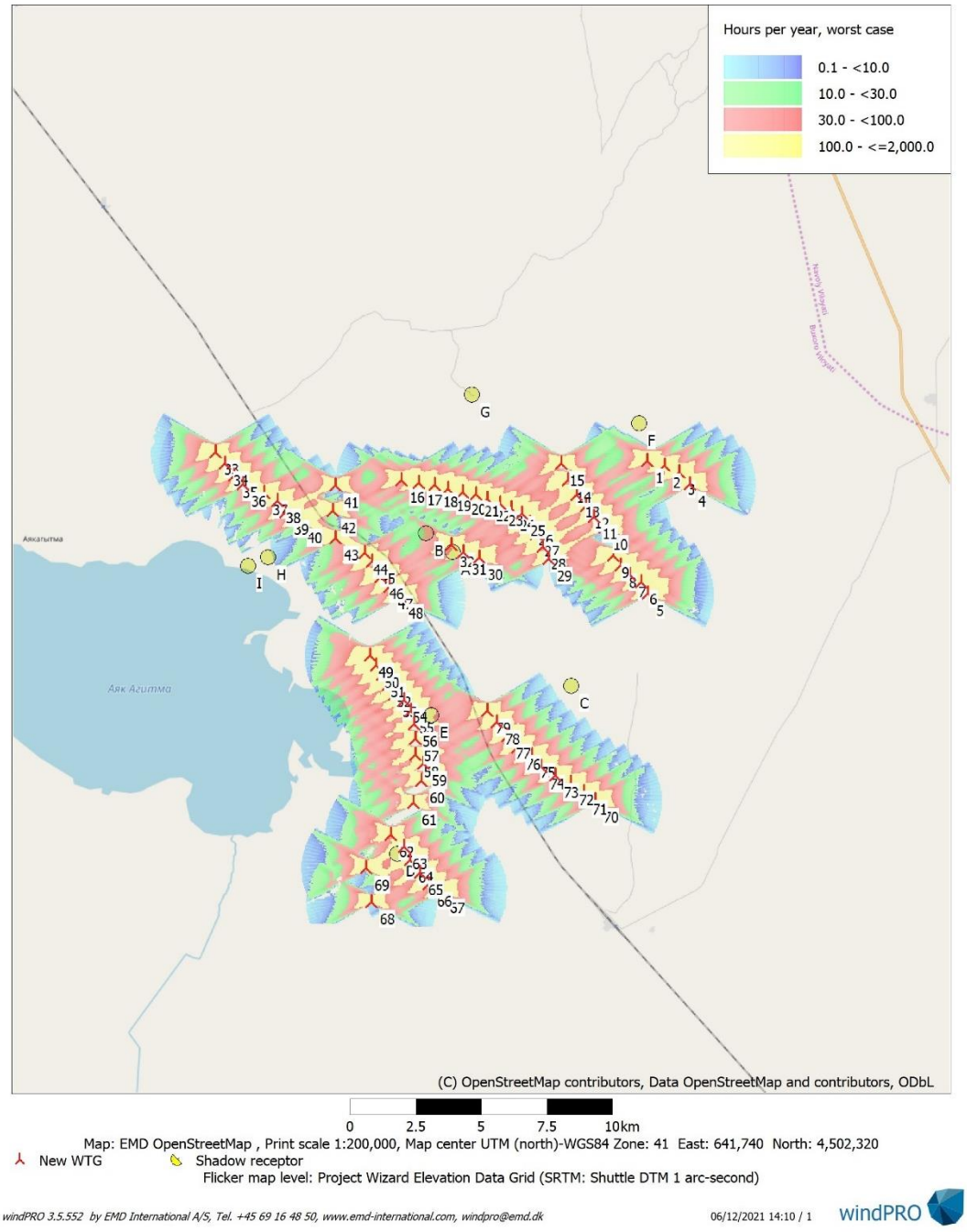


Table 15-5 Shadow Flicker Impact Significance, Mitigation & Management Measures and Residual Impacts – Operation

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
Shadow Flicker	**Moderate Negative**	Structure used by herders (within the project site) – **R5**	Medium	**Moderate**	• Herders with structures at the Project site will be relocated to alternative land outside the impact zone in accordance with the Project specific Resettlement Action Plan.	**n/a**
	Minor Negative	Structure used by herders (within the project site) – **R6**	Medium	**Minor**		**n/a**
	Moderate Negative	Structure used by herders (within the project site) – **R18**	Medium	**Moderate**		**n/a**
	Moderate Negative	Residential use by herders – **R21**	Medium	**Moderate**		**n/a**
	No Change	Structure used by herders (within the project site) - **R7**	Medium	**Neutral**	• No Mitigation Required	**Neutral**
	No Change	Animal Holding Area with accommodation area **R23**	High	**Neutral**		**Neutral**
	No Change	Herder Accommodation Area – **R24**	Medium	**Neutral**		**Neutral**

15.4 Monitoring Requirements

No monitoring requirement proposed as herders with structures at the Project site will be relocated to alternative land outside the impact zone.

16 SOCIO-ECONOMICS

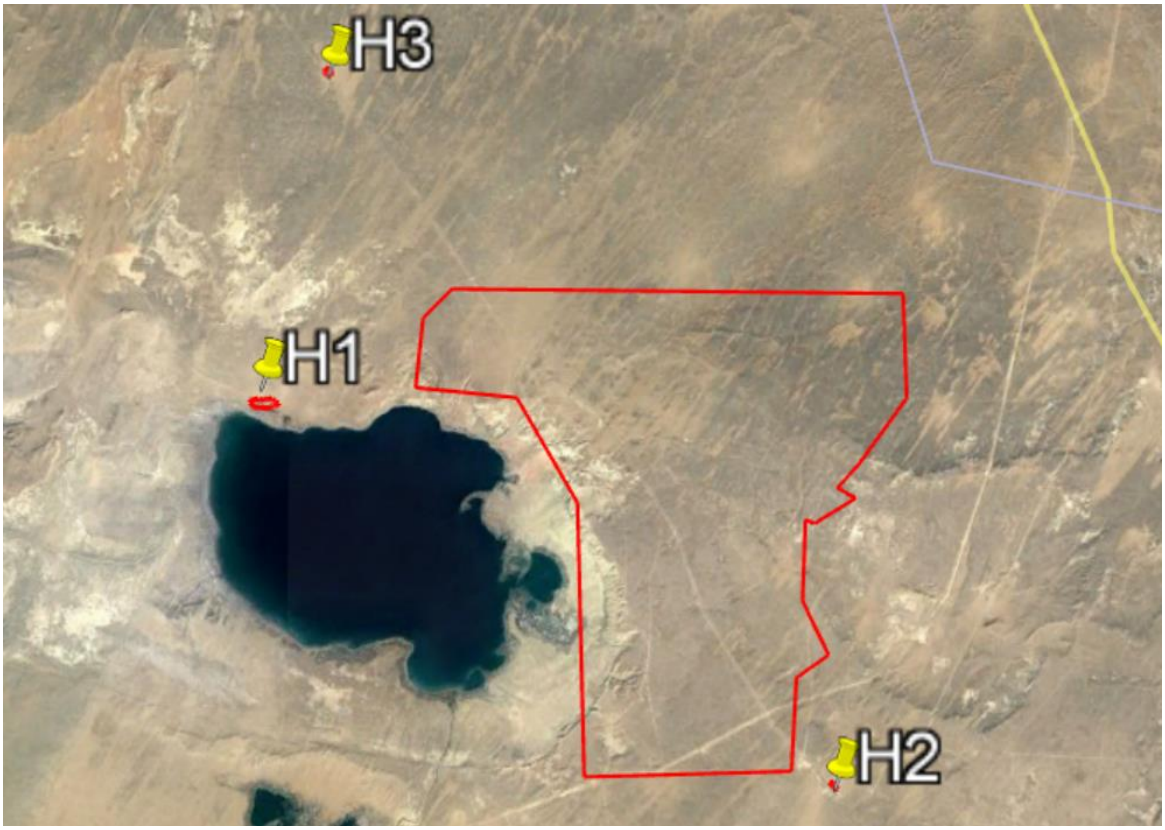
16.1 Observation and Baseline Condition

16.1.1 Background & Methodology

Information about the national and regional socio-economic characteristics was collected through a desktop study (Reference section 6.5). The information collected was used to prepare a national and regional baseline which was supplemented by conducting project specific socio-economic study for communities living near the Wind Farm.

The socio-economic surveys were conducted between 21st to 22nd April 2021 at Kuklam, Chulobod and Agitma villages. These communities are located in remote areas within a 10km radius of the Project site as shown in the figure below.

Figure 16-1 Location of Communities targeted during Socio-economic Surveys



Note:

- H1: Ayakagitma village which is located approximately 6km north-west of the Project site
- H2: Kuklam village located approximately 1.6km south east of the Project site.
- H3: Chulobod village located approximately 10km north of the Project site.

The number of households surveyed per village is as shown in the table below:

Table 16-1 Number of Surveyed Households Per Village

ID	Overall no. of Households in the Village	Number of surveyed households	Date of household survey
Ayakagitma Village	49	38	22nd April 2021
Kuklam Village	10	6	21st April 2021
Chulobod Village	10	6	

Plate 16-1Socio-Economic Surveys in Ayakagitma

Kuklam

16.1.2 Demographic Characteristics

According to the socio-economic survey, a total of 261 people were living in the 50 households that were surveyed. Of these, 52% are male and 48% are female. The majority of the households in the three villages are male led households at 98% and 2% (one household) are led by women. The female household is found at Ayakagitma village.

In addition, only two households in Ayakagitma out of the 50 surveyed reported to have a member of the family living with physical or mental disability. The main challenge faced by those living with disabilities include the high cost of medical care and the low disability pension from the government.

MARITAL STATUS

According to the survey, 77% were recorded to be married, 18% were recorded to be single while 5% were either divorced or widowers. In the head of the female led household is divorced.

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 the majority of people in these villages are Muslims.

ETHNICITY & CULTURE

The survey identified that 96% of the heads of households are Kazakhs while the rest are Tajiks, Turkoman and Kirgiz. It is noted that Kazakhs make up to 2.5% of the Uzbek population and the majority of them are found in the Tashkent region.

The survey showed that all the respondents are fluent in both Kazakh and Uzbek languages while 6% speak Russian. According to majority of the respondents (88.2%), their dialect differs from the main dialect spoken by the Kazakh people.

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 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 in order to acquaint themselves with each other. This occurs 1-2 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:

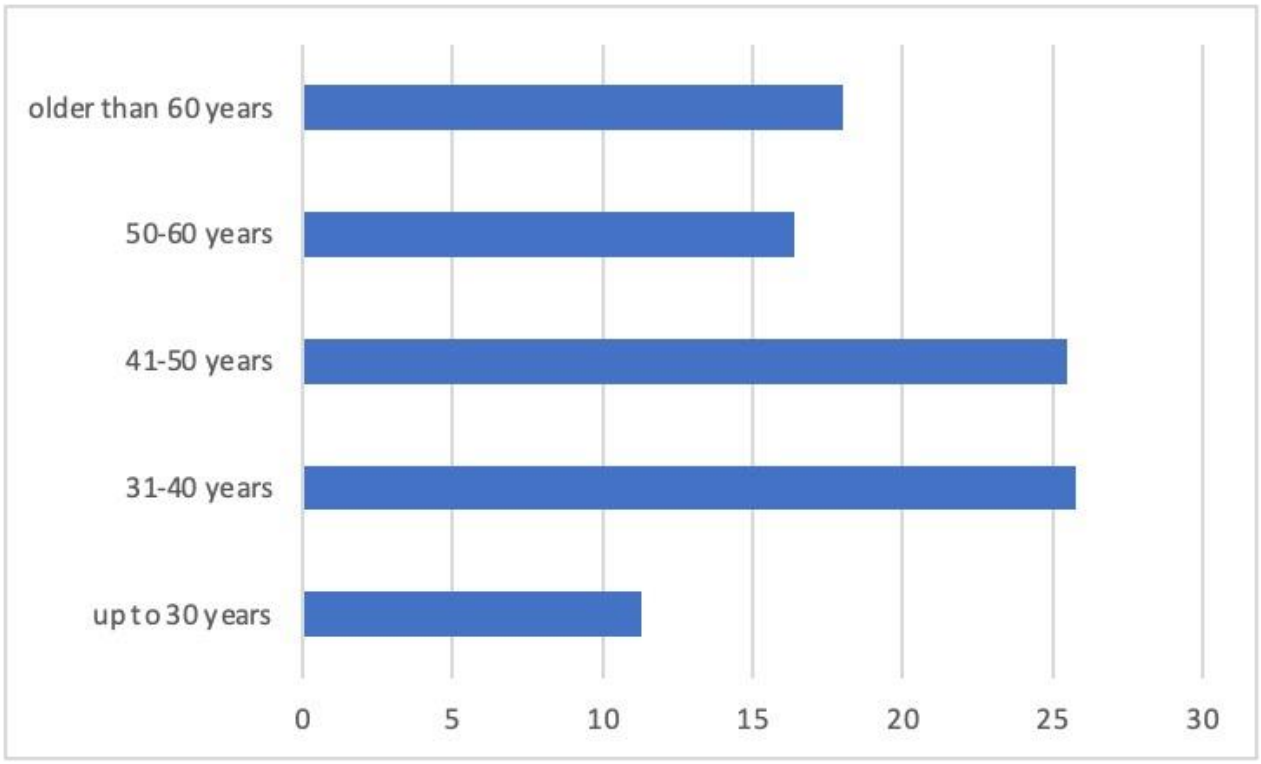
- *Tusau Keser*: When a child takes their first steps, their legs are tied with a thread and that thread is cut by someone they would want their child to emulate (like a role model). Various items such as money, books, whip are placed in front of the child and their choice is believed to determine their future.
- *Shildehana:* This is an event organized when the new born leaves the hospital as a celebration of the birth.

All respondents stated that they do not face any form of discrimination or harassment because of their culture or customs.

AGE GROUP

Approximately half of the surveyed heads of households are aged between 31-50 years as shown in the figure below. The head of the female household is 57 years old.

Figure 16-2 Age Composition of Surveyed Households



16.1.3 Social Economic Characteristics

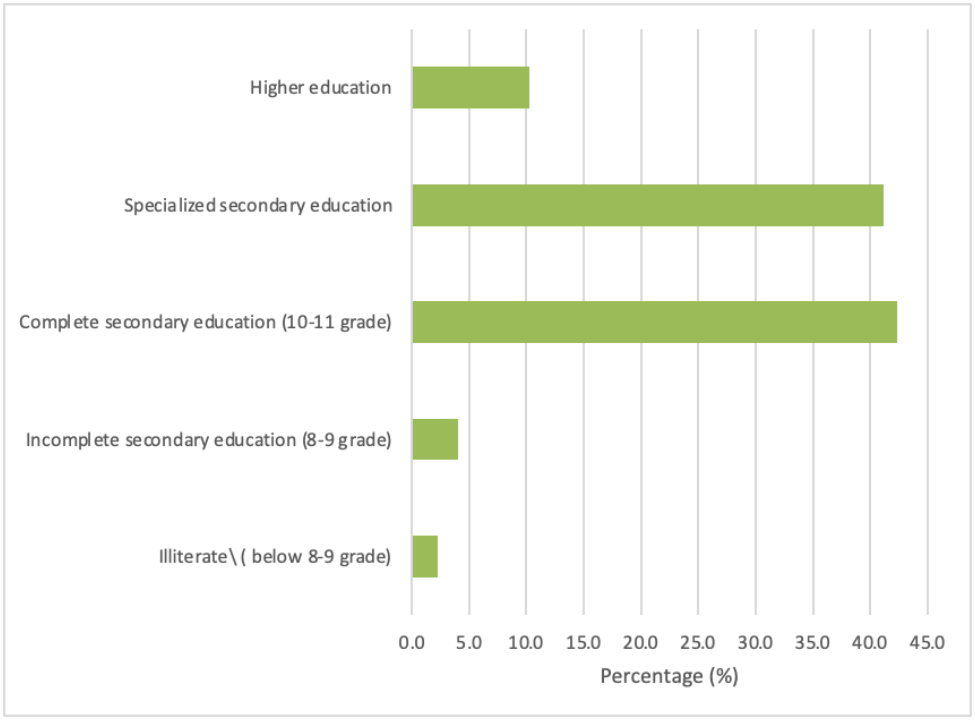
EDUCATION

The right to education is guaranteed to all citizens of the Republic of Uzbekistan under the Constitution " Every person has a right to education". The state oversees education and provides guarantee for free secondary education. Almost 100% of Uzbek's population has at least a secondary education with women and men both at an equal ration of 99.9% (UNDP, 2016).

According to the socio-economic survey at the Project area 97.7 % of the respondents stated that they have some form of education whereas 2.3% were either illiterate or had not gone beyond grade 9.

The head of the female household was recorded to have received vocational training which is considered as specialized secondary education.

Figure 16-3 Education Level of Respondents



SOURCES OF LIVELIHOOD

According to the survey, approximately 36.6% of the respondents (both men and the female household) are employed at government or private sector while 22.9% are registered as unemployed. Other sources of income included working in the quarry, temporary jobs etc.

The female respondent stated that she works as an entrepreneur bringing food and non-food items from Gijduvan district to sell in Agitma village and receives retirement benefits from the government.

Table 16-2 Occupation of Respondents

OCCUPATION	PERCENTAGE (%)
University Student	0.6
College student, lyceum	1.1
State organization, military, private companies	36.6
Quarry worker	1.7
working in a farm in Gidjuvon	0.6
Working in temporary and one-time jobs	2.3
Entrepreneur (registered or unregistered)	0.6
Works on household's tomorka or someone's tomorka	0.6
Grazing livestock for pay	4
Unemployed but willing to work (but not registered with the labour exchange)	22.9
Not working and not looking for a job	7.4
Disabled (registered)	0.6
Retirement benefits	21.1

Approximately 5.9% of the respondents stated that their family members work in other regions of Uzbekistan or abroad. Out of this, 3.9% are men and 2% are women. However, due to the COVID-19 pandemic most of those working away from home were forced to return home due to loss of jobs.

When asked about the main challenge faced when looking for employment or ways to increase their household incomes, the respondent gave the following responses:

- Low level of education vs the job requirements.
- Low territorial mobility i.e., due to the remote location of these villages' locals are not able to commute to other areas/towns/cities to look for jobs.
- High demand on the women work schedule especially because they have additional responsibilities at home relating to children and home care.
- Employees give preference to male workers because they consider women "less productive" because women cannot perform hard manual labour and work overtime. This is common in the private sector where women workers can be expected to work between 10-12hrs a day.
- There are legal restrictions on the use of female labour in certain jobs which may have an impact on their health such as hard manual labour or industrial work.
- Low entrepreneurship mainly because of the limited market and lack of infrastructure that support local businesses. It is noted that no women

entrepreneurs were recorded in the villages of Kuklam, Chulobod and only one was recorded in Agitma.

- Lack of "tomorka[11]" as a source of income and employment due to the lack of irrigation water and the quality of the soil.

GENDER ROLES

All the respondents stated that the women in their families are expected to perform domestic chores. The men are the providers and are more involved in the purchase of food, non-food items and animal feed etc in bazaars and towns.

Majority of the respondents stated that their children are expected to perform household chores. Of all the respondents, 39% stated that their children perform chores such as cleaning, cooking and fetching water & taking care of younger siblings, 15% graze the family livestock while 46% do not expect their children to participate in any household chores.

When asked to estimate how many hours the children perform their chores per week, 43% stated that their children help out for approximately 20 hours, 7% stated it was more than 30 hours while 50% chose to not respond.

ALLOWANCES TO LOW-INCOME FAMILIES

Uzbekistan has a system meant to identify families and people in need of social protection and support. This also includes the women, youth, poor families, families with members living with disabilities and families with many children including those without housing. Families and individuals registered in the system receive priority in receiving social and material assistance from state and public organisations.

The following support systems exist in the villages surveyed:

- *Temir Daftar* (Iron notebook): Includes families with members living with disabilities, experienced the death of a breadwinner, single elderly people, families without housing etc.
- *Ayollar Daftari* (Women notebook): Includes women living with disabilities, chronic illnesses, unemployed and poor women.
- *Yoshlar daftari* (Youth notebook): This can cover the youth facing difficult financial times, expenses for non-governmental organisations for teaching youth entrepreneurship and vocational training, to cover costs for purchasing equipment and tools for starting a job, costs associated with treatment for seriously ill children of families included in the Temir Daftar

[11] Tomorka is a household plot. For the majority of households in Uzbekistan, tomorka are a main source of income where families cultivate agricultural crops especially vegetables and keep livestock. Workers especially women can be employed to work in Tomorka which acts as a source of income.

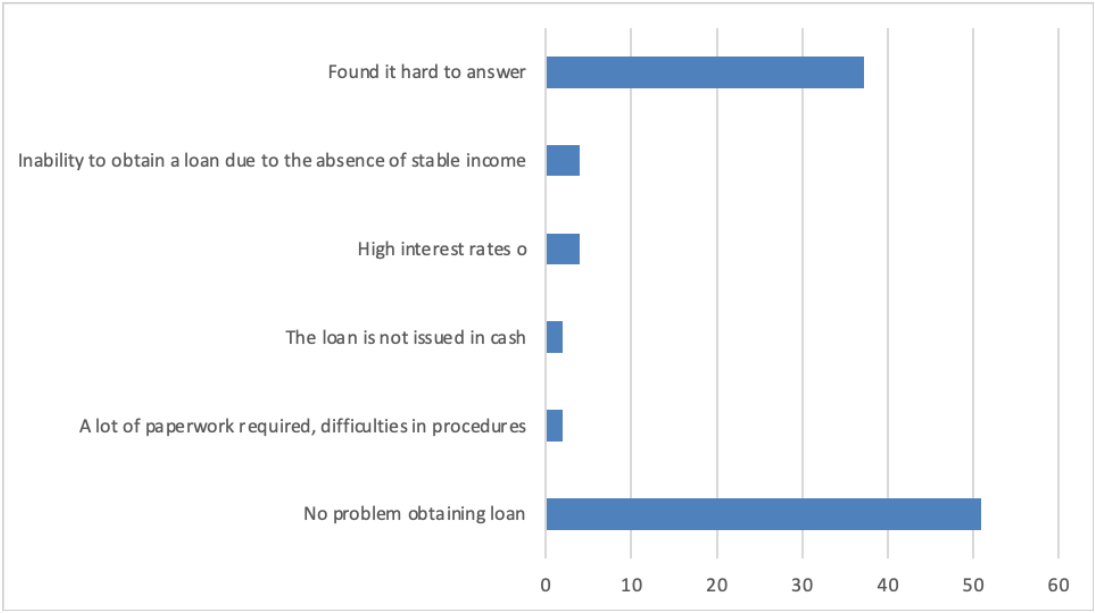
Based on the socio-economic survey, 7.8% of the respondent are registered in the system for social support. In addition, approximately 11.8% of the families receive child or poverty allowances and almost the same number of respondents believe they should be receiving allowances but do not. The main reason for this is that some families do not meet the criteria set by the government due to their income level, ownership of assets such as a car and failure to register as unemployed[12] with the mahalla.

FINANCIAL ACCESS

According to the survey, only 4% of the respondent have taken a loan in the past 5 years for the purchase of household goods and livestock. All these respondents were men and the women respondent stated that they think it is harder for women to get loans which was disputed by the male respondents. Such difference in opinion could potentially be explained by the fact that men are largely viewed as the ones in charge of household finances.

When asked about the challenges experienced in accessing loans, 51% stated that they did not experience any challenges, 9.8% stated that loans have high interest and there was a lot of paper work and requirements to be met such as a proof of a stable income etc while 37.3% found it difficult to respond.

Figure 16-4 Challenges faced by households in obtaining loans



It is noted that there are no financial services in the villages and respondents complained that they have to travel to Gijduvan to access banking or loan services.

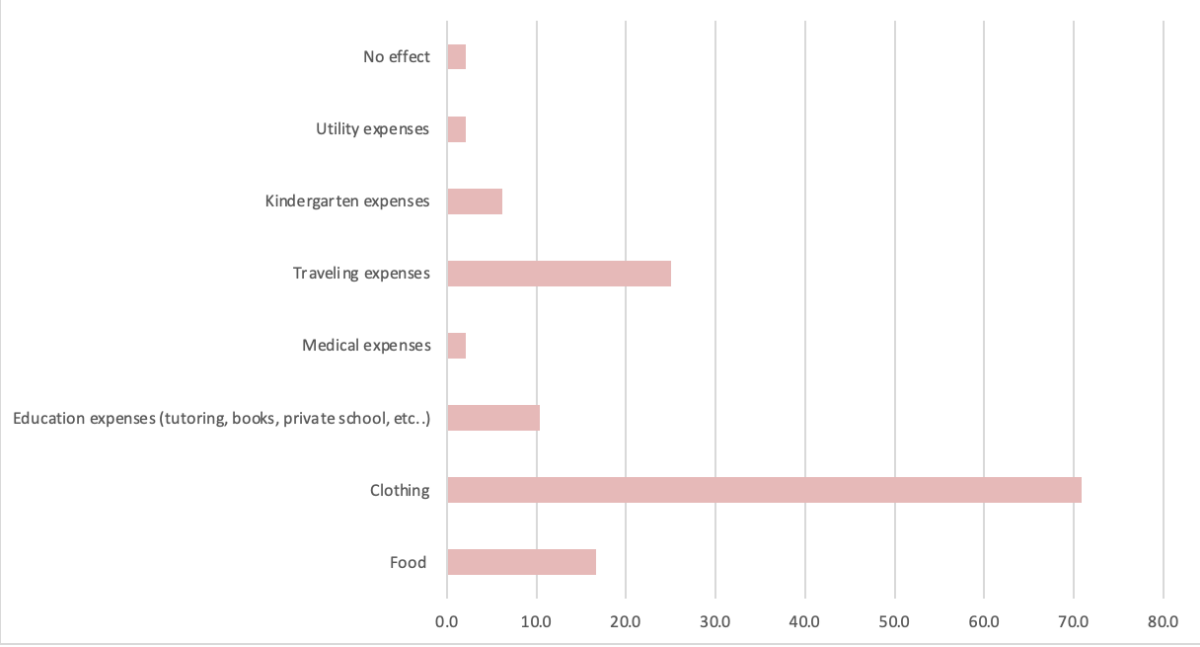
[12] According to Uzbek legislation, the lack of registration as an unemployed person in the state employment service is a basis for denial of the child and poverty allowance. However, the state employment services make it extremely difficult to register as unemployed because they are required to provide benefits, offer free vocational training courses etc.

The average income in the impacted households is approximately 225 USD per month. The main source of expenditure in the surveyed households is food at 48.1%, clothing (12.6%), transportation (10.4%) and Livestock (7%). Out of the 50 households surveyed, 45% stated that their income is enough to meet only the basic needs, 35% can meet their basic needs and other additional costs, 10% only have enough for food, 6% do not earn enough to buy enough food while 4% have extra income and feel they can buy anything they want in addition to their basic needs.

Strict quarantine measures were enforced in Uzbekistan for more than six months. The measures were implemented in order to promote social protection and ensure that the health sector was not overwhelmed by rise in number of infections. Even though there was some form of economic support provided to businesses and families, the economic impacts are still being felt through job losses and reduced incomes etc.

According to the survey, 83.7% of the respondents stated that the pandemic did not have a serious impact on their incomes. Households whose income was impacted by the pandemic stated that they had been forced to reduce expenses associated with kindergarten, healthcare, clothing, food and tutoring as shown in the figure below.

Figure 16-5 Cost Reduction in Households as a Result of Covid-19



In addition, 38% of the families stated that they received benefits and support in form of money and goods from the government, non-governmental organisations, private individuals and other private sponsors. Approximately 14% of the respondents stated that they did not request for support even though they were impacted by the pandemic because they felt that there

were some other families who needed the help more. Others stated that they considered inappropriate to ask for help.

UTILITIES

The villages do not have any centralised gas supply, heating or sewage system in place and only electricity is supplied to all the houses.

Based on the survey, 65% of the respondents have to buy water from water suppliers from Gijduvon districts while 33% get water from a pump station located in the village and 2% get their water delivered free of charge by people living in other parts of the district. 6% of the households stated that they were not satisfied with the quality of the water due to its high salt content and contamination.

For cooking purpose's, 94% of the households use gas cylinders, while 27.5% use coal and 62.7% use saxaul wood. It is understood that there are special brigades engaged in the cutting of saxaul wood and they sell it to the locals and in some cases the locals collect the saxaul for themselves.

Plate 16-2 Gas Cylinders used for Cooking

The saxaul tree is listed in the Uzbekistan Red List and is a protected tree. Based on the survey, 78.4% of the respondents stated that they are aware the saxaul tree is protected but they do not have any other alternative due to lack of centralised gas and heating system. In this desert area, the saxaul trees act as natural barriers to soil erosion and can withstand harsh desert conditions. As such, the cutting down of the saxaul trees has great environmental impacts.

Out of the 50 households, 98% stated that they have access to a stable electricity supply while 2% stated that they experienced unstable connection during summer and winter for at least once per month.

There are no garbage/waste collection services in the villages and 14% of the respondents stated that they have garbage pits in their vegetable gardens while the rest dump the waste public garbage pit.

Due to the lack of a centralised sewage system, each household builds its own pit latrines which can be unsanitary sometimes due to poor maintenance.

ACCOMMODATION & LIVING CONDITIONS

All respondents of the survey live in one storey houses. Approximately 74% own their own homes, 22% use service housing (allocated to them by their employer) while the rest 4% rent. Out of all the respondents, 96% stated that they live in their homes all year round while 4% stated that they only use it a few months per year.

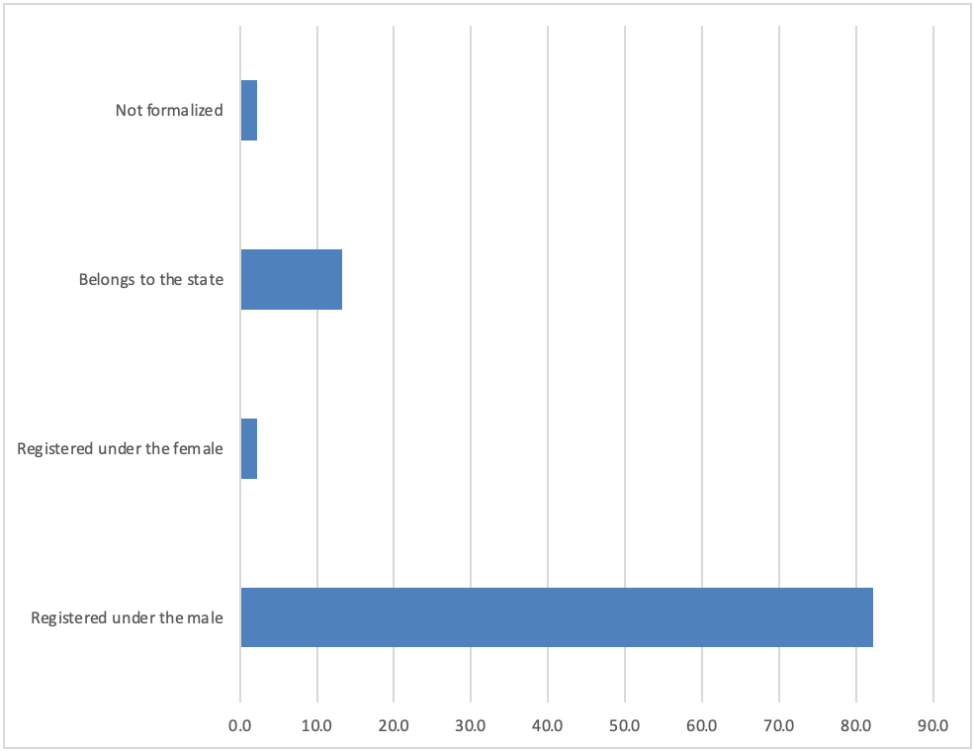
Plate 16-3 Typical Houses in Agitma Village

It is noted that 82.2 % of the houses are registered (owned) under the men in the household, 2.2% under the female while the rest are either under state ownership or have not been legally registered.

Traditionally women move into their husband's home (or family home)after marriage which means the home is registered under the man's ownership or his parents. In such instances, a woman is expected to go back to her parent's home in case of a divorce/separation.

The Family Code states that property belonging to each spouse before marriage and acquired individually without the contribution of the other spouse is considered private property. However, it recognises equal rights and ownership of houses/assets if it has been acquired jointly by both spouses before and after marriage.

Figure 16-6 House Ownership



OWNERSHIP OF LIVESTOCK & POULTRY

According to the survey, 84% of all the households keep livestock which mainly consist of cows, sheep, poultry, horses and camels while 16% do not own any livestock including the female led household. The livestock acts as a source of income for these households and is also used to supply the household with milk and meat.

Livestock grazing is conducted by the 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. Out of those who own livestock some graze at or near the Project site while others graze in other areas.

When the respondents were asked about the presence of nomadic herders in the area and at the Project site, all respondents stated that they had not seen any nomadic herders in 2021 while they have seen them in the area in past years.

The main challenges associated with keeping livestock include:

- Lack of access to veterinary services.

- High cost of animal fodder especially in winter when the animals are not grazing in the field.
- Scarcity of water recourses.

FARMING

The villages are located in a desert area which is not suitable for farming. All the surveyed households stated that they have small gardens (tomorka) but 94% stated that they do not use them because of lack of irrigation water and soil salinity. Majority of the respondents stated that the inability to use their tomorka disadvantages them from growing vegetables for their family and making additional income from selling any excess food.

GENDER BASED VIOLENCE AND HARASSMENT

The issue of gender based violence and harassment was disussed with PAPs including with female participants only in public meetings held in February 2022. During these meetings, information on potential impacts impacts from the Project and managements measures that will be implemented by the Project was provided to the community members. It is noted that no questions or concerns were raised at the end of this meetings relating to gender based violence and harassment and questions raised related to employment opportunities.

CRIME & SECURITY

Of those surveyed, 62.7% reported that crime in their villages is extremely low while 32.4% said the prevalence of crime is low and 5.9% as medium. The main source of crime in the villages was reported as theft which 2% of the respondents stated that they had experienced in the past 6 months.

The residents stated that crime can be reported to the police via the number 002 or directly to the prevention inspector. None of the villages have a police station and any police services can be accessed from Gijduvan District.

16.1.4 Access to Social Services

ACCESS TO HEALTH SERVICES

There is a clinic located in the Agitma village and villagers from Kuklam and Chulobod villages have to travel to other areas to access medical care. According to the outcome of the survey, 20% of the respondents stated that the community clinic is well equipped, 46% find the services offered unsatisfactory and 23% stated that the clinic was well equipped but does not have qualified specialist.

Plate 16-4 Local Clinic in Agitma Villaga

One of the main challenges faced by the respondent is the lack of maternity services in the local clinic. It is noted that the nearest maternity hospital is located more than 100km. As such, there are midwives found in the village even though the laws in Uzbekistan require child delivery to be conducted in hospitals.

The most common illnesses reported by the households are as shown in the table below.

Table 16-3 Common Illnesses in the Village

COMMON ILLNESSES	
Cardiovascular disease	Jaundice
Gastrointestinal diseases	Nervous system disorders
Influenza, cold	High blood pressure

Only 2% of the respondents said that at least one of their family members has a health insurance while 82% stated that they did not have any insurance cover. The chose not to answer the question. It is noted that the uptake of health insurance in rural areas is not common in Uzbekistan.

COVID-19 & VACCINATION

Due to the remote location of the villages the number of COVID-19 cases reported have been few compared to other larger villages and urban areas in Uzbekistan. Approximately 29% of the respondents have already received their COVID-19 vaccination, 28% do not plan to be vaccinated because they believe the vaccine is potentially harmful or they do not need it, 31% plan to get vaccinated if it is free and 12% did not answer the question. At present, the government vaccination drive has been targeted towards medical workers, public workers and the elderly.

EDUCATION SERVICES

There is a school and kindergarten in Agitma village but none of the villages have any college which are found in larger urban areas. Based on the survey, 74% of the respondent with children of pre-school age attend kindergarten while 26% stated that their children did not attend kindergarten because it was located far from their homes. The high number of children attending kindergarten could be potentially explained by the sensitization conducted by the Ministry of Preschool Education on importance of early childhood education. Additionally, the Ministry has establishment more kindergarten networks in Uzbekistan and the law now allows creation of private kindergartens.

Out of the 50 households, 41% of the respondents stated that the schools in the village are not well equipped with qualified teachers and learning materials such as books, desks while 55% stated that the schools are well equipped or met the basic requirements for learning. The rest (4%) found it hard to answer.

TRANSPORTATION SERVICES

In general, public transportation network in the villages is under developed and locals mostly rely on taxi services which can be expensive depending on the travel distance. This is a huge challenge because the villages are located far away from towns where locals travel to access services and goods.

Based on the survey, 31.4% of the respondents stated that they own a vehicle, 41% use private taxis and 17.6% use route taxis (which can transport several people at once). Other means of transport available to the locals include motorcycles, buses and train depending on their destination and distance of travel. The nearest train stations are located in Kuklam and Chulobod villages.

MARKET PLACE

There are 1-2 shops located in each village and in some instances, they have to travel to Gijduvan district (which is over 100km away)to purchase some essential goods. All respondents stated that there are "mobile shops-minibuses" which visit the village to sell food and non-food items. These minibuses do not visit the villages on a defined schedule and hence they are not entirely reliable. However, 30% of the respondents stated that they rely on these mobile shops to buy food.

The majority of the respondents (85.7%) buy their animal feed from the larger towns and bazaars.

The average cost of items at shops located in the surveyed site area are shown in the table below.

Table 16-4 Current Price of Commodities in the Project Area

ITEM	UNIT	AVERAGE PRICE IN THOUSAND SOUMS	AVERAGE PRICE IN USD
Bakery products	1 pc	4 000	0.38
Bread	1 pc	2 500	0.23
Meat/beef	1 kg	57 500	5.40
Potato	1 kg	4 250	0.40
Onion	1 kg	3 000	0.28
Carrot	1 kg	2 875	0.27
Tomato	1 kg	17 500	1.64
Milk (l)	L	4 000	0.38
Dairy product (l)	L	4 000	0.38
Egg (pcs)	1	1 360	0.13
Rice	1 kg	10 300	0.97
Oil (l)	L	17 000	1.60
Flour	1 kg	3 375	0.32
Sugar	1 kg	9 000	0.85

NGOs OPERATING IN THE PROJECT AREA

Approximately 96% of the respondents stated that they were not aware of any NGOs working in their villages while 4% stated that they are familiar with the International Committee of the Red Cross (ICRC) but they do not have any local offices and area located in Bukhara. ICRC is involved in humanitarian work.

16.1.5 Use of Lake Ayakagitma

Approximately 69% of the respondents stated that they use Lake Ayakagitma for fishing, a source of water for cleaning and dust suppression and making of clay for construction while 31% do not use the lake. Of the 65% who use the lake for fishing, 93% stated that they fish for sale, 7% fish for domestic consumption only.

According to information obtained from the socio-economic survey, 17% of the fishing households rely on fishing as their main source of income while the rest supplement their income with unskilled temporary works (e.g., house cleaning, repair works, herding etc.).

The most common type of fish found in the lake include the common carp, herring, crucian carp and the pikeperch (though this is not common).

All the respondents using the lake for fishing stated that they are aware they need a fishing permit but none of them has applied for it. However, the fishermen obtain "unofficial permission" to fish in the lake from a representative from `Bukhara department of fishing who are empowered to control fishing in the lake. As a condition to be allowed to fish, the fishermen are expected to sell their entire stock to the Bukhara department of fishing association "*Bukhora baliq sanoat*" and a price lower than the market price.

More than 70% of the respondents using the lake believe there are no restrictions on their fish quota, 14% assume that their fishing quota is restricted to 30kgs per month, 7% stated it is 25kgs per month while 7% did not provide a response.

The users of the lake stated that the main challenge of using the lake include:

- Selling their catch to the representative of the *Bukhora baliq sanoat* sometimes at 50% less than the market price.
- Inability to use the lake for any other purpose like drinking water or irrigation due to the salinity of the water.
- Safety concerns because the waters in the lake get rough.

16.1.6 Use of the Project Site

The project site is used primarily for grazing and no other economic activities are undertaken there. Based on findings from numerous site visits, consultations and surveys undertaken with local community members and land users at the site , there are 10 herders that use the project site for livestock grazing activities. Six (6) of these herders have contracts with Kokcha LLC and are mostly from Gijduvon, Vobkent, Shofirkon districts while the remaining 4 herders do not have contracts with the LLC and are from Agitma village. The total number of livestock belonging to the herders and Kokcha LLC and grazing on the project site is 5,664.

Three herders employed by Kokcha LLC have accommodation structures within the project site and will require to be resettled. Based on consultation and communication with SWID, Kokcha LLC and Bukhara Municipality, alternative land for grazing was identified and site visits arranged with the herders to show them the land. However, the herders with structures on the site indicated they prefer compensation to be paid and they would secure alternative land themselves. The four herders from Agitma village have been allocated alternative grazing land north of their village.

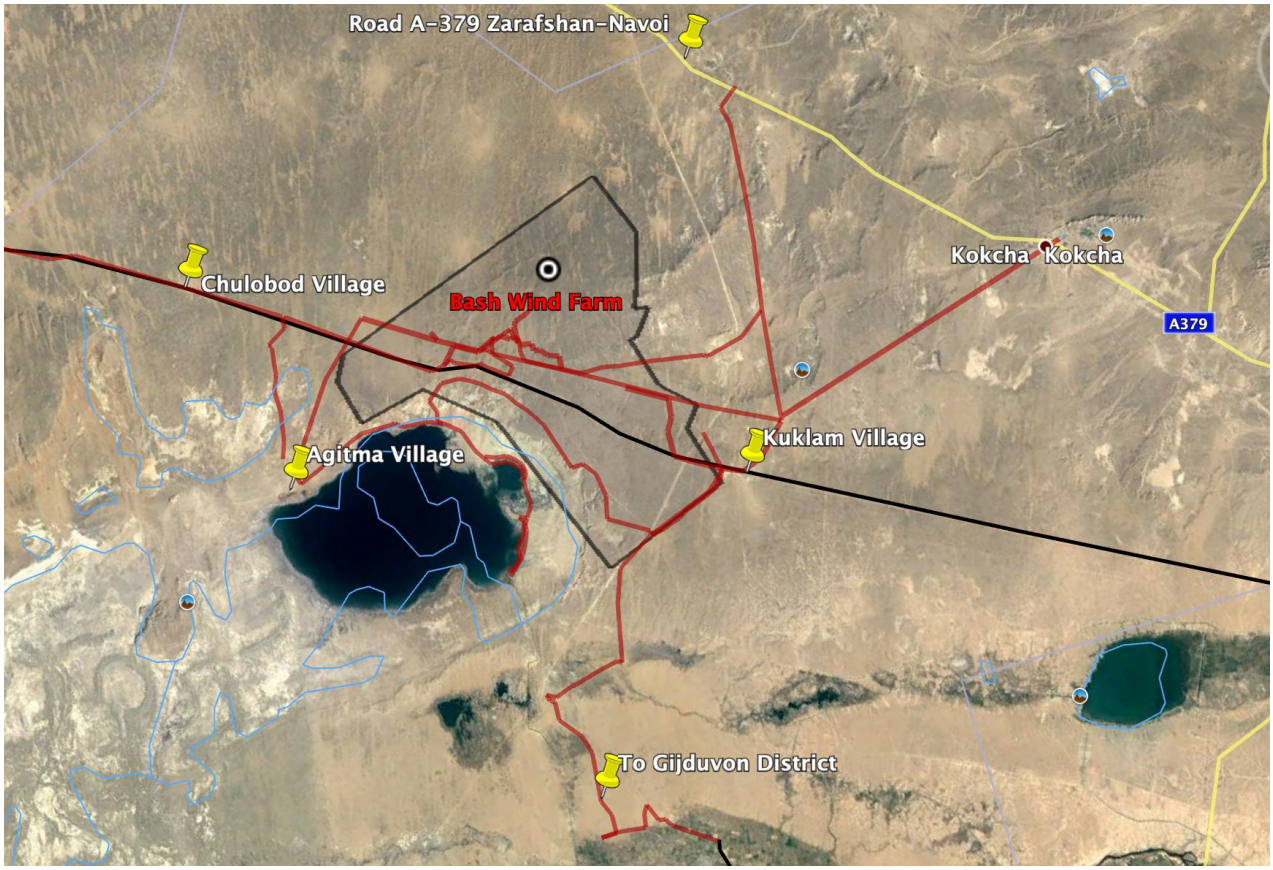
The other 3 herders employed by Kokcha LLC do not have structures within the project site and can continue their grazing activities outside of the Project boundary where they have access to more land.

It is noted that grazing within the Project site will be possible during the operational phase apart from areas impacted by the project footprint. Reference the Project specific RAP for more details on land users, impact and compensation entitlements etc.

LOCAL ACCESS ROADS

The Project site also contains a network of unpaved access roads which are used to connect the neighbouring villages to grazing areas, Gijduvon district, A-379 High way and Kokcha as shown in the figure below.

Figure 16-7 Access Road Networks across the Project Site (in red)

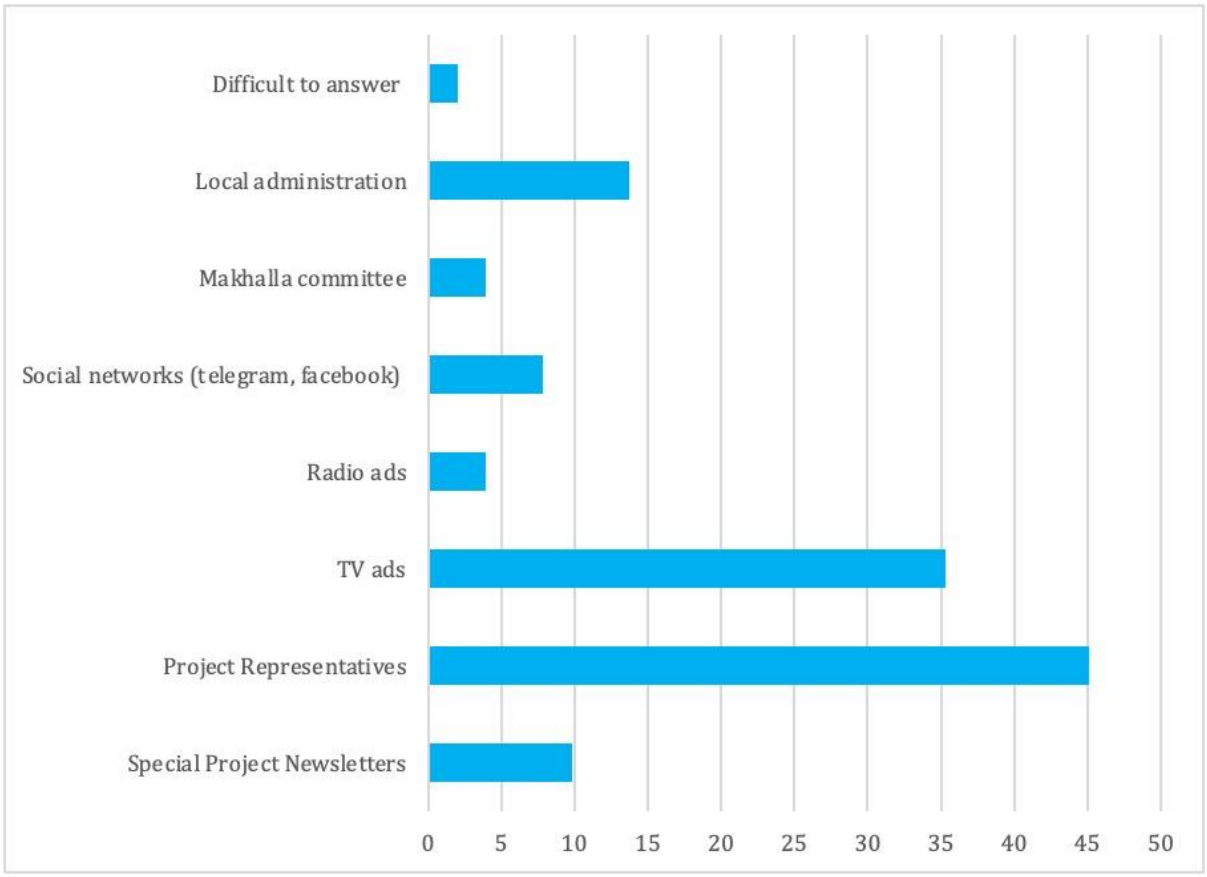


16.1.7 Knowledge About the Project

Approximately 31% of the households surveyed reported to have previous knowledge of the Project, 24% had heard about the Project but did not have sufficient information while 45% did not have any prior information about the Project. Approximately 18% of those with knowledge about the Project had received the information from the Makhalla Committee while the others had heard about the Project from their relatives or friends.

When asked about how they would like to receive Project information moving forward, 45% would like to receive information from Project representatives, 35.3% from TV adverts and 13.7% from the local administration.

Figure 16-8 Preferred Source of Project Information



PROJECT ANTICIPATED IMPACTS

Households were asked to list some of the perceived Project impacts and benefits based on the information they had received. Some of the main positive impacts anticipated by the local communities include:

- Job opportunities;
- Reduction in the cost of electricity;
- Support to poor and vulnerable families;
- Improvement in power supply; and
- Improvement of infrastructure and local businesses.

It is noted that the female led households expressed more optimism regarding the opportunities presented by the Project compared to the male led households.

Households that were surveyed also expressed their concerns regarding the impacts of the Project. The main areas of concern include:

- Generation of noise and dust especially during construction;
- Reduction of grazing land; and
- Environmental and ecological impacts.

Approximately 72.5% of the household surveyed stated that they would like the community representatives involved during the implementation of the Project in order to mitigate against the negative impacts of the Project to the villagers.

16.2 Receptors

Table 16-5 Potential Socio-Economic Receptors

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.
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.

16.3 Potential Impacts, Mitigation, Management and Residual Impacts

16.3.1 Construction Phase

16.3.1.1 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 in order to reduce risk of socio-cultural conflict due to influx of people to the Project area based on their skill set and Project requirements.

As well as 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..

16.3.1.2 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.

16.3.1.3 Purchase of Construction Materials & Food Products Locally

Additional secondary impact on the local economy is likely to arise from spending on local and foreign goods and services during the construction process. The nature of the development, and specialized nature of required materials, suggests that these will be sourced internationally, apart from construction materials (e.g. concrete, aggregate, etc.) which will be sourced locally.

There is also the potential for purchase of food products locally to boost the local economy where local people are able to sell vegetables and daily products to the workers. However, workers buying goods from the small community shops could potentially lead to an increase in retail price of basic commodities which would impact the local households negatively.

16.3.1.4 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 water will be supplied to the Project site via water tanker trucks however, it has not been confirmed where the water will be sourced from.

Based on the socio-economic survey undertaken, about 65% of respondents from surrounding village indicated that they buy water from water suppliers from Gijduvon district and 33% obtain water from a pump station as such If the supply of water to the Project site via water tanker trucks is not properly coordinated and managed, the Project demand for water can potentially create a shortage for the local community or an increase in the price of water particularly if water is obtained from the same supplier at Gijduvon district that sells water to the village.

16.3.1.5 Impacts to Vulnerable Groups & 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 gender-based violence and harassment due to the presence of new workers in their communities including other labour violations (Reference Chapter 29 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 11 Traffic & Transportation.

16.3.1.6 Land Use Change

Reference the project specific RAP for impacts relating to land use change.

16.3.1.7 Disruption of Local Custom

The influx of workers and migrants (refer to Chapter 31 of assessment on Influx of Workers) to the Project site could potentially introduce new habits or practices that are not consistent with the local culture. This could lead to potential conflict with the new workers or decline in social cohesion between the local communities.

16.3.1.8 Expectations from Local Communities

During ESIA public disclosure meeting with the local communities, members of Agitma village provided suggestion on the social services they would like the Project to provide. Besides the provision of employment opportunities, the community members had the following suggestion on social services:

- Provision of modern technology and sport facilities at the local school. This includes items such as computers, printers, multimedia projector, football stadium, balls, etc.
- Provision of sewing machines and training to young women of the community

The Project Developer will assess the suggestions in consultations with the local government municipalities to determine suitability, existing government initiatives etc..

16.3.1.9 Supply Chain Risks

The engagement of suppliers will present potential risks relating to labour and working conditions such as:

- Child labour, forced labour, gender- based violence 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 issues for workers and local communities;
- Risks associated with the use of migrant labour and ethnic minorities;
- Risks to freedom of movement e.g. being able to leave worker accommodation;
- Human rights risks associated with COVID-19 restrictions such as movement restrictions etc; and
- impact on the environment relating to pollution of water supplies, soil and air.

In order to assess these risks to the Project, ACWA Power requested Envision (WTG Supplier) to undertake a supplier's risk assessment for their tier 1 & 2 suppliers. This is in order to ensure that the Project complies with PR1 and PR2 requirements on supply chain. In turn, Envision commissioned SGS to undertake the assessment.

SGS has mapped 22 suppliers for the Project which include Envision (Tier 1) and the rest as Tier 2 & 3. The scope of the on-going assessment includes the following:

- Desktop screening of labour, HSE risks through review of the suppliers' policies/procedures and public concerns/court case results etc.
  - Online screening of labour, HSE risk through the review of the suppliers' policies and procedures and public concerns/court cases results and employee feedback has been undertaken and completed for 14 out of the 22 suppliers.
  - The screening of the 14 suppliers has concluded that there is no presence of child and/or forced labour.
- Site based assessments will be undertaken for all suppliers where there are issues identified during the desktop screening prior to the submission/approval of the project by the lending banks.

It is noted that ACWA Power will only contractually engage one EPC Contractor. The EPC will be contractually obligated to follow ACWA Power's Chartered Institute of Procurement & Supply (CIPS) procurement system which requires that all contractors and suppliers engaged by the EPC are vetted and meet ACWA Power's procurement policies as well as national and lenders requirements.

The EPC Contractor will be responsible for undertaking due diligence and audits to ensure that its contractors and suppliers are in compliance with the applicable national and lenders requirements. In addition, on-going vetting of suppliers by the EPC will be monitored during the quarterly independent E&S audits with specific questions relating to the supply chain.

Table 16-6 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 i.e., Kuklam, Agitma and Chulobod villages. • 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	**Minor Positive**

Potential Impact	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					for unskilled and semi-skilled labour positions.	
Training and dissemination of construction skills	**Minor Positive**	Welfare of Local Population	High	**Minor to Moderate Positive**	• All Project workers will receive induction training at the Project, as well as vocational specific training for on-site construction works. • 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.	**Minor to Moderate Positive**
Purchase of construction materials and food resources locally	**Minor Positive**	Local/Regional Economy	High	**Minor to Moderate 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. • Project workers will be forbidden from fishing in Lake Ayakagitma.	**Minor to Moderate Positive**

Potential Impact	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					• Water supply to the Project site will not be sourced from the village springs/wells or from Lake Ayakagitma (unless a license is obtained to draw water from the lake).	
Consumption of water	**Moderate Negative**	Water resources	Medium	**Moderate Negative**	• EPC Contractor will engage a licensed water tanker trucks and obtain relevant permits. • Prior to engaging a licensed 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 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.	**Minor Negative**

Potential Impact	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
					• 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 vulnerable groups	**Minor Negative**	Vulnerable groups & women	High	**Minor to Moderate Negative**	• The CLO will regularly undertake informal meetings including with women focus groups & vulnerable 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 Chapter 11 Traffic & Transportation, Chapter 29 Community Health, Safety & Security and Chapter 30 Labour & Working Conditions. • Implementation of the Project specific RAP to ensure that herders livelihoods are not impacted.	**Minor Negative**

Potential Impact	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
Disruption of Local Custom	**Minor Negative**	Welfare of Local Communities	High	**Minor to 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 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	**Minor Negative**

Potential Impact	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
Social risks related to supply chain	**TBD**	Workers working within the supply chain	High	**TBD**	• 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 ensure its core suppliers will implement the recommendations from the Supply Chain audit in relation to Envison'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 Envision 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. • 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.	**TBD**

16.3.2 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 Chapter 29 Community Health, Safety & Security and Chapter 30 Labour & Working Conditions.

Table 16-7 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 to Major Positive**	• Ensure the appropriate operation and maintenance of the Wind Farm to enable a secure supply of renewable energy	**Moderate to Major Positive**
Employment Opportunities	**Minor Positive**	Employment Market	Medium	**Negligible to Minor 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 to Minor Positive**

16.4 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 16-8 Socio-Economic Monitoring Requirements (Construction and Operations)

MONITORING	PARAMETER	FREQUENCY & DURATIONS
Employment	Number of persons employed from the villages near the Project site	On-going
Third Party Grievances	Issues concerning socio-economic factors or land use/ownership	Ref. to Grievance Mechanisms section in Stakeholder Engagement Plan (SEP)
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
Supply chain	Risks associated with the supply chain	As per the Supply Chain Management Plan

PART B – OVERHEAD TRANSMISSION LINE

This chapter outlines site specific baseline conditions along the OHTL route, receptors within the identified Area of Influence (AoI), provides an assessment of the potential environmental and social impacts as a result of the OHTL construction and operations and proposes mitigation & management measures to prevent or minimize negative impacts and ameliorate positive impacts.

17 TERRESTRIAL ECOLOGY

17.1 Observation and Baseline Environment

The following subsections provide an overview summary of the OHTL ecology surveying results obtained thus far, for the OHTL.

17.1.1 Ecosystems, Habitats and Plant Communities

17.1.1.1 Survey Methodology

The field studies were conducted 9th –11th April, 12th –20th May and 18th–30th June 2021 by traditional methods of botanical survey 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). The corridor was surveyed with approximately a 100 m buffer in width along the planned electric lines.

Refer to the detailed habitat and flora reports in Appendix C-1 for methodology, location coordinates, maps, and full datasets of results.

17.1.1.2 Results

HABITATS

The following habitat types were recorded along the proposed OHTL corridor:

- Sandy and sandy-loamy desert plain
- Fixed and semi-fixed sands
- Saline lands and wetlands
- Agricultural lands
- Saline Land
- Complex of Fixe and semi-fixed sands, and Saline Lands
- Relic Uplands

The following figure provides an estimation of the habitat distribution along the OHTL corridor. Accurate extent of habitat distribution along the latest OHTL alignment route is not available at this time due to lack of remotely sensed data.

Figure 17-1 Habitat Map for Bash to Karakol OHTL Corridor

FLORA

The following table provides the species types considered nationally threatened which were registered during the surveys of the corridor. One species; *Calligonum zakirovii* is a nationally endangered species, thus satisfying Criterion ii and qualifying as a priority biodiversity feature.

Table 17-1 Threatened Flora Registered During OHTL Survey

	NAME OF SPECIES		IUCN /RDB STATUS	ABUNDANCE/ DENSITY
	LATIN	ENGLISH		
1	*Calligonum zakirovii (Khalk.) Czerep.*		Not Evaluated (NE) / UzbRDB 1 (endangered species)	Rare, Endemic
2	*Acanthophyllum cyrtostegium Vved.*	-	Not Evaluated (NE) / UzbRDB 3 (vulnerable, declining species)	Rare / up to 40–50 individuals per 1 hectare
3	*Calligonum zakirovii (Khalk.) Czerep.*	Zakirov's calligonum	Not Evaluated (NE) / UzbRDB 1 (endangered species)	Rare / density varies from solitary plants to 30–40 per 1 hectare
4	*Eremurus korolkowii Regel*	Korolkow's desert-candle	Not Evaluated (NE) / UzbRDB 2 (rare species) in former editions, currently excluded	Occasional to Rare / density varies from solitary plants to 100–150 per 1 hectare
5	*Ferula kyzylkumica Korovin*	Kyzylkum's ferula	Not Evaluated (NE) / UzbRDB 3 (vulnerable, declining species)	Occasional to Rare / density varies from

	Name of species		IUCN /RDB Status	Abundance/ density
	Latin	English		
				solitary plants to 50–100 per 1 hectare
6	*Tulipa lehmanniana Merckl.*	Lehmann's tulip	Not Evaluated (NE) / UzbRDB 3 (vulnerable, declining species)	Occasional to Rare / density varies from solitary plants to 900–1000 per 1 hectare

Plate 17-1 *Acanthophyllum cyrtostegium*

Plate 17-2 *Calligonum zakirovii*

17.1.2 Terrestrial Mammals

17.1.2.1 Survey Methodology

Mammal surveying was undertaken during June 2021 along proposed OHTL alignment corridor including nocturnal surveying and ground transects.

Refer to the detailed mammal survey reports in Appendix C-1 for methodology, location coordinates, maps, and full datasets of results.

17.1.2.2 Results

The following table provides a summary of species registered during the surveys of OHTL.

Table 17-2 Registered Mammals During OHTL Surveys

# TRANSECT	BIOTOP	MAMMALS	OTHER WILD AND DOMESTIC ANIMALS
Transect 1	Semi-shrub steppe, furrows from old saxaul plantations	Small five-toed jerboa (2 inhabited barrows) Libyan jird (1 inhabited colony) Red fox (1 indi, diggings)	Sunwatcher *Phrynocephalus helioscopus* Many tracks and dungs of domestic livestock
Transect 2	*Tamarix* spp. shrub land, reeds	Tolai hare (1 indi)	Many tracks and dungs of domestic livestock
Transect 3	Canal with *Tamarix* spp. shrubs and reeds	No signs of mammals	Long-legged buzzard *Buteo rufinus* Tracks and dungs of domestic livestock
Vehicle transect survey with headligh, 10 km	Sandy desert with *Ferula assa-foetida* and saxaul *Haloxylon* spp.	No signs of mammals	Flock of domestic sheep
Transect 4	Sandy desert with *Ferula assa-foetida* and saxaul *Haloxylon* spp.	No signs of mammals	Passeriformes
Transect 5	Road along canal: *Tamarix* spp., reed overgrazing rice paddy fields	No signs of mammals	Glossy ibis *Plegadis falcinellus* (10 indi), purple heron *Ardea purpurea* (2 indi), Charadriformes, Passeriformes
Transect 6	Vegetation desert with Alhagi and Carelinia	Long-clawed ground squirrel (2 inhabited barrows, tracks) Small five-toed jerboa (1 indi, tracks) Great gerbil (2 inhabited colony) Midday jird (3 inhabited colony)	Eremias scripta (1 indi), Passeriformes
Transect 7	Canal and crops overgrazing by reed and Alhagi	No signs of mammals	Purple heron *Ardea purpurea* (1 indi), European roller Coracias garrulous (1 indi), Passeriformes

# TRANSECT	BIOTOP	MAMMALS	OTHER WILD AND DOMESTIC ANIMALS
Transect 8	Old craps overgrazing by reed, Alhagi and Carelinia	Yellow ground squirrel (2 indi) Red fox (1 indi, tracks)	Blue-cheeked bee-eater *Merops superciliosus* (6 indi), carrion crow *Corvus corone* (3 indi), Passeriformes

None of the species recorded during the OHTL mammal survey met the conditions for critical habitat or priority biodiversity feature as per the EBRD PR6 requirements.

17.1.3 Bat Roosts

The initial OHTL reconnaissance survey indicated that there did not appear to be substantial structures that would be conducive to roosting bat colonies. Therefore, detailed bat roost searches were not carried out for the OHTL alignment.

17.1.4 Reptiles

17.1.4.1 Survey Methodology

The field trip to the survey points in the area along planned Bash-Karakul OHTL was carried out from May 5 to 7, 2021.

Refer to the detailed herpetology survey reports in Appendix C-1 for methodology, location coordinates, maps, and full datasets of results.

17.1.4.2 Results

As a result of the field trip, 8 species of reptiles were recorded on the project territory, of which 2 species – the Russian tortoise and Caspian Monitor, are rare and threatened species listed in the Red Book of the Republic of Uzbekistan (2019). It is worth noting that the main part of the project area passes through agricultural lands, and no potential habitats for the Southern Even-fingered Gecko were identified throughout the project area.

Table 17-3 List of Reptile Species Inhabiting the Project Area Along Planned Bash-Karakul OHTL

№	SPECIES	SPECIES PRESENCE ACC. TO LITERARY SOURCES	AUTHOR'S EARLIER PERSONAL DATA	MAY 2021 FIELD EXPEDITION DATA	ENDEMISM	NATURE CONSERVATION STATUS	
						UzRDB	IUCN
Family Bufonidae (toads)							
1	Turan Toad *Bufotes turanensis*	+	+		UZ, TJ, TM		
Family *Testudinidae* (tortoises)							
2	Russian tortoise *Testudo horsfieldii*	+	+	+		2 (VU)	VU
Family *Gekkonidae* (geckoes)							

№	Species	Species presence acc. to literary sources	Author's earlier personal data	May 2021 field expedition data	Endemism	Nature conservation status	
						UzRDB	IUCN
3	Comb-toed Gecko *Crossobamon eversmanni*	+			UZ, TJ, TM, KZ, IR, AF		
4	Caspian Bent-Toed Gecko *Tenuidactylus caspius*	+	+				LC
5	Turkestan thin-toed gecko *Tenuidactylus fedtschenkoi*	+	+		UZ, TJ, TM, KZ		
6	Common Wonder Gecko *Teratoscincus scincus*	+	+	+	UZ, TJ, TM, KG, IR,CN		
Family *Agamidae* (agamas)							
7	Steppe agama *Trapelus sanguinolentus*	+	+	+			
8	Sunwatcher toad-headed agama *Phrynocephalus helioscopus*	+					
9	Lichtenstein's Toadhead Agama *Phrynocephalus interscapularis*	+		+	UZ, TM, KZ		
10	Secret Toadhead Agama *Phrynocephalus mystaceus*	+					
Family *Lacertidae* (true lizards)							
11	Rapid Lizard *Eremias velox*	+	+	+			
12	Sand Racerunner *Eremias scripta*	+	+	+			
13	Reticulate Racerunner *Eremias grammica*			+			
Family *Varanidae* (monitor lizards)							
14	Caspian Monitor Varanus *griseus caspius*	+	+	+		2 (VU:D)	
Family *Boidae* (Boas)							
15	Desert sand boa *Eryx miliaris*	+				3 (NT)	
Family *Colubridae* (colubrid snakes)							
16	Sand racer *Psammophis lineolatus*	+	+				
17	Spotted whip snake *Hemorrhois ravergieri*	+	+				
18	Spotted desert racer *Platyceps karelinii*	+	+				
19	Diadem Snake *Spalerosophis diadema*	+	+				
Family *Viperidae*							
20	Saw-scaled Viper, Phoorsa	+	+				

№	Species	Species presence acc. to literary sources	Author's earlier personal data	May 2021 field expedition data	Endemism	Nature conservation status	
						UzRDB	IUCN
	Echis multisquamatus						

With the exception of the Russian Tortoise (VU), all species recorded during the OHTL reptile survey are classified as LC on the Global IUCN Red List. There are no global population estimates available for the Russian Tortoise. However, sexual maturity is not reached until 10 years of age, with average lifespans of 20 to 30 years. It is considered therefore that losses to mature individuals in areas with viable populations could easily have significant impacts on the regional population. As per the EBRD PR6 GN6 this species satisfies Criterion ii for Priority Biodiversity Feature (PBF) as a Vulnerable IUCN Red List species and is classified as such.

Caspian Monitor and Desert Sand Boa are both nationally threatened (listed on the Uzbekistan Red Data Book). These species do not trigger criticality nor meet the conditions for classification as priority biodiversity feature.

17.1.5 Invertebrates

17.1.5.1 Survey Methodology

Invertebrate surveying was undertaken by visual and netting surveys covering various transects throughout the OHTL corridor; the surveys were undertaken in May 2021.

Refer to the detailed entomology survey reports in Appendix C-1 for methodology, location coordinates, maps, and full datasets of results.

17.1.5.2 Results

The following table summarizes the invertebrate species registered during transects carried out along the OHTL corridor. The entomologist expert has concluded that the invertebrate community present within the corridor is typical of the region and no representatives of threatened species were documented. A single endemic species was registered, *Lioponera desertorum*, an endemic of Uzbekistan and Turkmenistan. However, this species is considered common within its range and therefore is not classified as critical or a priority biodiversity feature.

Table 17-4 Results of the Entomological Survey Along the Projected Power Line From Bash to Karakul Substation

No. of monitoring location	Coordinates	Biotope	Recorded species, including from the Red Data Book
Location 1	40°32'17.34" 64°41'47.15"	Clayey plain	*Lopezus fedtschenkoi* *Bombylius sp.* *Cataglyphis pallidula*

No. of monitoring location	Coordinates	Biotope	Recorded species, including from the Red Data Book
Location 2	40°27'25.46" 64°36'42.26"	Clayey plain	*Cataglyphis setipes* *Monomorium kusnezovi* *Tapinoma erraticum*
Location 3	40°17'23.87" 64°22'29.33"	Fixed sands	*Menecleonus sp.* *Hyalomma asiaticum*
Location 4	40°14'13.01" 64°17'37.85"	Sand hillocks and dunes	*Nighttime records* *Reduvius sp.* *Lopezus fedtschenkoi* *Aeschna sp.* *Mesobuthus eupeus* *Lycosa sp.* *Pimelia sp.* *Adesmia sp.* *Cataglyphis oxiana* *Tetramorium schneideri*
Location 5	40°11'40.99" 64°11'52.91	Fixed sands adjoining fields	*Cataglyphis oxiana* *Adesmia sp.* *Musca domestica*
Location 6	40°09'17.39" 64°07'43.95"	Anthropogenic fields	*Клопы miridae* *Eurydema ornata* *Chironomus sp.* *Vespa orientalis* *Polistes watii* *Messor laboriosus* *Cataglyphis aenescens* *Camponotus turkestanicus* *Monomorium kusnezovi* *Tapinoma erraticum* *Apis mellifera* *Hyalomma asiaticum* *Numerous small unidentifiable dipterans. Locust larvae unidentifiable at early developmental stages.*
Location 7	40°00'41.23" 64°01'05.15"	Anthropogenic landscape near road	-
Location 8	40°00'41.23" 64°01'05.15"	Sand hillocks	*Nighttime records* *Reduvius sp.* *Lopezus fedtschenkoi* *Lioponera desertorum (rare species endemic to Uzbekistan and Turkmenistan)* *Cataglyphis pallidula* *Camponotus xerxes* *Hyalomma asiaticum* *Lycosa sp.*

No. of monitoring location	Coordinates	Biotope	Recorded species, including from the Red Data Book
Location 9	39°53'23.02" 63°56'36.24"	Sand hillocks	*Julodis variolaris* *Adesmia sp.* *Cataglyphis pallidula*
Location 10	39°32'04.77" 63°51'58.45"	Fixed sands adjoining canal	*Chironomus sp.* *Polistes watii*
Location 11	39°42'54.32" 63°50'29"	Fixed sands adjoining canal	*Messor laborisus* *Crematogaster subdentata* *Vespa orientalis*
Location 12	39°40'27.34" 63°51'53.11"	Fixed sands	*Anacanthotermes turkestanicus* *Hyalomma asiaticum* *Cataglyphis palludila*
Location 13	39°37'31.75" 63°53'32.01"	Fixed sands	*Anacanthotermes turkestanicus* *Hyalomma asiaticum* *Julodis variolaris* *Camponotus xerxes* *Cataglyphis aenescens* *Vespa orientalis* *Polistes watii* *Pimelia sp.* *Sympetrum*
Location 14	39°34'21.37" 63°52'41.51"	Sandy area adjoining fields	*Vespa orientalis* *Pieris brassicae* *Messor laboriosus* *Cataglyphis aenescens* *Cataglyphis setipes* *Musca domestica* *Apis mellifera*
Location 15	39°32'04.77" 63°51'58.45"	Anthropogenic landscape	*Vespa orientalis* *Cataglyphis aenescens*

17.1.6 Birds

Bird Surveys were undertaken along the OHTL alignment at a series of Vantage Points from May to October, as shown in the following figures.

Refer to the detailed OHTL bird survey reports in Appendix C-1 for methodology, location coordinates, maps, and full datasets of results.

Figure 17-2 Survey Points of the Projected OHTL Route in June

Two nests of Golden Eagles were found on anchor poles near Ayakagitma Lake, however, the birds were not nesting this year. At the time of the survey, Indian Sparrows were nesting in the remains of one of the nests.

The greatest species diversity was observed in areas with water bodies and agricultural lands **(VP 1,2,5,14,15).** Border landscapes attract a greater number of birds due to a greater diversity of shelters, food resources, etc. Threatened species Egyptian vulture, Eurasian Curlew, Golden Eagle and Houbara Bustard were observed during the survey.

As per EBRD PR6 requirements CHA for the Egyptian Vulture (EN) found that this species does not trigger criticality in the wind farm area as ≥ 0.5% of the global population were not recorded in the OHTL area. Surveys recorded a total of 5 individuals over the course of one year. However, it remains a priority biodiversity feature (PBF) for which mitigation will be addressed in the ecological impact assessment.

Six houbara bustard (VU) were recorded along the OHTL alignment over the course of one year. Though the quantitative popula tion estimation of the baseline surveys is below the proposed threshold for criticality, it is considered that population extrapolation for such a secretive species has a high margin of possible error. The stakeholder accounts of M.Koshkin and R.J. Burnside confirm that the project area lies within prime breeding ground and a migratory corridor. Therefore, this species is considered as triggering criticality for the project.

Table 17-5 The Summary List of Observed Threatened Species

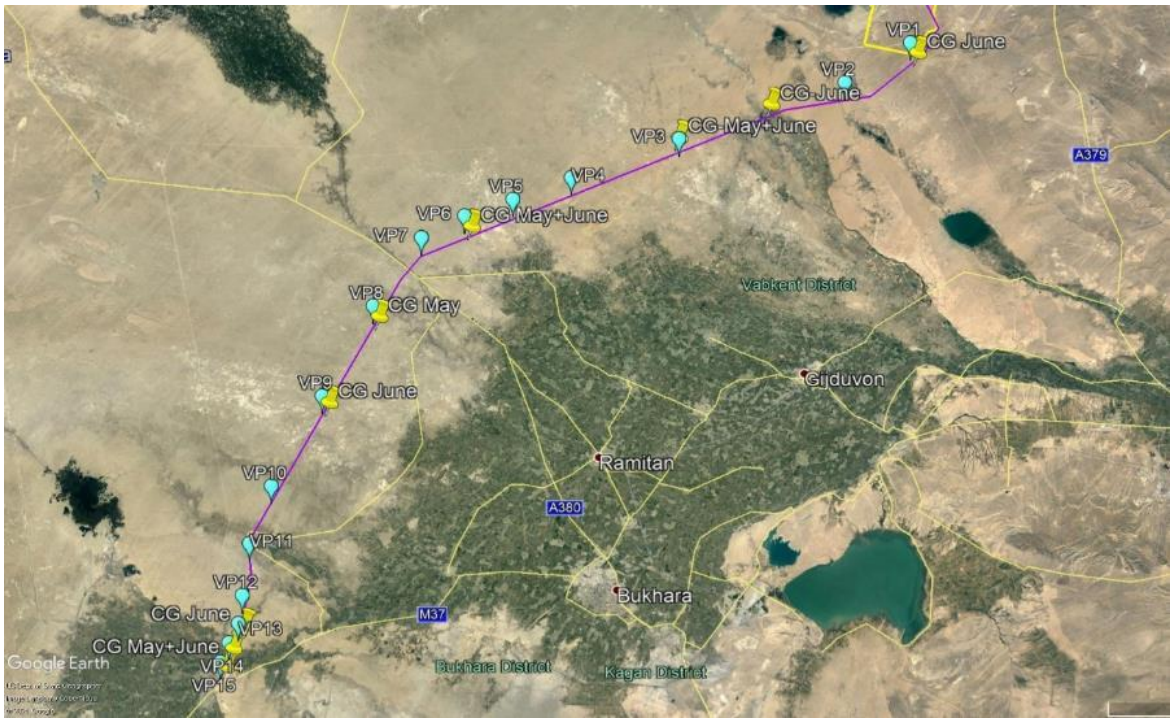
NAME OF SPECIES		IUCN /RDB STATUS	OBSERVATIONS					
LATIN	ENGLISH		MAY	JUNE	JULY	AUG	SEPT	OCT
Neophron perncopterus	Egyptian Vulture	IUCN-EN, UzRDB-VU	-	3	1	1	-	-
Numenius arquata	Eurasian Curlew	IUCN - NT, UzRDB-VU	4	2	-	-		-
Aquila chrysaetos	Golden Eagle	UzRBD-VU	-	-	-	1	-	-
Chlamydotis macqueenii	Houbara Bustard	IUCN-VU, UzRBD-VU	-	-	-	1	2	2

Table 17-6 Threatened species recorded outside of VPs

SPECIES	NUMBER	NOTES
May		
Eurasian Roller *Coracias garrulus*	20	Between VP 3 and 4
June		
Egyptian Vulture *Neophron percnopterus*	1	Between VP 3 and 4
Eurasian Roller *Coracias garrulus*	5	Between VP 2 and 3
July		
Egyptian Vulture *Neophron percnopterus*	1	Between VP 1 and 2
Houbara bustard *Chlamydotis macqueenii*	1	Between VP 3 and 4
August		
Egyptian Vulture *Neophron percnopterus*	1	Between VP 3 and 4
October		
Houbara bustard Chlamydotis macqueenii (undulate)	3	Between VP 4 and VP 5 (at night)

Figure 17-3 Observation Points of Egyptian Vulture (NP) и Eurasian Curlew (NA) in May and June 2021

Figure 17-4 Observation Points of Eurasian Roller (CG) in May and June 2021



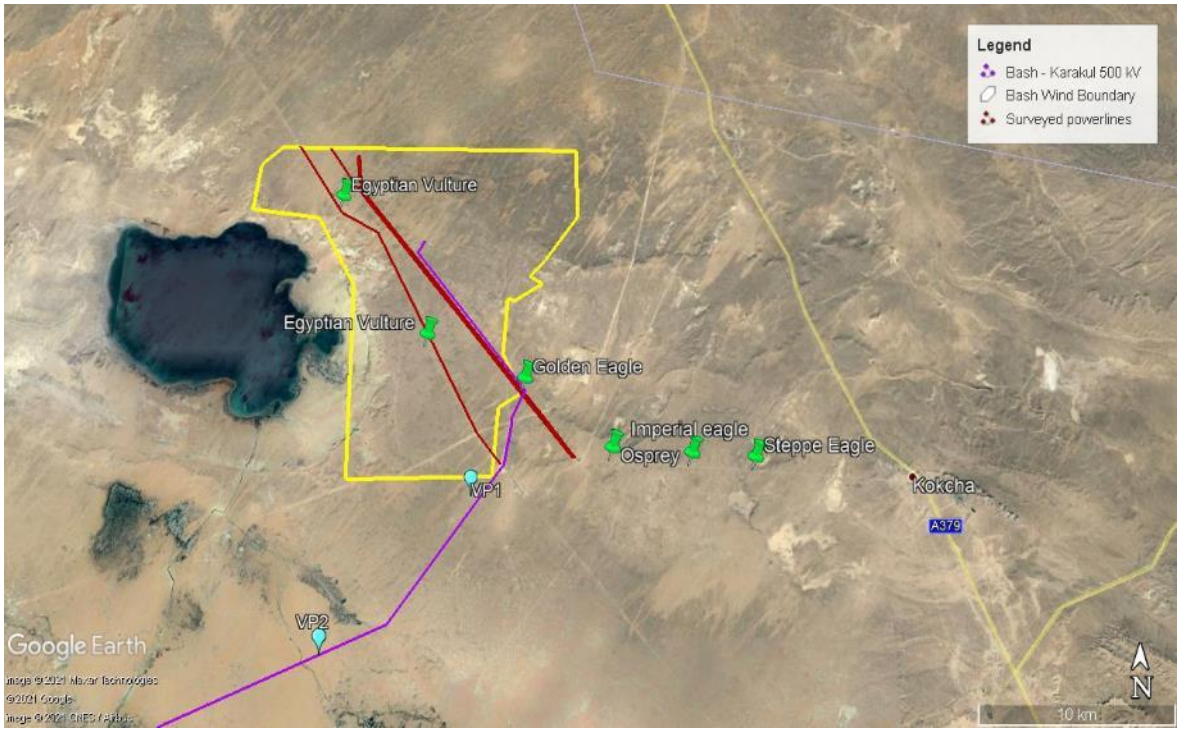
Other species are common inhabitants of the Kyzylkum desert and the developed area and are widely distributed throughout the adjacent territory. Critical habitats (of particular importance for nesting or feeding of rare and other bird species) were not identified.

It should be noted that in April, as part of surveys of operating power lines, species of birds of the Falconiformes family with high conservation status were observed. Considering the trophic type of migration of birds of prey, it is reasonable to consider these encounters relevant for the project power line as well. Endangered species recorded were not observed in abundances high enough to trigger criticality. All recorded species listed in the table below satisfy the requirements of Criterion ii for priority biodiversity feature (PBF) as per EBRD PR6 requirements.

Table 17-7 Threatened Species Observed in the Vicinity of the Project Area

	Name of species		IUCN /RDB Status	Total No. Observed
	Latin	English		
1	*Neophron perncopterus*	Egyptian Vulture	IUCN-EN, UzRDB-VU	4
2	*Pandion haliaetus*	Osprey	UzRDB-VU	2
3	*Circaetus gallicus*	Short-toed Snake-eagle	UzRDB-VU	2
4	*Aquila heliaca*	Imperial Eagle	IUCN-VU, UzRDB-VU	1
5	*Aquila chrysaetos*	Golden Eagle	UzRDB-VU	3
6	*Aquila nipalensis*	Steppe Eagle	IUCN-EN, UzRDB-VU	1

Figure 17-5 Places of Registration of Endangered Species of Birds



17.1.6.1 Collection of dead birds under operating OHTL

At the same time with visual observations of birds in selected locations along the project route, route surveys were conducted along existing and already operating OHTL located near the route. The total length of the routes surveyed under OHTLs was 64 km. Dead birds were found in April and June only.

Table 17-8 Schedule for Surveying Sections of Existing OHTLs in the Project Area

DATE	ROUTE LENGTH (KM)	ROUTE START COORDINATES	END-OF-ROUTE COORDINATES
11.03.2021	12	40°35'17.96"N 64°43'51.09"E	40°40'17.16"N 64°38'17.61"E
04.04.2021	21	40°32'55.47"N 64°46'30.61"E	40°42'5.56"N 64°37'21.00"E
03.05.2021	5	40°35'17.96"N 64°43'51.09"E	40°37'35.91"N 64°41'16.66"E
05.05.2021	1	39°42'53.78"N 63°50'31.51"E	39°42'40.96"N 63°51'19.48"E
14.05.2021	12	40°32'55.47"N 64°46'30.61"E	40°42'5.56"N 64°37'21.00"E
25.06.2021	12	40°32'55.47"N 64°46'30.61"E	40°42'5.56"N 64°37'21.00"E
	1	39°42'53.78"N 63°50'31.51"E	39°42'40.96"N 63°51'19.48"E

Plate 17-3 Common Buzzard recorded on operating power line within the project area

Plate 17-4 Common Buzzard's nest recorded on operating power line pole

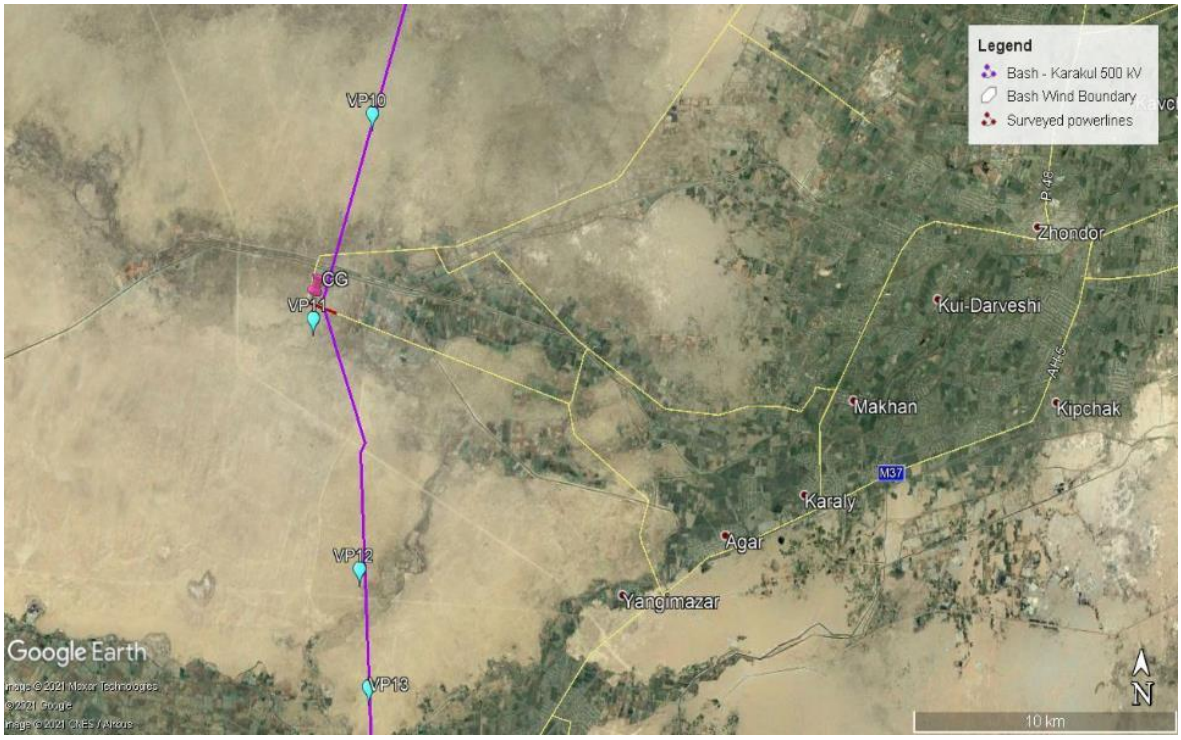
During the survey in spring 2021 the remains of 3 dead birds belonging to 3 species were found.

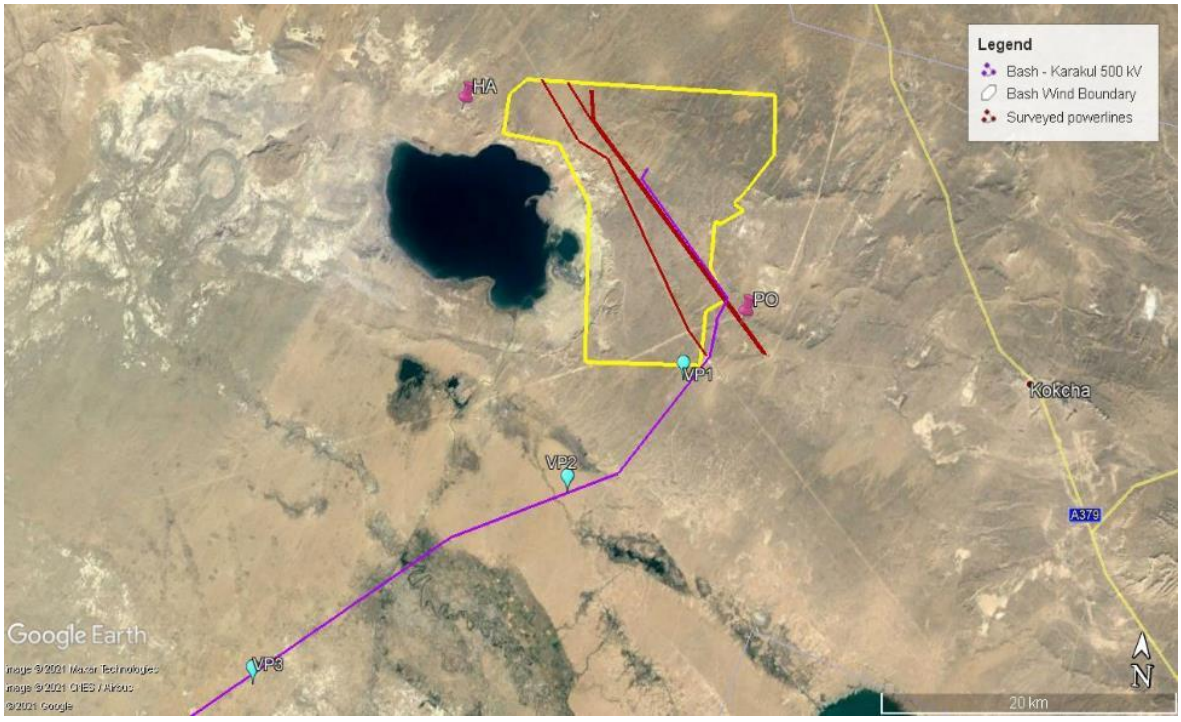
White Pelican and White-tailed Sea Eagle are included in the Red Book of Uzbekistan. The White-tailed Sea Eagle carcass was observed outside the project area however cause of death was electrocution and therefore included in the results below. Cause of death of the White Pelican and Rufous Scrub Robin was due to collision with wires.

Table 17-9 List of Dead Birds Found Under Operating OHTLs

№	LATIN NAME	ENGLISH NAME	NUMBER OF BIRDS	COORDINATES	DATE
1	*Pelecanus onoctotalus*	White Pelican	1	40°33'57.13"N 64°45'19.97" E	04.04.2021
2	*Haliaeetus albicilla**	White-tailed Sea Eagle	1	40°41'06" N 64°31'00" E	06.04.2021
3	*Cercotrichas galactotes*	Rufous Scrub Robin	1	39°42'52.22"N 63°50'37.47"E	25.06.2021

Figure 17-6 Locations of dead birds: CG - Cercotrichas galactotes, PO - Pelecanus onoctotalus, HA - Haliaeetus albicilla.





17.2 Receptors

17.2.1 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 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 500m 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 500m 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 1km 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 1km buffer, to account for one (1) potential major invasive spread and (2) secondary impacts caused by displacement of less competitive fauna into adjacent areas.

17.2.2 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 WF surveys as well as sensitive species that are anticipated to possibly occur within the area of influence.

Table 17-10 Bash to Karakul OHTL – Sensitive Ecological Receptors

GROUP	RECEPTOR(S)	JUSTIFICATION	VALUE
Natural Habitats	Sandy and sandy-loamy desert plain	Sandy and sandy-loamy desert plain with flat, flat-wavy or wavy terrain is covered with native ephemeroid-sagebrush and ephemeroid-saltwort-sagebrush vegetation sometimes with psammophilous shrubs and with saxaul plantations on sandy desert soil. The canopy cover is 10 to 40%, and the density of saxaul stands is up to 10–20%. A total of 29 plant species and 1 moss were recorded for this habitat.	High
	Fixed and semi-fixed sands	Fixed and semi-fixed sands with hilly, ridge-hilly, ridge and wavy terrain are covered with native stands of saxaul, communities of psammophytic shrubs, dwarf shrubs, ephemers and ephemeroids and with plots of saxaul plantations. Local plots of unfixed moving sands and communities of pastoral weeds have been found on overgrazed and other disturbed areas around farms and wells, and along roads. 48 plant species and one moss were recorded for this habitat type, including one nationally red-listed species, Calligonum zakirovii.	High
	Saline lands and wetlands	Saline lands and wetlands are situated in the ancient delta of the Zeravshan River, in depressions and along several irrigation and discharge channels and collectors of the irrigation system of Bukhara oasis The vegetation is represented by tugay and salt marsh communities with halophilic shrubs), reeds), camel thorn (, saltworts (.), other halophytes, halomesophytes and halohydrophytes, , and pastoral weeds (). In total, 43 plant species were recorded for this habitat type, red-listed plants are absent. This habitat type is of elevated importance for migratory waterbirds which may use wetland areas for stopovers during passage.	High
	Agricultural lands	This is the anthropogenic agricultural landscape of the ancient Bukhara Oasis situated in the lower course and the ancient delta of Zeravshan River. There are irrigated croplands, saline fallow lands, wastelands, villages, farmsteads, branched irrigation system of numerous channels and collectors, roads, power	Low / Lower

Group		Receptor(s)	Justification	Value
			lines, and other disturbed areas; vegetation is represented by cultural crops (wheat, rice, cotton, vegetables, etc.), and weeds. 42 species were recorded; red-listed plants are absent, and 2 species are alien (Cynodon dactylon, Tribulus terrestris). Although critically endangered Sociable Lapwing are possibly occurring within the region and known to associate with agricultural fallow lands during migration, there have been no recorded sightings documenting the species during any surveying to date.	
Endangered Flora		*Calligonum zakirovii* (PBF)	Listed as endangered in the Uzbekistan Red Data Book.	Very High
Threatened Flora		*Acanthophyllum cyrtost* *Ferula kyzylkumica* *Tulipa lehmanniana*	Listed as vulnerable on the Uzbekistan Red Data Book.	High
Protected Flora		Black Saxaul *Haloxylon ammodendron* White Saxaul *Haloxylon persicum*	Nationally Protected.	High
All other Flora		All other flora species	Listed as Least Concern, not considered to be of national importance .	Low / Lower
Endangered Birds	**Raptors**	Egyptian Vulture (PBF) Steppe Eagle (PBF)	Listed as critically endangered or endangered on IUCN Red List.	Very High
	Waterbirds	N/A to date	Listed as critically endangered or endangered on IUCN Red List.	Very High
Threatened Birds	**Raptors**	Imperial Eagle (PBF)	Listed as vulnerable or near threatened on the IUCN Red List.	High
	Waterbirds	Eurasian Curlew	Listed as vulnerable or near threatened on IUCN Red List.	High
	Groundbirds	Houbara Bustard (Critical)	Listed as vulnerable or near threatened on IUCN Red List.	High
	Songbirds/ Allies	Eurasian Roller	Listed as vulnerable or near threatened on IUCN Red List.	High

Group		Receptor(s)	Justification	Value
Nationally-threatened Birds	**Raptors**	Osprey Short-toed Snake-eagle (PBF) White-tailed Sea Eagle (PBF) Golden Eagle (PBF)	Classified as Least Concern on the global IUCN Red List but listed as vulnerable or near-threatened under Uzbekistan Red Data Book.	Medium
	Waterbirds	Great White Pelican		
Non-threatened Birds	**Raptors**	Hen Harrier Long-legged Buzzard Common Kestrel Marsh Harrier Black Kite Shikra	Classified as Least Concern on the global IUCN Red List but separated from all other LC birds due to susceptibility to OHTL developments.	Low / Lower
	Waterbirds	Grey Heron Great Egret Purple Heron		
	Groundbirds	Black-bellied Sandgrouse Common Pheasant		
All other Birds		All other Bird species	Listed as Least Concern on the IUCN Red List, not of national importance.	Low / Lower
Non-threatened Mammals	**Carnivores**	Red Fox	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. As a generalist species, population increase near anthropogenic areas is typical.	Low / Lower
	Rodents & Small Herbivories	Tolai hare *Lepus totai* Yellow ground squirrel *Spermophilus fulvus* Small five-toed jerboa *Allactaga elater* Great gerbil *Phombomys opimus* Libyan jird *Meriones libycus*	Rodents and lagomorphs 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 / Lower

Group		Receptor(s)	Justification	Value
		Long-clawed ground squirrel Midday jird		
Threatened Herptiles		Russian tortoise *Testudo horsfieldii* (PBF)	This tortoise is listed as Vulnerable on the IUCN Red List.	High
Nationally important Herptiles	**Lizards**	Caspian Monitor *Varanus griseus caspius*	This species is listed as vulnerable in the Uzbekistan Red Data Book.	Medium
	Snakes	Desert sand boa *Eryx miliaris*	This species is listed as near threatened in the Uzbekistan Red Data Book.	Medium
Non-threatened Herptiles	**Amphibians**	Turan Toad *Bufotes turanensis*	This species is not threatened and are common and widespread.	Low / Lower
	Geckos and Lizards	Caspian Bent-Toed Gecko Tenuidactylus caspius Comb-toed Gecko Crossobamon eversmanni Turkestan thin-toed gecko Tenuidactylus fedtschenkoi Common Wonder Gecko Teratoscincus scincus Steppe agama Trapelus sanguinolentus Sunwatcher toad-headed agama Phrynocephalus helioscopus Lichtenstein's Toadhead Agama Phrynocephalus interscapularis Secret Toadhead Agama Phrynocephalus mystaceus Rapid Lizard Eremias velox	These species are not threatened and are common and widespread.	Low / Lower

Group		Receptor(s)	Justification	Value
		Sand Racerunner Eremias scripta Reticulate Racerunner Eremias grammica		
	Snakes	Sand racer Psammophis lineolatus Spotted whip snake Hemorrhois ravergieri Spotted desert racer Platyceps karelinii Diadem Snake Spalerosophis diadema Saw-scaled Viper, Phoorsa Echis multisquamatus	These species are not threatened and are common and widespread.	Low / Lower
Threatened Invertebrates		*Lioponera desertorum*	Rare species endemic to Uzbekistan and Turkmenistan	High
Non-threatened Invertebrates		Hymenoptera (Wasps/Bees/Ants) Coleoptera (Beetles) Diptera (True Flies) Lepidoptera (Butterflies/Moths) Hemiptera (True Bugs) Blattodea (Cockroaches) Scorpiones (Scorpions) Scolopendromorpha (Centipedes)	Some of the species found are important predators whilst others are important pollinators. However, these species are not threatened or endemic and are common and widespread.	Low / Lower

17.3 Potential Impacts, Mitigation, Management & Residual Impacts

17.3.1 Construction Phase

17.3.1.1 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.

Habitat loss affects both vegetation and wildlife species that currently use the affected areas 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 regionally. Ecosystem function will be degraded as a result.

The EPC Contractor will maintain the following to restrict the construction footprint as much as possible:

- The access roads will be a width of 5m. The allowed construction buffer will not exceed 5m to each side of the permanent road footprint.
- The allowed construction buffer for the OHTL footprint will not exceed 30m buffer along the planned alignment.

Habitat loss estimates of the proposed OHTL corridor cannot be made at this time due to lack of remotely send data of the latest OHTL alignment.

Habitat loss is permanent and the impact duration is beyond the project lifetime. Habitat loss is certain to occur over the full project footprint. The overall magnitude of habitat loss is anticipated to be Moderate, with a calculated unmitigated significance of Minor to Major.

Table 17-11 Significance of Habitat Loss

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Natural Habitats (Sandy and sandy-loamy desert plains)	High	Moderate	**Moderate to Major**
Natural Habitats (Fixed and semi-fixed sands)	High	Moderate	**Moderate to Major**
Natural Habitats (Saline lands and wetlands)	High	Moderate	**Moderate to Major**
Modified Habitats (Agricultural lands)	Low / Lower	Moderate	**Minor**

Receptor	Value/ Sensitivity	Magnitude	Significance
Natural Habitats (Saline Land)	Very High	Minor	**Moderate to Major**
Natural Habitats (Complex of Fixe and semi-fixed sands, and Saline Lands)	Very High	Minor	**Moderate to Major**
Natural Habitats (Relic Uplands)	High	Minor	**Minor to moderate**

The EPC contractor will commit to the post-construction restoration of all affected areas to natural habitat conditions. The exact scope and methodology will be detailed in a Restoration Action Plan.

The residual significance is Negligible to Minor.

Table 17-12 Residual Significance of Habitat Loss

Receptor	Value/ Sensitivity	Magnitude	Residual
Natural Habitats (Sandy and sandy-loamy desert plains)	High	Minor	**Minor to Moderate**
Natural Habitats (Fixed and semi-fixed sands)	High	Minor	**Minor to Moderate**
Natural Habitats (Saline lands and wetlands)	High	Minor	**Minor to Moderate**
Modified Habitats (Agricultural lands)	Low / Lower	Minor	**Negligible to Minor**
Natural Habitats (Saline Land)	Very High	Negligible	**Minor**
Natural Habitats (Complex of Fixe and semi-fixed sands, and Saline Lands)	Very High	Negligible	**Minor**
Natural Habitats (Relic Uplands)	High	Negligible	**Minor**

17.3.1.2 Biodiversity Loss – Direct Mortality and Lowered Survivorship

Clearing, Excavation and Earthworks

Clearing of existing vegetation results in direct loss and mortality of removed specimens. Further, wildlife such as burrowing rodents and herptiles may be directly crushed during earthworks, or may suffer stress-induced mortality.

The Russian Tortoise (VU) is a burrowing species considered as a Priority Biodiversity Feature (PBFs). Active during early spring, these species enter a period of estivation (summer dormancy) which often flows into hibernation (winter dormancy) and may not be seen above surface at these times of the year. Therefore, clearing, excavation and earthworks may have a major impact on dormant individuals.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 17-13 Significance of Direct Loss and Mortality

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Moderate	**Major**
Threatened Flora	High	Moderate	**Moderate to Major**
Protected Flora	High	Moderate	**Moderate to Major**
Non-threatened Flora	Low / Lower	Moderate	**Minor**
Non-threatened Mammals	Low / Lower	Moderate	**Minor**
Russian Tortoise	High	Major	**Major**
Nationally Important Herptiles	Medium	Major	**Moderate to Major**
Non-threatened Herptiles	Low / Lower	Moderate	**Minor**
Threatened Invertebrates	High	Moderate	**Moderate to Major**
Non-threatened Invertebrates	Low / Lower	Moderate	**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 and whole-specimen translocation (during the peak spring season, chiefly March) for threatened flora;
- Seed-collection of endangered and threatened flora (during the peak season, chiefly March) such as Calligonum zakirovii (UzbRDB EN), Acanthophyllum cyrtostegium (UzbRDB VU), Eremurus korolkowii (UzbRDB VU), Ferula kyzylkumica (UzbRDB VU) and Tulipa lehmanniana (UzbRDB NT);
- Post-construction restoration via seeding, re-planting, and landscaping with native, high-value species such as Calligonum zakirovii (UzbRDB EN), Acanthophyllum cyrtostegium (UzbRDB VU), Eremurus korolkowii (UzbRDB VU), Ferula kyzylkumica (UzbRDB VU) and Tulipa lehmanniana (UzbRDB NT);
- Compensatory measures for removal of any saxaul trees as per National Regulatory Requirements.
- As part of the pre-construction biodiversity management program, a **Flora Conservation Action Plan** will be prepared, which will outline the locations and timings of pre-construction flora surveys to be undertaken for the purposes of seed collection, demarcation of areas to be protected, and translocation of whole specimens if deemed feasible.
- The Flora Conservation Action Plan will include the methodology for seed storage. Collected seeds will be utilized during post-construction restoration, which will be detailed in the **Restoration Action Plan**.

The following mitigation measures can serve to reduce the impacts on fauna species and provide a basis for the mechanisms for achieving NNL:

- Prior to start of construction, relocation of any Southern Even-fingered Gecko, Russian Tortoise, and Sand Boa (during respective active periods, not during hibernation) to suitable release sites;
  - Late spring and mid-summer represent seasons of highest reptile activity
  - Active period for the Southern Even-fingered gecko is during summer when average air temperature is around 27°C with low wind speeds.
  - April is the period of the highest activity of the Russian Tortoise. The species enters a period of estivation (summer dormancy) which often flows into hibernation (winter dormancy).
- 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.
- Chance Find Procedure will be 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; and
- Post-construction habitat restoration

For non-threatened species such as other herptiles, rodents, and invertebrates, chance-find procedures with individual relocations as deemed necessary will be sufficient.

With the above measures, the residual significance is presented in the following table.

Table 17-14 Residual Significance of Direct Loss and Mortality

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Negligible	**Minor**
Threatened Flora	High	Negligible	**Minor**
Protected Flora	High	Negligible	**Minor**
Non-threatened Flora	Low / Lower	Negligible	**Negligible to Minor**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Russian Tortoise	High	Minor	**Minor to Moderate**
Nationally Important Herptiles	Medium	Minor	**Minor**
Non-threatened Herptiles	Low / Lower	Minor	**Negligible to Minor**
Threatened Invertebrates	High	Minor	**Minor to Moderate**
Non-threatened Invertebrates	Low / Lower	Minor	**Negligible to Minor**

VEHICULAR COLLISION

Wildlife can be runover or collide with, motorized vehicles and equipment.

Vehicle-related death from trucks and machinery are less of a concern for larger mammals such as Gazelle, and Fox which are more likely to disperse in time to avoid collision (as the site

vehicles will be traveling under speed restrictions and large equipment movement such as cranes and turbine parts will be very slow).

Small to medium sized wildlife such as to hare, hedgehog and rodents, tortoise, lizards, snakes and amphibians have a higher chance of mortality from vehicular and machinery collisions. This could also apply to endangered, threatened and non-threatened raptors which may scavenge from road-kill.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 17-15 Significance of Vehicular Collision

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Moderate	**Major**
Threatened Birds	High	Moderate	**Moderate to Major**
Nationally Threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Russian Tortoise	High	Major	**Major**
Nationally Important Herptiles	Medium	Moderate	**Moderate**
Non-threatened Herptiles	Low / Lower	Moderate	**Minor**

However, the following mitigation measures will be implemented to reduce the risks and/or magnitude of impacts:

- Strict speed controls which will be enforced by EPC HSE and Security teams; especially during the active period (Late Spring – April) for the Russian Tortoise;
- Ban against driving outside of delineated access roads and restricting driving and machinery operation to daylight hours;
- Protocol for removal of any road-kill carcasses immediately upon observation to at least 10 meters away from the access roads.

With the above measures, the residual significance is presented in the following table.

Table 17-16 Residual Significance of Vehicular Collision

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**

Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**

"TAKE" (POACHING, HUNTING, GATHERING)

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 17-17 Significance of "Take"

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Moderate	**Major**
Threatened Flora	High	Moderate	**Moderate to Major**
Protected Flora	High	Major	**Major**
Non-threatened Flora	Low / Lower	Moderate	**Minor**
Endangered Birds	Very High	Moderate	**Major**
Threatened Birds	High	Moderate	**Moderate to Major**
Nationally Threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Russian Tortoise	High	Moderate	**Moderate to Major**
Nationally Important Herptiles	Medium	Minor	**Minor**
Non-threatened Herptiles	Low / Lower	Minor	**Negligible to Minor**

However, the following mitigation measures will be implemented to reduce the risk and/or magnitude of impacts:

- Strict controls forbidding the gathering, poaching or otherwise disturbance of any flora or fauna on site, included in induction training
- Staff training such as toolbox talks on specific species of concern such as Russian Tortoise, snakes, hares etc which might otherwise be hunted.

With the above measures, the residual significance is presented in the following table.

Table 17-18 Residual Significance of "Take"

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Negligible	**Minor**
Threatened Flora	High	Negligible	**Minor**
Protected Flora	High	Negligible	**Minor**
Non-threatened Flora	Low / Lower	Negligible	**Negligible to Minor**
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**

LITTERING

Improper management of solid waste could result in wind-blown litter, which are a danger to wildlife due to entanglement or ingestio.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 17-19 Significance of Littering

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Minor	**Moderate to Major**
Threatened Birds	High	Minor	**Minor to Moderate**
Nationally Threatened Birds	Medium	Minor	**Minor**
Non-threatened Birds	Medium	Minor	**Minor**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Russian Tortoise	High	Minor	**Minor to Moderate**
Nationally Important Herptiles	Medium	Minor	**Minor**
Non-threatened Herptiles	Low / Lower	Minor	**Negligible to Minor**

However, the following mitigation measures will be implemented to reduce the risk and/or magnitude of impacts:

- 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;
- Daily inspections and clean-up of litter by EPC/sub-contractor(s) responsible.

With the above measures, the residual significance is presented in the following table.

Table 17-20 Residual Significance of Littering

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**

GENERAL 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 the shy Houbara Bustard species, although most wildlife which is not already habituated to anthropogenic disturbance is anticipated to be negatively affected. Particularly, breeding birds with colonies present will be negatively affected if works occur during the breeding season.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 17-21 Significance of General Disturbance

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Major	**Major**
Threatened Birds	High	Major	**Major**
Nationally Threatened Birds (Raptors, Waterbirds)	Medium	Major	**Moderate to Major**
Non-threatened Birds	Medium	Major	**Moderate to Major**

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Non-threatened Mammals (Red Fox)	Low / Lower	Major	**Minor to Moderate**
Non-threatened Mammals (Rodents & Small Herbivores)	Low / Lower	Major	**Minor to Moderate**
Threatened Herptiles (Russian Tortoise)	High	Major	**Major**
Nationally Important Herptiles (Caspian Monitor)	Medium	Major	**Moderate to Major**
Nationally Important Herptiles (Desert Sand Boa)	Medium	Major	**Moderate to Major**
Non-threatened Herptiles (Amphibians, Lizards, Geckos, Snakes)	Low / Lower	Major	**Minor to Moderate**

However, the following mitigation measures will be implemented to minimize the magnitude of these potential impacts:

- Minimize construction footprint buffer zones and temporary laydown areas.
- Minimize duration of construction period avoiding most sensitive months/ seasons (e.g bird breeding season) where possible.
  - Houbara Bustard breeding season begin in mid-March and lasts until the end of July.
  - Egyptian Vulture's breeding season occurs during summer months (June, July & August).
- The pre-construction biodiversity management program will include a **Breeding Birds Protection Plan,** which will provide the detailed timings, scope and methodology for pre-construction nest searching in the appropriate seasons and locations; nests for these target species will be protected in-situ and no construction works will be allowed throughout the duration of the breeding season within 500m of the nests.
- Restore temporary laydown areas and buffer zones post construction with native vegetation and re-seeding with native flora. The detailed methodology for timing, scope and methods will be prepared in the Restoration Action Plan.

With the above measures, the residual significance is presented in the following table.

Table 17-22 Residual Significance of General Disturbance

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds)	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**

Receptor	Value/ Sensitivity	Magnitude	Residual
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**

17.3.1.3 Biodiversity Displacement – Competition and Dispersal

Displacement / dispersal

Shyer species may be displaced away from the project area as a result of construction disturbance, having indirect secondary impacts on adjacent territories via increased competition for resources compromising population stability, causing ecosystem imbalances.

However, the surrounding areas on a landscape level seem to support similar habitat types and are not constrained by large-scale urban or industrial developments. Therefore, it is not anticipated that displaced individuals will have a significant impact on adjacent ecosystems.

Figure 17-7 Habitat Availability for Potential Dispersed Species

Proliferation of Species

The dispersal of shyer species away from disturbed areas can lead to an increase in generalist species such as Red Fox which are well adapted to anthropogenic habitats.

Further, 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 17-23 Significance of Proliferation

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Major	**Major**
Threatened Flora	High	Major	**Major**
Protected Flora	High	Major	**Major**
Non-threatened Flora	Low / Lower	Major	**Minor to Moderate**
Endangered Birds	Very High	Moderate	**Major**
Threatened Birds	High	Moderate	**Moderate to Major**
Nationally Threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Russian Tortoise	High	Major	**Major**
Caspian Monitor	Medium	Moderate	**Moderate**
Non-threatened Herptiles	Low / Lower	Moderate	**Minor**
Threatened Invertebrates	High	Moderate	**Moderate to Major**
Non-threatened Invertebrates	Low / Lower	Moderate	**Minor**

However, the following mitigation measures will be implemented to minimise the magnitude of these potential impacts:

- 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;
- Daily inspections and clean-up of litter by EPC/sub-contractor(s) responsible.
- No provision of food waste for feral cats and dogs

With the above measures, the residual significance is presented in the following table.

Table 17-24 Residual Significance of Proliferation

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Negligible	**Minor**
Threatened Flora	High	Negligible	**Minor**
Protected Flora	High	Negligible	**Minor**
Non-threatened Flora	Low/Lower	Negligible	**Negligible to Minor**
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**

Receptor	Value/ Sensitivity	Magnitude	Residual
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Mammals	Low/Lower	Negligible	**Negligible to Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low/Lower	Negligible	**Negligible to Minor**
Threatened Invertebrates	High	Negligible	**Minor**
Non-threatened Invertebrates	Low/Lower	Negligible	**Negligible to Minor**

17.3.1.4 Biosecurity Risks

Introduced Species and Pathogens

Landscaping design that incorporates non-native, exotic species may lead to the introduction of potentially invasive, weedy 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 can allow the spread of invasive, weedy species which outcompete native species. Secondary impacts may occur on wildlife which utilize the reduced native vegetation for foraging or shelter.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 17-25 Significance of Introduced Species

Receptor	Value/ Sensitivity	Magnitude	Significance
Endangered Flora	Very High	Major	**Major**
Threatened Flora	High	Major	**Major**
Protected Flora (Black Saxaul, White Saxaul)	High	Major	**Major**
Non-threatened Flora	Low/Lower	Moderate	**Minor**
Endangered Birds	Very High	Moderate	**Major**
Threatened Birds	High	Moderate	**Moderate to Major**
Nationally Threatened Birds (Raptors, Waterbirds)	Medium	Moderate	**Moderate**
Non-threatened Birds)	Medium	Moderate	**Moderate**
Non-threatened Mammals	Low/Lower	Moderate	**Minor**
Russian Tortoise	High	Moderate	**Moderate to Major**

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Nationally Important Herptiles	Medium	Moderate	**Moderate**
Non-threatened Herptiles	Low/Lower	Moderate	**Minor**
Threatened Invertebrates	High	Moderate	**Moderate to Major**
Non-threatened Invertebrates	Low/Lower	Moderate	**Minor**

However, the following mitigation measures will be implemented to reduce the risk and/or magnitude of 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.

With the above measures, the residual significance is presented in the following table.

Table 17-26 Residual Significance of Introduced Species

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Negligible	**Minor**
Threatened Flora	High	Negligible	**Minor**
Protected Flora	High	Negligible	**Minor**
Non-threatened Flora	Low / Lower	Negligible	**Negligible to Minor**
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**
Threatened Invertebrates	High	Negligible	**Minor**
Non-threatened Invertebrates	Low / Lower	Negligible	**Negligible to Minor**

17.3.1.5 Environmental Quality

AIR QUALITY

Dust can coat vegetation, reducing photosynthesis and respiration ability, causing desiccation. Emissions of pollutants such as NOx, SOx, PM and CO can lower survivorship and increase susceptibility of affected wildlife to disease.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 17-27 Significance of Air Pollution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Minor	**Moderate to Major**
Threatened Flora	High	Minor	**Minor to Moderate**
Protected Flora	High	Minor	**Minor to Moderate**
Non-threatened Flora	Low / Lower	Minor	**Negligible to Minor**
Endangered Birds	Very High	Minor	**Moderate to Major**
Threatened Birds	High	Minor	**Minor to Moderate**
Nationally Threatened Birds	Medium	Minor	**Minor**
Non-threatened Birds	Medium	Minor	**Minor**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
(Russian Tortoise	High	Minor	**Minor to moderate**
Nationally Important Herptiles	Medium	Minor	**Minor**
Non-threatened Herptiles	Low / Lower	Minor	**Negligible to Minor**
Threatened Invertebrates	High	Minor	**Minor to moderate**
Non-threatened Invertebrates	Low / Lower	Minor	**Negligible to Minor**

However, the following mitigation measures will be implemented to reduce the risk and/or magnitude of 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 17-28 Residual Significance of Air Pollution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Negligible	**Minor**
Threatened Flora	High	Negligible	**Minor**

Receptor	Value/ Sensitivity	Magnitude	Residual
Protected Flora	High	Negligible	**Minor**
Non-threatened Flora	Low / Lower	Negligible	**Negligible to Minor**
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**
Threatened Invertebrates	High	Negligible	**Minor**
Non-threatened Invertebrates	Low / Lower	Negligible	**Negligible to Minor**

Noise

Construction noise can cause acoustic masking, disturbance and displacement, and general reduction in survivorship and reproductive success in a variety of fauna. Most impacted are acoustic communicators such as bird and bat species. However, most species will avoid construction areas due to human disturbance before they react to general noise. In addition birds may acclimatise to noise if there is no associated threats.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 17-29 Significance of Noise Impacts

Receptor	Value/ Sensitivity	Magnitude	Significance
Endangered Birds	Very High	Major	**Major**
Threatened Birds)	High	Major	**Major**
Nationally Threatened Birds	Medium	Major	**Moderate to Major**
Non-threatened Birds	Medium	Major	**Moderate to Major**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Russian Tortoise	High	Moderate	**Moderate to Major**
Nationally Important Herptiles	Medium	Moderate	**Moderate**
Non-threatened Herptiles	Low / Lower	Moderate	**Minor**
Threatened Invertebrates	High	Moderate	**Moderate to Major**

Non-threatened Invertebrates	Low / Lower	Moderate	**Minor**

Table 17-30 Significance of Vibration Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Non-threatened Mammals (Rodents & Small Herbivores)	Low / Lower	Moderate	**Minor**
Threatened Herptiles (Russian Tortoise)	High	Moderate	**Moderate to Major**
Nationally Important Herptiles (Caspian Monitor)	Medium	Moderate	**Moderate**
Nationally Important Herptiles (Desert Sand Boa)	Medium	Moderate	**Moderate**
Non-threatened Herptiles (Amphibians, Lizards, Geckos, Snakes)	Low / Lower	Moderate	**Minor**
Threatened Invertebrates (Lioponera desertorum)	High	Moderate	**Moderate to Major**
Non-threatened Invertebrates	Low / Lower	Moderate	**Minor**

However, the following mitigation measures will be implemented to minimize the magnitude of these potential impacts:

- Refer to noise control measures.
- Minimise noise during sensitive months/seasons (eg bird breeding season) where possible:
  - Houbara Bustard breeding seasons begins in mid-March and lasts until the end of July.
  - Egyptian Vulture's breeding season occurs during summer months (June, July and August).
- The pre-construction biodiversity management program will include a **Breeding Birds Protection Plan**, which will provide the detailed timings, scope and methodology for pre-construction nest-searching in the appropriate seasons and locations; nests for target species will be protected in-situ and no construction works will be allowed throughout the duration of the breeding season within 500m of the nests. Noise barriers, if deemed feasible, will be erected if required to ensure breeding birds are not impacted by excessive noise.
- Install temporary acoustic barriers around large generators, dampening, best available technology to reduce noise as much as practicable. Intermittent noise is less desirable than continuous noise as it does not allow for habituation.

With the above measures, the residual significance is presented in the following table.

Table 17-31 Residual Significance of Noise Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Minor	**Moderate to Major**
Threatened Birds	High	Minor	**Minor to Moderate**
Nationally Threatened Birds	Medium	Minor	**Minor**
Non-threatened Birds	Medium	Minor	**Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**
Threatened Invertebrates	High	Negligible	**Minor**
Non-threatened Invertebrates	Low / Lower	Negligible	**Negligible to Minor**

LIGHT POLLUTION

Night-time lighting can impact nocturnal wildlife behaviour. It can act as an attractant, which can cause congregation and higher predation rates / change movement and migration behaviour; act as a repellent which causes displacement, or 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 17-32 Significance of Light Pollution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Moderate	**Major**
Threatened Birds	High	Moderate	**Moderate to Major**
Nationally Threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Mammals	Low / Lower	Minor	**Negligible to Minor**
Russian Tortoise	High	Moderate	**Moderate to Major**
Nationally Important Herptiles	Medium	Moderate	**Moderate**
Non-threatened Herptiles	Low / Lower	Moderate	**Minor**
Threatened Invertebrates	High	Moderate	**Moderate to Major**
Non-threatened Invertebrates	Low / Lower	Moderate	**Minor**

However, the following mitigation measures will be implemented to reduce the risk and/or magnitude of impacts:

- Ensure lighting is fit for purpose and duration of lighting to be controlled and minimized as much as possible
- Lights will be shielded to prevent spill and glare beyond site boundary.

With the above measures, the residual significance is presented in the following table.

Table 17-33 Residual Significance of Light Pollution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds)	Medium	Negligible	**Negligible to Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**
Threatened Invertebrates	High	Negligible	**Minor**
Non-threatened Invertebrates	Low / Lower	Negligible	**Negligible to Minor**

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 17-34 Significance of Contamination

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Moderate	**Major**
Threatened Flora	High	Moderate	**Moderate to Major**
Protected Flora	High	Moderate	**Moderate to Major**
Non-threatened Flora	Low / Lower	Moderate	**Minor**
Endangered Birds	Very High	Moderate	**Major**

Threatened Birds	High	Moderate	**Moderate to Major**
Nationally Threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Birds	Medium	Moderate	**Moderate**
Non-threatened Mammals	Low / Lower	Moderate	**Minor**
Russian Tortoise	High	Moderate	**Moderate to Major**
Nationally Important Herptiles	Medium	Moderate	**Moderate**
Non-threatened Herptiles	Low / Lower	Moderate	**Minor**
Threatened Invertebrates	High	Moderate	**Moderate to Major**
Non-threatened Invertebrates	Low / Lower	Moderate	**Minor**

However, the following mitigation measures will be implemented to reduce the risk and/or magnitude of 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 17-35 Residual Significance of Contamination

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Negligible	**Minor**
Threatened Flora	High	Negligible	**Minor**
Protected Flora	High	Negligible	**Minor**
Non-threatened Flora	Low / Lower	Negligible	**Negligible to Minor**
Endangered Birds	Very High	Negligible	**Minor**
Threatened Birds	High	Negligible	**Minor**
Nationally Threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds	Medium	Negligible	**Negligible to Minor**
Non-threatened Mammals	Low / Lower	Negligible	**Negligible to Minor**
Russian Tortoise	High	Negligible	**Minor**
Nationally Important Herptiles	Medium	Negligible	**Negligible to Minor**
Non-threatened Herptiles	Low / Lower	Negligible	**Negligible to Minor**
Threatened Invertebrates)	High	Negligible	**Minor**
Non-threatened Invertebrates	Low / Lower	Negligible	**Negligible to Minor**

SOILS

During construction earthworks and vehicle movement, soils may become compacted, which prohibits vegetation regrowth and use for burrowing. 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 17-36 Significance of Soil Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora (Calligonum zakirovii)	Very High	Moderate	**Major**
Threatened Flora	High	Moderate	**Moderate to Major**
Protected Flora (Black Saxaul, White Saxaul)	High	Moderate	**Moderate to Major**
All Other Flora	Low / Lower	Moderate	**Minor**

However, the following mitigation measures will be implemented to reduce the risk and/or magnitude of impacts:

- Minimize construction footprint and strict controls to prevent driving out of designated corridors
- Restore buffer zones post construction and
- 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 17-37 Residual Significance of Soil Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Negligible	**Minor**
Threatened Flora	High	Negligible	**Minor**
Protected Flora	High	Negligible	**Minor**
Non-threatened Flora	Low / Lower	Negligible	**Negligible to minor**

17.3.2 Operation Phase

17.3.2.1 Ecosystem Function Degradation

HABITAT FRAGMENTATION

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.

The OHTL will not be fenced; therefore, there will be no physical barriers to movement. Especially as the OHTL has been designed within a 50m buffer of an existing road, railway line and/or existing OHTL the new OHTL is not anticipated to create significance habitat fragmentation.

17.3.2.2 Biodiversity Loss – Direct Mortality and Lowered Survivorship

OHTL COLLISION

Thin, dark wires used in overhead transmission lines as well as guylines for weather masts are visually difficult to detect. Bird mortality by collisions with these wires are documented for a variety of species. During the Spring 2021 survey of existing OHTLs, three carcasses of three different species were observed; White-tailed Sea Eagle, White Pelican and Rufus Scrub Robin.

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.

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 17-38 Level of OHTL Collision Risk

GROUPING VALUE	SPECIES OF CONCERN (IDENTIFIED/SUSPECTED)	RISKY FLIGHT INDICATORS	COLLISION RISK (I=UN LIKELY; II=POSSIBLE; III=HIGHLY PROBABLE)
Endangered Birds - Raptors	Steppe Eagle	Migratory Large-bodied	II
	Egyptian Vulture	Large-bodied	III
Threatened Birds - Raptors	Eastern Imperial Eagle	Migratory Large-bodied	II
Threatened Birds - Waterbirds	Eurasian Curlew	Poor Manoeuvrability Migratory	III
Threatened Birds - Groundbirds	Houbara Bustard	Poor Manoeuvrability Low Visual Detectability Low Altitude	III
Threatened Birds – Songbirds/Allies	Eurasian Roller	Low Visual Detectability	II
Nationally Threatened Birds - Raptors	Osprey	Migratory	II
	Short-toed Snake-eagle	Migratory	II
	White-tailed Sea Eagle	Migratory	II

Grouping Value	Species of Concern (identified/suspected)	Risky Flight Indicators	Collision Risk (I=un likely; II=possible; III=highly probable)
	Golden Eagle	Migratory	II
Nationally Threatened Birds - Waterbirds	Great White Pelican	Large-bodied Poor Manoeuvrability	III
Non-threatened Raptors	Hen Harrier	Migratory	II
	Long-legged Buzzard	Migratory	II
	Black Kite	Migratory	II
	Marsh Harrier	Migratory	II
	Common Kestrel	Migratory	II
	Shikra	Migratory	II
Non-threatened Waterbirds	Grey Heron Great Egret Purple Heron	Poor Manoeuvrability Large-bodied	III
Non-threatened Groundbirds	Black-bellied Sandgrouse Common Pheasant	Poor Manoeuvrability Low Altitude	III

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 17-39 Significance of OHTL Collision

Receptor	Value/ Sensitivity	Magnitude	Significance
Endangered Birds (Raptors) - Egyptian Vulture	Very High	Moderate	**Major**
Endangered Birds (Raptors) - Steppe Eagle	Very High	Moderate	**Major**
Endangered Birds (Waterbirds)	Very High	Major	**Major**
Threatened Birds (Raptors) - Imperial Eagle	High	Moderate	**Moderate to Major**
Threatened Birds (Waterbirds) - Eurasian Curlew	High	Major	**Major**
Threatened Birds (Groundbirds) - Houbara Bustard	High	Major	**Major**
Threatened Birds (Songbird/Allies) - Eurasian Roller	High	Moderate	**Moderate to Major**
Nationally Threatened Birds (Raptors) - Osprey	Medium	Moderate	**Moderate**
Nationally Threatened Birds (Raptors) - Golden Eagle	Medium	Moderate	**Moderate**
Nationally Threatened Birds (Raptors) - Short-toed Snake Eagle	Medium	Moderate	**Moderate**
Nationally Threatened Birds (Raptors) - White-tailed Sea Eagle	Medium	Moderate	**Moderate**
Nationally Threatened Birds (Waterbirds) - Great White Pelican	Medium	Major	**Moderate to Major**
Non-threatened Birds (Raptors)	Low / Lower	Moderate	**Minor**

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Non-threatened Birds (Waterbirds)	Low / Lower	Major	**Minor to Moderate**
Non-threatened Birds (Groundbirds)	Low / Lower	Moderate	**Minor**
All other Birds	Low / Lower	Minor	**Negligible to Minor**

The optimal design mitigation to completely remove collision risk is to bury the lines. However, this is not always possible and comes with other associated impacts.

The following mitigation measures will be applied to reduce collision risks:

- 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;
- Using existing infrastructure corridors such as road and railway RoW; existing powerline transmission corridors; and other areas with existing disturbances that deter bird activity. The alignment of the OHTL has been adjusted to be within a 50m buffer of existing roads, rail line and other OHTL.
- 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. Firefly Diverters are considered to be of robust specification to provide the needed visual deterrence required, as it includes UV-light reflectivity and are visible in low-light and low-visibility conditions.
- Any markers must be robust to allow long-term durability for the environmental conditions of exposure; maintenance plans for the OHTL will include inspections of marker devices and replacements as needed.
- A Post-Construction Fatality Monitoring Plan will be in place to include carcass searches and mortality rate calculations for the OHTL. The Post-construction Fatality Monitoring Program will be continued for up to 5 years or until the risk to birds is considered 'negligible' in consultation with the lenders;
- The Fatality Monitoring Plan will include Potential Biological Removal thresholds for species of concern, including Houbara Bustard. As this species has been determined to be critical as per the CHA, should the PBR threshold be exceeded, compensation will be provided in the form of funding for the Emirates Center for the Conservation of Houbara located in the region. The exact amount of funding to be provided will depend on the PBR and estimated actual losses, and estimations for these are currently under development.
- Since Houbara Bustard are an extremely shy and cryptic species which may avoid the boundary of the wind farm. The wind farm infrastructure may cause an

exaggerated habitat loss and displacement for this species in particular. A Compensation and Offset Plan is currently in development which will provide the detailed calculations of habitat loss and include the proposed location of habitat offset land which will be protected and/or restored from degraded land to provide suitable alternative habitat for the Houbara Bustard in line with the No-Net Loss and Net-positive Gain requirements for this Critical Species.

The OHTL will be designed and constructed under the proponent's supervision, and thus the mitigation being committed to in this section can be considered as final. Operation and Maintenance of the OHTL will fall under the purview of the National Grid of Uzbekistan (NEGU).

The project proponent, ACWA, commits to offset impacts to species of conservation concern should the project off taker, NEGU, fail to do so during OHTL operations.

With the above measures, the **residual** significance is presented in the following table.

Table 17-40 Residual Significance of OHTL Collision

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds (Raptors) - Egyptian Vulture	Very High	Negligible	**Minor**
Endangered Birds (Raptors) - Steppe Eagle	Very High	Negligible	**Minor**
Endangered Birds (Waterbirds)	Very High	Negligible	**Minor**
Threatened Birds (Raptors) - Imperial Eagle	High	Minor	**Minor to Moderate**
Threatened Birds (Waterbirds) - Eurasian Curlew	High	Minor	**Minor to Moderate**
Threatened Birds (Groundbirds) - Houbara Bustard	High	Minor	**Minor to Moderate**
Threatened Birds (Songbird/Allies) - Eurasian Roller	High	Minor	**Minor to Moderate**
Nationally Threatened Birds (Raptors) - Osprey	Medium	Minor	**Minor**
Nationally Threatened Birds (Raptors) - Golden Eagle	Medium	Minor	**Minor**
Nationally Threatened Birds (Raptors) - Short-toed Snake Eagle	Medium	Minor	**Minor**
Nationally Threatened Birds (Raptors) - White-tailed Sea Eagle	Medium	Minor	**Minor**
Nationally Threatened Birds (Waterbirds) - Great White Pelican	Medium	Minor	**Minor**
Non-threatened Birds (Raptors)	Low/Lower	Minor	**Negligible to Minor**
Non-threatened Birds (Waterbirds)	Low/Lower	Minor	**Negligible to Minor**
Non-threatened Birds (Groundbirds)	Low/Lower	Moderate	**Minor**
All other Birds	Low/Lower	Negligible	**Negligible to Minor**

OHTL ELECTROCUTION

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 17-41 Level of OHTL Electrocution Risk

GROUPING VALUE	SPECIES OF CONCERN *(IDENTIFIED TO DATE)*	WINGSPAN	PERCHING BEHAVIOUR	ELECTROCUTION RISK *(I=UN LIKELY; II=POSSIBLE; III=HIGHLY PROBABLE)*
Endangered Birds - Raptors	Steppe Eagle	Large	Yes	III
	Egyptian Vulture	Large	Yes	III
Threatened Birds - Raptors	Eastern Imperial Eagle	Large	Yes	III
Threatened Birds - Waterbirds	Eurasian Curlew	Medium	No	II
Threatened Birds - Groundbirds	Houbara Bustard	Medium	No	I
Threatened Birds – Songbirds/Allies	Eurasian Roller	Small	Yes	II
Nationally Threatened Birds - Raptors	Osprey	Medium	Yes	III
	Short-toed Snake-eagle	Large	Yes	III
	White-tailed Sea Eagle	Large	Yes	III
	Golden Eagle	Large	Yes	III
Nationally Threatened Birds - Waterbirds	Great White Pelican	Large	No	II
Non-threatened Raptors	Hen Harrier	Medium	Yes	III
	Long-legged Buzzard	Large	Yes	III
	Black Kite	Medium	Yes	III
	Marsh Harrier	Medium	Yes	III
	Common Kestrel	Medium	Yes	III
	Shikra	Medium	Yes	III

Grouping Value	Species of Concern (*identified to date*)	Wingspan	Perching Behaviour	Electrocution Risk (*I=un likely; II=possible; III=highly probable*)
Non-threatened Waterbirds	Grey Heron Great Egret Purple Heron	Large	Yes	III
Non-threatened Groundbirds	Black-bellied Sandgrouse Common Pheasant	Small	No	I

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 17-42 Significance of OHTL Electrocution

Receptor	Value/ Sensitivity	Magnitude	Significance
Endangered Birds (Raptors) - Egyptian Vulture	Very High	Major	**Major**
Endangered Birds (Raptors) - Steppe Eagle	Very High	Major	**Major**
Endangered Birds (Waterbirds)	Very High	Minor	**Moderate to Major**
Threatened Birds (Raptors) - Imperial Eagle	High	Major	**Major**
Threatened Birds (Waterbirds) - Eurasian Curlew	High	Minor	**Minor to Moderate**
Threatened Birds (Groundbirds) - Houbara Bustard	High	Minor	**Minor to Moderate**
Threatened Birds (Songbird/Allies) - Eurasian Roller	High	Minor	**Minor to Moderate**
Nationally Threatened Birds (Raptors) - Osprey	Medium	Major	**Moderate to Major**
Nationally Threatened Birds (Raptors) - Golden Eagle	Medium	Major	**Moderate to Major**
Nationally Threatened Birds (Raptors) - Short-toed Snake Eagle	Medium	Major	**Moderate to Major**
Nationally Threatened Birds (Raptors) - White-tailed Sea Eagle	Medium	Major	**Moderate to Major**
Nationally Threatened Birds (Waterbirds) - Great White Pelican	Medium	Minor	**Minor**
Non-threatened Birds (Raptors)	Low / Lower	Major	**Minor to Moderate**
Non-threatened Birds (Waterbirds)	Low / Lower	Minor	**Negligible to Minor**
Non-threatened Birds (Groundbirds)	Low / Lower	Minor	**Negligible to Minor**
All other Birds	Low / Lower	Minor	**Negligible to Minor**

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 integrated measures will be applied:

- 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 (minimum 2m) 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 will be insulated, and grounded wires and jumpers will be sheathed wires.
- Design will 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.
- Provide safe perching and nesting opportunities via the erection of perching poles and/or nesting platforms or boxes; they will be the highest elements of the structure to attract birds away from perching on potentially dangerous components.
- A Post-Construction Fatality Monitoring Plan will be in place to include carcass searches and mortality rate calculations for the OHTL. The Fatality Monitoring Plan will include Potential Biological Removal thresholds for species of concern. The Post-construction Fatality Monitoring Program will be continued for up to 5 years until the risk to birds is considered 'negligible' in consultation with the lenders;
- Reconfiguration and retrofitting of existing dangerous OHTL in the region would be a particularly effective compensatory offset with potential net gain benefits for affected species.

With the above measures, the **residual** significance is presented in the following table.

Table 17-43 Residual Significance of OHTL Electrocution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds (Raptors) - Egyptian Vulture	Very High	Negligible	**Minor**
Endangered Birds (Raptors) - Steppe Eagle	Very High	Negligible	**Minor**
Endangered Birds (Waterbirds)	Very High	Negligible	**Minor**
Threatened Birds (Raptors) - Imperial Eagle	High	Negligible	**Minor**
Threatened Birds (Waterbirds) - Eurasian Curlew	High	Negligible	**Minor**
Threatened Birds (Groundbirds) - Houbara Bustard	High	Negligible	**Minor**
Threatened Birds (Songbird/Allies) - Eurasian Roller	High	Negligible	**Minor**
Nationally Threatened Birds (Raptors) - Osprey	Medium	Negligible	**Negligible to Minor**
Nationally Threatened Birds (Raptors) - Golden Eagle	Medium	Negligible	**Negligible to Minor**

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Nationally Threatened Birds (Raptors) - Short-toed Snake Eagle	Medium	Negligible	**Negligible to Minor**
Nationally Threatened Birds (Raptors) - White-tailed Sea Eagle	Medium	Negligible	**Negligible to Minor**
Nationally Threatened Birds (Waterbirds) - Great White Pelican	Medium	Negligible	**Negligible to Minor**
Non-threatened Birds (Raptors)	Low / Lower	Negligible	**Negligible to Minor**
Non-threatened Birds (Waterbirds)	Low / Lower	Negligible	**Negligible to Minor**
Non-threatened Birds (Groundbirds)	Low / Lower	Negligible	**Negligible to Minor**
All other Birds	Low / Lower	Negligible	**Negligible to Minor**

Note: *The OHTL will be designed and constructed by ACWA Power who have committed to the implementation of the above mitigation measures. The operation and maintenance of the OHTL will be undertaken by the National Grid of Uzbekistan (NEGU).*

17.3.3 Decommissioning

A Decommissioning Plan will be prepared at least 18 months prior to planned decommissioning and submitted to the Regulator for review and approval. No decommissioning works can be commenced without a permit from the Regulator. The Plan will detail the site and surrounding environment and receptors and will likely require new baseline studies to assess the condition of the site, adjacent areas and the overall area of influence including designated sites. Based on the details outlined in this Report, the measures will likely relate to the following:

- Removal of all Project related components and wastes and appropriate disposal method that adopts the waste hierarchy and maximises re-use and recycling of materials;
- Restoration of terrestrial ecology habitats within the Project footprint including access roads e.g. re-seeding and re-vegetation using local indigenous species; and
- Remediation and/or scarification of any compacted soils.

17.4 Implementation Mitigation: Planning Management and Monitoring

The mitigation measures applied to reduce significant impacts will require a number of management plans to detail the implementation and action items needed, as well as monitoring and reporting requirements to ensure compliance.

17.4.1 Design

The following outline the mitigation requirements during design phase:

- Integration of design mitigation into OHTL design related to pole and wiring layout and specifications, diverter specifications, and inclusion of perching and nesting safe elements.

17.4.2 Pre-Construction

The following outline the mitigation requirements pre-construction:

- Review of Construction Methodology and Schedule by environmental consultant, especially in regards to:
  - Site Clearance and Layout
  - Timing and method of works
  - Lighting Strategy
  - Solid Waste Management Strategy
- Preparation of Biodiversity Action Plan, inclusive of Species-specific Action Plans, which outlines the CHA process, findings, and illustrates the pathway to no-net loss.
- Preparation of Reptile Relocation Plan
- Preparation of Flora Conservation Action Plan
- Preparation of Breeding Bird Protection Plan
- Carry out preconstruction surveys, and implementation of actions as per the above plans.
- Preparation of CEMP, inclusive of:
  - General Site Controls
  - Solid Waste Control Plan
  - Chance Find Procedure
  - Air Quality Control Plan
  - Dust Control Plan
  - Noise Control Plan
  - Lighting Control Plan
  - Hazardous Materials Control Plan
  - Emergency Action Plans
  - Spill Prevention and Clean-up Procedures

17.4.3 Construction

The following outline the mitigation requirements during construction:

- The EPC will employ a full-time site-based Ecologist and, during active periods, a Herpetologist, to ensure that ecology related measures are understood and fully implemented.
- Implementation of CEMP
  - Daily Checklist

- Weekly Inspection
- Monthly Reporting
- Quarterly Auditing

- Biodiversity Monitoring and Evaluation Programme BMEP for ongoing monitoring of translocation/relocation success, chance find procedures, target species impacts, etc

17.4.4 Post-Construction

The following outline the mitigation requirements post-construction:

- Preparation of Restoration Action Plan
- Carrying out restoration works
- Post-restoration survey
- Compensation Offset Plan
- Habitat restoration offset works
- Biodiversity Monitoring and Evaluation Programme BMEP

17.4.5 Operation

The following outline the mitigation requirements during operation:

- Fatality Monitoring Plan
- Compensation Offset Plan (for Birds & Bats)
- BMEP

18 AIR QUALITY

18.1 Observation and Baseline Environment

18.1.1 Influences on Air Quality

The air quality in the OHTL area is monitored by the meteorological station/observation post of Bukhara station located Bukhara station located approximately 104km from the Bash Project site. The climatic characteristics are provided in sub-section 8.1.1 of Chapter 8 -Air Quality Chapter.

Based on review of satellite imagery and numerous visits to the proposed Bash – Karakul OHTL alignment, the OHTL is located in a remote area that is not very populated and runs through desert land & agricultural lands. Numerous vehicle tracks are seen to run through different sections of the OHTL and the OHTL cuts across highway A380.

Few anthropogenic sources of emissions were identified along the OHTL route which included a construction materials market located approximately 160m east of the OHTL and approximately 800m north from the Karakul substation, eight (8) brickwork factories and an auto technical service LLC (Alligator LLC) located approximately 510m east of the OHTL. Pollutant emissions from these anthropogenic sources are likely to result include Nitric Oxide, NO_2, SO_2, VOC's, CO and Particulate Matter (i.e. $PM_{2.5}$ & PM_{10}).

18.1.2 Ambient Air Quality Monitoring

Similar to the Wind Farm site, ambient air monitoring along the OHTL route has not been undertaken on the basis that quantitative assessment is not considered necessary due to the remote location of the OHTL and the absence of local communities in proximity to the OHTL route.

18.2 Receptors

In relation to ambient air quality impacts from the OHTL route, the expected range of impacts are likely to be within a zone of 1km. A 1km radius has been chosen because the OHTL is not expected to result in any air emissions. Any impact upon ambient air quality is therefore anticipated to be limited to the construction phase activities such as dust generation during site preparation, excavation works, vehicle movements on unpaved surfaces and exhaust fumes from construction vehicles and equipment use.

Findings from site visits and review of satellite imagery identified receptors within 1km of the OHTL route and these are presented in the table below.

Table 18-1 Potential Air Quality Receptors - OHTL

RECEPTOR ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
OHL 1	Farmers & other users of the agricultural fields	Agricultural	**Medium**	Farmer, users of agricultural lands & irrigation canals, Herders and livestock will be relatively vulnerable to changes in ambient air quality as they are at the location for a short duration.
OHL 2	Users of the irrigation ditch & canal		**Medium**	
OHL 3	Herder & Livestock stables		**Medium**	
OHL 7	'Qirobod Mavjlari' LLC (brickwork production)	Industrial	**Low**	Brickwork production generate dust and as such workers at the factories will unlikely be sensitive to project impacts due to the dust generating activities they are exposed to from the brickwork production.
OHL 8	'Jura' LLC (brickwork production)			
OHL 9	'Az Nafis' Private Entrepreneur (brickwork production)			
OHL 10	'Bunyodkor-Shakhzod-Fayz' LLC (brickwork production)			
OHL 11	'Pakhlavon kichik' Private Entrepreneur (brickwork production)			
OHL 12	'Ortiq Bobo' (brickwork production)			
OHL 13	'Universal 5' LLC (brickwork production)			
OHL 14	'Akhmad-Huseyn-Zuxro' LLC (brickwork production)			
OHL 17	'Karakul Shersahiy' shopping centre	Commercial	**Medium**	Shoppers & workers at the shopping center will be relatively vulnerable to changes in ambient air quality
OHL 18	'Alligator' LLC (auto technical services)	Commercial	**Medium**	Workers and visitors of the auto technical services LLC will be relatively vulnerable to changes in ambient air quality
OHL 19	'Sabriya' LLC (metan gas station)	Industrial	**Low**	Workers & visitors at the metan gas station will be of low vulnerability to changes in ambient air quality

Receptor ID	Receptor	Receptor Type	Sensitivity	Justification
OHL 20	'Aziz' Private Enterpreneur (Uncultivated Land)	Agricultural	**Medium**	When cultivation starts, farmers will be relatively vulnerable to changes in ambient air quality
OHL 21	'Ismail Sher Chorvador' LLC (Uncultivated Land)	Agricultural	**Medium**	
OHL 22	Livestock market	Commercial	**Medium**	Shoppers & workers at the livestock market will be relatively vulnerable to changes in ambient air quality
OHL 23	Construction materials market "Gulobod Bunyodkor" LLC	Commercial	**Medium**	Workers & shoppers at the construction materials market will be relatively vulnerable to changes in ambient air quality
OHL 24	'Azamat Kholmurodov' Individual Entrepreneur,	Agricultural (Poultry)	**Medium**	Farmers at the poultry farm will be relatively vulnerable to changes in ambient air quality as they are at the location for a short duration.
OHL 25	'Kumush Kalava' LLC (sale of cotton)	Commercial	**Medium**	Workers at this LLC will be relatively vulnerable to changes in ambient air quality as they are at the location for a short duration.
OHL 26	'Abdukadir Baraka' LLC, Poultry farming	Agricultural (Poultry)	**Medium**	Farmers at the poultry farm will be relatively vulnerable to changes in ambient air quality as they are at the location for a short duration.
OHL 27	'Barkhayot Mukhammad Rajab' Farm	Commercial & Agricultural	**Medium**	Farmers at the farm will be relatively vulnerable to changes in ambient air quality as they are at the location for a short duration.
OHL 28	'Mardon' Farm	Agricultural (Cultivated Land)	**Medium**	Farmers at the farm will be relatively vulnerable to changes in ambient air quality as they are at the location for a short duration.
OHL 29	Household (Muminov Bobokhon, Bandboshi MCC)	Residential	**High**	Residents at this household will be sensitive to changes in ambient air quality
OHL 31	'Gofur Razzok' Farm	Agricultural (Cultivated Land)	**Medium**	Farmers at the farm will be relatively vulnerable to changes in ambient air quality as they are at the location for a short duration.
OHL 32	'Chorvoq NNU' Farm	Agricultural (Poultry)	**Medium**	Farmers at the poultry farm will be relatively vulnerable to

Receptor ID	Receptor	Receptor Type	Sensitivity	Justification
				changes in ambient air quality as they are at the location for a short duration.

18.3 Potential Impacts, Mitigation, Management and Residual Impacts

18.3.1 Construction Phase

During the construction of the OHTL, ambient air quality will be affected by dust generation during site preparation/ clearance, vehicle movement and by exhaust fumes from construction vehicles & machinery.

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

- Excavations and earthworks, stock piling, filling and levelling;
- Vehicle movements on unpaved, or compacted surfaces;
- Particulate matter dispersion from uncovered truckloads;
- Vehicle and Construction equipment emissions (e.g. NO_x, SO_x and CO, CO_2, VOCs, particulates and BTEX) and particulates from vehicles, generators and other mechanical equipment;.
- Construction of towers/pylons

18.3.1.1 Dust Generation

The principle sources of dust and particulate emissions during construction will be:

- Excavations and earthworks, such as ground breaking, cutting, filling and levelling;
- Vehicle movements on unpaved, or compacted surfaces; and
- Particulate dispersion from uncovered truckloads.

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 OHTL the following receptors are within 350m of the OHTL route: OHL1, OHL2, OHL3, OHL7, OHL13, OHL20, OHL21, OHL22, OHL23, OHL24, OHL25, OHL26, OHL29, OHL31 and OHL 32. As such, there is the potential for impacts relating to dust emissions as a result of OHTL preparatory activities.

However, the magnitude of such dust impacts from construction works will depend on the wind speed and wind direction which have been observed to predominantly come from the north west direction; based on the meteorological monitoring undertaken for the Project.

DUST EMISSIONS & PARTICULATE EMISSIONS FROM MOVEMENT OF VEHICLES

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

At this stage the exact road to be used by construction vehicles for the construction of the OHTL is unknown. This will be confirmed in the final ESIA and potential impacts to receptors along the route will be assessed in the final ESIA.

18.3.1.2 Gaseous Emissions

The principle 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. (see table below). The quantity of gaseous emissions from this equipment will depend on the numbers deployed on site and the hours of operation & efficiency.

Any emissions from the construction vehicles, plant and equipment are expected to mix in ambient air close to the point of origin and are unlikely to be discernible 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 within 50m from the access road. At this stage the road to be used by construction vehicles for the construction of the OHTL is unknown. This will be confirmed in the final ESIA and potential impacts to receptors along the route will be assessed in the final ESIA.

It should be noted that the ambient air quality in the Project area is well below established Uzbekistan Maximum Permissible Concentration for NO_2, SO_2 & CO (see sub-section 8.1.3 on Ambient Air Quality Monitoring in Part A of this ESIA), as such the release of pollutants from vehicles or equipment is not expected to result in noticeable incremental impacts to the local air shed of the OHTL project area neither will it result in distinguishable change in local ambient air quality at any receptor locations.

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

18.3.1.3 Emission of Volatile Organic Compounds (VOCs)

Small quantity of fuels, paints, solvents and other volatile substances are likely to be required during the construction of the OHTL. Where necessary, these will be stored in secure areas within the Project site as described in Part A of this ESIA. Where temporary construction laydown areas are established along the OHTL route, small quantity of fuels, paints, etc. will be stored in such areas for a short duration. If not adequately contained, such substances have the potential to result in the dispersion of volatile emissions to the immediate air shed. The expected range of impact from 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 of the OHTL corridor. As such, impacts to receptors over 100m from the OHTL route is not anticipated.

18.3.1.4 Odour

The construction phase of the project will likely include a number of chemical toilets along the OHTL corridor (including septic tanks) for construction workers. The expected range of impact from odour is likely to be within 100m from source such as temporary toilets/septic tanks. There is the potential for release of odour to the immediate surrounding areas from inappropriate containment and coverage associated with wastewater holding/septic tanks. However, such impacts may therefore be limited to the immediate surrounding area as such, impacts to receptor over 100m from the OHTL route is not anticipated.

Table 18-2 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 within 500m of the Project boundary – Generated as a result of site preparatory works and movement of vehicles on unpaved surfaces	**Minor Negative**	Farmers & other users of the agricultural fields **(OHL1)**	Medium	**Minor**	• 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 removed away or downwind of receptors) during periods of high winds conditions ((≥15km/h). • Where sand, cement and other dusty materials are transported to or from the OHTL construction area, trucks will not be overloaded and will be appropriately covered / sheeted to avoid loses en-route. • Notice will be provided to the sensitive receptors near the OHTL construction area as early as possible (minimum one-week notice) if there will be activities that might generate a lot of dust. • Vehicle routes will be clearly demarcated and appropriate signage displayed along the OHTL route. • Wetting down of any unpaved roads used by construction vehicles in order to reduce dust generation.	**Negligible**
	Minor Negative	Users of the irrigation ditch & canal **(OHL2)**	Medium	**Minor**		**Negligible**
	Minor Negative	Herder & Livestock stables **(OHL3)**	Medium	**Minor**		**Negligible**
	Minor Negative	Qirobod Mavjlari' LLC (brickwork production) **(OHL7)**	Low	**Negligible to Minor**		**Negligible**
	Minor Negative	'Universal 5' LLC (brickwork production) **(OHL13)**	Low	**Negligible to Minor**		**Negligible**
	Minor Negative	'Aziz' Private Enterpreneur (Uncultivated Land) **(OHL20)**	Medium	**Minor**		**Negligible**
	Minor Negative	'Ismail Sher Chorvador' LLC (Uncultivated Land) **(OHL21)**	Medium	**Minor**		**Negligible**
	Minor Negative	Livestock market **(OHL22)**	Medium	**Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
	Minor Negative	Construction materials market "Gulobod Bunyodkor" LLC **(OHL23)**	Medium	**Minor**	• OHTL workers will be provided with full PPE kit including dust masks where dust is identified as a risk to workers	**Negligible**
	Minor Negative	'Azamat Kholmurodov' Individual Entrepreneur **(OHL24)**	Medium	**Minor**		**Negligible**
	Minor Negative	'Kumush Kalava' LLC (sale of cotton) **(OHL25)**	Medium	**Minor**		**Negligible**
	Minor Negative	'Abdukadir Baraka' LLC, Poultry farming **(OHL26)**	Medium	**Minor**		**Negligible**
	Minor Negative	Household (Muminov Bobokhon, Bandboshi MCC) **(OHL29)**	High	**Minor to Moderate**		**Negligible to Minor**
	Minor Negative	'Gofur Razzok' Farm **(OHL31)**	Medium	**Minor**		**Negligible**
	Minor Negative	'Chorvoq NNU' Farm **(OHL32)**	Medium	**Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
Gaseous emissions – From vehicle exhaust	**Minor Negative**	Receptors within 50m of the route to be used by OHTL construction vehicles	Medium	**Minor**	• Paved and unpaved roads along the OHTL corridor will be designated and made clear to the drivers with signage for directions and speed limits placed all along the road. • Unnecessary usage of vehicles, plant and equipment will be minimised – No unnecessary idling at the OHTL tower construction area. • 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. • 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 during use at the OHTL construction area will require maintenance and re-assessment before it is returned.	**Negligible to Minor**

18.3.2 Operational Phase

As the operation of the OHTL will not include combustion related activities, they will be no direct emissions to the local air-shed as a result of primary project operations. The corona effect which is explained in more depth in the Noise and Vibration chapter of Part A of this ESIA can produce ozone and oxides of nitrogen in the air during humid conditions however, such gases will be released in small quantities and any associated impact will be negligible.

Although the operation and maintenance requirements of the OHTL will necessitate limited use of vehicles to undertake inspection & maintenance activities at some sections of the transmission line, emissions from these vehicles will be minor and unlikely to result in a discernible impact at receptor location.

Table 18-3 Air Quality – Impact Significance, Mitigation & Management Measures and Residual Impacts – Operation

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impact
Gaseous Emissions from Vehicles	**Minor Negative**	Receptors within 50m of the route to be used by OHTL construction vehicles	Medium	**Minor**	• 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. • 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.	**Negligible**

18.3.3 Decommissioning Phase

Potential impacts relating to decommissioning of the OHTL will be similar to those encountered during the construction phase as decommissioning will result in dust generation and gaseous emissions. 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.

18.4 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 OHTL 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 18-4 Air Quality Monitoring Requirements

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
Construction			
Dust Generation & Dispersion	Dust	General visual observation for dust emissions to be undertaken on a daily basis. To be monitored quantitatively if generation is considered to be excessive or complaints are received.	Access Road to the OHTL construction area, Dispersion to external receptors from point of generation.
Emissions from engines	Vehicle Emissions	General visual observation 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
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.

19 NOISE AND VIBRATION

19.1 Observation and Baseline Environment

Based on review of satellite imagery and various site reconnaissance visits undertaken along the 162km OHTL route, the area is remote and the majority of the OHTL alignment is away from permanent anthropogenic noise generating activities with the exception of the southern portion of the alignment. This portion includes a construction materials market located approximately 160m east of the OHTL and approximately 800m north from the Karakul substation, eight (8) brickwork factories and an auto technical service LLC (Alligator LLC), located approximately 510m east of the OHTL.

19.1.1.1 Noise Monitoring Survey Methodology

Due to the OHTL's remote location and limited noise sources, the area is in general considered to be similar to the wind farm site. As such, no additional noise survey was conducted along the OHTL.

19.1.2 Vibration

There are no facilities/works/processes/ infrastructure in the vicinity of the OHTL alignment that are likely to result in significant vibrations. No noticeable vibrations were encountered at any time during the site visits. As such vibration surveys were screened out.

19.2 Receptors

Noise impacts from the OHTL construction and operations will be limited (see assessment below), however as a conservative approach in line with common practices for noise, receptors within a 1km distance of the OHTL alignment have been identified as noise sensitive receptors and are presented in the table below.

Table 19-1 Receptors within 1km of the OHTL Route

RECEPTOR ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
OHL 1	Farmers & other users of the agricultural fields	Agricultural	**Medium**	Farmers, users of agricultural lands & irrigation canals, Herders and livestock will be relatively vulnerable to changes in ambient noise levels.
OHL 2	Users of the irrigation ditch & canal		**Medium**	
OHL 3	Herder & Livestock stables		**Medium**	
OHL 7	'Qirobod Mavjlari' LLC (brickwork production)	Industrial	**Low**	Brickwork production generate noise and as such workers at the factories will unlikely be sensitive

Receptor ID	Receptor	Receptor Type	Sensitivity	Justification
OHL 8	'Jura' LLC (brickwork production)			to project impacts due to the noise generating activities they are exposed to from the brickwork production.
OHL 9	'Az Nafis' Private Entrepreneur (brickwork production)			
OHL 10	'Bunyodkor-Shakhzod-Fayz' LLC (brickwork production)			
OHL 11	'Pakhlavon kichik' Private Entrepreneur (brickwork production)			
OHL 12	'Ortiq Bobo' (brickwork production)			
OHL 13	'Universal 5' LLC (brickwork production)			
OHL 14	'Akhmad-Huseyn-Zuxro' LLC (brickwork production)			
OHL 17	'Karakul Shersahiy' shopping centre	Commercial	**Medium**	Shoppers & workers at the shopping centre will be relatively vulnerable to changes in ambient noise levels
OHL 18	'Alligator' LLC (auto technical services)	Commercial	**Medium**	Workers and visitors of the auto technical services LLC will be relatively vulnerable to changes in ambient noise levels
OHL 19	'Sabriya' LLC (metan gas station)	Industrial	**Low**	Workers & visitors at the metan gas station will be of low vulnerable to changes in ambient noise levels
OHL 20	'Aziz' Private Enterpreneur (Uncultivated Land)	Agricultural	**Medium**	When cultivation starts, farmers will be relatively vulnerable to changes in ambient noise levels
OHL 21	'Ismail Sher Chorvador' LLC (Uncultivated Land)	Agricultural	**Medium**	
OHL 22	Livestock market	Commercial	**Medium**	Shoppers & workers at the livestock market will be relatively vulnerable to changes in ambient noise levels

Receptor ID	Receptor	Receptor Type	Sensitivity	Justification
OHL 23	Construction materials market "Gulobod Bunyodkor" LLC	Commercial	**Medium**	Workers & shoppers at the construction materials market will be relatively vulnerable to changes in ambient noise levels
OHL 24	'Azamat Kholmurodov' Individual Entrepreneur,	Agricultural (Poultry)	**Medium**	Farmers at the poultry farm will be relatively vulnerable to changes in ambient noise levels as they are at the location for a short duration.
OHL 25	'Kumush Kalava' LLC (sale of cotton)	Commercial	**Medium**	Workers at this LLC will be relatively vulnerable to changes in ambient noise levels as they are at the location for a short duration.
OHL 26	'Abdukadir Baraka' LLC, Poultry farming	Agricultural (Poultry)	**Medium**	Farmers at the poultry farm will be relatively vulnerable to changes in ambient noise levels as they are at the location for a short duration.
OHL 27	'Barkhayot Mukhammad Rajab' Farm	Commercial & Agricultural	**Medium**	Farmers at the farm will be relatively vulnerable to changes in ambient noise levels as they are at the location for a short duration.
OHL 28	'Mardon' Farm	Agricultural (Cultivated Land)	**Medium**	Farmers at the farm will be relatively vulnerable to changes in ambient noise levels as they are at the location for a short duration.
OHL 29	Household (Muminov Bobokhon, Bandboshi MCC)	Residential	**High**	Residents at this household will be sensitive to changes in ambient noise levels
OHL 31	'Gofur Razzok' Farm	Agricultural (Cultivated Land)	**Medium**	Farmers at the farm will be relatively vulnerable to changes in ambient noise levels as they are at the location for a short duration.
OHL 32	'Chorvoq NNU' Farm	Agricultural (Poultry)	**Medium**	Farmers at the poultry farm will be relatively vulnerable to changes in ambient noise levels as they are at the location for a short duration.

19.3 Potential Impacts, Mitigation, Management and Residual Impacts

19.3.1 Construction Phase

19.3.1.1 Construction Noise

During construction of the OHTL, noise will be generated by the operation of equipment /machinery and propagated to the surrounding areas via a range of processes. Pertinent construction activities in relation to noise are likely to include

- Site Preparation (e.g. excavation, earthworks)
- Civil Works (e.g. piling driving)
- Construction and Installation (e.g. erection of towers and conductors);
- Vehicle movements.

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, particularly those receptors near tower construction sites. Impacts are expected to be short in duration and isolated, as the length of works on each tower will not be extensive.

The anticipated construction equipment/machinery to be used in the construction of the 162 km OHTL together with noise data for these equipment are presented in the table below as obtained from 'British Standards: Code of practice for noise and vibration on construction and open sites'

Table -19-2 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
Diesel Generator	Table C.4, 84	74
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

EQUIPMENT	BS 5228-1:2009 REFERENCE	SPL DB (A)
Mechanical & Installation Works		
Lifting frame	Table C.4,57	67
50t truck crane	Table C. 4, 46	67
Mobile crane	Table C.3,28	67
Hydraulic hammer	Table C.3,2	87
Welding machine	Table C. 3, 31	73
Tower crane	Table C.4.48	76
Diesel Generator	Table C.4, 84	74
Truck	Table C.4, 62	66
Forklift	Table D.7 96	77

The methodology for assessing noise impacts at receptor location (per construction phase) is discussed in Part A: Noise and Vibration chapter.

Table E.1 of BS5228 sets out significance effect threshold values at receptors (dwellings or settlements). 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 19-3 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.*

Where all equipment is operating at the same location for 50% of the working day, the continued cumulative noise level would be 79.6dB(A) as perceived at 10m distance.

Noise levels dissipate with distance and as such the potential for noise impacts from OHTL site preparation, earth & civil works upon receptors will significantly decrease with distance from the noise sources. Calculation of distance propagation and ground absorbance have been undertaken for receptors within 1km of asset boundary.

The table below shows the anticipated noise levels.

Table 19-4 Site Preparation, Earth & Civil Works Noise Attenuation by Distance

RECEPTOR	DISTANCE FROM SOURCE	PREDICTED NOISE LEVEL
Source Noise: 79.6dB(A) (at 10m)		
OHL 1	30	69.7
OHL 2	30	69.7
OHL 3	30	69.7
OHL 7	220	48.0
OHL 8	570	37.7
OHL 9	700	35.5
OHL 10	550	38.1
OHL 11	840	33.5
OHL 12	500	39.1
OHL 13	300	44.7
OHL 14	300	44.7
OHL 17	700	35.5
OHL 18	510	38.9
OHL 19	810	33.9
OHL 20	110	55.6
OHL 21	30	69.7
OHL 22	140	52.9
OHL 23	160	51.5
OHL 24	155	51.8
OHL 25	142	52.8
OHL 26	350	43.0
OHL 27	607	37.0
OHL 28	30	69.7
OHL 29	250	46.6
OHL 31	30	69.7
OHL 32	270	51.0

Note: for those receptors identified to be along the OHTL route or where the OHTL route crosses, a distance of 30m is used in calculating the potential noise level from source to account for the 30m buffer zone on each side of the OHTL as required by law.

The ABC assessment method cannot be used to calculate the changes in noise levels from the baseline at residential receptor OHL 29 – (Mumimov Bobokhon Bandboshi MCC) because no noise surveys were undertaken at this location. As such, the predicted noise level calculated above have been compared with Uzbekistan noise limit of 55dB(A) for daytime and 45dB(A) for night time.

Upon comparison, it is evident that site preparation, earth & civil works would be discernible at daytime at OHL1, OHL2, OHL 3, OHL 21, OHL 28 and OHL31 and at night time at majority of the receptor location except at OHL8, OHL9, OHL10, OHL11, OHL12, OHL13, OHL14, OHL17, OHL18, OHL19 and OHL27. However, it is noted that impact at these locations will be depend on the location of the OHTL towers and associated construction works.

BUILDING AND FOUNDATION WORKS

Where all equipment is operating at the same location for 50% of the working day, the continued cumulative noise level would be 87.6dB(A) as perceived at 10m distance.

The table below shows the anticipated noise levels as a result of OHTL building and foundation works following calculation of distance propagation and ground absorbance.

Table 19-5 OHTL Building and Foundation Works Noise Attenuation by Distance

RECEPTOR	DISTANCE FROM SOURCE	PREDICTED NOISE LEVEL
Source Noise: 87.6dB(A) (at 10m)		
OHL 1	30	77.7
OHL 2	30	77.7
OHL 3	30	77.7
OHL 7	220	56.0
OHL 8	570	45.7
OHL 9	700	43.5
OHL 10	550	46.1
OHL 11	840	41.5
OHL 12	500	47.1
OHL 13	300	52.7
OHL 14	300	52.7
OHL 17	700	43.5
OHL 18	510	46.9
OHL 19	810	41.9
OHL 20	110	63.6
OHL 21	30	77.7

Receptor	Distance from Source	Predicted Noise Level
OHL 22	140	61.0
OHL 23	160	59.5
OHL 24	155	59.8
OHL 25	142	60.8
OHL 26	350	51.0
OHL 27	607	45.0
OHL 28	30	77.7
OHL 29	250	54.7
OHL 31	30	77.7
OHL 32	270	59.0

Upon comparing the above predicted noise levels at receptors with Uzbekistan noise limit of 55dB(A) for daytime and 45dB(A) for night time, it is evident that building and foundation works would be discernible at daytime at OHL1, OHL2, OHL3, OHL7, OHL20, OHL21, OHL22, OHL23, OHL24, OHL25, OHL26, OHL28, OHL29, OHL31and OHL32. At night time building and foundation works will be discernible at majority of the receptor location except at OHL8, OHL9, OHL11, OHL17, OHL19 and OHL27.

Mechanical & Installation Works

Where all equipment is operating at the same location for 50% of the working day, the continued cumulative noise level would be 85.2dB(A) as perceived at 10m distance.

The table below shows the anticipated noise levels as a result of OHTL mechanical and installation works following calculation of distance propagation and ground absorbance.

Table 19-6 OHTL Mechanical & Installation Works Noise Attenuation by Distance

Receptor	Distance from Source	Predicted Noise Level
Source Noise: 85.2dB(A) (at 10m)		
OHL 1	30	75.2
OHL 2	30	75.2
OHL 3	30	75.2
OHL 7	220	53.6
OHL 8	570	43.3
OHL 9	700	41.0
OHL 10	550	43.6
OHL 11	840	39.0
OHL 12	500	44.7
OHL 13	300	50.2
OHL 14	300	50.2
OHL 17	700	41.0
OHL 18	510	44.5
OHL 19	810	39.4

Receptor	Distance from Source	Predicted Noise Level
OHL 20	110	61.1
OHL 21	30	75.2
OHL 22	140	58.5
OHL 23	160	57.1
OHL 24	155	57.4
OHL 25	142	58.3
OHL 26	350	48.6
OHL 27	607	42.6
OHL 28	30	75.2
OHL 29	250	52.2
OHL 31	30	75.2
OHL 32	270	56.5

Upon comparing the above predicted noise levels at receptor locations with Uzbekistan noise limit of 55dB(A) for daytime and 45dB(A) for night time, it is evident that mechanical and installation works would be discernible at daytime at OHL1, OHL2, OHL3, OHL20, OHL21, OHL22, OHL23, OHL24, OHL25, OHL28, OHL31and OHL32. At night time building and foundation works will be discernible at majority of the receptor location except at OHL8, OHL9, OHL10, OHL11, OHL12, OHL17, OHL18, OHL19 and OHL27.

19.3.1.2 Vehicular Noise

A limited number of vehicles will be required for the OHTL construction, which are expected to follow defined routes along the OHTL corridor and primarily move between works at tower locations. Due to the remote location of the majority of OHTL works, much of this vehicle movement will be in areas that have few existing roads and tracks, that have limited (or no) existing vehicular movements and related noise impacts. In such areas, the addition of vehicles will result in slight additional noise generation, however, this will be limited due to the small number of vehicles required for the works, the lack of constant vehicle flows and the temporary nature of the works.

The addition of construction vehicles along other existing routes (with pre-existing traffic flows) will likely result in very minor temporary increases in traffic which will consequently result in very minor temporary increases in noise levels at any receptor location within close proximity to the OHTL route.

19.3.1.3 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 tower construction site.

As such, vibratory impacts (If any) at OHL1, OHL2, OHL3, OHL7, OHL13, OHL14, OHL20, OHL21, OHL22, OHL23, OHL24, OHL25, OHL26, OHL28, OHL29, OHL31 and OHL32 may be negligible while impacts at receptor location over 500m are not expected to be discernible due to the attenuation of vibration over distance.

19.3.1.4 Noise Impacts to OHTL Workers

OHTL construction workers will be exposed to varying levels of noise from construction equipment and vibration from hand held power tools. This will depend on the activities being conducted by the workers and 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 19-7 Noise and Vibration- 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 Noise –Noise generated from general construction activities	**Minor Negative**	Farmers & other users of the agricultural fields **(OHL 1)**	Medium	**Minor**	• 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. • Equipment or Machinery operating intermittently will be shut down in the intervening periods between use. • Dropping of heavy objects from height will be avoided as far as practicable. • Night time construction works along the OHTL route particularly near receptor locations 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. • Notice will be provided to the sensitive receptors as early as possible (minimum one-week notice) of periods of noisier works in regards to certain construction activities and for how long such	**Negligible**
	Minor Negative	Users of the irrigation ditch & canal **(OHL 2)**	Medium	**Minor**		**Negligible**
	Minor Negative	Herder & Livestock stables (**OHL 3)**	Medium	**Minor**		**Negligible**
	Minor Negative	Qirobod Mavjlari' LLC (brickwork production)(**OHL 7)**	Low	**Negligible to Minor**		**Negligible**
	Negligible Negative	'Jura' LLC (brickwork production)(**OHL 8)**	Low	**Negligible to Minor**		**Negligible**
	Negligible Negative	Az Nafis' Private Entrepreneur (brickwork production)(**OHL 9)**	Low	**Negligible to Minor**		**Negligible**
	Negligible Negative	'Bunyodkor-Shakhzod-Fayz' LLC (brickwork production)(**OHL 10)**	Low	**Negligible to Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
	Negligible Negative	Pakhlavon kichik' Private Entrepreneur (brickwork production) **(OHL 11)**	Low	**Negligible to Minor**	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.	**Negligible**
	Negligible Negative	'Ortiq Bobo' (brickwork production) **(OHL 12)**	Low	**Negligible to Minor**		**Negligible**
	Minor Negative	Universal 5' LLC (brickwork production) **(OHL 13)**	Low	**Negligible to Minor**		**Negligible**
	Minor Negative	'Akhmad-Huseyn-Zuxro' LLC (brickwork production) **(OHL 14)**	Low	**Negligible to Minor**		**Negligible**
	Negligible Negative	'Karakul Shersahiy' shopping centre **(OHL 17)**	Medium	**Negligible to Minor**		**Negligible**
	Negligible Negative	'Alligator' LLC (auto technical services) **(OHL 18)**	Medium	**Negligible to Minor**		**Negligible**
	Negligible Negative	Sabriya' LLC (metan gas station) **(OHL 19)**	Low	**Negligible to Minor**		**Negligible**
	Minor	'Aziz' Private Enterpreneur	Medium	**Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
	Negative	(Uncultivated Land) **(OHL 20)**				
	Minor Negative	'Ismail Sher Chorvador' LLC (Uncultivated Land) **(OHL 21)**	Medium	**Minor**		**Negligible**
	Minor Negative	Livestock market **(OHL 22)**	Medium	**Minor**		**Negligible**
	Minor Negative	Construction materials market "Gulobod Bunyodkor" LLC **(OHL 23)**	Medium	**Minor**		**Negligible**
	Minor Negative	'Azamat Kholmurodov' Individual Entrepreneur, **(OHL 24)**	Medium	**Minor**		**Negligible**
	Minor Negative	'Kumush Kalava' LLC (sale of cotton) **(OHL 25)**	Medium	**Minor**		**Negligible**
	Minor Negative	'Abdukadir Baraka' LLC, Poultry farming **(OHL 26)**	Medium	**Minor**		**Negligible**
	Negligible Negative	'Barkhayot Mukhammad Rajab' Farm **(OHL 27)**	Medium	**Negligible to Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
	Minor Negative	'Mardon' Farm **(OHL 28)**	Medium	**Minor**		**Negligible**
	Minor Negative	Household (Muminov Bobokhon, Bandboshi MCC) **(OHL 29)**	High	**Minor to Moderate**		**Negligible to Minor**
	Minor Negative	'Gofur Razzok' Farm **(OHL 31)**	Medium	**Minor**		**Negligible**
	Minor Negative	'Chorvoq NNU' Farm **(OHL32)**	Medium	**Minor**		**Negligible**
Vehicular Noise- Noise from movement of construction vehicles	**Minor Negative**	Receptors along the route to be used by OHTL construction vehicles	Medium	**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 with their engines running. • Ensure any appropriate permits are in place for deliveries 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). • 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.	**Minor to 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.	
Construction vibration impacts (including vehicle vibration)	**Negligible Negative**	Farmers & other users of the agricultural fields **(OHL 1)**	Medium	**Negligible to Minor**	• The Contractors will, at all times, carry out all work in such a manner as to keep any disturbance from vibration to a minimum. • Vibrating equipment/machinery will be switched off when not in use.	**Negligible**
	Negligible Negative	Users of the irrigation ditch & canal **(OHL 2)**	Medium	**Negligible to Minor**		**Negligible**
	Negligible Negative	Herder & Livestock stables (**OHL 3)**	Medium	**Negligible to Minor**		**Negligible**
	Negligible Negative	Qirobod Mavjlari' LLC (brickwork production)(**OHL 7)**	Low	**Negligible to Minor**		**Negligible**
	Negligible Negative	'Akhmad-Huseyn-Zuxro' LLC (brickwork production) **(OHL 14)**	Low	**Negligible to Minor**		**Negligible**
	Negligible Negative	'Aziz' Private Enterpreneur (Uncultivated Land) **(OHL 20)**	Medium	**Negligible to Minor**		**Negligible**
	Negligible Negative	'Ismail Sher Chorvador' LLC (Uncultivated Land) **(OHL 21)**	Medium	**Negligible to Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
	Negligible Negative	Livestock market **(OHL 22)**	Medium	**Negligible to Minor**		**Negligible**
	Negligible Negative	Construction materials market "Gulobod Bunyodkor" LLC **(OHL 23)**	Medium	**Negligible to Minor**		**Negligible**
	Negligible Negative	'Azamat Kholmurodov' Individual Entrepreneur, **(OHL 24)**	Medium	**Negligible to Minor**		**Negligible**
	Negligible Negative	'Kumush Kalava' LLC (sale of cotton) **(OHL 25)**	Medium	**Negligible to Minor**		**Negligible**
	Negligible Negative	'Abdukadir Baraka' LLC, Poultry farming **(OHL 26)**	Medium	**Negligible to Minor**		**Negligible**
	Negligible Negative	'Mardon' Farm **(OHL 28)**	Medium	**Negligible to Minor**		**Negligible**
	Negligible Negative	Household (Muminov Bobokhon, Bandboshi MCC) **(OHL 29)**	High	**Minor**		**Negligible**
	Negligible Negative	'Gofur Razzok' Farm **(OHL 31)**	Medium	**Negligible to Minor**		**Negligible**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
	Negligible Negative	'Chorvoq NNU' Farm **(OHL32)**	Medium	**Negligible to Minor**		**Negligible**
Impacts to Construction Workers	**Moderate Negative**	OHTL Workers	High	**Moderate to Major**	• 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 to Moderate**

19.3.2 Operational Phase

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. Acoustic noise from the conductors is more with high voltage power lives (400-800kV) and even greater with ultra-high voltage lines (100kV and higher) (Gerasimov, 2003). 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 center 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. Given the location of nearest residential household (OHL29- Household (Muminov Bobokhon, Bandboshi MCC)) to the OHTL route to be approximately 250m, noise level as a result of corona effect is not expected to exceed established daytime and night time standard at this receptor location due to partial screening by residential buildings and decrease in noise level with distance from source.

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

Table 19-8 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
Corona Effect	**Negligible Negative**	Household (Muminov Bobokhon, Bandboshi MCC **(OHL 29)**	High	**Minor**	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.	**Negligible**

19.3.3 Decommissioning Phase

Potential impacts relating to decommissioning of the OHTL 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.

20 SOILS, GEOLOGY AND GROUNDWATER

20.1 Observation and Baseline Environment

During the reconnaissance survey undertaken along the Bash to Karakul OHTL route in April & June 2021, it was observed that the OHTL route runs through different topographies and surface conditions consisting of desert landscape, salt marshes and agricultural fields. The majority of the OHTL runs through desert land with loose sand and a salt marsh while approximately 15-18km passes through irrigated agricultural land. The land between the irrigated fields and the existing Kurakul sub-station (approximately 2km) is used for commercial purposes with areas of loose sand.

Besides the presence of vehicle tracks and local access roads, no obvious existing influences on soil quality (such as soil contamination) were identified along the OHTL route during the recon survey via visual or olfactory senses.

20.1.1 Soil Analysis

As a precautionary approach, soil quality analysis was undertaken along the OHTL route from the Bash sub-station to the Karakul substation. The purpose of the survey was to understand baseline soil conditions and to check for possible contamination in the soils that could not be seen of smelt.

The samples were collected on 21st and 22nd August 2021 at nine (9) sampling locations. Sampling locations were selected to provide representative soil condition for the OHTL route in general as shown in the figure below. Soil samples were collected from each sampling location using a shovel at a depth of 0.1m (10cm) using the scoop method (after scraping away the immediate surface layer).

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

Table 20-1 Soil Sampling Location along Bash-Karakul OHTL Route

ID	COORDINATES	
	NORTHING	EASTING
SQ1	40°24'9.76"	64°29'2.39"
SQ2	40° 8'40.09"	64° 1'36.42"
SQ3	39°53'43.22"	63°54'37.28"
SQ4	39°37'2.45"	63°52'20.36"
SQ5	39°33'8.94"	63°52'1.27"
SQ6	39°32'13.77"	63°51'48.00"

ID	COORDINATES	
	NORTHING	EASTING
SQ7	40°29'31.49"	64°40'44.80"
SQ8	39°37'11.31"	63°52'19.74"
SQ9	39°34'7.35"	63°52'9.10"

Figure 20-1 Soil Sampling Locations along Bash-Karakul OHTL Route

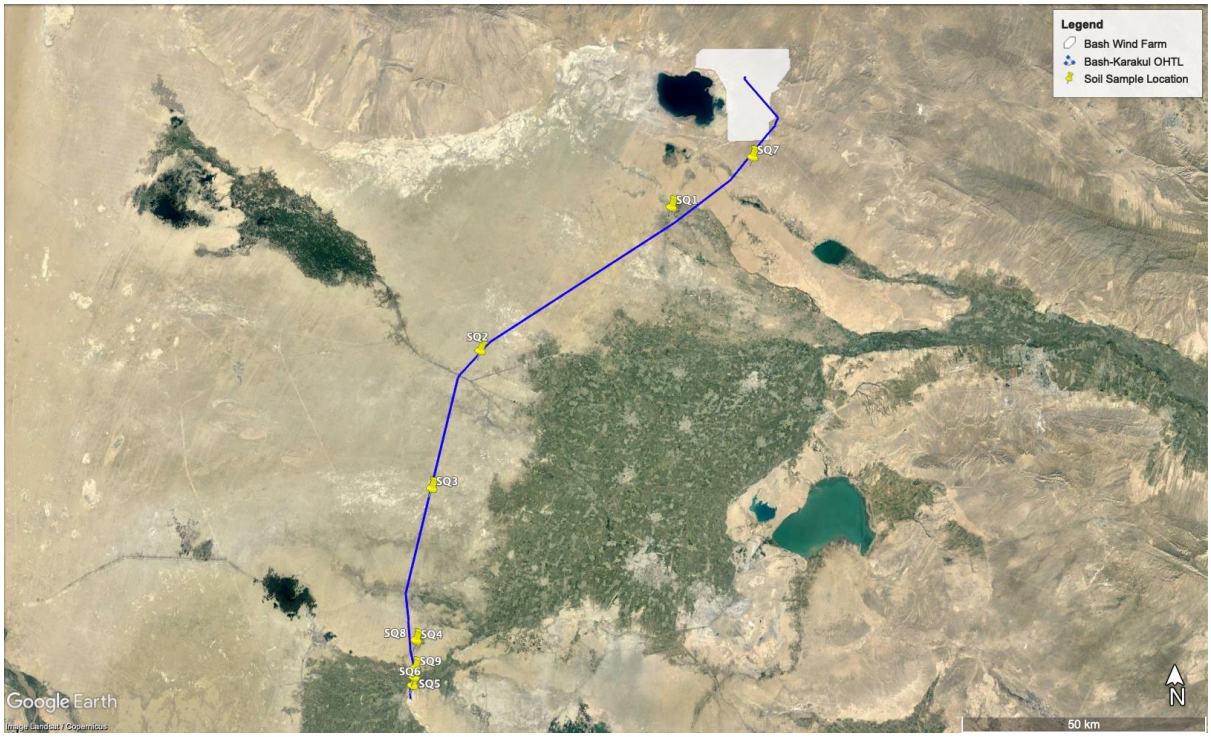


Plate 20-1 Evidence of Soil Sampling along Bash-Karakul OHTL Route

20.1.1.1 RESULTS

The results of the soil quality analysis are presented in the tables below and have been compared with the national standard SanPiN № 0191-05 "Maximum allowable concentrations (MPC) and Approximate permittable concentrations of exogenous harmful substances in soil" and the Dutch Soil Quality Standards.

Table 20-2 Soil Analysis Results for Samples Collected along Bash-Karakul OHTL Route

Name of parameters	Sample number									Detectable limits in mg/L	SanPiN № 0191-05 MPC	Dutch Standards (Intervention Value)
	SQ1	SQ2	SQ3	SQ4	SQ5	SQ6	SQ7	SQ8	SQ9			
pH	8.10	8.28	8.00	8.10	8.20	8.20	8.30	8,20	8.30	1-14	-	-
Chloride (as Cl), %	67.00	11.0	3.00	3.00	14.00	11.00	11.00	3.00	9.00	N/A	-	-
Nitrate (NO_3), mg/dm^3	49	6.00	9.00	101.00	21.00	38.00	15.00	9.33	10.00	10^{-6}-100* mg/kg	**130 (gross content)**	-
Sodium (Na), mg/kg	8,100	9,000	7,600	9,600	10,000	8,900	12,000	10,000	10,000	40-110000mg/kg	-	-
Magnesium (Mg), mg/kg	12,000	8,100	11,000	7,100	14,000	10,000	6,300	7,400	8,200	40-110000mg/kg	-	-
Potassium, mg/kg	13,000	13,000	16,000	13,000	17,000	17,000	20,000	15,000	14,000	80-300000 mg/kg	-	-
Lead (Pb), mg/kg	13	10	16	14	15	14	13	10	9.80	0.1-4000 mg/kg	**32**	**530**
Manganese (Mn), mg/kg	12,000	81,00	11,000	7,100	14,000	10,000	6,300	7,400	8,200	20-100000 mg/kg	**1,500 (gross content)**	-
Copper (Cu), mg/kg	31.0	35.0	37.0	190	52.0	46.0	38.0	37.0	28.0	1.0-4000 mg/kg	**3**	**190**
Zinc (Zn), mg/kg	42.0	37.0	64.0	110	60.0	49.0	40.0	40.0	36.0	1.0-4000 mg/kg	**23**	**720**
Chromium (Cr), mg/kg	48.0	44.0	53.0	44.0	52.0	52.0	51.0	53.0	48.0	1.0-4000 mg/kg	**6**	**380**
Iron (Fe), mg/kg	19,000	13,000	24,000	13,000	24,000	22,000	16,000	14,000	13,000	60-3000000 mg/kg	-	-
Mercury (Hg), mg/kg	0.024	0.032	0.024	0.032	0.097	0.056	0.014	0.022	0.073	*	**2.1**	**36**
Nickel (Ni), mg/kg	46.0	24.0	33.0	31.0	30.0	35.0	28.0	48.0	26.0	1.0 -4000	**4.0**	**210**
Cadmium (Cd), mg/kg	0.082	0.091	0.099	0.033	0.077	0.100	0.062	0.031	0.031	0.005-4000 mg/kg	-	**12**
Aluminum (Al), mg/kg	41,000	390,000	490,000	40,000	65,000	57,000	52,000	44,000	47,000	20-200000 mg/kg		-
Arsenic (As) mg/kg	21.0	17.0	24.0	17.0	20.0	25.0	18.0	18.0	19.0	0.1-4000 mg/kg		**55**

Note

- *Where there is a difference between the SanPiN № 0191-05 "Maximum allowable 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 not been colour coded, this is because there are no established SanPiN № 0191-05 "Maximum allowable concentrations (MPC) and/or Dutch Intervention Value for such parameters.*

The MPC in soil is determined for 35 substances that are considered typical for anthropogenic impacts, including for 109 pesticides. The pH results of the samples were greater than 8 indicating the alkaline nature of the soil. SQ4 is characterized by a high content of nitrates compared to the other samples which could be potentially be attributed to the use of fertilisers in this agricultural area.

All samples exceed the Maximum Permissible Values established in SanPiN № 0191-05 for Ni, Cr, Zn, Cu and Mn. However, these are well below the benchmarked Dutch intervention standards. The soil chemistry of the Kyzyllum Desert naturally comprises of metals as such the high concentration of Ni, Cr, Zn, Cu and Mn can be said to be attributed to the potential mineral and metal reserves in the Kyzllum Desert where the OHTL is located.

The full soil analysis results and laboratory certificates are presented in Appendix V.

20.2 Receptors

Table 20-3 Soils, Geology & Groundwater - Receptor Sensitivity

RECEPTOR	SENSITIVITY	JUSTIFICATION
Soil Quality	**Low**	The soil quality along the OHTL route is typical of the soil characteristics found in the project area. It is not known to be of particular significance. Hence, it is of low importance and rarity on a local scale.

20.3 Potential Impacts, Mitigation, Management and Residual Impacts

20.3.1 Construction Phase

Construction of the OHTL will result in some changes to the soil characteristics in the area of works. Such changes are expected to be limited to the tower construction areas and laydown areas where site preparatory works will be undertaken. There may also be some soil compaction along unpaved routes used by construction vehicles.

20.3.1.1 Excavation or Removal of Soil

Excavation activities will be required along the OHTL corridor in order to establish foundations for the transmission towers. The construction of temporary access route to areas of tower assembly, installation and erection will also require earthworks. These activities may result in the interaction with the geology along the route which could potentially provide direct pathways for contamination of groundwater during the construction phase.

In addition, the soil characteristics will be impacted directly through backfilling and soil compaction activities to provide structural stability for the structures.

20.3.1.2 Spills and Leaks Associated with Construction

Soil quality can be susceptible to contamination from various construction sources. Such as from the storage and usage of fuels and chemicals in laydown areas and from the transportation of such materials along temporary routes or access roads. Improper methods of storing, transferring, and handling of these products can result in spillage to the ground and result in soil contamination.

Due to the type of works in the OHTL tower areas, there will be few risks from spills and leaks, due to the lack of need for hazardous materials.

These risks will be managed through the implementation of the project CESMP and associated Management Plans and Procedures.

20.3.1.3 Inadequate Waste and Wastewater Management

Construction of the OHTL 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 will also need to be carefully managed and only in designated washing areas, with sealed protection to soils.

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 the Solid Waste and Wastewater Management Chapter in Part C of this report.

Table 20-4 Soils, Geology, 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
Pollution from Accidental Leaks or Spillage	**Minor Negative**	Soil Quality	Low	**Negligible to Minor**	• Temporary storage of hazardous materials such as chemicals at tower construction area will only be in designated chemical storage areas or in secondary containment bund. • Storage of all hazardous materials 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. • All equipment using oils will have drip trays underneath to capture any oil leaks or drips. • 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 at the OHTL laydown areas. • 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. • Spill kits will be made available at chemical storage areas and fully stocked with appropriate absorbent materials. • Refuelling and maintenance of vehicles/equipment will be within a dedicated depot area at the site, on impermeable surface. • Availability of suitable containment and spill clean-up materials/equipment at specific	**Negligible to Minor**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					locations along the OHTL corridor (e.g. where refuelling is to take place). • 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. • Concrete washout is only to be disposed in designated washing areas, with protection to soils.	
Inadequate waste management	**Minor Negative**	Soil Quality	Low	**Negligible to 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. • Implementation of good housekeeping practices during construction activities including procedures and requirements for proper handling, storage, and transport of hazardous materials and waste.	**Negligible to Minor**

20.3.2 Operational Phase

Specific project impacts to soil, geology and groundwater during the operational phase of the OHTL are not expected. Certain preventative and unplanned maintenance works may include the use of paints and other hazardous materials; however, these are not expected in large quantities.

Potential impacts may include accidental and minor spills & leaks. Although these materials may be used in small quantities, precaution must be taken 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.

Table 20-5 Soils, Geology 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 to Minor**	• O&M Company to ensure conformance with ERP procedures (preventative and response) will be monitored through routine inspections. • 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.	**Negligible**

20.3.3 Decommissioning Phase

Potential impacts relating to decommissioning of the OHTL will be similar to those encountered during the construction and operational phase. Only the risk of accidental spills and waste management is expected as decommissioning will only require removal of foundation and other OHTL components but will not result in removal of top and/or sub-soil. 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 the Solid Waste and Wastewater Chapter in Part C of this ESIA.

20.4 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 20-6 Monitoring Requirements

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
Construction			
Soil Quality	Visible spills & leaks of hydrocarbons and other potentially hazardous or chemical pollution sources	Daily visual observations and during weekly inspections	Along the OHTL route during construction and at temporary construction facilities.

21 WATER ENVIRONMENT

21.1 Observation and Baseline Environment

During the reconnaissance survey undertaken along the Bash to Karakul OHTL route in April & June 2021, it was observed that the OHTL route runs in proximity to or through areas of salt marsh or agricultural field areas with irrigation channels.

21.1.1 Consultations with Amu Bukhara Irrigation Systems Basin Department

During the OHTL prefeasibility studies, Juru Energy's technical team recorded nine (9) canal crossing points along the OHTL. As such, a consultation letter was sent to Amu Bukhara Irrigation System Dept. on 24th September 2021 requesting for more information on the canal system and specific requirements for the Project.

The Dept. provided a response on 16th October 2021 providing the canals found along the OHTL as provided in the table below.

Table 21-1 Water Canals along Bash-Karakul OHTL Route

COORDINATES		NAME OF CANAL	FUNCTION	RESPONSIBILITY
NORTHING	EASTING			
40.455672	64.612546	18-GD wastewater ditch	Improve the melioration condition of irrigated lands	Melioration expedition under Amu Bukhara Irrigation system rehabilitation
40.404684	64.522863	Toldi wastewater ditch		
40.396418	64.508090	T-17 wastewater ditch		
40.378942	64.473798	T-9 Agytma wastewater ditch		
40.116575	63.984039	Shimoliy wastewater ditch		
39.726260	63.857490	Go'jayli wastewater ditch		
39.724296	63.856310	Katta-ko'l Go'jayli wastewater ditch		
39.610584	63.867791	Qorako'ldaryo water ditch		
39.558931	63.867438	Sayyot water ditch	Irrigation	Karakul irrigation department under Amu Bukhara Irrigation system rehabilitation

In addition, the following technical conditions are also required for the Project:

IRRIGATION DITCHES

- A buffer zone of at least 30m should be maintained between the OHTL pylons/towers and the irrigation canals in order to allow for safe repair and restoration works of the canals.

- In order to allow safe use of excavators for canal maintenance with a length of 15m, electrical wiring should run at a height of 5m from the banks of the irrigation ditch.

WASTEWATER DITCHES

- The distance between the OHTL pylons/towers under construction and the wastewater ditches banks should be at least 25m.
- Electrical wiring should run at a height of 4-4.5m from the banks of the wastewater ditches.

GENERAL REQUIREMENTS

- Installation of power transmission equipment parallel to the ditches is strictly prohibited.
- Measures should be taken to prevent negative impacts on the canals as well as their future repair and restoration works.
- Movement of equipment along the canal tracks is prohibited during the construction and operational phase of the project.
- Construction should commence after the approval of the design by the Irrigation Dept.
- A specialist from the Dept. should be present during the construction works near the canals/ditches.

21.1.2 Water Analysis

A water quality survey was undertaken from the irrigation canals (near crossing points of the OHTL) to better understand baseline conditions prior to works and as a precautionary approach to check for potential contamination.

21.1.2.1 METHODOLOGY

Water sampling was conducted on 21st and 22nd August 2021 with six (6) samples being collected and analysed by a certified laboratory. Water samples were collected following the national standard 31861-2012 "Water. General requirements for sampling".

Sampling locations were selected near certain crossing points along the Bash- Karakul OHTL route as shown in the figure below.

Table 21-2 Water Sampling Location along Bash-Karakul OHTL Route

ID	COORDINATES	
	NORTHING	EASTING
WS1	39°43'31.32"	63°51'3.49"
WS2	40°7'3.07"	63°58'51.25"
WS3	40°31'35.25"	64°33'21.97"
WS4	39°33'31.73"	63°52'1.50"

ID	Coordinates	
	Northing	Easting
WS5	39°33'24.16"	63°52'3.30"
WS6	39°32'53.68"	63°51'58.29"

Figure 21-1 Water Sampling Locations along Bash-Karakul OHTL Route

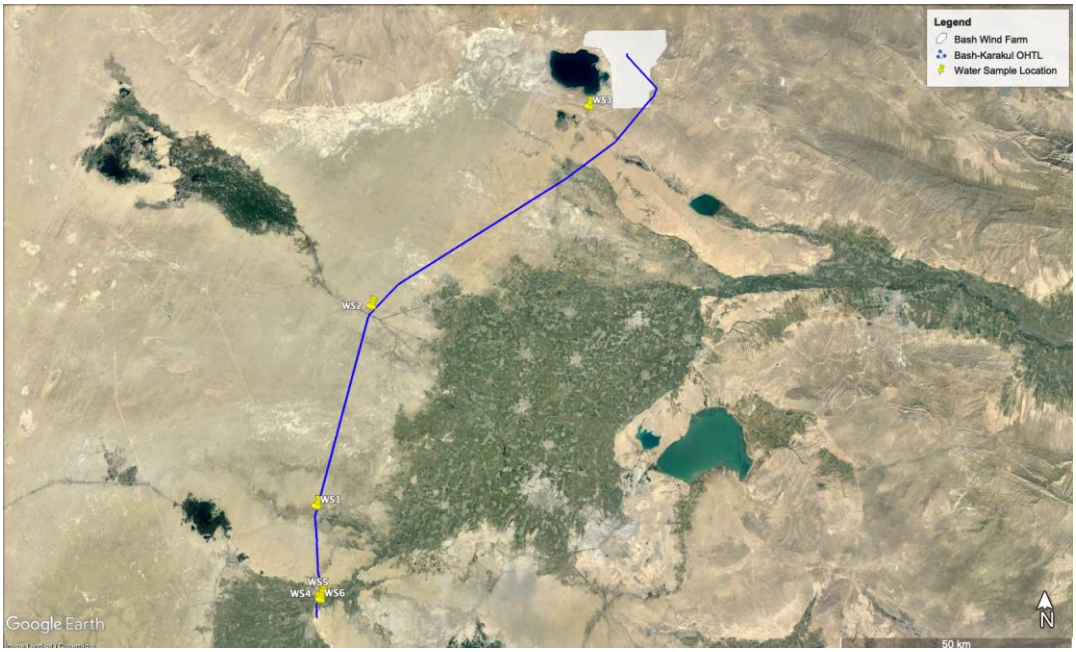


Plate 21-1 Evidence of Water Sampling along Bash-Karakul OHTL Route

21.1.2.2 Results

The results of the water laboratory analysis are presented in the table below and have been compared with the national standards:

- Generalized list of maximum permissible concentrations (MPC) of harmful substances for water in fishery reservoirs for surface waters; and
- O'zDSt 950:2011 National Standard of the Republic of Uzbekistan for drinking water Hygienic norms and quality control.

Table 21-3 Water Analysis Results for Samples Collected along Bash-Karakul OHTL Route

Name of parameters	Sample number						Detectable limits in mg/l	MPC O'zDSt 950:2011
	WS1	WS2	WS3	WS4	WS5	WS6		
pH	8	8	8	8	8	8	1-14	6-9
Turbidity, mg/dm^3	0.03	0.03	0.03	0.03	0.03	0.03	0,001-9999 mg/l	1.5 (2.0)
Arsenic (As) mg/dm^3	0.01	0,011	0,014	0,0079	0,018	0,0098	0.0001-10 mg/l	0.05
Aluminium (Al) mg/dm^3	0.039	0.0057	0.015	0.059	0.0081	0.016	0.002- 10 mg/l	0.2 (0.5)
Cadmium (Cd) mg/dm^3	<0.0001	0,00012	0,000094	<0.0001	<0.0001	0.00028	0.0001- 1 mg/l	0.001
Copper (Cu) mg/dm^3	0.0026	0.0027	0.0031	0.0018	0.0042	0.0026	0.002 - 1 mg/l	1.0
Mercury (Hg) mg/dm^3	$1.4*10^{-5}$	<0.00001	$2.9*10^{-5}$	<0.00001	<0.00001	<0.00001	*	0.0005
Nickel (Ni) mg/dm^3	0.0074	0.0075	0.01	0.0019	0.0066	0.0063	0.002- 1 mg/l	0.1
Ferrum (Fe) mg/dm^3	0.0048	0.0053	0.0059	0.0049	0.0054	0.0055	*	0.3
Lead (Pb) mg/dm^3	0.00028	0.00019	0.000082	0.000073	0.000078	0.000091	0.0002- 10 mg/l	0.03
Zinc (Zn) mg/dm^3	0.0085	0.0055	0.0071	0.0021	0.0033	0.0032	0.0002- 10 mg/l	3.0

The results of the water samples comply with the national standards and do not exceed the maximum permissible concentration. pH in all samples is alkaline, which is considered normal for irrigation water.

The full sets of the water analysis results from the laboratory as well as the laboratory certificate are presented in Appendix V.

21.2 Receptors

Table 21-4 Soils, Geology & Groundwater - Receptor Sensitivity

RECEPTOR	SENSITIVITY	JUSTIFICATION
Farmers in Neighbouring Lands (water supply to their farms)	**High**	The irrigation channels are vital water source for irrigation in the OHTL area and of high importance on a local scale.
Irrigation Water Quality	**High**	

21.3 Potential Impacts, Mitigation, Management and Residual Impacts

21.3.1 Construction Phase

21.3.1.1 Obstruction of Irrigation Channels to Neighbouring Lands

The construction phase of the proposed OHTL can potentially obstruct the flow of the irrigation channels running through the OHTL construction areas to neighbouring farms. This could potentially impact the farming activities and crop yield of the impacted farmers if the required buffer zones are not adhered to as provided by Amu Bukhara Irrigation System Department.

21.3.1.2 Contamination of Irrigation Water

Considering the construction and installation activities for the OHTL are in proximity to the existing irrigation channels, water quality can be susceptible to contamination from any hazardous materials used in these works (e.g. paints, fuels and some chemicals). It is noted that these hazardous materials will be used in small quantities, but impacts could result from inadequate storage, handling and management of waste and wastewater or due to the absence of proper transport, storage, and handling of chemicals, fuel, and oils.

If pollutants reach the irrigation channels, the spread of pollution can increase quite rapidly and can prove difficult to control. The contamination of irrigation water can result in potentially indirect impacts to crops quality, livestock herding in the OHTL area (if they use this water for drinking), and the public consuming crops from lands irrigated with contaminated water.

However, these risks will be managed through the implementation of the project CESMP and associated Management Plans and Procedures.

Table 21-5 Water Environment -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
Obstruction of lirrigation channels to neighbouring land	**Minor Negative**	Farmers in neighbouring Lands	High	**Minor to Moderate**	• The design of the OHTL towers/pylons near the canals/ditches will be submitted to Amu Bukhara Irrigation Systems Basin Dept. • The OHTL design and construction will adhere to the buffer zones provided by the Amu Bukhara Irrigation Systems Basin Dept. • The Project Company and EPC Contractor will conduct consultations with the Amu Bukhara Irrigation Systems Basin Dept. and any damage to the canals will be reported to the Dept. immediately. • The EPC Contractor will hold consultation meetings with the relevant authorities and stakeholders including impacted farmers before any construction works can begin for the OHTL in order to discuss the rerouting of the irrigation channels along the OHTL supplying water to other farms (if required). • The rerouting of the irrigation channels (if required) will not be conducted during planting season which may affect the yields of the affected farmers. • The cost of rerouting the irrigation channels and any other infrastructure related to irrigation of the neighbouring farms such as pumps will not be passed on to the farmers. • The impacted farmers will have access to a grievance mechanism in accordance with the Project SEP.	**Negligible to Minor**
Contamination of irrigation Water	**Minor Negative**	Water Quality	High	**Minor to Moderate**	• Storage of all hazardous materials such as fuels and chemicals in designated storage areas. • 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.	**Negligible to Minor**

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. • 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. • 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. • Wastewater will be stored in septic tanks and no wastewater will be discharged into the irrigation channels. • 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. • 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. • Implementation of good housekeeping practices during construction activities including procedures and requirements for proper handling, storage, and transport of hazardous materials and waste. • Water flow will be channelled to limit the run-off from the OHTL construction area into the irrigation channels. • Site clearance will be limited to the Project footprint in order to minimise unnecessary stripping of vegetation and reduce erosion. • The EPC Contractor will have a grievance mechanism in place that will allow downstream	

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					water users to lodge their complaints and concerns regarding any water issues related to the OHTL construction. • Any grievances will be addressed in accordance with the SEP and corrective action taken immediately.	

21.3.2 Operational Phase

Specific project impacts to surface water and irrigation channels during the operational phase from the OHTL are not expected. Certain preventative and unplanned maintenance works may include the use of paints and other hazardous materials; however, these are not expected in large quantities.

Such impacts could potentially include accidental spills & leaks. Although these materials may be used in small quantities, precaution must be taken 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 pathway to surface waters.

Table 21-6 Water Environment Impact Significance, Mitigation & Management Measures and Residual Impacts – Operation

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
Contamination of Irrigation Water	**Negligible Negative**	Water Quality	High	**Minor**	• O&M Company to ensure conformance with ERP procedures (preventative and response) will be monitored through routine inspections. • 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.	**Negligible**

21.3.3 Decommissioning Phase

Potential impacts relating to decommissioning of the OHTL will be similar to those encountered during the construction phase. As such, it is assumed that the risk of obstruction of irrigation channels and contamination of irrigation water 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 obstruction of irrigation channels and contamination of irrigation water will be applicable to the decommissioning phase as well.

21.4 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 21-7 Monitoring Requirements

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
Construction			
Water Quality	Visible spills & leaks of hydrocarbons and other potentially hazardous or chemical pollution sources	On-going visual observations	Along the OHTL route during construction.
Grievances received	Record of grievances received, response period, close-outs	On-going	Irrigation Channels along the OHTL route

22 ELECTRIC MAGNETIC FIELD

22.1 Introduction

The proposed OHTL will have a rating of 500kV which presents a significant source of electric magnetic field (EMF). Electric fields are produced from the voltage in the transmission line while magnetic fields are produced from the electric current. While electric fields can be shielded by objects (such as buildings or trees), magnetic fields pass through most objects. Such fields are strongest at the source and decrease significantly with increasing distance from the source.

22.1.1 Effects on Human Health

According to the World Health Organisation (WHO) the effects of external exposure to EMF on the human body and its cells depend mainly on the EMF frequency and magnitude or strength (WHO, 2002).

According to WHO, health effects of EMF include:

- Low-frequency electric fields as influencing the human body just as they influence any other material made up of charged particles. When electric fields act on conductive materials, they influence the distribution of electric charges at their surface and cause current to flow through the body to the ground.
- Low-frequency magnetic fields induce circulating currents within the human body. The strength of these currents depends on the intensity of the outside magnetic field. If sufficiently large, these currents could cause stimulation of nerves and muscles or affect other biological processes.

Both electric and magnetic fields induce voltages and currents in the body but even directly beneath a high voltage transmission line, the induced currents are very small compared to thresholds for producing shock and other electrical effects (WHO, 2016).

22.2 Baseline Conditions

According to the OHTL prefeasibility study report there are eight (8) transmission line crossings along the proposed OHTL. These include three OHTLs running through the central area of the Project site with a rating of 220kV. In addition, approximately 11km of the proposed OHTL (mostly within the Bash site) will run parallel to the future Murantau- Navoi 500kv OHTL.

The majority of the OHTL from Bash to Kurakul mainly passes through uncultivated desert pasture land and 15-18km is through irrigated land while the land between Kurakul station and irrigated fields is used for commercial purposes.

There are approximately 4 land users with structures within the 30m HPZ to be established for the OHTL. These receptors will be resettled in accordance with the requirements within the

Project specific RAP. The closest community to the OHTL is Kuklam village which is located approximately 2.1km south east of the Bash-Kurakul OHTL and outside of the HPZ.

22.3 Receptors

With regards to electro-magnetic field, the expected range of impacts likely to be within a buffer zone of 30m on both sides of the OHTL. The table below presents the receptors that may be located within this buffer zone.

Table 22-1EMF - Receptor Sensitivity

RECEPTOR	SENSITIVITY	JUSTIFICATION
Herders, and farmers using the Project site & the land along the OHTL alignment	**Medium**	The herders and farmers using land found along the OHTLs will be relatively vulnerable to exposure to electric magnetic field.
Users of the irrigation ditch & canal	**Medium**	Users of the irrigation ditch & canal will l be relatively vulnerable to exposure to electric magnetic field
OHTL Maintenance workers	**Medium**	The OHTL maintenance workers will be relatively vulnerable to EMF exposure because of their work in close proximity to the OHTL.

22.4 Potential Impacts, Mitigation, Management and Residual Impacts

22.4.1 Construction Phase

EMF is associated with cables that are transmitting electricity and therefore no impacts are anticipated during the construction phase of the Project.

22.4.2 Operational Phase

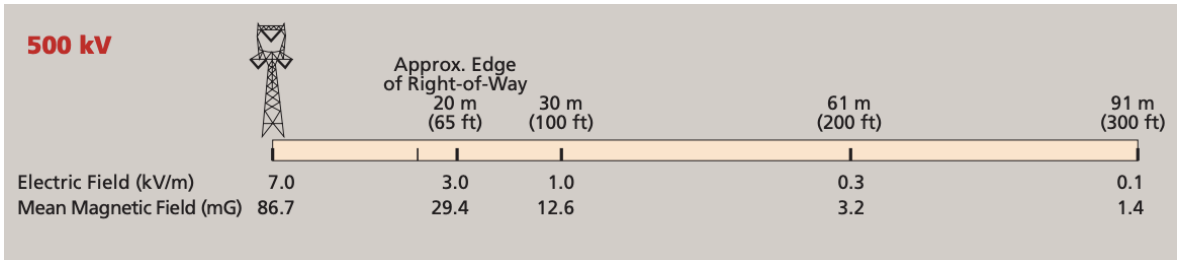
22.4.2.1 EMF

The majority of the OHTL from Bash to Kurakul substation is located within desert area without human settlements. As such, potential impacts relating to EMF will potentially be in the agricultural zones and areas near human settlements. 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 22-1 Typical EMF levels for Power Transmission Lines



Source: *National Institute of Environmental Health Sciences, 2002*

In the context of the Bash-Kurakul OHTL, the closest residential area is approximately 250m west of the OHTL where the EMF levels will be below 0.1kV/m for electric fields and).14 µT (1.4mG) magnetic fields. This represents a negligible impact to these receptors.

It is expected that some agricultural activities will continue directly under the OHTLs where the EMF may exceed the national and lenders requirements. However, agricultural activities under the OHTLs are expected to be spaced out, thus limiting the period of exposure to workers and animals.

22.4.2.2 Electromagnetic Interference

The corona of overhead transmission line conductors and high-frequency currents of overhead transmission lines may result in the creation of radio noise. Typically, transmission line rights-of-way and conductor bundles are created to ensure radio reception at the outside limit remains normal. There are no radio or TV broadcast stations located near the OHTLs.

22.4.2.3 Occupational EMF Exposure

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.

Table 22-2 EMF 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
Exposure to EMF	**Negligible Negative**	Herders and farmers using the Project site & the land along the alignment of the OHTL	Medium	**Negligible to Minor**	• Installation of cables at increased height above ground to allow for agricultural activities and movement of machinery under the OHTL to continue. This will also reduce EMF exposure to farm workers. • Implementation of the Project specific RAP so that receptors with structures within the HPZ are resettled. • All land users along the RoW will be provided with a written document which will include land use restrictions and an explanation of safety risks to them in case of violations i.e., construction of new buildings within the HPZ, planting certain trees or crops etc. • After provision of such information, land users will be required to sign a form as proof they were briefed and they understand the future restrictions and potential risks (including EMF). • Safety signals and warning signs will be posted along the OHTL.	**Negligible**
	Medium Negative	Users of the irrigation ditch & canal	Medium	**Negligible to Minor**		**Negligible**
	Medium Negative	OHTL Maintenance workers	Medium	**Negligible to Minor**	• 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.	**Negligible to Minor**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					• Utilization of personal monitors during work activities in high EMF zones.	

22.4.3 Decommissioning Phase

As EMF is only associated with cables that are transmitting electricity, no impacts are expected during the decommissioning phase since electricity will be disconnected.

23 TRAFFIC AND TRANSPORTATION

23.1 Observation and Baseline Environment

Based on review of satellite imagery, there are a number of vehicle tracks along the Bash - Karakul OHTL route. There are no local access roads to the OHTL route and the nearest highway is the Highway A379 located approximately 14km east of the wind farm site and Highway A380 located towards the southern extent of the OHTL. Both highways are single carriage ways with dual lanes.

Given the lack of local access road in the vicinity of the OHTL route in some areas, it is understood that an access road will be established along the OHTL route where none is available. This access road will be paved and will link to the highways to enable access & delivery of OHTL components.

23.2 Receptors

Table 23-1 Traffic & Transportation – Receptor Sensitivity

RECEPTOR	SENSITIVITY	JUSTIFICATION
Users of Highways A379, A380	**Medium**	Although the traffic flows on highway are low at present, the highways are single carriage ways & narrow and this may present a challenge to other road users during the transportation of OHTL components.
Users of the vehicle tracks along the OHTL route including children	**High**	Farmers of agricultural fields along the route, herders together with livestock and other land users use these vehicle tracks and as such will be particularly vulnerable to an increase in vehicular flow in the OHTL area.

23.3 Potential Impacts, Mitigation, Management and Residual Impacts

23.3.1 Construction Phase

23.3.1.1 Transportation of OHTL Materials and Equipment

The major components for the construction of the OHTL are pylons/ towers, wires, conductors etc. that can only be assembled along the OHTL corridor and as such they have to be transported to the site individually.

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. The exact route the construction vehicles will take to reach the site is not known, however it is expected that all vehicles will use the access road that will be established by the Project along the OHTL route.

The EPC Contractor will be required to apply for the relevant permits to transport OHTL components, equipment and machinery across borders and with local roads authorities.

23.3.1.2 Increased Vehicular Flow and Traffic Congestion

A limited number of vehicles will be required for the OHTL construction, which is expected to follow defined routes along the OHTL corridor and primarily move between works at tower location. Due to the remote location of the majority of the OHTL works, much of this vehicle movement will be in areas that have few existing roads and tracks that have limited (or no) existing vehicular movements. The addition of vehicles along other existing routes will likely result in very minor temporary increases in traffic.

23.3.1.3 Safety of Residents

The many vehicle tracks along the OHTL route will be used by farmers of agricultural fields, herders and other land users present along the OHTL. There is also the possibility of users of the vehicle tracks to want to utilise the access road established by the Project

As the development of the OHTL will require the use of vehicles carrying normal loads & abnormal loads, this will result in an increase in the number of vehicles (both LDVs & HGVs) in the OHTL area (an area with low traffic flows) as a result of the OHTL's development and this has the potential to result in road traffic accidents affecting farmers, herders and other road users including vulnerable groups such as children, disabled and elderly.

Table 23-2 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**	Highways A379 & A380 and project access road	Medium	**Moderate**	• A Traffic & Transportation study will be conducted before the transportation of OHTL related equipment and machinery. • The plan will assess the requirements for upgrades to be made to highway & local road infrastructure to enable safe transportation of oversized and/or heavy specialised transportation vehicle	**Minor**
Increased vehicle flow on highway	**Minor Negative**	Drivers along the highways A379 & A380	Medium	**Minor**	• 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 OHTL components will be delivered to the site and outline how construction traffic will be managed to limit impacts upon farmers, herders, project personnel, and other road users. • The plan will include information on the designated access routes, speed limits, waiting, parking areas and map out accident and traffic hotspots for access vehicles etc. • The local police and other relevant authorities will be consulted during the development of the Traffic & Transportation Management Plan; • Construction of access road in the OHTL working areas 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 project access roads & highways areas leading to OHTL. • Deliveries of OHTL construction materials will be coordinated to reduce congestion on access roads and to reduce the waiting time for the drivers.	**Negligible to Minor**
Safety of Residents of nearby villages & herders	**Minor Negative**	Farmers of agricultural fields, herders and other land users nearby the project access road including children	High	**Minor to Moderate**		**Minor**

Potential Impacts	Magnitude of Impact	Receptor	Sensitivity	Potential Impact Significance	Mitigation and Management Measures	Residual Impacts
					• Where applicable, the EPC Contractor will notify the local communities on delivery of materials and how it could potentially impact road use. • Road closures and diversions as a result of transportation of OHTL component will be kept to a minimum and wherever practicable peak transportation hours must be avoided to reduce impacts on commuters & road user. • The EPC Contractor will provide awareness training on traffic safety to the local people in collaboration with local police office. • Children will be informed about the project at local schools and in village meetings and they will be educated about the importance of road safety and risk associated with road crossing. • Road safety campaign will be implemented. Particular attention will be given to vulnerable groups including children, illiterate community members and the elderly so they are well informed about the risk that may arise from road crossing and transportation. • 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.	

1.1.2 Operational Phase

23.3.1.4 Increased Vehicle Flows

It is expected that the movement of vehicles along the OHTL during the operational phase will only be for inspection and preventative and unplanned maintenance purposes. As such, there will not be any vehicle movement during day-to-day operational conditions.

Table 23-3 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	**Negligible Negative**	Project Access Rodas	Medium	**Negligible to Minor**	• Operational phase workers will be encouraged to carpool wherever possible to limit the number of vehicles along the local roads.	**Negligible**

23.3.2 Decommissioning Phase

Potential impacts during decommissioning phase of the OHTL are anticipated to be similar to those encountered during construction. As such, it is assumed that risk of transportation of OHTL 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 OHTL components, increase in vehicle flow on highway, project access roads and increased risk of road traffic accidents will be applicable to the decommissioning phase as well.

23.4 Monitoring

The final monitoring methodology with specific monitoring details (i.e. locations etc.) will be developed in the specific 'Environmental and Social Monitoring Plan'.

Table 23-4 Traffic and Transportation Monitoring Requirements (Construction)

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
Safety of drivers, farmers local herders and other local community members in the Project area	Record keeping in case of accidents or incidents or in case of any complaints from local communities.	Daily	Roads used by the Project vehicles

24 INFRASTRUCTURE & UTILITIES

24.1 Observation and Baseline Environment

24.1.1 OHTL Site Visit

Site visits along the OHTL route were undertaken between 24th to 29th June 2021 by Juru Energy's Technical Team as part of the OHTL prefeasibility study commissioned by ACWA Power. During this period the Juru Energy E&S Team were also present to conduct surveys related to the ESIA and were accompanied by representatives from organisations with infrastructure and utilities found along the proposed Bash to Kurakul OHTL alignment.

Details of the specialists present during the site visit are as shown in the table below.

Table 24-1 Specialists Present During the Site Visit

ORGANIZATION	NAME OF REPRESENTATIVE	POSITION
NEGU Bukhara Branch	Bukaev M	OHTL Engineer
Ustansgaz	Kosimov A.	Chief Engineer
Uztelecom	Do'stmurodov D.	Chief Engineer
State Committee for Geology	Sattorov S.	Inspectorate for Mining & Geological activities control
Karakul SS	Berdiev Z.	Head of Substation Karakul
Bukhara Railway Power Supply Enterprise	Qaxorov C.	Deputy Chief

24.1.2 Observations along the OHTL

During the site visit the following infrastructure and utilities were identified along the proposed OHTL alignment.

Table 24-2 Details of Infrastructure & Utilities along the OHTL

INFRASTRUCTURE AND/OR UTILITIES	DESCRIPTION	PHOTO
Connection to the 500kV Bash-Karakul line	This will require the Bash-Karakul line to cross with existing 500kV line which is allowed by local PUE[13]. The two 500kV line crossings is subject of system reliability and subject to approval by NEGU's head office.	 Available space for installation of 500kV overhead support for connection to spare bay.
Kandym – Karakul railway and the main highway	Located approximately 10.7km from the Karakul substation. The railway line is intended for carriage of goods.	 Railway crossing

[13] PUE – 2011. 2.5.117, for 500kV overhead line crossings, the supports of the crossing overhead line must be of normal anchoring design.

Infrastructure and/or Utilities	Description	Photo
3 main gas pipelines belonging to Transgaz	The 3 main gas pipelines have a diameter of 1020mm each with an estimated width of 70m. These are located approximately 17km from Karakul sub-station.	 Gas pipeline mark
Gas pipelines and underground communication line	Located approximately 67.5km from Karakul substation. The three Aziatransgas gas pipelines have a diameter of 1020mm each with a depth of 1.5m and one Uztransgaz gas pipeline. There is also an underground communication line after the gas pipeline.	 Crossing point of the gas pipeline

Infrastructure and/or Utilities	Description	Photo
Bukhara Gazli highway	The OHTL crosses the highway at approximately 105km from the Karakul substation.	 Crossing over the highway
Bukhara-Misken railway	Located approximately 114km from the Karakul sub-station.	 Bukhara-Misken railway

Infrastructure and/or Utilities	Description	Photo
Shofirkon gas pipeline	Located approximately 35km from the proposed Bash substation. The pipeline has a diameter of 325mm and a depth of 1.1m.	 Gas pipeline crossing
Navoi-Uchkuduk railway	Located approximately 15km from the Bash Project site this railway line connects between Navoi-Uchkuduk.	 Navoi-Uchkuduk railway

Infrastructure and/or Utilities	Description	Photo
MG Gazli – Chimkent gas pipeline	Located 13.5km from the proposed Bash substation.	
Existing OHTL	The proposed alignment is crossed by three 220kV OHTLs (L-Bessapan, L-17-D and L-A-B) at approximately 13.5km from the Bash substation.	

Source: Pre-feasibility Study for 500kV Transmission Lines (draft), 2021

24.1.3 Consultations with Ministry of Transport

A consultation letter was sent to the Ministry of Transportation on 23rd September 2021 providing OHTL coordinates from Bash to Kurakul sub-station and the three intersecting points with the highway. The following clarifications were also requested:

- Which cities/districts or regions do the roads connect?
- What are the buffer zones required for the construction of the OHTL near the highway/roads?
- Any additional requirements for the transportation of OHTL workers and materials.

A response was received from the Territorial Administration for Highways in Bukhara Region (under the authority of the Ministry of Transportation) was received on 21st October 2021 requesting that the Project specialists should accompany representatives from the Dept. for a site visit to study the intersecting points between the OHTL and the highways. This letter was provided to ACWA Power for further follow up because the OHTL technical studies do not fall under the scope of this ESIA.

24.2 Potential Impacts

Inappropriate design of the OHTL could affect the infrastructure and utilities observed along the alignment of the OHTL. For instance, the wrong vertical height of the OHTL from roads could pose a public safety concern for commuters using the road. Damage of the existing facilities i.e., gas pipelines, existing OHTL etc could potentially result to disruption of services to many customers within Uzbekistan and to other countries who rely on the gas supply.

As such, on-going consultations will be undertaken and the conclusions of the OHTL prefeasibility study implemented as provided below.

24.3 Mitigation and Management Measures

The mitigations and management measures below are as provided in the conclusions provided in the OHTL Prefeasibility study report which was prepared in consultation with the relevant stakeholders.

ASPECT	CONCLUSIONS
Crossing across underground gas pipelines	• This will be implemented in accordance with the requirements of the "Rules for the technical operation of main gas pipelines" (PTE MG-20069 and VSN 51-1-80). • The technical conditions for design will be obtained from the owners of the pipelines and ACWA Power will follow these requirements and ensure compliance with its conditions. • Design approval at the crossings will be obtained from the owners of the gas pipelines.

ASPECT	CONCLUSIONS
	• The crossing angle of 500kV overhead lines over underground gas pipelines must be at least 60°. • The horizontal distance from the axis of the main gas pipelines to the ground electrode and the underground part of the overhead line support must be at least the values specified in the PUE. • At the crossing point, the installation of identification marks with a height of 1.5 -2.0m, in accordance with the requirements of the "Rules for the technical operation of main gas pipelines" PTE MG-20069 and VSN 51-1-81 will be provided.
Crossings over railways	• This will be undertaken in compliance with technical conditions from the railway owner. • The crossing must be carried out in accordance with the current norms of the local KMK and the PUE-2011.2.5.138 • The crossing must be made across the railway on metal anchor supports of appropriate dimensions with the fastening cables on double strings of insulators. • After the development of the transition project coordination will be required with the UE "RZhU Tashkent" and design Institute.
Crossing over highway	• Undertake site visits and consultations with the Territorial Administration for Highways in Bukhara Region. • When crossing highways, the supports of OHTL that limit the span of the crossing must have an anchor of a normal structure. • The horizontal distance from the base of the support to the edge of the roadbed of the road at the intersection must not be less than the height of the support. • The vertical distance from the wires to the roadbed, in normal mode, overhead line is at least 9m as per table 2.5.28 of PUE.
Crossing over existing transmission lines	• At the point of intersections of 500kV OHTL with each other, the supports of the crossing overhead line must anchor on a normal structure. • Crossings of 500kV OHTL must be carried by anchored towers with normal structure • Crossings of 500kV OHTL with 220kV lines and below can be implemented by intermediate supports. • Overhead lines of 220kV and below can be built under the operating lines of 500kV in spans limited by the intermediate supports. • All two-line crossings with each other have contingent impact on system reliability and must be approved by NEGU's head office.
All crossings	• Third party crossing protocols will be prepared and implemented and training provided to the workers and third parties on the requirements during construction and operational phase.

24.4 Structure Requirements at Crossing Points

24.4.1 Transmission Line Crossings

Dead End Tower/Angle Tower/ Special type Tower will be used to cross existing OHTL to avoid long shut down period of existing OHTL during the construction process. These towers will be used with body extension to provide required vertical clearance from top of existing conductor. Tower height and body extension height will depend on the existing conductor height.

24.4.2 Railway Crossing

Dead End tower/Section Tower/Angle Tower will be used to cross the railway line. These type tower will provide easiness in stringing during construction period and the required vertical clearance.

24.4.3 Pipeline Crossing

This crossing will not require any special type of tower. All pipelines are crossed at 90°. Required horizontal & vertical clearance will be provided during tower spotting.

24.4.4 Highway Crossing

Dead End Tower/Angle Tower will be used to cross the highway road for easiness in stringing during the construction period. Tower height and body extension requirement will depend on the importance of the road which requires continued consultations with relevant authorities.

24.4.5 Small Road Crossing

Crossings over small roads will not require any special type of towers.

Table 24-3 Summary of the Infrastructure & Utilities between Bash – Kurakul

ELEMENT	DESCRIPTION	SPECIAL TOWER REQUIREMENT
Number of transmission line crossings	8	Yes
Number of railway line crossings	3	Yes
Number of pipeline crossings	4	No
Number of highway crossings	2	Yes
Number of small road crossings	1	No

Source: Pre-feasibility Study for 500kV Transmission Lines (draft), 2021

25 ARCHAEOLOGY AND CULTURAL HERITAGE

25.1 Observation and Baseline Environment

Based on the consultations undertaken to date and review of satellite imagery, there are no known archaeological sites or other sites of potential cultural importance within 5km radius of the OHTL.

However, given that a number of archaeological finds were discovered at the Wind Farm during the archaeological survey and the Wind Farm & OHTL are located within relative proximity, there is potential for archaeological finds or items of cultural importance to be within the vicinity of the OHTL.

25.1.1 Consultation with the Institute of Archaeology

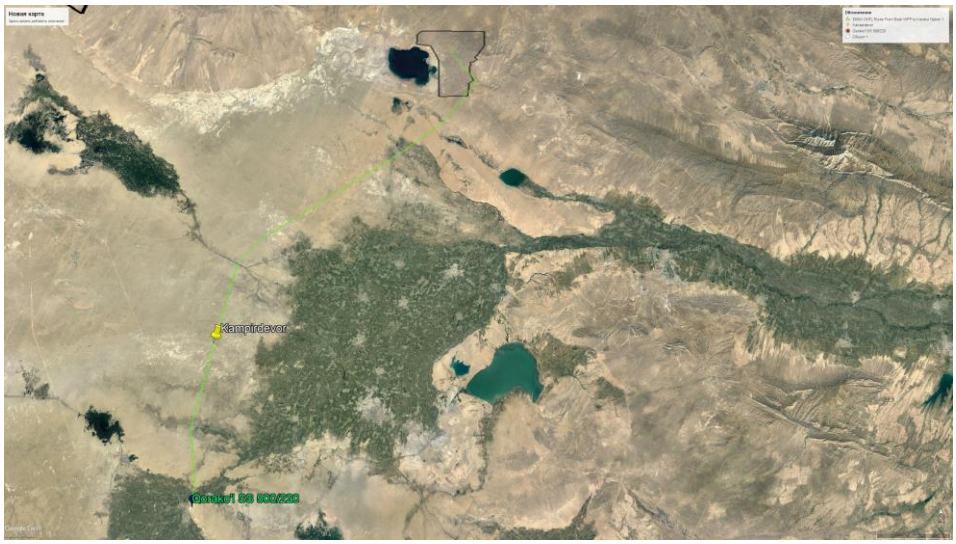
A consultation letter was sent to the Institute of Archaeology under the Academy of Sciences of the Republic of Uzbekistan on 24th September 2021 requesting if there any recognized archaeological sites along the planned Bash-Kurakul OHTL route. A response letter was received on 12th October 2021 stating that no archaeological research has been undertaken along the planned Dzhankeldy- Bash-Kurakul route and therefore there is no information regarding the presence/absence of archaeological sites/finds along the route. However, the OHTL route is found in the Kyzylkum desert area where ancient stone age settlements, workshops, tombs or burial grounds of ancient nomadic herders have been found. As such the Institute stated that there is potential for ancient items of cultural importance to be present along the route and therefore preliminary archaeological research should be undertaken along the OHTL.

25.1.2 Consultations with the Cultural Heritage Agency

A letter was sent to the Cultural Heritage Agency on 25th October 2021 requesting for details regarding the archaeological and cultural objects/items along the Bash-Kurakul OHTL alignment. The Agency delegated the letter to the Bukhara regional department for Cultural Heritage Agency requesting them to provide a response to the clarifications submitted by the Project.

The Bukhara region department for Cultural Heritage Agency, provided a response on 4th November 2021 stating that there are kampir devor cultural objects along the Bash-Kurakul OHTL as shown below. The Dept. stated that the Project will be required to adhere to the set buffer zones and construction works should be conducted under the supervision of an archaeologist.

Figure 25-1 Location of the Kampir Devor along the OHTL



According to publicly available information, kampir devor consists of ruins of defensive structures constructed by farmers in Central Asia to protect them from attacks from nomads.

Additional consultations was undertaken with the Bukhara Cultural Heritage Agency in order to determine the exact area (width & height)and the applicable buffer zones of the kampir-devor found near the OHTL. A response was received on 17th December 2021 stating that there are two (2) kampidevor objects located within a 1km radius of the OHTL route. According to Annex 7, part No. 33 of the resolution *"On approval of some normative legal acts on organization of activities of the Department of Cultural Heritage under the Ministry of Culture of the Republic of Uzbekistan protection and use of tangible cultural heritage"*, the protected boundaries of archaeological sites are 100 meters.

Figure 25-2 Exact Location of the Two (2) Kampir Devor Objects in Relation to the OHTL

25.1.3 Archaeological Survey Along OHTL Route

Given that the Bukhara region department of Cultural Heritage Agency does not require archaeological surveys to be undertaken along the OHTL route and only requires that an archaeologist is present, the Project will ensure that an archaeologist is on site during the construction works and the Project will adhere to the established buffer zones of 100m as stated in the response received from Bukhara Cultural Heritage Agency on 17th December 2021.

25.2 Intangible Cultural Heritage

Though specific consultations have not been undertaken along the OHTL in relation to existing elements of intangible cultural heritage, it is highly likely that at least two (Palov culture and Nawrouz) are practiced within communities along the OHTL as they are common across Uzbekistan. The nearest community to the OHTL is Kuklam village which is located approximately 2.1km south east of the Bash – Kurakul OHTL. However, it is noted that there are land users (herders, farmers and commercial) along the OHTL who may potentially also practice the same elements.

25.3 Receptors

Table 25-1 Archaeology & Cultural Heritage –Receptors

RECEPTOR	SENSITIVITY	JUSTIFICATION
Unknown items of cultural or archaeological significance	**Medium**	Although there are no items of archaeological or cultural importance in proximity to the OHTL route, the local area is known to be of importance archaeologically or culturally. As such, unknown buried artefacts are of high to medium importance on a local scale.
Intangible Cultural Heritage	**High**	The OHTL alignment is located near communities that potentially practice the Palov culture, Nawrouz etc. These are important elements and part of a national identity that has also been recognised by UNESCO.

25.4 Potential Impacts, Mitigation, Management and Residual Impacts

25.4.1 Construction Phase

25.4.1.1 Direct Impact to Unknown Buried Archaeology

Given the proposed location of the OHTL route in an area identified to be of archaeological significance, excavation and earthwork activities can result in damage and destruction of undiscovered archaeological artefacts. Although there are no items of archaeological or cultural significance within 5km of the OHTL route, 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 in the unlikely event any items of archaeological significance are discovered, these can be appropriately identified and preserved.

25.4.1.2 Impact on Intangible Cultural Heritage

There are potentially 2 (or more) elements of intangible cultural heritage along the OHTL (though not officially confirmed). As such, the construction of the OHTL could potentially induce social change and introduce new cultural influences resulting to tensions between the workers and local communities.

However, the impacts are expected to be negligible as the number of workers will be relatively low and laydown areas along the OHTL are expected to be in use for a few weeks after which they will disassembled and moved to another area of construction. The relatively low number of workers at each construction area (where pylons are located) would therefore not cause any significant cultural influence/social change or prevent any of the communities from practicing these elements.

Table 25-2 Archaeology and 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
Accidental destruction of unknown archaeological resources buried along the OHTL route.	**Minor Negative**	Unknown belowground archaeological artefacts or remains	Medium	**Minor**	• An archeologist will be present during the construction phase of the OHTL in order to supervise construction works especially near established buffer zones. • An archaeological 'Chance Find Procedure' will be developed prior to construction and the start of 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 relevant government authorities. • A Cultural Management Plan will be developed and implemented. • Where artefacts or archaeological remains are encountered, the site will be clearly signed/delineated with high visibility flagging to impede access and prevent any damage or loss of the artefacts which have just been found. • Contractor crew to be informed during morning toolbox meeting about any suspected archaeological finds to avoid disturbance. • Removal of any archaeological artefacts found along the OHTL route by site workers is strictly prohibited.	**Negligible**
Impact on intangible cultural heritage	**Negligible Negative**	Communities who practice an of the elements of intangible cultural heritage	High	**Minor**	• Implement mitigation under section 13.4.1 (Table 13-4) of this ESIA.	**Negligible**

25.4.2 Operational Phase

The operational phase will not result in further impacts to archaeology, as the site will be static and excavations will not be required.

25.4.3 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 OHTL.

As such further consultations will be conducted with the National Centre of Archaeology and the Institute of Archaeology in order to determine the mitigation measures to be implemented. If further groundworks are required during the decommissioning phase.

25.4.4 Monitoring

Table 25-3 Archaeology and Cultural Heritage - Monitoring Requirements

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
Construction			
Archaeological Resources & Artefacts	Undiscovered archaeological remains along OHTL route	Continued visual observations by site staff involved in excavations.	The OHTL construction area requiring excavations, earthworks or grading during construction.

26 LANDSCAPE AND VISUAL AMENITY

26.1 Observation and Baseline Environment

This chapter identifies aspects of the landscape and visual receptors along the OHTL route.

Based on numerous site visits undertaken to date and review of satellite imagery, the OHTL corridor consist of different landscape character; desert land, agricultural fields, areas with salt marshes, irrigation canals and a number of infrastructures identified in the Karakul district of the proposed OHTL route. As such, a landscape & visual impact survey was undertaken along the proposed OHTL route between the Bash substation which will be located at the Project site and the Karakul Substation.

26.1.1 Landscape Baseline

26.1.1.1 Landscape Survey

METHODOLOGY

The landscape survey was undertaken in July 2021 at a total of sixteen (16) viewpoint locations along the OHTL route. The survey involved taking photographs of the cardinal directions at the chosen locations to assess the landscape character as well as the view of the proposed OHTL as seen from identified receptors. Photographs were taken during periods of good weather and clear atmospheric conditions to capture the optimal scenario of the best visibility of the OHTL and surrounding area.

The locations of the viewpoints are shown in the table and figure below.

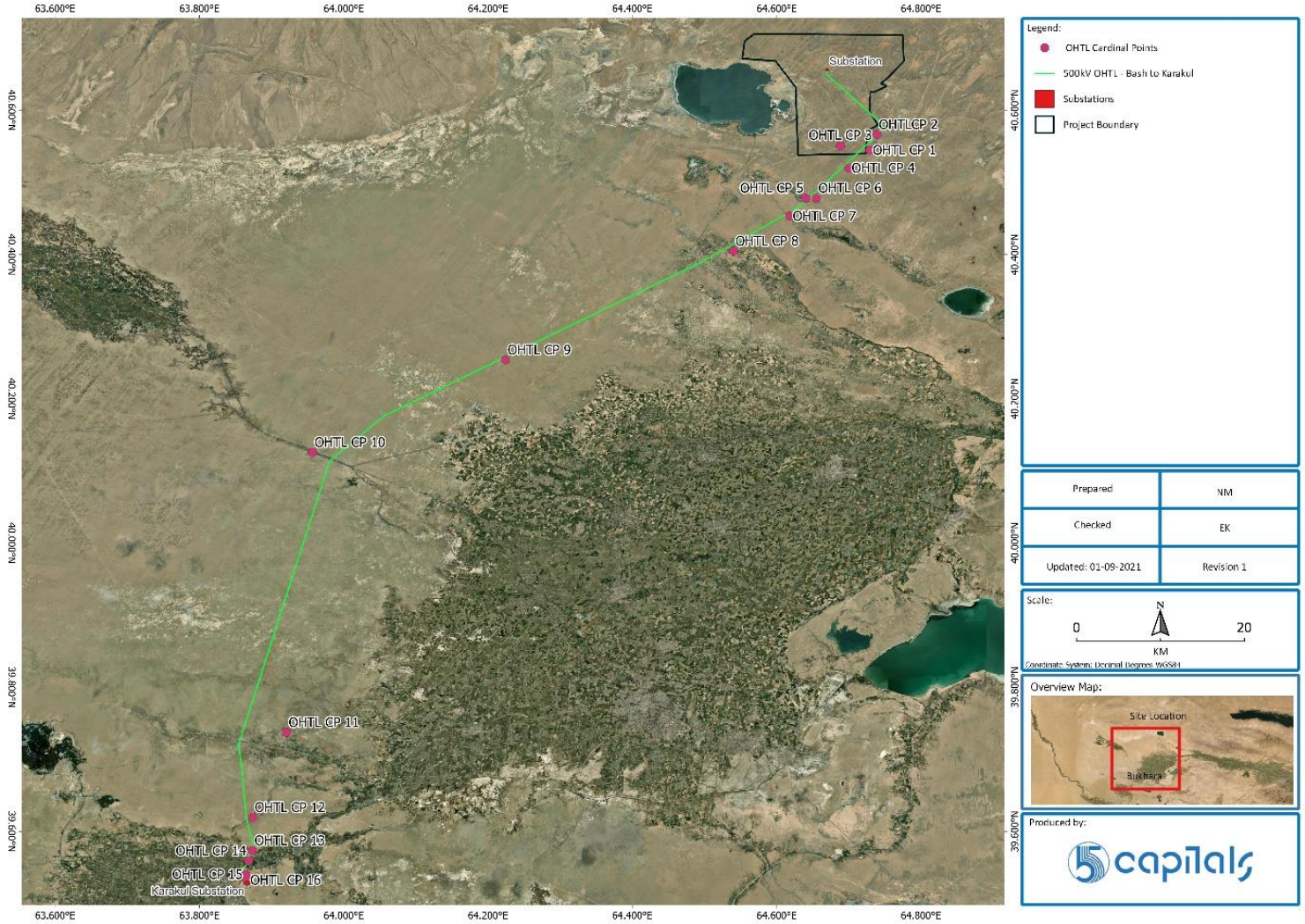
Table 26-1 OHTL Cardinal Point Locations

VIEWPOINT ID	COORDINATES		DESCRIPTION
	LONGITUDE	LATITUDE	
OHTL CP 1	64.729059	40.54475	Located on the railway crossing on the outskirts of the small village and Oil and Gas Facility.
OHTL CP 2	64.738713	40.566159	Located where the proposed OHTL crosses the ATG.
OHTL CP 3	64.688486	40.550145	The represents the views as seen from the ATG facility.
OHTL CP 4	64.699597	40.520028	This represents the view as seen from a small structure used seasonally by herders.
OHTL CP 5	64.640106	40.478111	Located on the edge of the saltmarshes from the Ayakagitma depression.
OHTL CP 6	64.65485	40.478059	This represents the view as seen from a small structure used seasonally by herders.
OHTL CP 7	64.618118	40.453511	Located where the proposed OHTL crosses a water canal.

Viewpoint ID	Coordinates		Description
	Longitude	Latitude	
OHTL CP 8	64.539905	40.404742	This represents the view as seen from the agricultural fields.
OHTL CP 9	64.224335	40.253815	This represents the view of the proposed OHTL as seen from the structure used by camel herders.
OHTL CP 10	63.956808	40.125683	Located where the proposed OHTL crosses two parallel canals and highway A380.
OHTL CP 11	63.920704	39.737285	This represents the view as seen from the agricultural fields.
OHTL CP 12	63.873706	39.619547	Located where the proposed OHTL crosses the railway tracks.
OHTL CP 13	63.873394	39.57368	This represents the view as seen from the agricultural fields near the proposed OHTL.
OHTL CP 14	63.868149	39.55934	This represents the view as seen from the agricultural fields where the proposed OHTL crosses a canal.
OHTL CP 15	63.864301	39.54074	This represents the view as seen from the industrial facilities near the proposed OHTL.
OHTL CP 16	63.866362	39.532833	This represents the view as seen from the Karakul Substation.

Notes:
OHTL = Overhead Transmission Line
CP = Cardinal Points
Coordinate System = WGS 1984, Decimal Degrees

Table 26-2 OHTL Cardinal Point Locations



RESULTS

The proposed OHTL will predominantly be constructed on an undeveloped, open desert landscape with the landscape typology characterised by sparse shrub vegetation, gravel or coarse soils with the occasional minor dunes, salt marshes, irrigation canals and irrigated agricultural fields.

The large portion of the OHTL is found within a desert area with little anthropogenic influence due to its remote nature. The most significant anthropogenic contributions to the landscape are from the existing infrastructure and facilities identified in the Karakul district as well as the various irrigated farms and canals in the Atabuzuk area.

The following subsections highlight different elements and attributes which determine the landscape baseline along the OHTL route.

LAND USE AND COVER

Land use along the OHTL route consist of an undeveloped natural desert with some undulating hills, sand dunes, saltmarshes, water canals and irrigated agricultural fields. The undeveloped desert area is commonly used by herders (for sheep, camels and goats). While rice, cotton and watermelons are just some of the crops produced in the irrigated field. There are mainly two settlements along the route, Kuklam village and Karakul Town.

Plate 26-1 Herder's Structure Along Proposed OHTL

Plate 26-2 Typical Irrigated Agricultural field

Plate 26-3 Typical Irrigation Canal

SETTLEMENT

The only notable settlement along the OHTL route is the Kuklam Village which is a small settlement near the proposed Wind Farm. This settlement is very small and focused on agriculture, typically farming with Goats, Sheep and Camels. The village also has an Oil facility on its outskirts and a small railway station. Most roads are dirt tracks servicing the sporadically distributed homes. Most buildings are limited to one story in height.

SOCIAL INFRASTRUCTURE

The most significant anthropogenic contributions to the landscape are from the existing infrastructure and facilities identified in the Karakul district, as presented in the table below.

ID	NAME OF INFRASTRUCTURE & FACILITIES	AREA
1	"Kirobod Mavjlari" LLC – brick factory	0.70 ha
2	"Autodrome"	2 ha
3	"Universal 5" LLC	1 ha
4	"Kumush Kala" LLC - Cotton receiving factory	10 ha
5	Livestock market	3.5 ha
6	Construction materials market	5 ha
7	The Karakul District Cemetery	217.5 ha
8	"Abdukadir Baraka" LLC	1.5 ha
9	"Mardon" Farm	64 ha
10	"Farkhod Bekhruz Pakhtakor" Farm	49.54 ha
11	"Gofur Razzok" Farm	177.24 ha
12	"Barkhayot Mukhammad Rajab" Private Farmstead	161 ha
13	"Ismail Sher Chorvador" LLC	2 ha
14	"Aziz" Private Enterpreneur	0.74 ha

Plate 26-4 Karakul Substation

Plate 26-5 Karakul, Kirobod Mavjlari" LLC – Brick Factory

Plate 26-6 Oil Facility at Kuklam Village

LANDFORM AND TOPOGRAPHY

The topography along the OHTL route is similar to that of the wider region and consists of rolling desert shrub-covered hills and the occasional dunes. The elevation of the OHTL route ranges from around 280m above sea level at Kuklam Village to around 200m above sea level within the Karakul District.

VEGETATION

The dominant vegetation within the study area is small desert shrubs in the undeveloped desert landscape. Some diversity of flora species can be found as the landscape changes from gravel plains and dune habitats to saltmarshes, where a large number of Halophytes were observed. The irrigated fields and canals also had a much larger diversity of plants.

Plate 26-7 Typical Vegetation of The Dune Landscapes

Plate 26-8 Typical Vegetation of The Gravel Plain Landscape

LANDSCAPE CHARACTER AREAS

Through a combination of desktop study and fieldwork surveys along a 3km buffer of the OHTL route, the landscape is classified into five (5) distinct LCA's. as shown in the following table and figure.

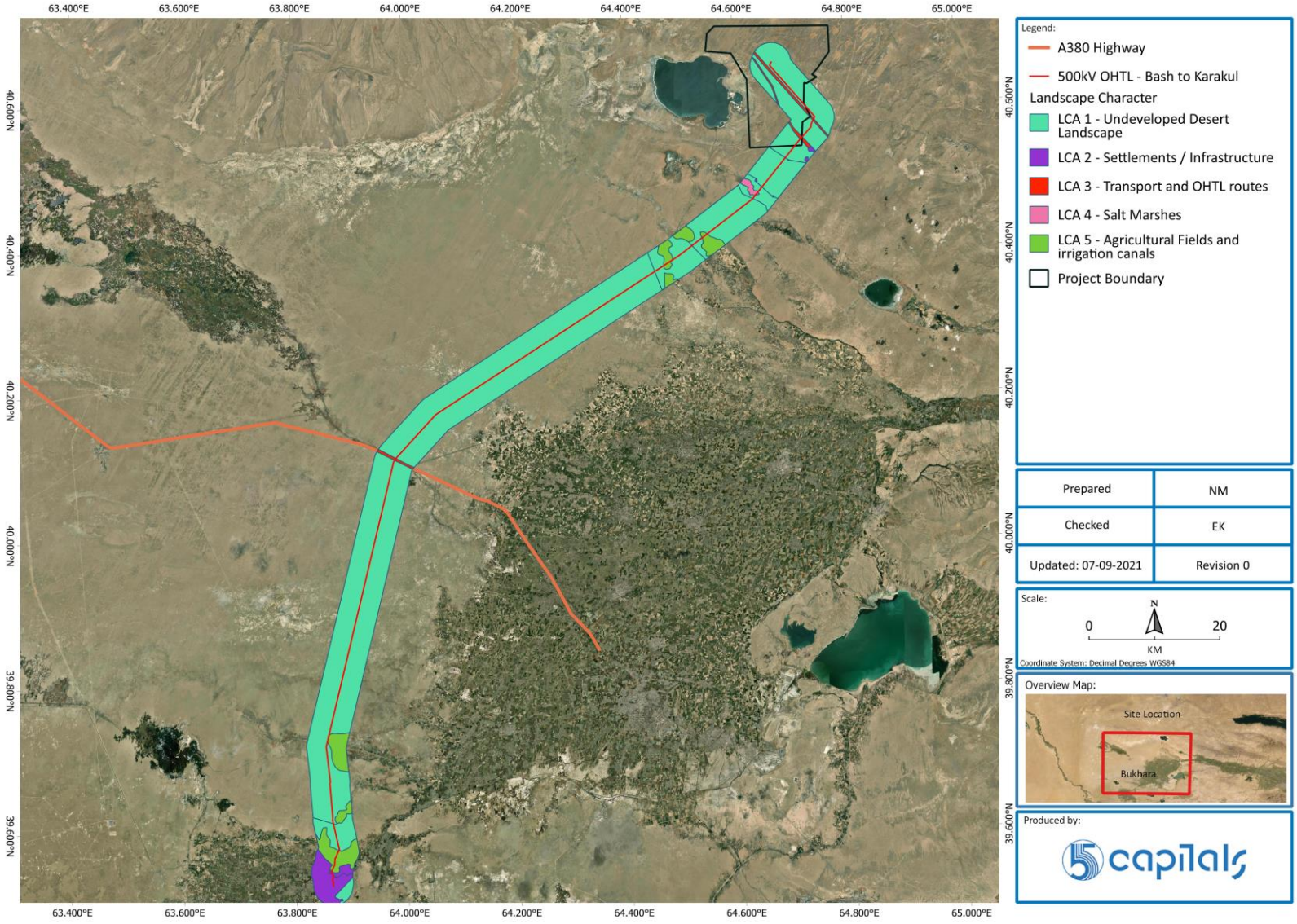
Table 26-3 Landscape Character Areas

ID	NAME	DESCRIPTION	VALUE	SENSITIVITY
OHTL LCA 1	Undeveloped Desert Landscape	Mostly undeveloped and undisturbed desert landscape with shrubs and dunes.	The area lacks any recognised features of local or national value. In addition, the landscape is untouched and without interesting features hence, it is of low value.	Low
OHTL LCA 2	Settlements / Infrastructure	The OHTL corridor is devoid of large settlements for the majority of the route. Besides the Kuklam village, the only large settlement is Karakul where the OHTL ties in with the substation. Other infrastructure observed along the route is mostly seasonal accommodation used by herders and farms.	The area lacks any recognised features of local or national value and has few distinctive characteristics. It is considered to be of low value.	Low

ID	NAME	DESCRIPTION	VALUE	SENSITIVITY
OHTL LCA 3	Transport and OHTL routes	Along the proposed OHTL route there are an existing OHTL as well as railway tracks and multiple branching roads, including small gravel tracks.	The road & railway network causes fragmentation of the natural environment and does not add any aesthetic value to the landscape. The landscape value is considered low.	Low
OHTL LCA 4	Salt Marshes	Along the OHTL corridor, there are a few isolated areas with salt marshes.	In the desert landscape, salt marshes add a distinctive natural characteristic to the landscape	Medium
OHTL LCA 5	Agricultural Fields and irrigation canals	Along the OHTL corridor, but especially near Karakul, there are multiple irrigation canals and Agriculture fields.	Canals and irrigated agricultural fields add life to an otherwise barren desert landscape. However, it lacks any recognised features of local or national value.	Low

Note: The sensitivity of each Landscape Character was assigned using the criteria described in "Table 4-5 Environmental Value of Receptor or Resource.

Figure 26-1 OHTL Landscape Character



26.1.2 Visual Quality

26.1.2.1 Visual Quality Survey

METHODOLOGY

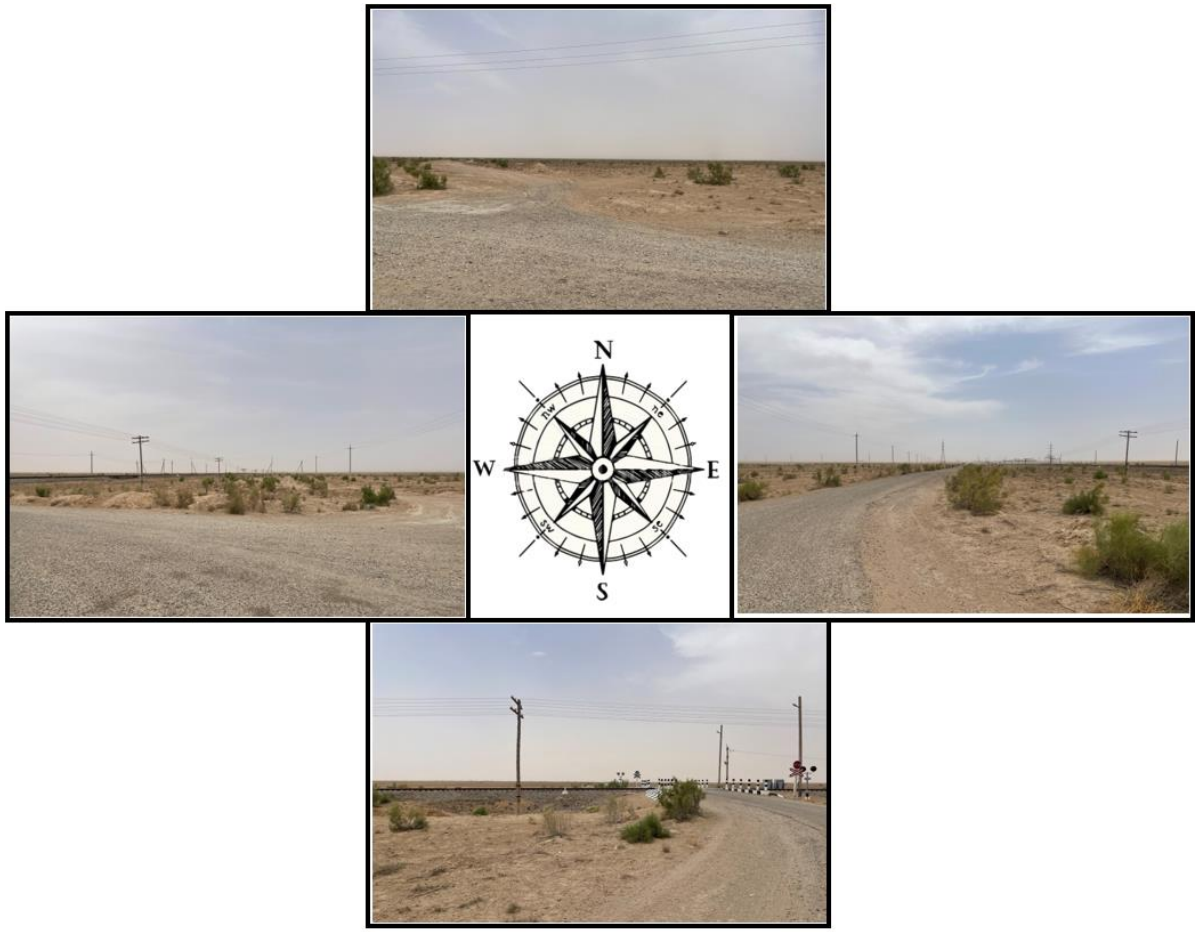
The visual amenity of the study area was surveyed from the selected locations. Views from a variety of distances, aspects, elevations and extents were considered.

RESULTS

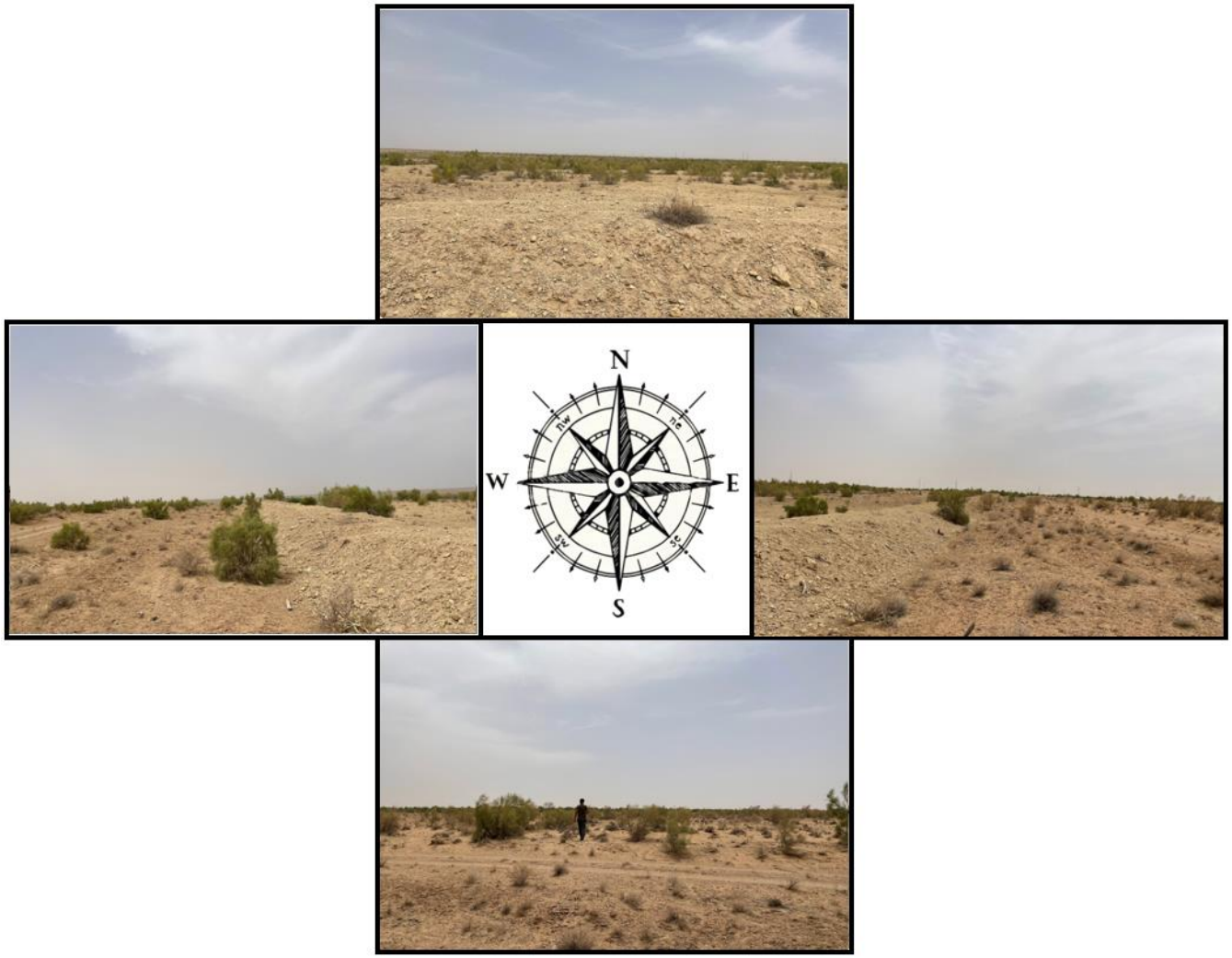
Besides views of the existing OHTL and residential buildings in villages which have resulted in an amount of disturbance to the visual envelope of the landscape, views across the OHTL route are predominantly unobstructed and provide a typical example of the desert typology found in Uzbekistan.

The following table outlines the views that may potentially be impacted at each of the cardinal point locations.

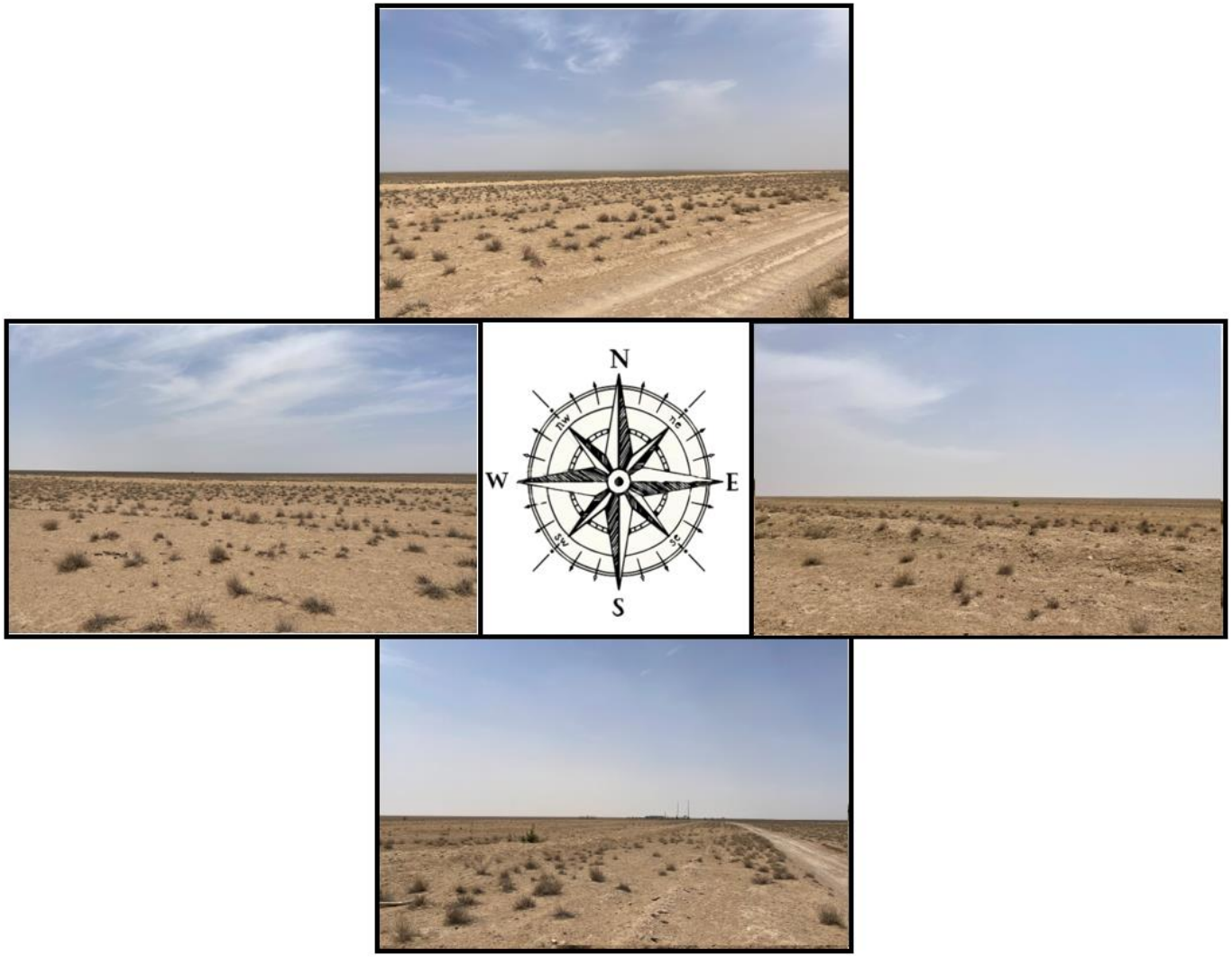
Table 26-4 Views from Cardinal Points Locations Along OHTL

DESCRIPTION OF VIEW
OHTL CP 1
Located on the railway crossing on the outskirts of the small village and Oil and Gas Facility.


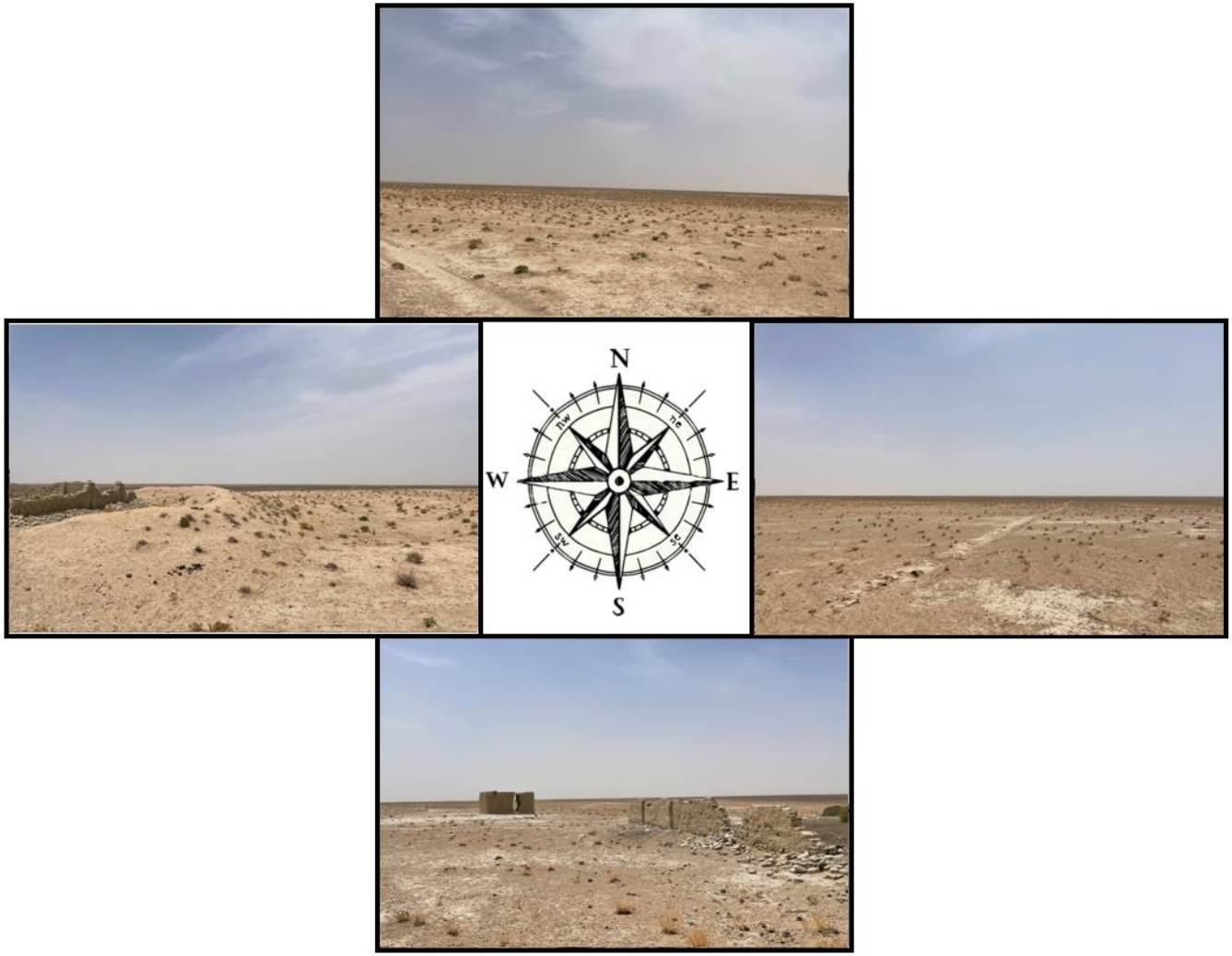
Description of View
OHTL CP 2
Located where the proposed OHTL crosses the ATG.



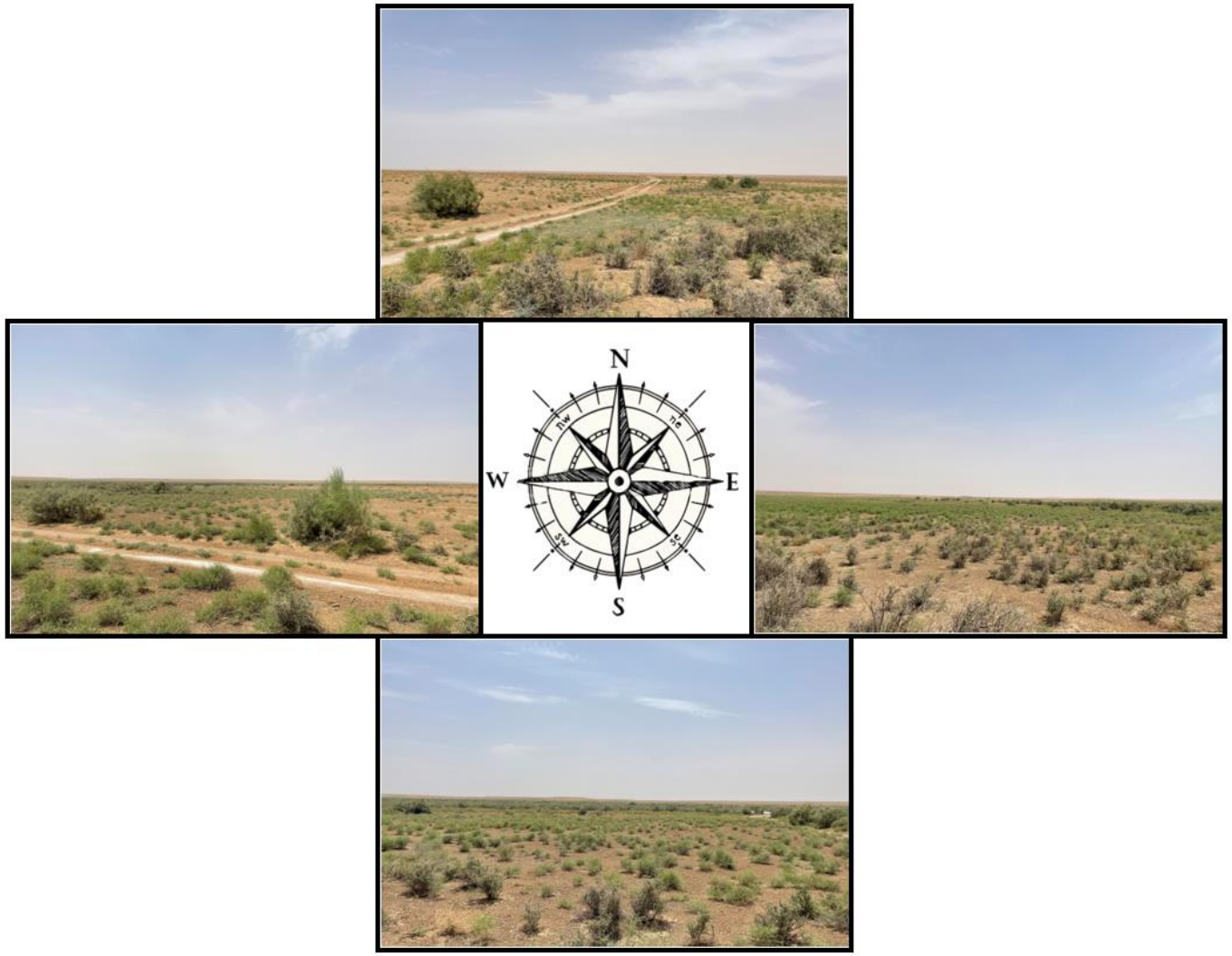
Description of View
OHTL CP 3
The represents the views as seen from the ATG facility.



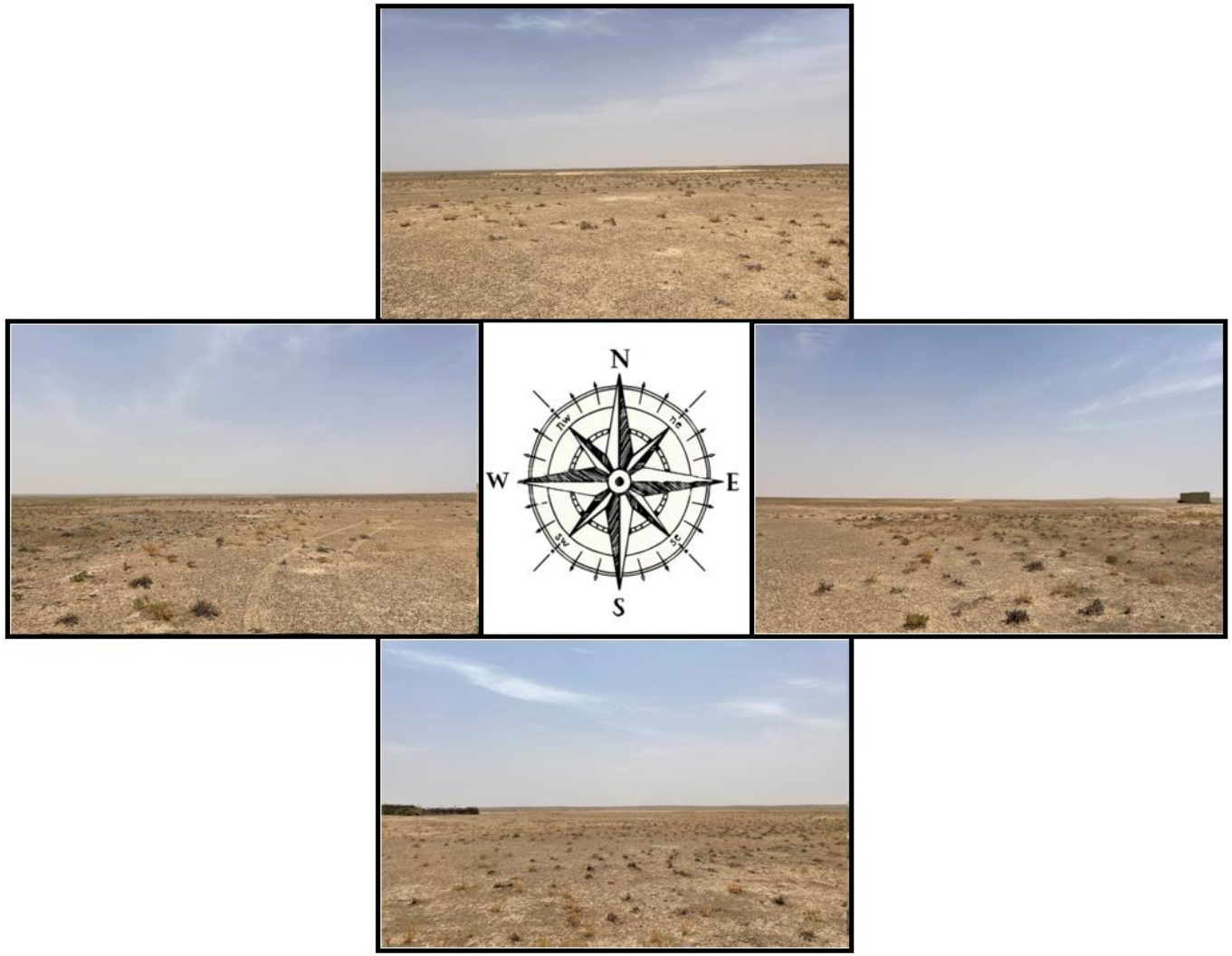
Description of View
OHTL CP 4
This represents the view as seen from a small structure that was used seasonally by herders but has since been abandoned.



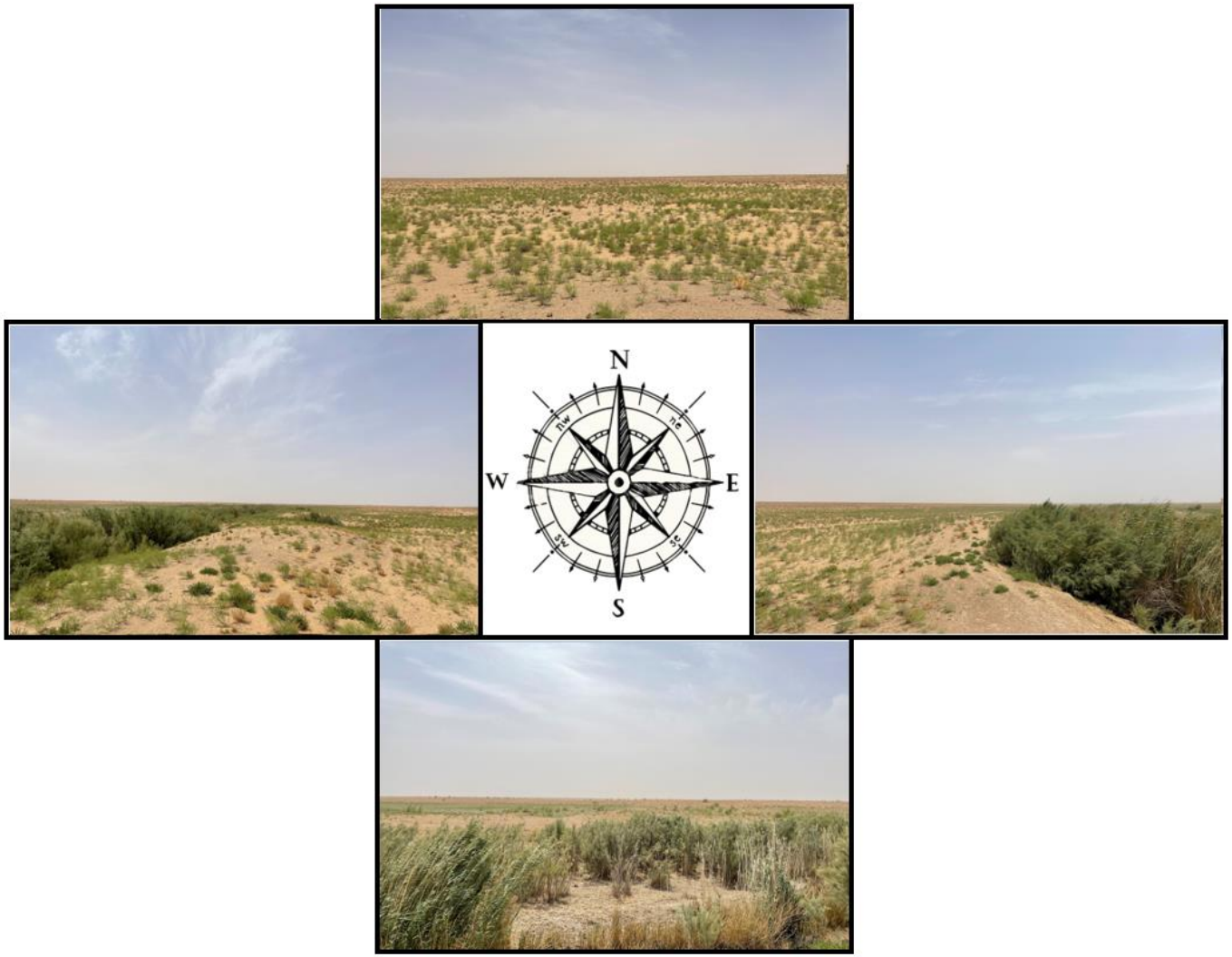
DESCRIPTION OF VIEW
OHTL CP 5
Located on the edge of the saltmarshes that formed as a result of the Ayakagitma depression.



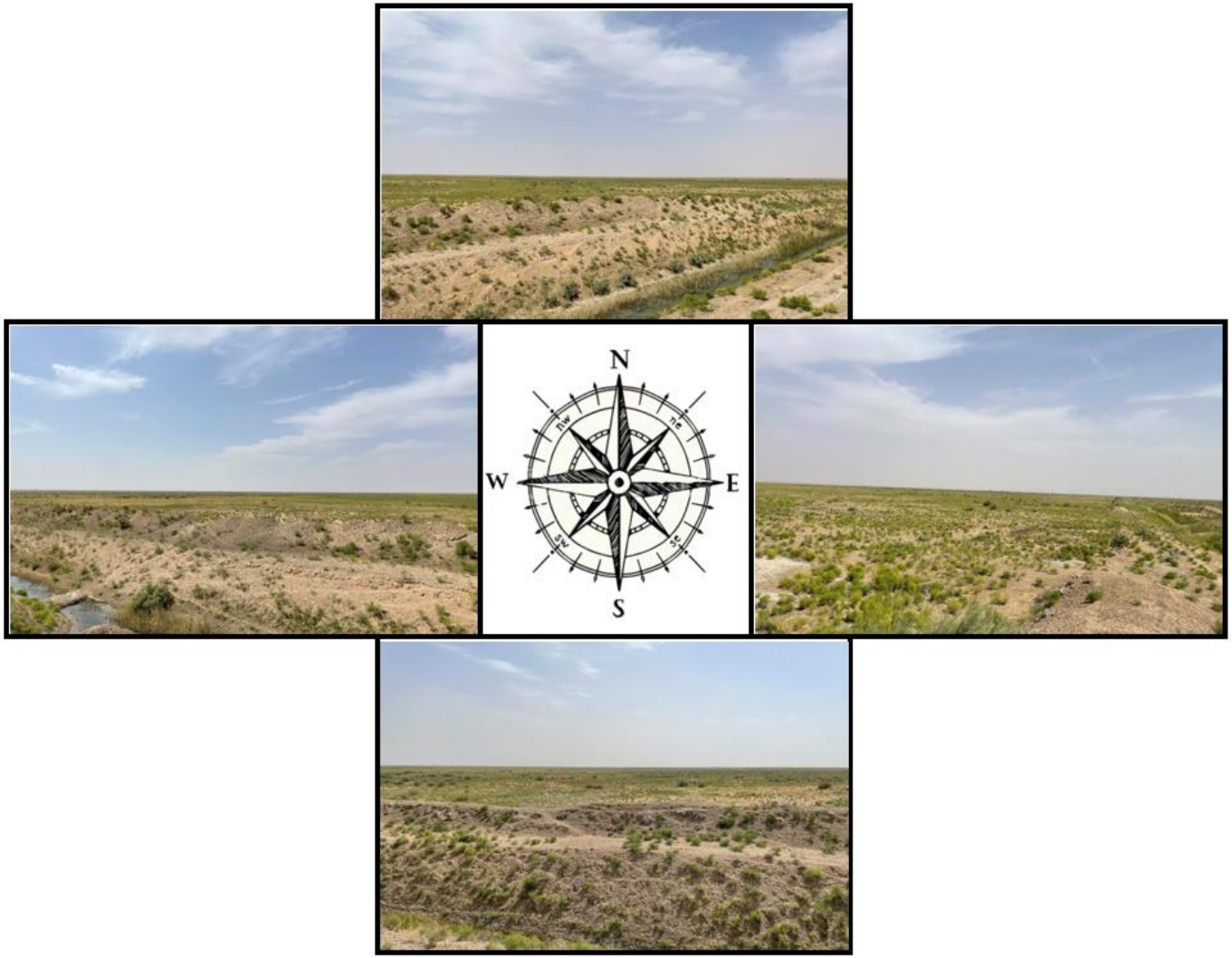
DESCRIPTION OF VIEW
OHTL CP 6
This represents the view as seen from a small structure used seasonally by herders.



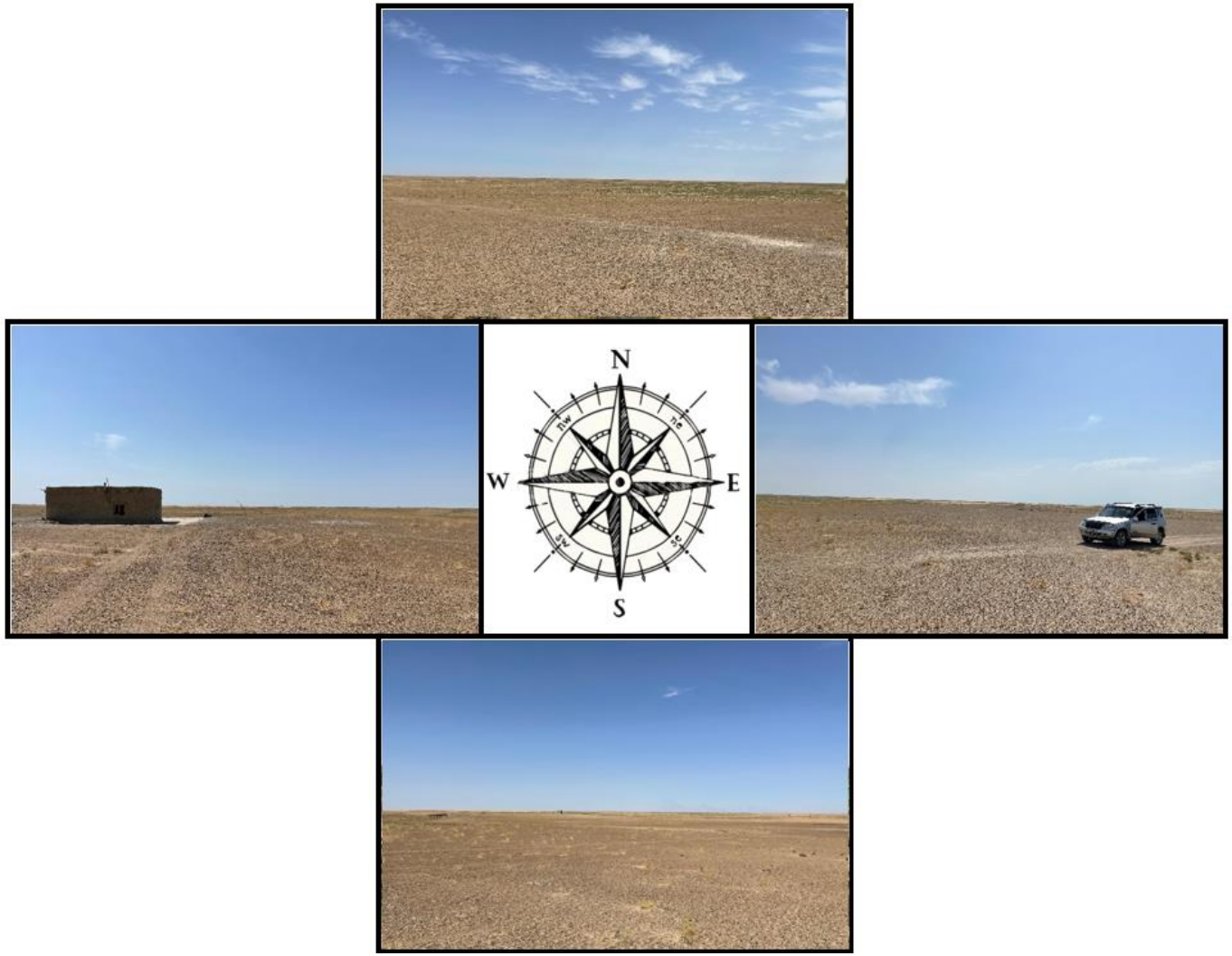
Description of View
OHTL CP 7
Located where the proposed OHTL crosses a water canal.



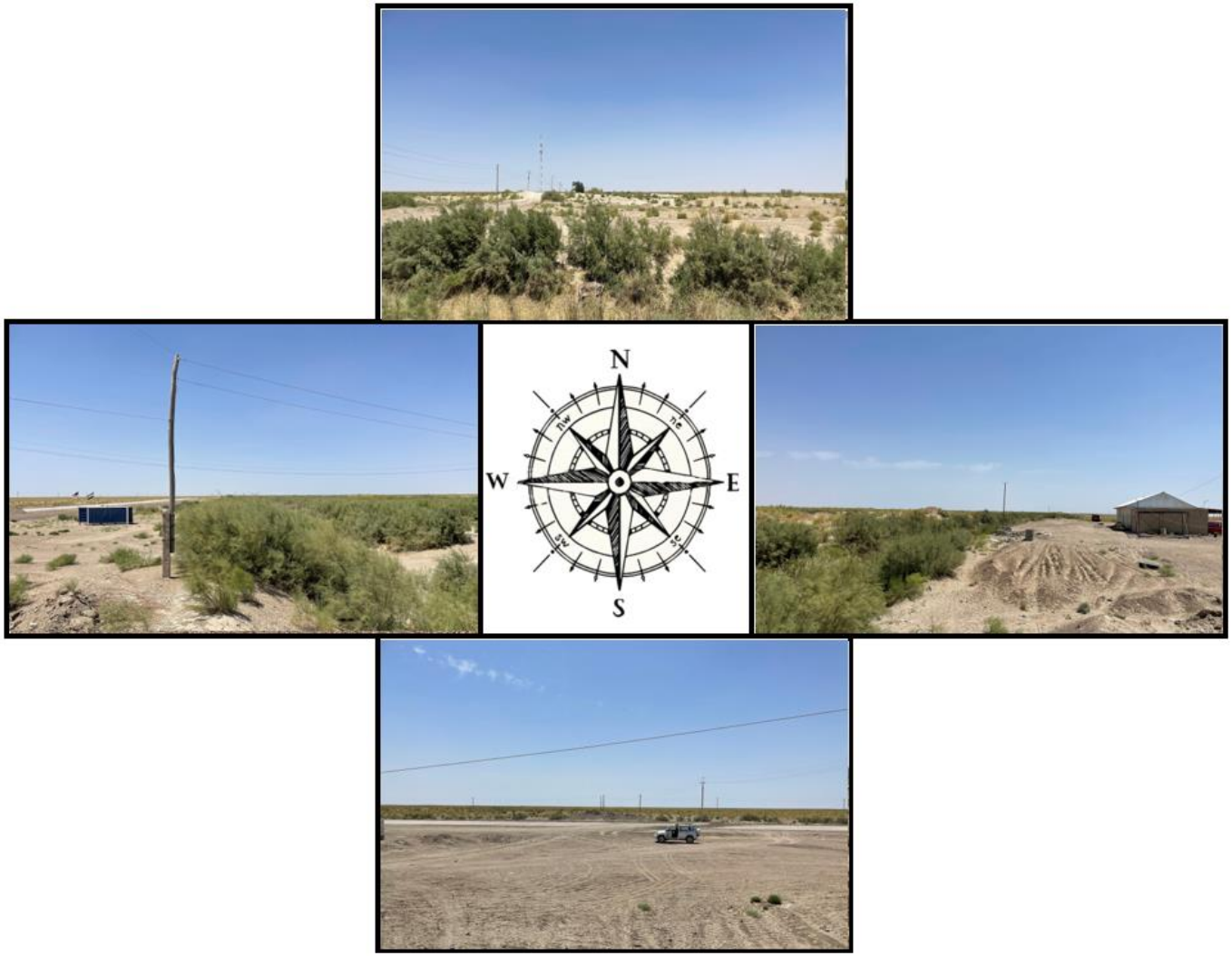
Description of View
OHTL CP 8
This represents the view as seen from the agricultural fields.



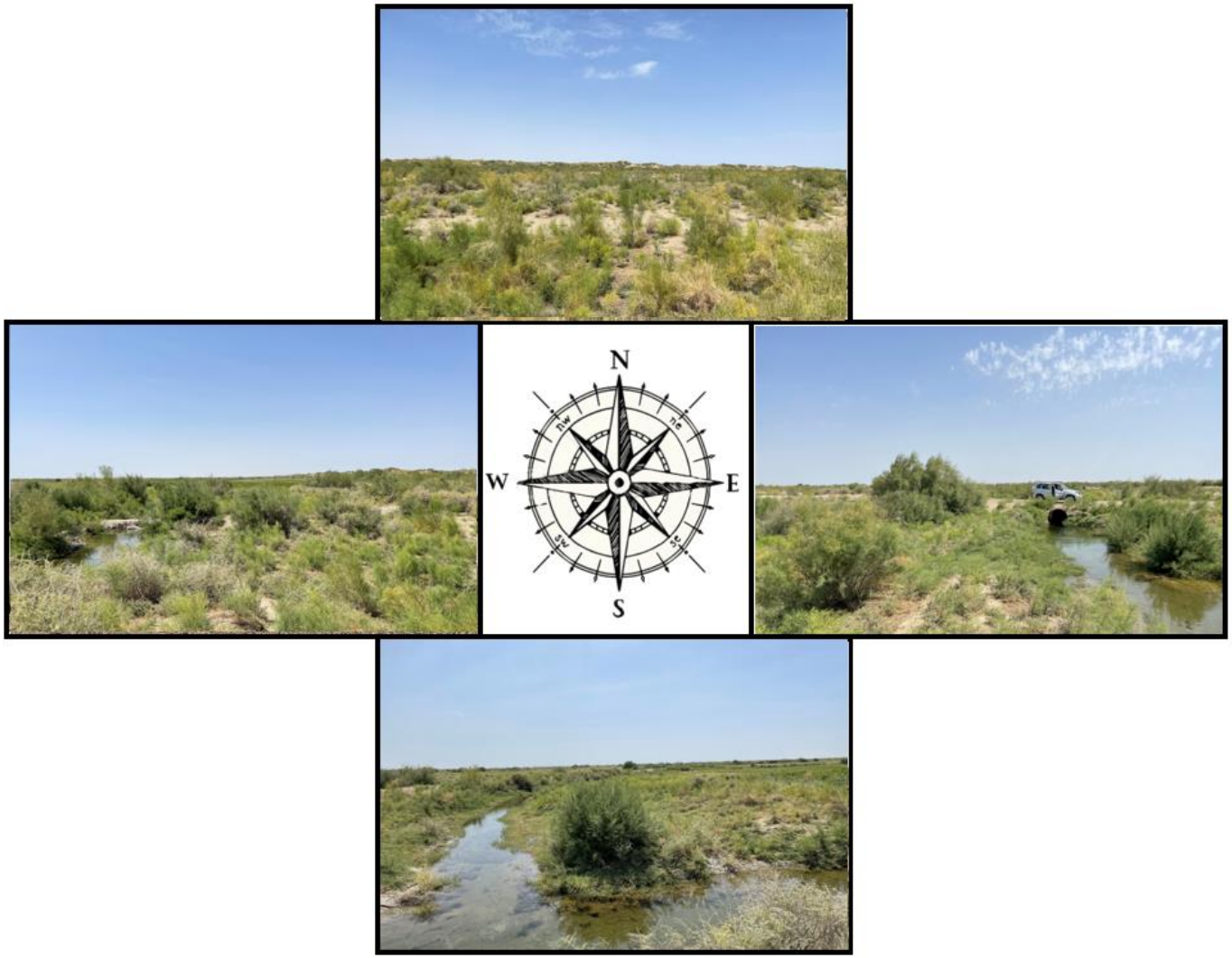
Description of View
OHTL CP 9
This represents the view of the proposed OHTL as seen from the structure used by camel herders.



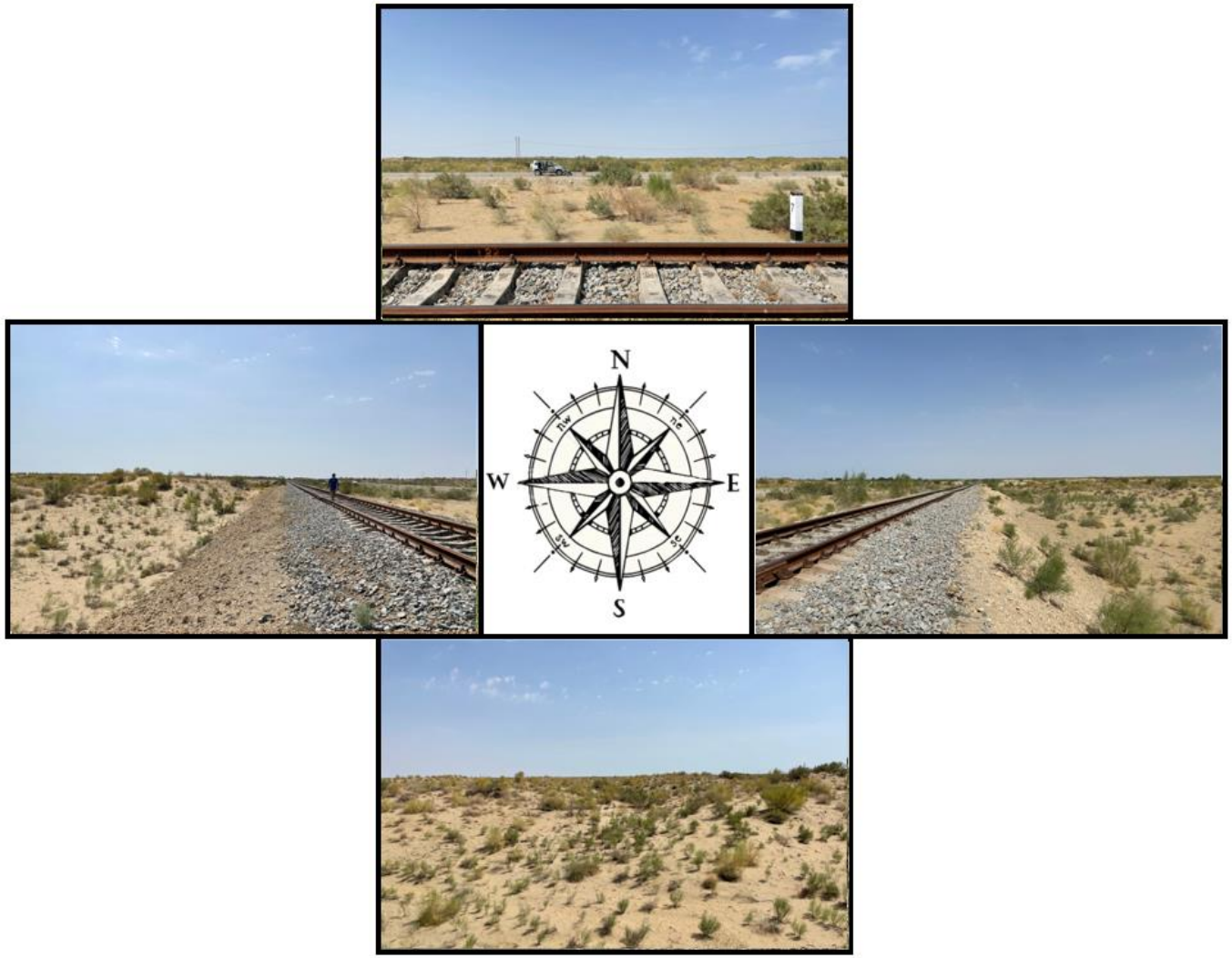
Description of View
OHTL CP 10
Located where the proposed OHTL crosses two parallel canals and highway A380.



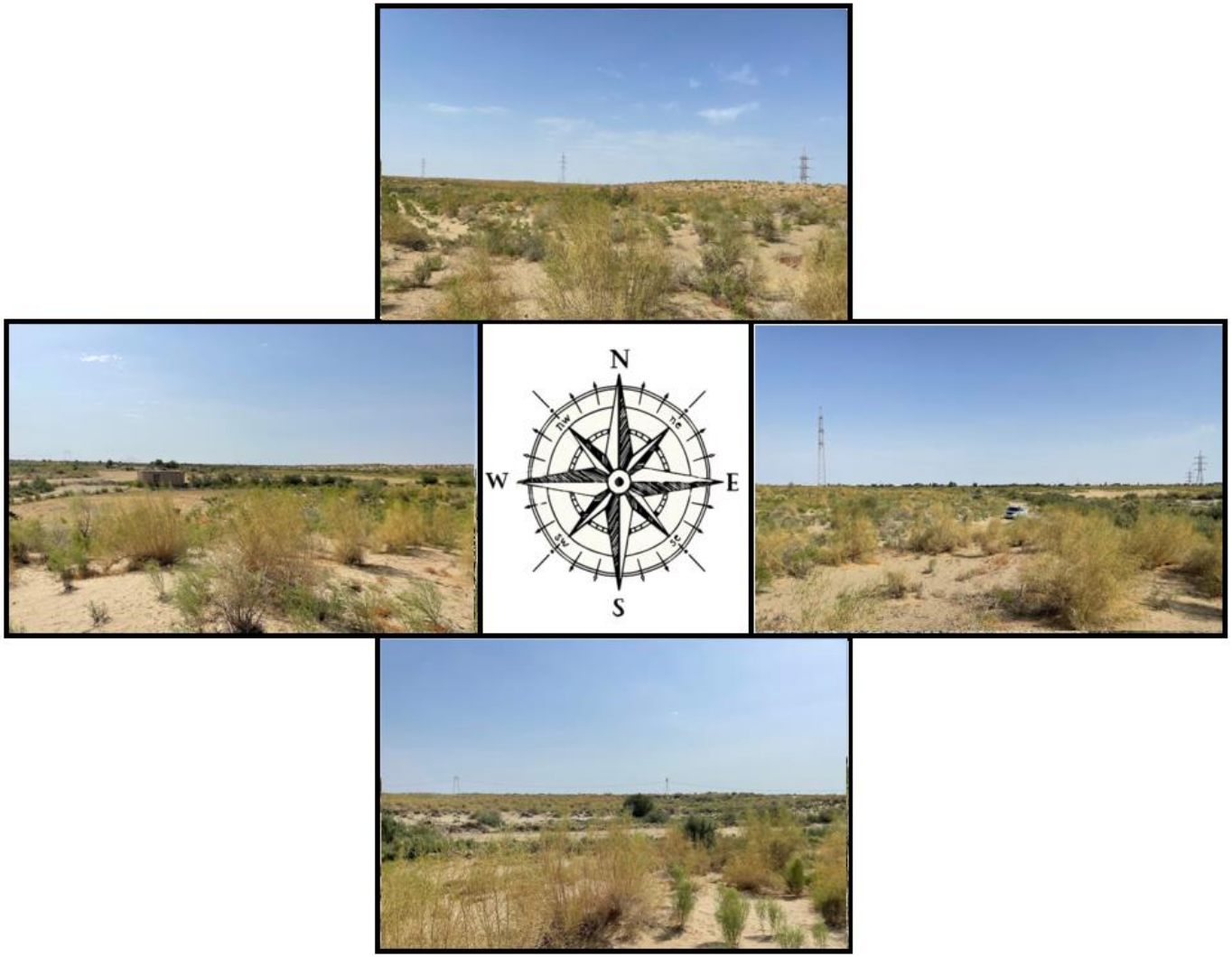
Description of View
OHTL CP 11
This represents the view as seen from the agricultural fields.



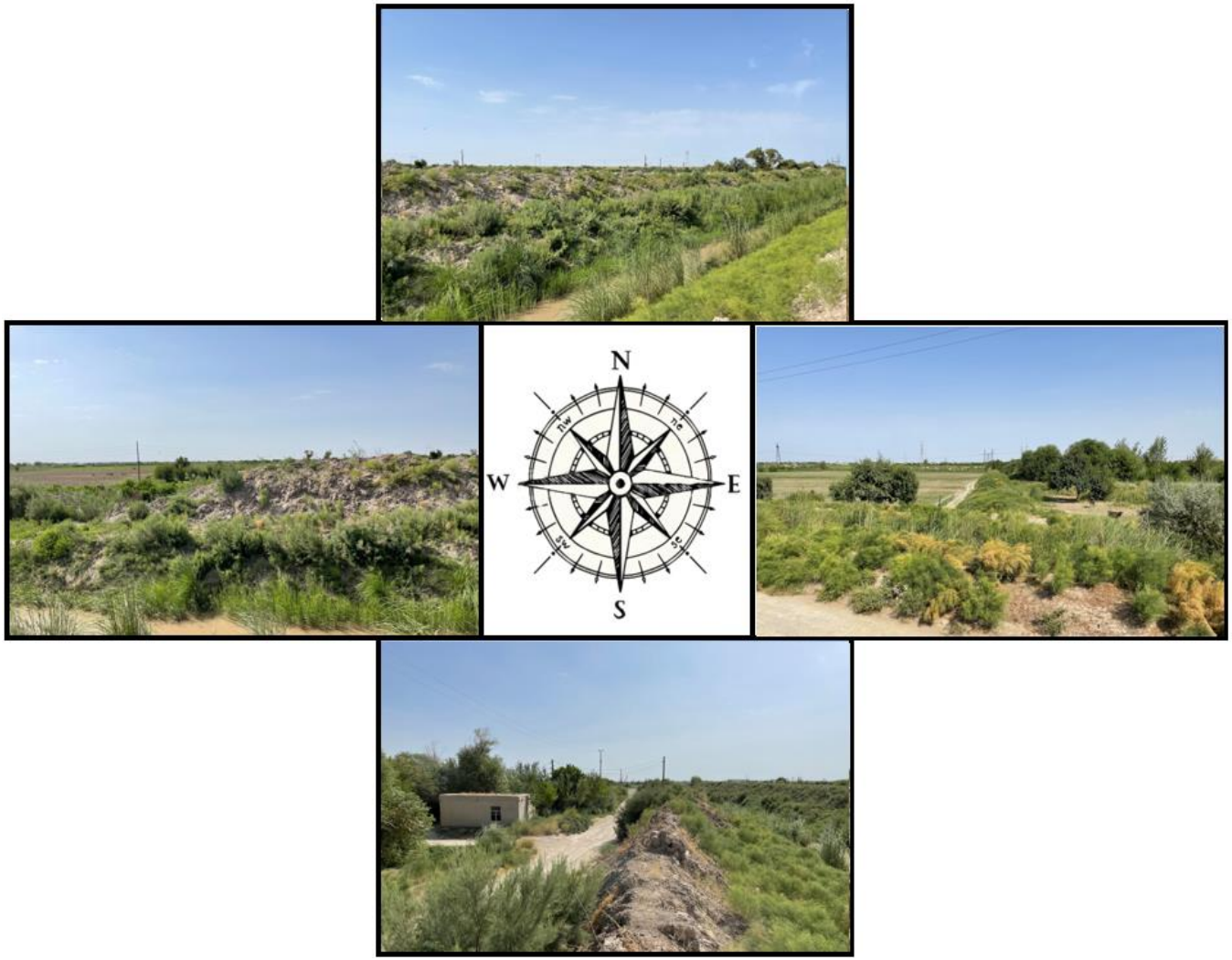
Description of View
OHTL CP 12
Located where the proposed OHTL crosses the railway tracks.



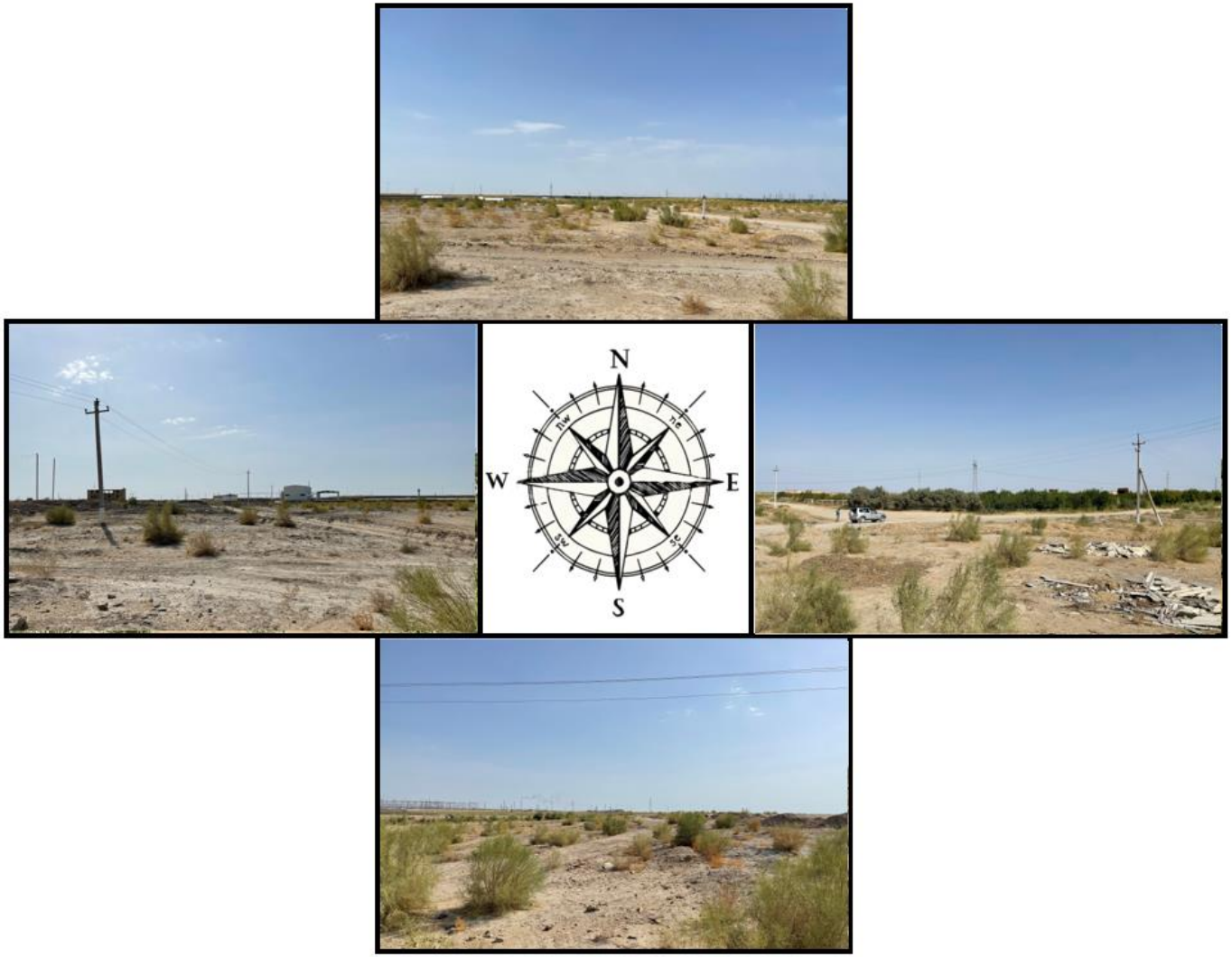
Description of View
OHTL CP 13
This represents the view as seen from the agricultural fields near the proposed OHTL.



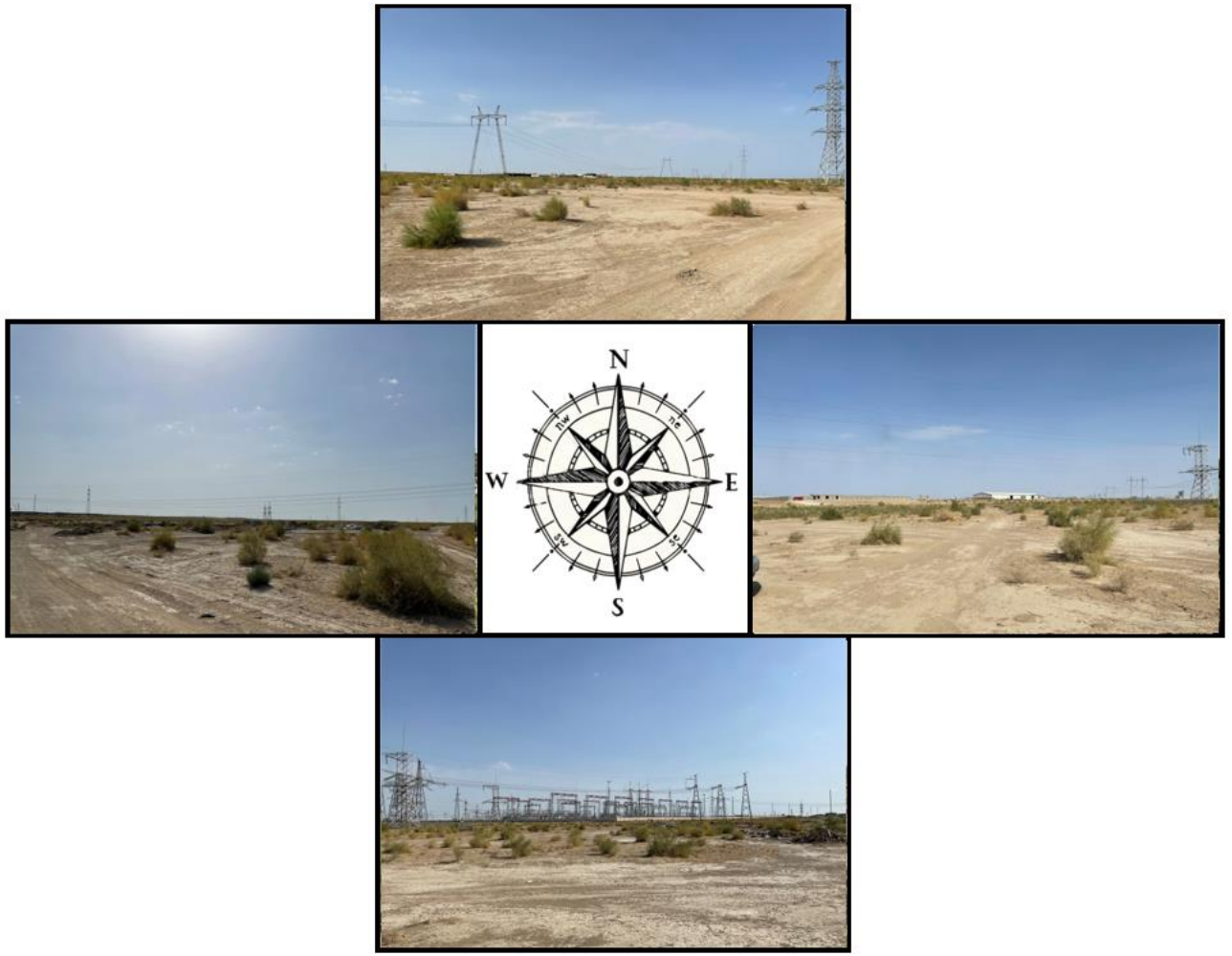
DESCRIPTION OF VIEW
OHTL CP 14
This represents the view as seen from the agricultural fields where the proposed OHTL crosses a canal.



Description of View
OHTL CP 15
This represents the view as seen from the industrial facilities near the proposed OHTL.



DESCRIPTION OF VIEW
OHTL CP 16
This represents the view as seen from the Karakul Substation.



26.2 Receptors

The potential landscape and visual receptors as a result of the OHTL 's development are presented in the table below.

Table 26-5 Landscape and Visual Impacts – Sensitive Receptors

ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
OHTL LCA 1	Landscape Character	Undeveloped Desert Landscape	**Low**	The landscape across the entire OHTL route is that of the typical landscape present across Uzbekistan. It is therefore of low or medium importance and rarity on a local scale.
OHTL LCA 2		Settlements / Infrastructure	**Low**	The landscape in these areas lacks any recognised features of local or national value hence it is of low importance on a local scale
OHTL LCA 3		Transport and OHTL routes	**Low**	The road & railway network causes fragmentation of the natural environment as such the landscape value is low importance
OHTL LCA 4		Salt Marshes	**Medium**	This landscape is a typical saltmarsh landscape in Uzbekistan. However, there is limited potential for substitution as it adds a distinctive natural characteristic to the desert landscape.
OHTL LCA 5		Agricultural Fields and irrigation canals	**Low**	This landscape lacks any recognised feature of local or national importance hence it is of low importance
-	Karakul Residents	Residential	**High**	As one of the larger residential districts in the area, there will be a large number of people impacted by any changes to the landscape character and visual amenity. These residents will have direct visibility of the proposed OHTL route and as such will be particularly vulnerable.
-	Irrigated Farms and Herder's	Agricultural	**Medium**	As an agricultural area, the area is a district in the barren desert landscape. However, while any changes to the landscape character will be notably visible, there is no permanent residence in the fields, as such it is considered to have a medium value.

ID	Receptor	Receptor Type	Sensitivity	Justification
-	Karakul Businesses/ Industry	Commercial / Industrial	**Low**	As a commercial and industrial area, people are only there during working hours. Furthermore, as an industrial area, there is already a significant change to the landscape and visual amenity. As such, while OHTL will be directly visible, people are less affected by further change in the already modified landscape.
R12	Kuklam Village (R12)	Residential and Commercial	**High**	While not as large as Karakul district, there are still several people impacted by changes to the landscape character and visual amenity of the area. These residents will have direct visibility of the proposed OHTL route and as such will be particularly vulnerable.

26.3 Potential Impacts, Mitigation, Management and Residual Impacts

26.3.1 Construction Phase

26.3.1.1 Change in Landscape Character

Similar to the construction of the wind farm, the construction of the OHTL has the potential to result in changes to the landscape character of a locality through land use and topographical changes or other factors. Given that the OHTL route is on a mostly flat gravel plain, excavation, levelling, grading and other site preparation activities that may result in land-use changes will be limited.

The subsequent erection of pylons/ towers will however, result in large anthropogenic intrusions in to the landscape of the OHTL route. Such intrusions of large-scale vertical structures will likely result in minor but noticeable landscape character impacts. This will also divide areas of existing landscape character with long linear and vertical infrastructure features.

26.3.1.2 Reduction in Visual Quality

Similar to the Wind Farm, the movement of heavy construction vehicles to and from the OHTL construction area on sandy surfaces can potentially result in dust generation and a resulting temporary haze causing disturbance to the current visual envelope of receptors, by changing their visual amenity and/or blocking their views.

Impacts to the visual envelope of surrounding receptors will also occur at night where the addition of lighting during construction will illuminate the OHTL construction area that has

previously been free of any light sources. The use of lighting across the area in case of night time construction activities will likely be visible to receptors along the OHTL. However, it is not anticipated to have a significant impact on receptors due to separation distance, a lack of light spill to receptors and existing lighting at the Karakul District and Kuklam village.

Any impacts from lighting are anticipated to be minimised by the implementation of specific controls detailed in the CESMP on-site.

Table 26-6 Landscape and Visual Amenity 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	**Moderate Negative**	LCA 1 - Undeveloped Desert Landscape	Low	**Minor**	• Site clearance, levelling & grading are to be limited within the boundaries of the Project site. • Construction works are to be limited within the OHTL corridor. • Where appropriate, construction work areas will be screened with stockpiles to reduce the visual intrusion to the receptors. • All temporary construction facilities along the OHTL corridor will be removed once this phase is complete.	**Negligible to minor**
	Minor Negative	LCA 2 - Settlements / Infrastructure	Low	**Negligible to minor**		**Negligible**
	Minor Negative	LCA 3 - Transport and OHTL routes	Low	**Negligible to minor**		**Negligible**
	Moderate Negative	LAC 4 - Salt Marshes	Medium	**Moderate**		**Minor**
	Moderate Negative	LCA 5- Agricultural Fields and irrigation canals	Low	**Minor**		**Negligible to minor**
Disturbance to Visual Envelope of Receptors	**Moderate Negative**	Karakul Residents	High	**Moderate to Major**	• Where appropriate, construction laydowns and working areas along the OHTL route will be screened to reduce the visual intrusion to existing receptors. • When not in use, cranes and other construction plants will be lowered, so they are at their minimum height and do not protrude unnecessarily within the visual envelope of local receptors. • Any temporary structures constructed along the OHTL corridor into the site will be removed immediately after use.	**Moderate**
	Moderate Negative	Irrigated Farms and Herder's	Medium	**Moderate**		**Minor**
	Moderate Negative	Karakul Businesses/ Industry	Low	**Minor**		**Negligible to minor**

Potential Impact	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
	Moderate Negative	Kuklam Village (R12)	High	**Moderate to Major**	• Mitigation and management measures relating to the generation of dust (as detailed in the Air Quality Chapter herein) 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 the issuance of night permits. • Any floodlights 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.	**Moderate**

26.3.2 Operational Phase

26.3.2.1 Landscape Character

Following the impacts of construction and installation of the OHTL, the operational phase will not result in further changes to the landscape character of the Project site. Vegetation removed during the construction will regrow and eventually the presence of the OHTL (i.e. the towers and cables) will become part of the overall Landscape Character.

HEALTH PROTECTION ZONE

It is understood that the Project will be required to establish a Health Protection Zone in accordance with SanPiN No 0236-07 and SanPiN № 0350-17 which require a 30m health protection zone for single circuit OHTL with rated voltage of 500kV as the ground projection of the outermost phase conductors in a direction perpendicular to the OHTL. More details of the HPZ and consultations with the Agency for Sanitary and Epidemiological Welfare under the Ministry of Health can be found in the " Community, Health, Safety & Security" Chapter in Part C of this ESIA.

26.3.2.2 Reduction of Visual Quality

Following the initial impacts of construction and installation of the OHTL, the movement of heavy construction vehicles to and from the OHTL construction area on sandy surfaces will seize. Furthermore, the lighting used during construction activities will also no longer be present.

Subsequently, the overall visual quality of the area will improve post-construction. Due to the distance from receptors, the presence of existing OHTL's and the expectation that receptors will become accustomed to the presence of another OHTL, it is not anticipated to have a significant impact on receptors visual quality.

Table 26-7 Landscape and Visual Amenity Impact Significance, Mitigation & Management Measures and Residual Impacts- Operational

Potential Impact	Magnitude of Impacts	Receptor	Sensitivity	Impact Significance	Mitigation and Management Measures	Residual Impacts
Changes in Landscape Character	**Minor Negative**	LCA 1 - Undeveloped Desert Landscape	Low	**Negligible to minor**	-	**Negligible to minor**
	Negligible	LCA 2 - Settlements / Infrastructure	Low	**Negligible to minor**		**Negligible to minor**
	Negligible	LCA 3 - Transport and OHTL routes	Low	**Negligible to minor**		**Negligible to minor**
	Minor Negative	LAC 4 - Salt Marshes	Medium	**Minor**		**Minor**
	Minor Negative	LCA 5- Agricultural Fields and irrigation canals	Low	**Negligible to minor**		**Negligible to minor**
Disturbance to Visual Envelope of Receptors	**Negligible**	Karakul Residents	High	**Minor**	-	**Minor**
	Negligible	Irrigated Farms and Herder's	Medium	**Negligible to minor**		**Negligible to minor**
	Negligible	Karakul Businesses/ Industry	Low	**Negligible to minor**		**Negligible to minor**
	Negligible	Kuklam Village (R12)	High	**Minor**		**Minor**

27 SOCIO-ECONOMICS

27.1 Observation and Baseline Condition

27.1.1 Socio Economic Survey

The socio-economic survey along the OHTL was conducted between 27th and 31st January 2022 using survey questionnaires targeting directly impacted land lease holders and users as part of the Project specific RAP process. Since the design of the OHTL has not been finalised, the Client advised that an assessment of impacts should be undertaken within a 50m of each side of the OHTL which also accounts for the 30m HPZ.

Based on this AoI (100m), socio-economic questionnaires were administered to land users who included herders, farmers, commercial enterprises and their workers. Institutional and government agencies land owners and lease holders including LLC clusters under SWID and State Forest Funds were not included in the socio-economic surveys.

A total of 16 land users were surveyed (formal and informal land users) including 17 workers. Out of the 16 PAPs, 7 were farmers, 5 were herders and 4 own commercial land that has not been developed yet.

The survey established the socio-economic profile of the land lease/users along the OHTL details of which are provided in the Project Specific RAP.

27.2 Receptors

Similar to the wind farm, the welfare of the local population, local/regional economy and employment market will benefit from the development of the OHTL. However, the construction will also result into economic and physical displacement impacts to land users and this has been assessed in the Project specific RAP.

Table 27-1 Potential Socio-Economic Receptors - OHTL

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 development of the OHTL 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 OHTL will result in the creation of employment opportunities and will offer an opportunity for greater dissemination of skills especially during the construction phase.

RECEPTOR	SENSITIVITY	JUSTIFICATION
Herders and farmers along the OHTL route	**High**	Herders identified to graze livestock and farmers that have farms & agricultural produce within the OHTL area of influence will face access restrictions during the construction phase of the OHTL as such, they are particularly vulnerable.
Business/Commercial Enterprise Owners	**High**	Business owners will face access restrictions to their lands during the construction phase of the OHTL as such, they are particularly vulnerable.

27.3 Potential Impacts, Mitigation, Management and Residual Impacts

27.3.1 Construction Phase

The potential construction phase socio-economic impacts and mitigations as a result of the OHTL construction will be similar to the construction phase impacts as discussed in the Socio-Economic Chapter of Part A of this ESIA (Reference Chapter 16).

Impacts relating to land use by the herders, famers, commercial enterprises and their workers have been assessed and will be mitigated and managed through the implementation of the Project Specific RAP.

27.3.2 Operational Phase

Refer to Chapter 16 Socio-Economic for operational phase impacts and mitigation measures in relation to employment.

27.4 Monitoring

Reference monitoring requirements outlined in the Socio-Economic Chapter in Part A of this ESIA.

PART C - APPLICABLE TO BOTH WIND FARM & OHTL

This chapter assesses the Environmental & Social elements relevant to both the Wind Farm and OHTL.

28 SOLID WASTE & WASTEWATER MANAGEMENT

This chapter assesses the Projects expected generation of solid and liquid waste during the construction and operational phases. It does not consider the significance of impacts with respect to a specific receptor (i.e., soil or groundwater quality); as such impacts to soil or groundwater quality with respect to solid and liquid waste have been assessed in the respective Soils, Geology, Groundwater & Surface water Chapter of Part A & B of this ESIA.

The primary purpose of this chapter is to identify specific management measures in regard to solid waste and wastewater generation that can be adopted in the construction & operational phase ESMS' in order to ensure compliance with applicable regulations and standards.

28.1 Observation and Baseline Environment

28.1.1 Waste Management at the Project Area

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[14].

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 [15]. The Project site is

[14] https://unece.org/DAM/env/epr/epr_studies/ECE.CEP.188/ECE.CEP.188.RUS.03.part_II.pdf

[15] Resolution of the president of the republic of Uzbekistan About approval of Strategy according to the treatment of municipal solid waste in the Republic of Uzbekistan for 2019-2028

located in such rural areas where there is insufficient provision of services for the collection and disposal of solid waste as such, local communities such as those of Agitma village dispose household waste in the desert.

In addition, during the consultations with herders living in settlements within the Project area, all of them confirmed that they bury their waste in the Project site. It is noted that none were willing to show the locations at which they bury their waste as this is not in accordance with the law.

LIQUID WASTE/ WASTEWATER

Similar to the solid waste management in the project area, there are no wastewater treatment facilities in the project area or in the district. Wastewater is often discharged in special drainage pits in their garden. The nearest Wastewater Treatment Plant (WWTP) is the Bukhara City WWTP located approximately 94km from the southern boundary of the project site. The figure below shows the location of the WWTP in relation to the Project site.

Figure 28-1 Location of Bukhara City Wastewater Treatment Plant in Relation to the Project Site

28.2 Potential Impacts

28.2.1 Construction Phase

28.2.1.1 Solid Waste

During construction of the Wind farm and OHTL, 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 and non-reinforced concrete found in foundations (such as surface level concrete slabs).

Solid waste generated from construction activities of the Wind Farm and OHTL 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 – Specific to the Wind farm
    - Residual materials from electrical equipment installation such as Waste Electrical Equipment (WEE)

Given the Wind Farm footprint, the amount of solid waste generated will be of a considerable size. Inappropriate handling, storage, transport and/or disposal of these solid wastes during construction might pose the potential to pollute the surrounding environment (i.e. soil and groundwater resources), cause odour and visual nuisance, encourage pests or result in occupational health and safety issues.

Given that the construction of the OHTL will comprise of the assembly of prefabricated structures, the amount of solid waste that will be generated along the OHTL route will not be

significant. However, Inappropriate handling, storage, transport and/or disposal of these solid wastes might also pose the potential to pollute the surrounding environment.

Note: Maintenance of construction machinery and vehicles is not anticipated to be undertaken within the OHTL construction area as such the generation of associated vehicle related waste such as oil filters, spend filtration cartridges, machinery lubricants is not expected along the OHTL route.

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. Such materials may result in fuel containers waste, oily residues, paints, paint cans and wastes from chemical cleaning products.

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 and potentially groundwater, as assessed in the Soils, Geology, Groundwater & Surface Water Chapters in Part A & Part B 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 rain water 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.

Solid waste streams likely to be associated with the construction phase of the project are listed in the table below.

Table 28-1 Anticipated Solid Waste Types Associated with the Construction Phase

TYPE	WASTE STREAM
Inert	Subsoil and Rock
	Glass
Non-Hazardous	Concrete and cement
	Asphalt
	Scrap metal
	Wood
	Plastic
	Packaging
	Municipal waste from construction workers
Hazardous	Contaminated soil/asphalt
	Resins and paints
	Waste oils
	Waste solvents and thinners
	Waste fuel and chemicals.
	Batteries
	Used spill kits and clean up materials.
	Waste Electrical Equipment (WEE)

28.2.1.2 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 can be estimated as an average of 0.1m^3/person/day (100 litres). Assuming the estimated number of construction workers at the Wind Farm and along the OHTL route during peak periods will be between 700 - 1,000 personnel (as indicated in the Project Description section of this ESIA), sanitary wastewater is estimated to total 70m^3 - 100m^3 at peak periods of construction. Wastewater generated on-site & along the OHTL route will be stored within septic tanks for removal by a licensed wastewater contractor.

It should be noted that the figure of 100 litres/worker/day relates to overall water consumption including at accommodation areas (anticipated to be located at the accommodation area within the Wind Farm site. 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 or groundwater resources; as assessed in the Soils, Geology, Groundwater & Surface Water Chapter in Part A of this ESIA.

It is understood that the licensed contractor "Toza Hudud" SUE 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.

28.2.2 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 National Electric Grid Uzbekistan. 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).

28.2.2.1 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) – specific to the OHTL

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.

28.2.2.2 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.

Any oily wastes from the transformer area, or other floor drains in oily areas, will collect oily water 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 and groundwater resources, which have been assessed for significance in the Soils, Geology, Groundwater & Surface Water in Part A & B of this report.

28.2.3 Decommissioning Phase

During decommissioning of the wind farm, 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.

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 and EBRD PR3 on Resource Efficiency and Pollution Prevention and Control.

28.3 Mitigation and Management Measures

28.3.1 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 28-2 Waste Characterization

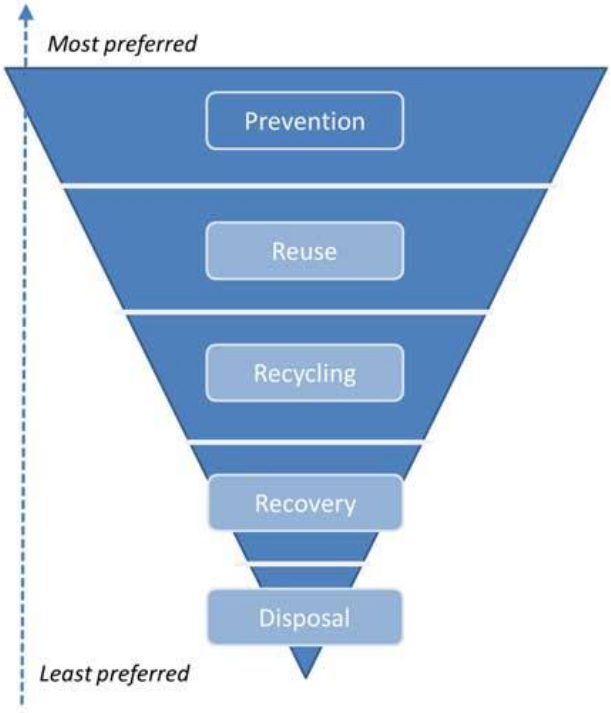
WASTE CLASSIFICATION	DESCRIPTION
Domestic Waste	Household, commercial, agricultural, governmental, industrial and institutional wastes, which have chemical and physical characteristics similar to those of household such as garbage, paper, cardboard,

Waste Classification	Description
	plastic, cans, etc. Disposal of such waste can generally be routed to municipal recycling or disposal facilities
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.

28.3.2 Waste Management Hierarchy

The waste hierarchy illustrates good practice for waste management considerations by ensuring consideration of the most sustainable available application for waste management in preference of 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 28-2 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;
- Promoting cradle-to-cradle waste management instead of cradle-to-grave waste management

28.3.3 Construction Phase

Table 28-3 Waste & Wastewater Mitigation and Management Measures - Construction

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 labeled 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/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 signed and labeled 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 response procedures. This area must be placed away from any sources of ignition.

Impact/Source	Mitigation and Management Measures
	• 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/un controlled 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. • The removal of any sludge residues as solid hazardous waste will be undertaken by a licensed waste contractor and handled as a hazardous waste.

IMPACT/SOURCE	MITIGATION AND MANAGEMENT MEASURES
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.

28.3.4 Operation Phase

Table 28-4 Waste & 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 labeled 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. • 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.

SOURCE	MITIGATION AND MANAGEMENT MEASURES
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 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.

28.4 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 28-5 Waste Management Monitoring Requirements (Construction and Operations)

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
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
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.

29 COMMUNITY, HEALTH, SAFETY & SECURITY

This chapter assesses the impacts relating to the health & safety of the local community who live and work in the surrounding area and may be subject to project related impacts.

The majority of secondary impacts relating to the local community in terms of air quality, noise, wastewater, waste etc., have been addressed in specific chapters elsewhere in this ESIA. This chapter therefore concentrates more specifically on the potential emergency impacts that could relate to the project, and the security of the project to avoid instances of trespass, malicious intrusions and other misdemeanours.

The primary purpose of this chapter is therefore to identify specific management measures in regard to community, health, safety and security.

29.1 Observation and Baseline Condition

29.1.1 Wind Farm

Project related activities might result in the increase of risks associated with those who live near the Project site or may visit areas in and around active Project sites and its access road.

The closest residential receptors to the Project site include the herder accommodation area (R24) approximately 1.2km north west , fishermen accommodation structure (R25) approximately 1.5km north west, Kuklam Village approximately 1.6km south east and Mining area 2 worker accommodation area approximately 900m west. There are also commercial receptors within close proximity of the site as identified in Land Use and Site Condition section of this ESIA. Kuklam Village as well as herders and livestock holding areas structures were also identified as receptors along the access road.

As a result, Project activities may pose health, safety and security risks to these receptors.

29.1.2 OHTL

The closest residential receptor to the OHTL route is the Household (Muminov Bobokhon, Bandboshi MCC) (OHL 29) located approximately 250m west of the OHTL. This is the only residential receptor along the OHTL route. Construction & operation of the OHTL may pose health, safety and security risks to these receptors. Impacts relating to the local community in terms of air quality, noise, wastewater, waste etc., have been addressed in specific chapters in Part B of this ESIA.

29.1.3 Health Protection Zone

A consultation letter was sent to the Agency for Sanitary and Epidemiological Welfare under the Ministry of Health on 3rd April 2021 regarding the requirements for establishment of a Health Protection Zone for the Wind Farm Project.

The following response was received on 12th April 2021 from the Agency:

- Based on the sanitary norms, rules and hygienic standards: SanPiN № 0236- 07 "On ensuring the safety of the population living near high-voltage overhead power transmission lines" for single circuit OHTL with rated voltage of 500kV the size of sanitary protection zone should be "at least 500 meters"
- Based on the sanitary norms, rules and hygienic standards: SanPiN No 0350-17 "Sanitary norms and rules on atmospheric air protection in populated areas of the Republic of Uzbekistan" when producing electric power of 600MW and above (in the case of the Bash project, it is 500MW) the size of the sanitary protection zone should be at least 500m.
- Increased levels of acoustic and electromagnetic pollution levels on surrounding areas as well as emergency situation, such as collapse of turbines during bad weather conditions, may occur at the commissioning stage.
    - Based on the calculations presented in the projects and analysis of data on the environmental impacts of foreign WPPs, it is established that the limiting factor of WPPs is acoustic pollution in the sound frequency range, which extends beyond the territory of the wind farm.
    - As a result, a HPZ for modern WPP is justified as 700m from the outermost wind turbines.
    - It is recommended to maintain a distance of 200m from wind turbines to limit any activities and risk to people during possible emergencies under adverse weather conditions.
    - Considering the above, it can be concluded that the WPP should be classified as Class I with a health protection zone of at least 1000m.

On 6th September 2021, the Agency for Sanitary and Epidemiological Welfare was contacted to verify the stated health protection zone for single circuit OHTL with rated voltage of 500kV as this was different from what is stated in the SanPiN № 0236- 07 and SanPiN № 0350-17. A response was received on 7th September via phone call indicating that there was an omission in the letter sent to the Project on 12th April 2021. As such, the Agency updated the letter on 9th September 2021 and it now states that:

- Based on the sanitary norms, rules and hygienic standards: SanPiN № 0236- 07 "On ensuring the safety of the population living near high-voltage overhead power transmission lines" for single circuit OHTL with rated voltage of 500kV the size of sanitary protection zone should be "not be less than 30 metres from both sides of the OHTL tower"

Based on the response provided by the Sanitary Epidemiological Welfare, the Dzhankeldy wind farm is classified as Class I with a health protection zone of at least 1000m while the OHTL

will have a health protection zone of at least 30m on both sides. The Project will be required to establish these health protection zones 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 W.

29.2 Potential Impacts

29.2.1 Construction Phase

29.2.1.1 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. Detail assessment of these impacts is provided in Chapter 31 Influx Impact Assessment.

29.2.1.2 Public/Community Safety

WIND FARM

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.

The Wind Farm will be required to establish a Health Protection Zone (HPZ) in accordance with SanPiN No 0350-17 which requires a 700m health protection zone from the outermost wind turbines and maintain a distance of 200m from wind turbines to limit any activities and people's presence during possible emergencies periods under adverse weather conditions.

In addition, there will be an increased safety risk associated with the increased traffic due to transportation of Project materials & equipment. Details of these impacts and mitigation and management measures to be implemented are provided in Chapter 11 Traffic & Transportation.

Risks related to increase of communicable diseases and burden on local health services due to worker influx and mitigation and management measures to be implemented are provided in Chapter 31 Influx Impact Assessment.

OHTL

The OHTL will be required to establish a Health Protection Zone in accordance with SanPiN № 0236- 07 which requires a 30m HPZ on both sides of the 500kV OHTL as ground projection of the outermost phase conductors in a direction perpendicular to the OHTL to ensure safety of the population living near the OHTL.

29.2.1.3 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.

The interaction of workers with local communities could potentially lead to an increase in illicit behaviour such as alcoholism, prostitution, gambling, etc. all of which can result into insecurity within the communities (Reference section 31.1.1.7). Based on the socio-economic survey undertaken 62.7% of respondents reported that crime in their villages is extremely low (reference section 16.1.3) . Increase in crime poses safety risks to the local communities thereby interfering with the quality of life and sense of security.

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 temporally disrupt of grazing activities. Due to the influx of construction workers and health & safety risks associated with the development of the Project, 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, EBRD PR 5 and ADB Involuntary Resettlement Safeguards in order to ensure that the impacts of the Project to PAPs are minimised and managed.

29.2.1.4 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

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 for the victims.

29.2.2 Operational Phase

29.2.2.1 Public/Community Safety

WIND FARM

The project will carry various risks that could result in impacts to public safety. Such reasonably foreseeable situations may include:

- Blade and ice throw from the wind turbine;
- Electromagnetic Interference and radiation (reference Chapter 22);
- Impacts to aircraft & aircraft radar (reference section 12.3.1.2) ;
- VOC releases, fire, explosions, spills of back up fuels and;
- Security and safety concerns of trespassers including that of children.

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 200m from the local communities to the nearest wind turbine in accordance with the Agency for Sanitary and Epidemiology Welfare Health Protection Zone requirement '*to maintain a distance of 200m from wind turbines to limit any activities and people's presence during possible emergency periods under adverse weather conditions*. 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. 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. As all of the WTGs are over 2km from the nearest local community and the local communities are not within the setback distance of approximately 278m & 407m for blade throw & ice throw respectively, the likelihood/risk of

blade & ice throw is anticipated to be negligible. In addition, the design of the wind turbines ensures a setback distance of over 500m for both blade throw & ice throw. It is also expected that the wind turbines will be subject to continuous monitoring and regular maintenance.

Security & Safety Concerns

Children and young people are curious in nature and may potentially want to explore the WTGs on site and the substation. As the Wind Farm is the first in their communities, 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. As such, the Project Company and O&M Company will conduct on-going awareness campaigns in the local communities targeting children and their parents. This will help them understand the risks and dangers involved.

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.

OHTL

During operations, there is the potential for low flying aircraft to collide with the towers resulting in OHTL damage as well as fatality in the worse-case. However, based on review of satellite imagery, there are no airports in the vicinity of the OHTL route. As such, the likelihood of aircraft collision with tower to occur is very low.

In the event that transmission line 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 OHTLs 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.

29.2.2.2 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.

29.2.3 Decommissioning Phase

The community health, safety and security impacts associated with the decommissioning of the wind farm & OHTL are anticipated to be similar to those encountered during the construction phase. As such, no new impacts are predicted.

29.3 Mitigation and Management Measures

Table 29-1 Community Health, Safety and Security Mitigation & Management Measures – Construction Phase

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
Influx	• Mitigation & management measures identified and to be implemented are provided in section 31.2.
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.

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	• 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. • 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.

Potential Impact	Mitigation and Management Measures
Vulnerable Groups – 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. • 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.

Potential Impact	Mitigation and Management Measures
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 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; • 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.

Table 29-2 Community Health, Safety and Security Mitigation & Management Measures – Operational Phase

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 1.5 X turbine height (tower + rotor radius) 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

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	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 • The tower will be tested for collapse to ensure design and installation is in line with National Electric Grid Uzbekistan (NEGU) & international best practice. **Wind Farm & OHTL** • All risks to public safety will be appropriately addressed and prepared for in the operational 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. • 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.

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
Gender Based Violence & Harassment, Sexual Exploitation and Abuse (SEA) and Sexual Harassment (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. • 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.

Potential Impact	Mitigation and Management Measures
	• 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.

29.4 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 29-3 Key Monitoring Indicators

Indicator	Source of Information	Frequency Construction /Operation
Number of security incidences at the project site	Security personnel/local police	On-going
Record of related or project workforce related incidents causing injuries/damage to community member	HSE personnel	On-going
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.	On-going
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.	On-going
Record of human rights violation/complaints from the local communities	Complaints filed by community members in relation to the Project	Ongoing
Any suspected cases of COVID-19 on site	Records from daily monitoring procedures on site	On-going
Number of grievances closed out	Grievance Management System	Quarterly / bi-yearly

INDICATOR	SOURCE OF INFORMATION	FREQUENCY CONSTRUCTION /OPERATION
Average time for grievance processing and close out and trends	Grievance Management System	Quarterly / bi-yearly
Number of grievances still opened, method to submit the grievance and trends	Grievance Management System	Quarterly / bi-yearly
Topics raised in grievances and trends	Grievance Management System	Quarterly / bi-yearly

30 LABOUR & WORKING CONDITIONS

This chapter identifies aspects relating to Labour & Working Conditions for the WF and the OHTL and how they will be managed in accordance with EBRD PR 2/ADB Environmental Safeguard/IFC PS 2 requirements. 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;
- Health risks associated with COVID-19
- Human rights risks to workers; and
- Gender risks.

30.1 Observations and Baseline Conditions

CONSULTATIONS WITH THE MINISTRY OF EMPLOYMENT

A consultation letter was sent to the Ministry of Employment on 4th May 2021 informing them of the Project and expected construction phase workforce of approximately 700 to 1,000 workers. In addition, the letter was meant to establish whether the Ministry of Employment 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 18th May 2021 stating that the Project is required to comply with the relevant labour protection and safety requirements in line with the following normative documents:

- The Law "On Labour Protection" (new edition) ZRU-410 dated 22/09/2016;
- Resolution of the Cabinet Ministers of the Republic of Uzbekistan "On further improvement of measures for labour protection of employees' No. 263 dated 15.09.2014;
- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan "On further development of the market of services in the field of labour protection" No. 246 dated 27.04.2017;
- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan "On measures to improve the activities of the Ministry of Employment and Labour Relations of the Republic of Uzbekistan" No. 1066 dated 31.12.2018;
- Standard Regulation of the Ministry of Labour of the Republic of Uzbekistan "On the organisation of work on labour protection" No.273 dated 29.06.1996;

- Standard Regulation of the Ministry of Labour of the Republic of Uzbekistan "On the organisation of training and testing of knowledge on labour protection" No.272 dated 14.08.1996;
- Regulation of the Ministry of Labour of the Republic of Uzbekistan "On the development of instructions on labour protection" No.870 dated 07.01.2000;
- Order of the Minister of Labour and Social Protection of the population of the Republic of Uzbekistan "On approval of standard norms for the free issuance of special clothing, special shoes and other personal protective equipment for employees of construction, construction and installation and repair and construction enterprises" No. 2224 dated 10.05.2011; and
- Construction Regulations and rules (KMK) 3.01.02-00 "Safety in construction" dated 2000 developed by Gasarchitekstroy (State Committee on Architecture & Construction) of the Republic of Uzbekistan.

In addition, the Ministry of Employment requires the project to implement other relevant regulatory requirements which are meant to improve labour protection and safety as well as promote good working conditions for employees at the construction site.

Consultations letters are provided in Appendix X.

30.2 Potential Impacts, Mitigation, Management & Residual Impact

30.2.1 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 include:

- Occupational Health & Safety Risks;
- Forced labour;
- Child labour;
- Lack of worker representation and restrictions on trade onions;
- Compulsory overtime and excessive working hours
- Provision of inadequate accommodation facilities; and
- Lack of access to grievance mechanism

An assessment of these risks is as provided in the sections below.

30.2.1.1 Occupational Health and Safety

Common activities undertaken during the construction of a wind project include the movement of heavy machinery, excavation, handling of chemicals, works undertaken at height, working in confined space etc., can all introduce significant risk to the health and

safety for the associated work force. In particular, risks are more likely to be apparent for those who are not familiar with the type of works undertaken and/or the associated hazards.

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-contractor. It is therefore of the utmost importance that the EPC and affiliated sub-contractors demonstrate full consideration of health and safety risks as part of their chosen construction methods and that these risks are appropriately mitigated. This will also necessitate systematic processes to be implemented on-site to ensure that such risks are adequately managed and that workers have competency to undertake their works safely.

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 force will be managed through effective risk assessment, development and implementation of an Occupational Health & Safety Plan and an Emergency Preparedness and Response Plan for reasonably foreseeable site based emergencies.

30.2.1.2 Forced Labour

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 350-500 workers will consist of local workforce and the rest will be recruited from outside Uzbekistan. As such, 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 (refer to section 16.3.1.9 on Supply Chain Risks and proposed mitigation & management measures).

30.2.1.3 Child Labour

There is a potential for child labour to be present within the supply chain companies to be used by the EPC Contractor. In order to assess this risk, a Supply Chain Impact Assessment for Tier 1, 2 & 3 suppliers is currently being undertaken for the Project (refer to section 16.3.1.9 on Supply Chain Risks). Upon completion of this assessment, ACWA Power & the Project Company will ensure that the recommendations provided are implemented by their core suppliers. In addition, ACWA Power, the Project Company and EPC Contractor will only work with approved suppliers.

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 (i.e., ACWA Power's Policy requires all workers to be 18 years and above)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.*

30.2.1.4 Lack of Worker Representation & Restrictions on Trade Unions

Although Article 30 of the Uzbekistan Labour Code allows workers to undertake collective bargaining (as long as they comply with the established requirements for collective bargaining and agreements), there is a potential risk that workers may not be allowed to join or form trade unions by companies within the Project.

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.

30.2.1.5 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.

30.2.1.6 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). At present there are no local facilities for the accommodation of workers at or near to the site. As such, it will be necessary to establish a temporary accommodation camp.

Due to the remote location of the Project site, there is a risk that accommodation facilities may be inadequate vs. 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.

30.2.1.7 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 may be because they do not know that a grievance mechanism is available to them, how it works or they are afraid or 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.

30.2.1.8 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 Chapter 31 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 affect 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 child bearing 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.

30.2.2 Operational Phase

30.2.2.1 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 be 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.

A structured Grievance Redressal 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.

30.2.2.2 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.

30.2.2.3 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.

30.3 Mitigation and Management Measures

Table 30-1 Workers Condition & Occupational Health & Safety Mitigation & Management Measures – Construction

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 - Human Resource Policies & Procedures - Worker Accommodation Plan - Stakeholder Engagement Plan (including implementation of the Grievance Mechanism) - Human Rights Policy - GBVH Policy - Worker Code of Conduct

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 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.
Forced Labour	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 labour, such as indentured labour, bonded labour or similar labour-contracting arrangements. • The EPC will only engage recruitment agencies that are registered in their country of operations and have a good track record i.e., have no court cases.
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. • The EPC will not employ children in a manner that is economically exploitative, or is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. • 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.

Potential Impact	Mitigation and Management Measures
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	• The EPC contractor 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). • 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.
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.

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. • 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. • 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.

Potential Impact	Mitigation and Management Measures
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. • 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 will 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 will 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. • Grievance mechanism will be used to monitor worker morale, understand how workers are affected and what their concern are in relation to COVID-19 and address pressing matters promptly. • The grievance mechanism will 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.

Table 30-2 Workers Condition & Occupational Health & Safety Mitigation & Management Measures – Operational Phase

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 - Human Resources Policies & Procedures - Human Rights Policy - GBVH Policy - Stakeholder Engagement Plan (including the implementation of the Grievance Mechanism).
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 • 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

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	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 O&M Company will comply with all relevant national laws, lenders requirements and ILO provisions related to the employment of minors. • In any event, the client will not employ children in a manner that is economically exploitative, or is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. • 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 nondiscrimination and consultation. 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.

Potential Impact	Mitigation and Management Measures
	• 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. • 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 mechanismwill 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 will 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.

30.4 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 30-3 Key Monitoring Indicators

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATIONS
Construction & Operations			
Structural Policy	Date of implementation & proof of top management commitment to respecting human rights.	At the start of construction & operation	n/a
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
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.
Worker Welfare	Sanitation Facilities, Office Spaces, Welfare and Rest Areas	On-going	At all such facilities on-site
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.
OH&S Near Misses (involving external parties)	Any classified near miss	On-going	n/a
OH&S Emergency Situations and Incidents	Any classified emergency situation or incident	On-going	n/a
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.
Human rights complaints/violations as reported by Project workers including	Grievances received	On-going	As defined in the Stakeholder Engagement Plan (SEP)

Monitoring	Parameter	Frequency & Durations	Monitoring Locations
workers hired through third-parties or in the supply chain			
Records and frequency of human rights training among the workers	Human Rights training records	Quarterly / bi-yearly	All Project site workers including those under different sub-contractors, suppliers etc.

31 INFLUX IMPACT ASSESSMENT

The Project is expected to employ about 700 – 1000 personnel which will include approximately 300-500 Uzbek nationals and the remainder are expected to be primarily recruited from countries such as: China, Turkey, India and European countries (refer to section 2.4.5). In addition to the influx of workers in the area, the development of the wind farm and OHTL may result in the in-migration of the other people seeking direct or indirect opportunities from the Project. This includes:

- Opportunistic in-migrants seeking jobs from the Project;
- Opportunistic traders aiming to take advantage of business opportunities encouraged by the Project and by the increased income of the local community and;
- Other migrants seeking to take advantage of the economic and development opportunities created in the area.

This influx of workers and in-migration of the general population to the Project area due to the construction related activities has the potential to impact public infrastructure, local & regional economy and social features, cause conflict etc. These potential impacts are as assessed in the section below:

31.1 Potential Impacts, Mitigation, Management & Residual Impact

31.1.1 Social Risks

31.1.1.1 Risk of Social Conflict

The risk of conflict may arise between the local communities and the workers which may be related to religious, cultural, ethnic, nationality differences or competition over existing resources and infrastructure.

In addition, conflict may arise between different groups within the workforce due to the different nationalities and difference in culture, political views, religion etc. This could also spill over and exacerbate pre-existing conflicts within the community.

31.1.1.2 Impact on Local Accommodation Facilities

Based on the socio-economic study (reference section 16.1.3) there is limited local capacity to accommodate additional demand for workers. As such these communities do not have the capacity to accommodate additional demand. As such, Project workers will be housed within dedicated temporary accommodation facilities on the Project site. These on-site accommodation facilities will provide a level of supervision and security so that public order is maintained and unlawful conduct minimized. Where accommodation for some sub-

contractor employees cannot be on site, these will be sourced from larger towns/cities such as Navoi.

However, opportunistic workers and traders moving to the Project area and in need of accommodation may exhaust any available rental property, contributing to the risk of illegal lodging arrangements or establishment of shanty. Such actions would create tensions within the communities and could lead to increase in crime such as petty theft.

31.1.1.3 Increased Burden on and Competition for Public Service Provision & Access

An influx of non-locals (both workers & migrants) will potentially result in additional demand and pressure on the public infrastructures such as existing roads, water supply, waste management, heating, transportation, electricity, religious facilities, recreational , education and health facilities some of which are already under resourced and is at a low carrying capacity (reference Chapter 16 Socio-economics). The pressure on public infrastructure & services will be greater during peak period of construction works when nearly 1000 workers are on site. This will impact the local communities ability to access these services and compromise their right to a decent life.

31.1.1.4 Increased Risk of Communicable Diseases & Burden on Local Health Services

The interaction of workers from other regions of Uzbekistans and abroad may result in the transfer of communicable diseases such as COVID-19 and/or illnesses and spread of sexually transmitted diseases such as HIV/AIDs. This may potentially result in an additional burden on local health services especially where workers with certain illnesses prefer to access local medical facilities anonymously.

In addition, the socio-economic baseline studies described in Chapter 16 of this ESIA identified that there is a clinic in Agitma village. The influx of workers and migrants to the project area will potentially result in additional pressure on the local clinic especially in case of an emergency if no alternative health facilities (i.e., site clinic) are provided for the workers. Although the clinic is well equipped it lacks qualified specialists and so increase in pressure on the clinic will result in restriction of use by local residents thereby impacting their health ability to access medical services.

As such, the EPC Contractor, will be required to have a site-based health clinic and make arrangement with other regional hospitals so that the services to the local communities are not undermined.

31.1.1.5 Gender Based Violence & Harassment

Reference section 30.2.1.4 for potential gender risks associated with the Project and section 30.3 on mitigation measures to be implemented.

31.1.1.6 Disruption of Local Custom

The socio-economic survey of the 36 households in Ayakagitma and 6 households each in Chulobod and Kuklam village respectively identified that 96% of the household surveyed are of Kazakh ethnic background and predominantly Muslim with their own customs and beliefs. The influx of workers and migrants to the Project area has the potential to introduce new habits or cultural practices inconsistent with the local culture. This could lead to potential conflict with the new workers & in-migrants or decline in social cohesion between the local communities.

31.1.1.7 Increase Incidence of Illicit Behaviour

Influx of workers and in-migrants coupled with access to disposable income may result in increased incidence of vices such as drug abuse, alcoholism, prostitution, gambling, etc. all of which presents additional social challenges for the local communities.

Single non-local men with money may demand prostitution and interact sexually with local females and this might result in the spread of sexually transmitted infections. Drug abuse and alcoholism may result in increasing health problems in the local communities and this will subsequently result in an increased pressure on the existing health care facilitie and the local law enforcement authorities may not be sufficiently equipped to deal with such challenges.

31.1.1.8 Intangible Cultural Heritage

Reference section 13.4.1 and 25.4.1 for the worker impacts on intangible cultural heritage and the mitigation and management measures to be implemented.

31.1.1.9 Increase in Traffic Risks

Delivery of Project equipment, machinery and other supplies will lead to an increase in traffic, potential rise in accidents as well as additional burden on the transportation infrastructure. These could potentially impact vulnerable groups such as people living with disabilities, children and women more disproportionately than other groups. Details of these impacts and mitigation and management measures to be implemented are provided in Chapter 11 Traffic & Transportation.

31.1.2 Local Economy

31.1.2.1 Local Inflation of Prices

During the construction phase of the Project, although majority of the equipment & materials required will be sourced internationally, there is a potential for construction materials such as

concrete, cabling, etc. to be sourced locally. Demand for other goods and services such as food, clothing etc may significantly lead to local price hikes making such commodities and services out of reach for locals.

However, there is also the potential for purchase of food products locally to boost the local economy where local people are able to sell vegetables and dairy products to the workers & in-migrants.

31.2 Mitigation and Management Measures

Table 31-1 Influx Impact Assessment Mitigation & Management Measures

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
All Impacts	• The Project Company will ensure that the EPC Contractor develops and implements an Influx Management Plan which will be aligned with the Local Recruitment Plan, Security Management Plan, GBV/SEA & SH Prevention & Response Action Plan, Worker Code of Conduct, Local Content Plan and relevant Accommodation Management Plans. • Local communities and other stakeholders will be provided information on how to access the GRM in accordance to the SEP.
Social Risks	• All workers will be provided with the Worker Code of Conduct in a language understandable to them. • The Project Company will ensure that the EPC Contractor prioritises the recruitment of local workforce for both skilled and unskilled positions. • Workers will be provided with mandatory cultural sensitization training programmes regarding engagement with local communities. • The EPC Contractor will cooperate with the local law enforcement in order to prevent the spread of crime or misconduct within the workforce. • EPC Contractor will provide recreational facilities within accommodation areas to minimise and ultimately reduce the need for workers to use local community facilities; • The EPC Contractor will hire workers through registered recruitment agencies in order to discourage spontaneous influx of workers. • The worker accommodation camp on site including those established offsite by sub-contractors will include waste and wastewater disposal system (including sufficient septic tanks); • Water supply to the Project will be from a registered authorized supplier and will not source from local water supply systems. • A Code of Conduct to guide staff on water and electricity consumption will be established. • EPC Contractor will undertake campaigns and awareness training on sexually transmitted illnesses to workers and local communities, including access to testing facilities, prevention etc (in a culturally appropriate manner). • EPC Contractor will adopt a zero-tolerance policy towards unacceptable workforce behavior towards females or any community member. • EPC Contractor will provide regular substance abuse prevention and management programs

Potential Impact	Mitigation and Management Measures
	• 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 after with a medical fitness certificate from an authorized medical center. • Regular and sporadic site checks with regards to substance abuse will be conducted at accommodation camps whilst respecting workers' freedom of movement rights. • EPC Contractor will develop a COVID-19 Risk Assessment at the start of the construction phase which will be reviewed regulary in line with the evolving national and WHO requirements and guidance.
Local Economy	• The Project Company and EPC Contractor will ensure an appropriate mix of locally and non-locally procured goods to allow local project benefits while reducing the risk of crowding out and price hikes for local consumers. • The Project will manage expectations with regards to purchasing goods and services from local businesses. The project commitments on local content for provision of good and service will help to ensure the opportunities and benefits are feasible. • Special consideration will be provided for female headed households in employment and delivery of other services to the Project. • The EPC will provide project workforce (expatriate & migrants) with awareness training on including income/finance management.

31.3 Monitoring

Monitoring of influx of non-locals will be undertaken as required via the management measures outlined above.

Table 31-2 Key Monitoring Indicators

Indicator	Source of Information	Frequency Construction /Operation
Record of any conflict between community members since project inception and influx (related to the Project or project parties). Including any cases relating to employment, sexual harassment.	Complaints filed by community members or Project workers and number of worker sensitization and awareness campaigns undertaken.	Daily during construction
Health of the workers	Records of the illnesses the workers are suffering from and an analysis of top diseases.	On-going
Record of any communicable diseases on site that could pose a risk to the local communities	Project site clinic or HSE personnel	On-going
Any suspected cases of COVID-19 on site	Records from daily monitoring procedures on site	On-going

INDICATOR	SOURCE OF INFORMATION	FREQUENCY CONSTRUCTION /OPERATION
Record of human rights violation/complaints from the local communities	Complaints filed by community members in relation to the Project	Ongoing
Number of influx related grievances received	Grievance Management System	Quarterly / bi-yearly
Number (per type) of grievances related to local community health, safety and security (injuries, damage, diseases, etc.);	Grievance Management System	Quarterly / bi-yearly
Monitoring of recruitment agencies involved in employing foreign workforce	Complaints received form the foreign workforce	Daily during recruitment

32 CLIMATE AFFAIRS

32.1 Potential Project Impacts upon Climate Change

32.1.1 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.

32.1.1.1 Fuel Combustion

STATIONARY SOURCE

The primary stationary combustion fuel source that will be used during the construction of the Project will be temporary diesel generators which will be located in EPC & sub-contractor administration & office areas within the Wind Farm site and in selected locations along the OHTL route (primarily the laydown area).

The electricity on site will be provided by onsite generators, at the time of writing the exact number of generators and their estimated consumption are unknown. 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 32-1 GHG Emissions from the Use of Diesel During Project Construction

FUEL TYPE	VOLUME OF FUEL (LT)	CO_2	CH_4	N_2O	ALL GHGS (TONNES CO2E)
Liquid fossil (Diesel)	10,500	28.103	1.138E-03	2.276E-04	28.195
Total GHG emissions from fossil fuels (tonnes CO2e)					**28.195**
*if/when the generators are operational					

The above calculation can be updated once the number of generators and their estimated consumption are known.

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 at the OHTL

route, and are expected to be used in most construction processes. It is anticipated that these will be fuelled by either diesel or unleaded petrol. The table below summarises the anticipated equipment, plant and vehicles that are expected to be used during construction.

Table 32-2 Anticipated Quantity of Construction Equipment/Machinery/Vehicles

CONSTRUCTION EQUIPMENT/PLANT/VEHICLES	QUANTITY
750t crawling crane	1
150t crawling crane	1
Hydraulic lifting device and lifting frame	1
250t crawling crane	1
50t crawling crane	1
50t truck crane	1
Gantry crane	2
Truck	3
Forklift	2
Tower crane	2
Vehicle crane	2
Wheel loader	1
Backhoe excavator	7
Crawler bulldozer	1
Road roller	2
Dump truck	10
Platform lorry	1
Batch plant	2
Concrete pump truck	3
Concrete delivery truck	6
Piling machine	4

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.

32.1.1.2 Loss of Carbon Sinks

The Project is located in an open area with grass and shrubs as the major vegetative cover and lacks voluminous biomass that would present stores for carbon. Stores of carbon on-site relate to seasonal grasses and low-relief shrubs. While it is noted that the construction phase will result in the removal of ground cover vegetation, this is not expected to be widespread as it will be limited to turbine & OHTL tower footprints and ancillary facility footprints at the wind farm. As such, significant loss of carbon storage is not anticipated due to the Project's development.

32.1.2 Operational Phase

32.1.2.1 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 are 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.

32.1.2.2 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 key supply chains (i.e. 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.

The mitigation and management measures for all potential emissions are as provided in the Air Quality Chapter in Part A of this ESIA.

32.2 Vulnerability of the Project to Climate Change

32.2.1 Climate Physical Risks

A climate physical risk refers to those risks that arise as a result of climate change and can be either acute or chronic. Acute risks refer to event-driven changes in climate patterns e.g. increased severity of extreme weather events. Chronic risks refer to longer-term shifts in climate patterns e.g. sustained higher temperatures, that may lead to sea level risk or chronic heat waves (Equator Principles, 2020).

The climate physical risks relevant to the Project include rising temperatures and flood risk.

32.2.1.1 Increased Temperatures

Current trends in global warming are resulting in temperature increases worldwide, which are also expected to impact Uzbekistan. Historical meteorological records between 1991 – 2016 indicate that the mean annual temperature was 13.33°C (WBG, Climate Change Knowledge Portal, 2021). Mean summer temperatures (May to September) range from < 22°C to 28-30°C

in central districts and mean winter temperatures (December to early February) range from -9°C in northern districts to 5-7°C in south eastern districts.

This trend of increase mean temperatures across the year have been experience in Uzbekistan since 1938. Looking at projected trends under an emission scenario of RCP 8.5, Uzbekistan mean annual temperature is predicted to rise by 2.37°C between 2040 and 2059 (WBG, 2021).

During warmer temperatures and any dry periods (i.e. during the summer), there may also be a resulting increase in the severity or frequency of dusty days and dust storms.

The Project will require few staff primarily maintenance engineers to work outdoors during operations for maintenance works. The number of these staff working outdoors will be limited and as such impacts to the workforce from possible rising temperatures or dust storms due to climate change are expected to be minimal.

32.2.1.2 Increased Flooding

A resulting impact of current climate change can be increased/heavy rainfall, which may result in increased runoff/flooding.

The Project is located towards the central extent of the country and this area experiences dry hot summer, cold winters and limited rainfall. By virtue of geography, the Project area may be impacted by increased water flows/ water ponds at times of future heavy rainfall therefore increasing the likelihood of flooding at the Project site.

As part of this project's development & ESIA, the Project site has been selected to ensure that the WTGs are situated in areas with minimal flood areas.

For additional details on flooding risk, please refer to Flood Risk Assessment sub-section of Part A of this ESIA. This has been assessed based on the flood risk modelling undertaken by UzAssystem (2021b). The flood risk model considered impacts for a T=50 years & T=100 years period.

32.2.2 Climate Transition Risks

Climate transition risks refer to those which may arise from the plans or processes that may be put in place to adjust to a lower-carbon, climate-resilient economy. These can include changes or updates to policy or legislation (e.g. introduction of emission limits), imposition of carbon tax, shifts in demand and supply due to technology and market changes and reputation risks reflecting changing customer or community perceptions (Equator Principles, 2020).

As part of the Uzbekistan 2030 Energy Strategy, the country aims to develop and expand the use of renewables and integrate it into the unified power system. The 500MW Wind Farm is a

renewable energy project therefore it is not expected to result in emission of any greenhouse gases during operations.

Given that the Bash 500MW Wind Farm Project is a zero-carbon operation project, there are not anticipated to be any specific transition risks of concern.

33 CUMULATIVE IMPACTS

Cumulative impacts are 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*'. CIA is therefore the process of:

- Analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and environmental and social external drivers on the chosen Valued Environmental and Social Components (VECs) over time; and
- Proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible.

The purpose of a cumulative impact assessment is to determine how the potential impacts of a proposed development might combine cumulatively, with the potential impacts of other projects or human activities as well as natural stressors such as droughts or extreme climatic events.

The objectives and expected outcomes of a Cumulative Impact Assessment process are as follows:

- Identification of VECs such as air, water, soil etc. that may be affected by the Project and the selected VECs the assessment will focus on;
- Identification of existing and reasonably anticipated and/or planned developments, as well as natural environmental and external social drivers, that could affect the selected VECs;
- Assessment and/or estimation of the future condition of selected VECs, as the result of the cumulative impacts that the development is expected to have, when combined with those of other reasonably predictable developments;
- Evaluation of the future condition of the VECs relative to established or estimated thresholds of VEC condition or to comparable benchmarks;
- Avoidance and minimization of cumulative impacts of the Project on the VECs and
- Monitoring and management measures to ensure the VEC viability over the life span of the development or its impacts.

33.1 Identification of Valued Environmental and Social Components (VECs)

This ESIA has assessed cumulative impacts of several environmental and social parameters in the main sections of this ESIA. For instance, biodiversity impacts, construction air quality (particulates) and construction noise impacts have considered the measured baseline conditions in combination with the predicted process contributions. As a result, this has provided an assessment of cumulative impacts, as a result of the Project itself.

33.2 Identification of Other Activities and Environmental Drivers

For the purpose of this ESIA and in light of the two (2) active mining areas, the CIA will be undertaken to establish whether there are barriers to both current and future development within the projects area of influence, such as:

- Is there sufficient environmental carrying capacity available for future development?
- Are there any factors that may restrict future development?
- Are there any key factors of concern that may relate to the development/operation of other projects in tandem with the proposed Bash 500MW Wind Farm Project?

Table 33-1 Known and/ Future Projects in the Project's Area of Influence

PROJECT	DESCRIPTION	DISTANCE TO PROJECT
Mining	Mining area 1 – This mine is currently inactive but the owner of the mine; Lucent Centre LLC has obtained a license for the extraction of gypsum valid from 2020 until 2076. There is a potential for mining works to commence anytime in the nearest future	1.4km east
	Mining area 2 - This mine is currently inactive but the owner of the mine; Navoi Sonoat Saydo LLC has obtained a license for the extraction of gypsum valid from 2020 until 2040. There is a potential for mining works to commence anytime in the nearest future	0.9km west
Dzhankeldy Wind Farm & OHTL	A wind farm project that will be developed by ACWA Power alongside the Bash Project	94km west

The following table presents the different environmental and social components or aspects that were considered within this ESIA and therefore have the potential to be impacted by the construction & operation of on-going activities and existing facilities within the Project's area of influence.

Table 33-2 Valued Environmental & Social Components (VEC's)

ENVIRONMENTAL AND SOCIAL COMPONENTS	CONSIDERED VEC TO BE INCLUDED IN CIA?	JUSTIFICATION FOR INCLUSION OR EXCLUSION
Terrestrial Ecology	**Yes**	Project related impacts with regards to terrestrial ecology would be those associated with habitat loss, habitat fragmentation, biodiversity loss and displacement. Cumulative impact to terrestrial ecology is only anticipated when the operation of the Bash wind farm & OHTL is undertaken simultaneously with mining works at the mining areas and the Dzhankeldy Wind Farm and OHTL.

Environmental and Social Components	Considered VEC to be included in CIA?	Justification for Inclusion or Exclusion
Air Quality	**Yes**	Project related impacts on ambient air quality would be those associated with construction: temporary emissions from vehicles, dust from earthworks and dust from vehicle movements within the Project. Cumulative impact on air quality with respect to dust generation and gaseous emissions is only anticipated when construction activities at Bash site is undertaken simultaneously with mining works at the mining areas.
Noise and Vibration	**Yes**	Project related impacts with regards to nuisance to sensitive receptors from noise and vibration would be those associated with construction: use of vehicles, heavy plant and machinery, in particular earthworks and operation of the WTGs etc. Cumulative noise and vibration impacts at receptor location particularly any activities that will be undertaken at the boundary is only anticipated when extraction processes is being undertaken at the mining areas at the same time as the Bash wind farm construction activities.
Soils Geology, Groundwater and Surface water	**No**	Project related impacts on soil and groundwater quality would be those related to the potential contamination of soil and groundwater resources during construction as well as during operation. However, the effect of these impacts will be localized and limited within the Project boundaries and area of works along the OHTL route, with very limited potential for cumulative effects. Furthermore, no extraction of local groundwater resources is envisaged during the construction and operation of the Project.
Archaeology and Cultural Heritage	**No**	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 significant cumulative impacts will take place.
Landscape and Visual	**No**	Project related impacts in relation to landscape would mainly be those related to the clearance of the Project site, loss of typical desert landscape and visual impact due to the anthropogenic intrusion of vertical wind turbine & OHTL structure. Existing & future geological processes at the mines will not require additional land clearance as mining areas have already been established
Shadow Flicker	**No**	Cumulative impacts from Shadow Flicker is not anticipated as there are no wind farm in the project area of influence for shadow flicker and when active,

Environmental and Social Components	Considered VEC to be included in CIA?	Justification for Inclusion or Exclusion
		the mining areas do not have any machinery or equipment that will cause shadow flicker
Socio-economics	**Yes**	Project related impacts in relation to socio-economics would be mainly those related to creation of employment (beneficial impact) and dissemination of skills during both construction and operational phases. Given the scale of the Project, significant beneficial cumulative impacts are anticipated.
Waste and Wastewater Management	**No**	Project related impacts in relation to waste and wastewater management would mainly be those related to the potential 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. However, given the amounts of waste generated it is not envisaged that cumulative impacts with other projects will be significant.
Community Health, Safety and Security	**Yes**	Project related impacts with regards to community health, safety and security would mainly be those associated with construction: influx of workers, public trespassing, security concerns as well as incidents (accidents) from the presence of vehicles, heavy plant and machinery. Given the proximity of residential receptors to the Project site and mining areas, cumulative impacts is therefore anticipated as a result of increase in equipment & machinery use, influx of workers.
Worker Conditions & Occupational Health and Safety	**No**	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.

33.3 Assessment of Cumulative Impacts on VECs Due to Development of Project Area

The table below provides a summary of cumulative impacts on the VECs identified in the section above to be included in the cumulative impact assessment. Only those environmental and social parameters envisaged to have noticeable or discernible cumulative impacts due to the construction and operation of the Dzhankeldy Wind Farm in combination with the mining facilities and Bash Wind Farm & OHTL has been included.

Table 33-3 Summary of Cumulative Impacts (Qualitative Assessment)

	CONSTRUCTION	OPERATION
Terrestrial Ecology		
Impacts from Bash Wind Farm & OHTL	Please see explanation in the sub-section below	Please see explanation in the sub-section below
Impacts from future mining areas		
Impact from Dzhankeldy Wind Farm & OHTL		
Cumulative Impacts		
Air Quality		
Impacts from Bash Wind Farm & OHTL	Local ambient air quality will be potentially affected by increased dust during site clearance, and earthworks as well as by gaseous emissions of nitrogen oxides, sulphur dioxides, carbon monoxide, carbon dioxide from the exhaust of construction vehicles, equipment and temporary power generators.	None
Impacts from future mining areas	Construction of complete mine site facilities and plants will give rise to dust generating activities and the emission of pollutants into the air thereby leading to significant changes in ambient air quality that may be cumulatively above Uzbekistan and WHO/IFC Ambient Air Quality Standards.	Extraction of gypsum and other geological activities at the mines during operation will give rise to dust generating activities and the emission of pollutants into the air
Impact from Dzhankeldy Wind Farm & OHTL	Expected to be similar to the impacts identifies for Bash Wind Farm & OHTL	None
Cumulative Impacts	If the project construction period coincide with mining activities, cumulative impact on air quality with respect to dust generation and gaseous emissions from construction activities at the Project is anticipated. However, with the implementation of management and mitigation measures, the cumulative impacts are expected to be Minor. No cumulative air quality impacts are anticipated along the OHTL route as there are no known existing or future projects along the route. With regards to the cumulative impact from the Bash Wind Farm & Dzhankeldy Wind Farm, cumulative impact on air quality is not anticipated due to the distance of the Bash wind farm to the Dzhankeldy site. Any impact	At this point, the start-up dates for the extraction activities at the mines are unknown and even if the Project operation period coincide with mining extraction process, cumulative impact is not anticipated

	CONSTRUCTION	OPERATION
	to air quality will be limited to the immediate/local air shed of respective wind farms and only expected to occur at receptor location within 1km of the respective wind farms	
Noise and Vibration		
Impacts from Bash Wind Farm & OHTL	Construction activities will result in temporary and short duration increases in the noise and vibration levels emanating from the project sites, access road and the laydown area.	The Noise chapter provides an assessment of noise impacts from the wind farm and based on the assessment, the operation of the project is in compliance with established IFC EHS limit at majority of the receptor location.
Impacts from future mining areas	Increases in ambient noise due to construction machinery, equipment and vehicles.	The noise levels from mining activities will be the same as construction as such, it will not increase the existing noise levels.
Impact from Dzhankeldy Wind Farm & OHTL	Expected to be similar to the impacts identified for Bash Project	Expected to be similar to the impacts identified for Bash Project
Cumulative Impacts	No cumulative impact will occur if the Project construction period do not overlap with mining activities. If the project construction period coincide with mining activities, cumulative impact will occur at receptors within the area of influence which is defined as 2km in this ESIA. Receptors within the area of influence may be temporarily impacted by the cumulative impact from the increase in ambient noise due to operation of construction machinery and equipment With regards to the OHTL, no cumulative impacts are anticipated along the OHTL route there are no known existing or future projects along the route. Cumulative noise impact from the Bash Wind Farm & Dzhankeldy Wind Farm, is not anticipated due to the distance of the Bash wind farm to the Dzhankeldy site. Any increase in noise level as a result of construction works are only expected to occur to impact receptors within 2km of the respective wind farms	Cumulative noise levels from the wind farm and mining facilities will not increase existing noise level by more than 3dB. With regards to the OHTL, no cumulative noise impact is anticipated as operation of the OHTL does not generate noise and there are no known existing or future projects along the route . With regards to the Dzhankeldy Wind Farm, no cumulative noise impact is anticipated due to the distance of the Bash Wind Farm to the Dzhankeldy site .
Socio-Economic		
Impacts from Bash Wind Farm & OHTL	The Project will lead to land acquisition and resettlement which will impact herders who graze livestock & live at settlements within the	This project will reduce Uzbekistan dependency on fossil fuel generated power and will reduce atmospheric pollution; in

	CONSTRUCTION	OPERATION
	Project site. This will be mitigated through the Project specific RAP. Positive impacts will include additional local employment and generation of electricity.	comparison to other power generation technologies in the current energy mix of Uzbekistan. It will also support the continued growth of the national economy through the provision of sufficient power supplies in Uzbekistan.
Impacts from future mining areas	Positive in terms of additional local employment.	Positive in terms of additional local employment.
Impact from Dzhankeldy Wind Farm & OHTL	Expected to be similar to the impacts identified for Bash Project	Expected to be similar to the impacts identified for Bash Project
Cumulative Impacts	If the project construction period coincide with mining activities this will also lead to increase in local employment With regards to the Dzhankeldy Wind Farm, positive cumulative impact is anticipated in terms of cumulative increase in local employment in the Region	Positive impact in terms of increase in power generation and employment opportunities. With regards to the Dzhankeldy Wind Farm, positive cumulative impact is anticipated in terms of cumulative increase in renewable energy power generation in the Country and local employment in the Region
Community, Health and Safety		
Impacts from Bash Wind Farm & OHTL	It is expected that with the implementation of mitigation and management measures the impacts relating to community health, safety and security will be low in relation to conduct of workforce in the community, spread of diseases and illnesses, incidents and accidents from operation of vehicles and machinery etc. However, the risk of COVID-19 infections could be high if the safety precautions and procedures are not followed.	Impacts related to operations will mainly be: new workers, public trespassing, as well as incidents (accidents) from equipment operation and the Project vehicles.
Impacts from future mining areas	Local employment is expected to result in similar impacts identified for the Project.	
Impact from Dzhankeldy Wind Farm & OHTL	Expected to be similar to the impacts identified for Bash Project	

	CONSTRUCTION	OPERATION
Cumulative Impacts	If the project construction period coincide with mining activities & construction of the Dzhankeldy Wind Farm & OHTL, the influx of workers during the construction phase could lead to outbreak of diseases and illnesses, strain the public social services etc. Construction works could also increase the risk relating to public safety particularly in regard to use of high-powered equipment, machinery etc. However, impacts relating to safety and security will be site-specific and therefore the cumulative impacts are considered to be insignificant.	

33.3.1.1 Cumulative Impacts on Biodiversity

POTENTIAL CONSTRUCTION IMPACTS

Construction-phase impacts such as habitat loss, fragmentation and displacement can be regionally cumulative. However:

- the anticipated significance of habitat loss (based on relatively small BUA footprint of windfarms) is not considered to be significant;
- displacement during active construction works is temporary and it is assumed that there are available adjacent habitats for fauna to utilize during disruptive works; and
- fragmentation is not anticipated to occur given that the wind farm and OHTL will not be fenced to prevent physical movement.

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 on biodiversity receptors are anticipated to occur during the construction stage.

POTENTIAL OPERATION IMPACTS

<u>Ecosystem Function Degradation</u>

HABITAT FRAGMENTATION

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.

The OHTL may result in fragmentation for species that exhibit strong avoidance behaviour.

The below receptors may be cumulatively affected by the presence of three wind farms operating simultaneously.

Table 33-4 Operational Phase Cumulative Impacts – Habitat Fragmentation

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	CUMULATIVE SIGNIFICANCE
Endangered Birds	Very High	Moderate	**Major**
Threatened Birds	High	Moderate	**Moderate to Major**
Non-threatened Birds	Medium	Moderate	**Moderate**
Threatened Mammals (Goitered Gazelle)	High	Minor	**Minor to Moderate**
Non-threatened Mammals (carnivores)	Medium	Minor	**Minor**
Non-threatened Mammals (non-carnivores)	Medium	Moderate	**Moderate**
Threatened Herptiles (Southern Even-fingered Gecko)	Very High	Moderate	**Major**
Non-threatened Herptiles	Medium	Moderate	**Moderate**
Non-threatened Invertebrates	Medium	Moderate	**Moderate**

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.

The presence of multiple wind farms in the same migratory corridor may produce cumulative collision impacts.

The cumulative rate of collision for bird species produced by both Bash and Dzhankeldy wind farms are outlined in the following table. The CRM analysis indicates an overall low-moderate level of collision risk for sensitive bird species (tier 1 and tier 2 target species) as well as other modelled bird species for the WF Project.

Egyptian Vultures are the most prevalent in the area during the Spring through Autumn seasons, the most likely to be breeding within the vicinity of the Project area, and potentially the most likely to be impacted by the Project. CHA for this species found that it triggered criticality. It is anticipated that cumulative impacts of wind turbine collision on this species

could be additive between both wind farms. Cumulative risk analysis for this species estimates 0.1626 collision per year.

Houbara bustard is predicted to have a cumulative annual collision frequency of one bird per year. CHA for this species triggered criticality at both wind farm project sites. However, zero inflight observations of this species were made during the VP survey. For the purpose of the CRM hypothetical assumptions were made that a single bird was seen flying within rotor swept height during the VP surveys in each season.

It should be noted that Winter VP surveying was not conducted at the Bash Project site and these estimates do not consider winter bird counts at Bash WF. Therefore, cumulative risk may be underestimated, and this should be verified and monitored for during operations phase.

However, the anticipated collision risk for all identified target species indicate predicted cumulative collisions of less than 1 per year. It is therefore not anticipated that wind turbine collision would be additive between both wind farms.

Table 33-5 Cumulative Collision Risk for Bird Species at the Bash & Dzhankeldy WFs

English Common Name	Species Sensitivity	Using Realistic CA values for each season	
		Collisions/year	Years to 1 collision
Egyptian Vulture	Very High	0.1626	5
Steppe Eagle	Very High	0.232	4
Houbara Bustard	High	0.92489	1
Cinereous Vulture	High	0.2205	5
Eurasian Griffon	High	0.03888	20
Imperial Eagle	High	0.11059	10
Golden Eagle	Medium	0.0995	10
Saker Falcon	Very High	0.0285	30
Eurasian Marsh-Harrier	Medium	0.677	3 (2 birds)
Hen Harrier	Medium	1.304	2 (3 birds)
Eurasian Sparrowhawk	Medium	0.19	5
Common Buzzard	Medium	0.3225	3
Long-legged Buzzard	Medium	0.922	1
Great White Pelican	Low / Lower	0.1998	5
Pygmy Cormorant	Low / Lower	0.3453	3
Ruddy Shelduck	Low / Lower	0.259	4
Gadwall	Low / Lower	1.535	2 (3 birds)
Green-winged Teal	Low / Lower	0.6411	3 (2 birds)
Great Cormorant	Low / Lower	0.285	3
Black-crowned Night-Heron	Low / Lower	1.152	1

TURBINE COLLISION – BATS

Bats may be cumulatively affected by the presence of multiple regional wind farms operating simultaneously. In particular, V. murinus as a high-flyer, and P. pipistrellus, as a regional migrator, may be cumulatively affected.

In the absence of any mitigation, cumulative impact is anticipated to be Major. Given appropriate curtailment programs at both wind farms, the cumulative impact is anticipated to be Minor to Moderate.

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.

The below receptors may be cumulatively affected by the presence of multiple regional wind farms operating simultaneously, **if assuming that design does not adequately mitigate** against electrocution. As appropriate design essentially eliminates electrocution risk, the residual cumulative effects given appropriate design would be **negligible**.

Table 33-6 Operational Phase Cumulative Impacts – OHTL Electrocution (Birds)

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds: Raptors	Very High	Major	**Major**
Threatened Birds: Raptors	High	Major	**Major**
Non-threatened Raptors	Medium	Major	**Moderate to Major**

OHTL COLLISION - BIRDS

Thin, dark wires used in overhead transmission lines as well as guylines 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.

The below receptors may be cumulatively affected by the presence of multiple wind farms operating simultaneously.

Table 33-7 Operational Phase Cumulative Impacts – OHTL Collision (Birds)

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds (Raptors) - Egyptian Vulture	Very High	Moderate	**Major**
Threatened Birds (Groundbirds) - Houbara Bustard	High	Major	**Major**
Threatened Birds (Songbird/Allies) - Eurasian Roller	High	Moderate	**Moderate to Major**
Nationally Threatened Birds (Raptors) - Short-toed Snake Eagle	Medium	Moderate	**Moderate**

Biodiversity Displacement – Competition and Dispersal

DISPLACEMENT / DISPERSAL

Shyer species may be displaced away from the project area, having indirect secondary impacts on adjacent territories via increased competition for resources compromising population stability, causing ecosystem imbalances.

The below receptors may be cumulatively affected by the presence of multiple wind farms operating simultaneously.

Table 33-8 Operational Phase Cumulative Impacts – Displacement

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Moderate	**Major**
Threatened Birds	High	Moderate	**Moderate to Major**
Non-threatened Birds	Medium	Moderate	**Moderate**
Threatened Bats	High	Moderate	**Moderate to Major**
Non-threatened Bats	Medium	Moderate	**Moderate**
Threatened Mammals (Goitered Gazelle)	High	Moderate	**Moderate to Major**
Non-threatened Mammals	Medium	Moderate	**Moderate**
Threatened Herptiles (Southern Even-fingered Gecko)	High	Moderate	**Moderate to Major**
Non-threatened Herptiles	Medium	Moderate	**Moderate**

Other impacts arising during operation are relatively localized and thus do not present cumulative effects.

CONCLUSION

The below summarizes the potential cumulative effects on biodiversity receptors.

Table 33-9 Summary of Potential Cumulative Effects on Biodiversity Receptors

	CONSTRUCTION	OPERATION
Impacts from Bash Wind Farm	Construction-phase impacts such as habitat loss, fragmentation and displacement have residual significance is rated as Minor. Disturbance, mortality and emissions	Direct mortality and displacement are major operational impacts that could potentially be regionally additive. Collision risk for birds and bats will have a residual significance of minor given the stringent mitigation and management measures

	Construction	Operation
	will be managed with residual significance of minor or less.	proposed. Habitat restoration is proposed as a compensatory offset to displacement and habitat degradation.
Impacts from Bash to Karakul OHTL		OHTL impacts likewise given the proposed design are predicted to be of negligible significance.
Impacts from Dzhankeldy Wind Farm	Construction-phase impacts such as habitat loss, fragmentation and displacement have residual significance is rated as Minor. Disturbance, mortality and emissions will be managed with residual significance of minor or less. Of highest concern is loss of Southern Even-fingered Gecko which is being mitigated with minimization of footprint, pre-construction survey.	Direct mortality and displacement are major operational impacts that could potentially be regionally additive. Collision risk for birds and bats will have a residual significance of minor given the stringent mitigation and management measures proposed. Habitat restoration is proposed as a compensatory offset to displacement and habitat degradation.
Impacts from Dzhankeldy to Bash OHTL		OHTL impacts likewise given the proposed design are predicted to be of negligible significance.
Cumulative Impacts	Habitat loss and fragmentation are not anticipated to be significant due to the nature of the project design (unfenced, low BUA). Other Construction Phase impacts are relatively localised, such as mortality, disturbance and emissions-related impacts. Therefore, no cumulative impacts of significance on biodiversity receptors are anticipated to occur during the construction stage.	Wind Turbine collision for birds and bats may have additive mortality effects. OHTL collisional and electrocution, if infrastructure is not designed adequately with mitigation, would anticipate to be cumulative. However, stringent mitigation will reduce residual significance to Minor or less. No significant cumulative impact is anticipated.

Although cumulative effects can occur on biodiversity elements as a result of multiple wind farm projects being developed within the region, both wind farms will incorporate stringent mitigation measures to reduce all residual significance to no greater than Minor. Therefore given that residual impacts at each wind farm individually is predicted to be Negligible to minor, it is not anticipated that the cumulative effect of the windfarms and associated OHTL would be significant.

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