

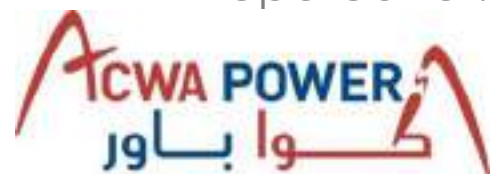
Dzhankeldy 500MW Wind Farm Republic of Uzbekistan



Environmental & Social Impact
Assessment (ESIA)

Volume 2- Main Text, Tables &
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LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
ACCH	Agency of Conservation of Cultural Heritage
ADB	Asian Development Bank
AoI	Area of Influence
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
CWMP	Construction Waste Management Plan
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
EPC	Engineering, Procurement and Construction
ERP	Emergency Response Plan
ESIA	Environmental & Social Impact Assessment
ESMS	Environmental & Social Management Systems
GBVH	Gender Based Violence and Harassment
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
IoA	Institute of Archaeology
IPCC	Intergovernmental Panel on Climate Change.
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
KV	Kilovolts
LILLO	Loop In Loop Out
LLA	Land Lease Agreement
LNTF	Limited Notice to Proceed
MoE	Ministry of Energy
MW	Mega-Watt
NAC	National Archaeological Centre
NEGU	National Electric 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 & Abuse
SNH	Scottish Natural Heritage
SO ₂	Sulphur Dioxide
tCO ₂ e	Tonnes of carbon dioxide equivalent
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
VP	Vantage Point
WHO	World Health Organisation
5 Capitals	5 Capitals Environmental and Management Consultancy
JE	Juru Energy

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

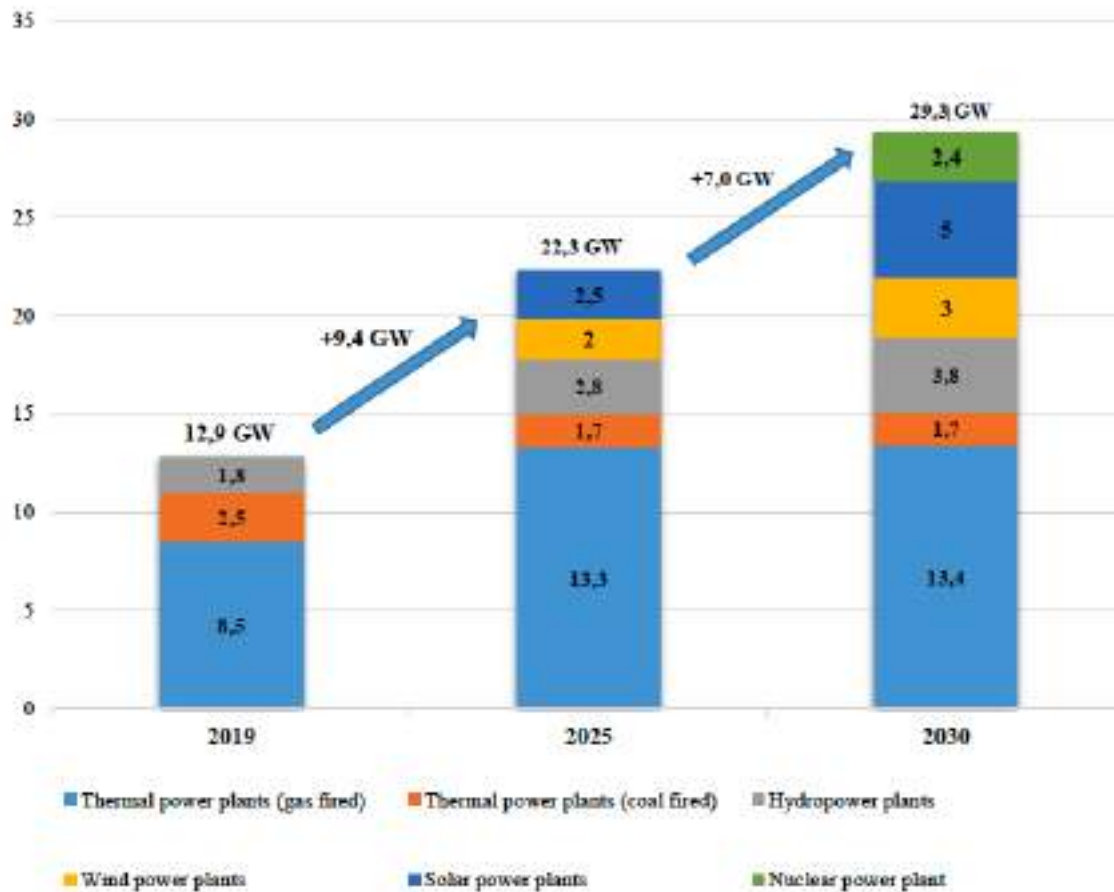
Figure 1-1 Uzbekistan Renewables-Based Generation Targets by 2030



Source: Uzbekistan 2030 Energy Strategy Concept Note, 2020

Of the 29.3GW power generating capacity the country will have in 2030, the Government of Uzbekistan amongst other things, aims for renewable energy to contribute almost half (11.8GW) 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

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

ACWA Power have since established a Project Company, 'FE ACWA Power Dzhankeldy Wind LLC' registered in the Republic of Uzbekistan with registration number 839766. ACWA Power Dzhankeldy Wind LLC has entered into a 25-year Power Purchase Agreement (PPA) with JSC 'National Electric Grids of Uzbekistan', which is based on the ultimate operations of the Project. The Project will include the development financing, construction, operation and maintenance

of the Wind Farm including 79 wind turbine generators (WTGs) and wind farm electrical substations.

The Project scope also includes development, financing, construction and transfer of the Purchaser Electrical Facilities¹ (PEF) and common electrical facilities shared with Bash 500MW Wind Farm, switchyard (with transformers) and 500/220 kV 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

At this stage, it is understood that the European Bank for Reconstruction and Development (EBRD), the Asian Development Bank (ADB) and Multilateral Investment Guarantee Agency (MIGA) are 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 ADB²) 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 certain 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

Prior to the EIA/ESIA, an Environmental and Social Scoping report for the Project was prepared by 5 Capital's on 11th March 2021 prior to the EIA/ESIA. This was submitted to the lenders for review and comments. Comments on the general environmental and social terms of

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.

² The E&S Policy for ADB is the ADB Safeguards Policy (2009)

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.

1.2.2 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 5th July 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 No93 of 18.02.2020.
- 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.

As the National EIA included an Environmental Management Plan and an Environmental Monitoring Plan, it was agreed with SCEEP to include biodiversity mitigation measures in these plans. The preliminary Biodiversity Conservation Plan and Biodiversity Monitoring Programme were prepared and included to the Environmental Management Plan and an Environmental Monitoring Plan and submitted to the Department of Biodiversity on 7th September 2021 and it was approved on 23rd 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 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.

The ESIA is considered to be inclusive of the national Stage II EIA requirements as well as the Environmental & Social Impact Assessment requirements of the 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 (Aol) 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 -15): These chapters are specific to elements relating to the Wind Farm. It outlines the baseline environmental & social conditions, identifies receptors within the Aol 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 16 – 25): These chapters include elements specific to the OHTL. It also outlines the baseline environmental & social conditions, identifies receptors within the Aol 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.

Volume 4 comprises Appendices which have been divided into three (3) parts and these are as follows:

Part A – Main Appendices

- Appendix A – Conclusions from SCEEP on National EIA
- Appendix B – Scoping Report
- Appendix C – Presidential Decree (July 2022)
- Appendix D – Consent Letter from Committee for Development of Sericulture & Karakul Farming
- Appendix E - Air Insulated Substation (AIS)
- Appendix F – Critical Habitat Assessment Reports and Presentations (see Appendices Part B)
- Appendix G – Detailed Terrestrial Ecology Survey Report (see Appendices Part B)
- Appendix H – Gecko Habitat Assessment – Wind Farm (see Appendices Part B)
- Appendix I – Air Quality Calibration Certificates
- Appendix J – Particulate Matter Calibration Certificate
- Appendix K – Sound Meter Calibration Certificate
- Appendix L – Noise Modelling Study
- Appendix M – Soil Laboratory Results – Wind Farm
- Appendix N – Consultation with Ministry of Transportation
- Appendix O – ACWA Power Route Survey & EPC Preliminary Transportation Report
- Appendix P – Consultation Letters, Minutes of Meetings and Power Point Presentation with Institute of Archaeology
- Appendix Q – Translated Summary of Detailed Archaeological Survey Report (March, 2022)

- Appendix R – Shadow Flicker Assessment Report
- Appendix S – Supply Chain Labour & Working Condition Assessment Report
- Appendix T – Gecko Habitat Assessment – OHTL (see Appendices Part B)
- Appendix U – Soil Laboratory Results – OHTL
- Appendix V – Consultation Letter To & From Agency of Sanitary & Epidemiological Wellbeing
- Appendix W – Proof of Consultation with Civil Aviation Agency and Ministry of ICT
- 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 Gecko Habitat Assessment referenced in Appendix F, G, H & T 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 and OHTL Terrestrial Ecology Report

1.5 Key Project Information

Table 1-1 Key Project Information

PROJECT TITLE	Dzhankeldy 500MW Wind Farm
PROJECT DEVELOPER	ACWA Power
PROJECT COMPANY	FE "ACWA Power Dzhankeldy Wind" LLC
OFFTAKER	JSC National Electric Grid of Uzbekistan
EPC CONTRACTOR	China Energy International Group Co (CEEC)
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 Dzhankeldy 500MW Wind Farm Project is located in the south eastern part of the Kyzylum desert on the territory of the Kuldzhuktau mountain range, Peshku district of the Bukhara region.

The western plot of the wind farm is located approximately 2.5km east of Dzhankeldy village and directly adjacent to the Kalaata village. The eastern plot of the wind farm will be located approximately 1.4km west of Dzhankeldy, 27km west of Ayakguzhumdy and approximately 92km west of Bukhara town.

Both the western & eastern plot are approximately 47km north of Highway A380. The proposed Project coordinates and locations are provided in the table and figures below.

Table 2-1 Project Site Coordinates

ID	UTM (NORTH) – WGS84 ZONE 41	
	LONGITUDE (E)	LATITUDE (N)
Eastern Plot		
1	523031	4532092
2	523619	4534734
3	543600	4529734
4	536496	4510432
5	526923	4516488
6	532348	4525455
Western Plot		
7	515436	4532204
8	525738	4525290
9	522033	4519603
10	514981	4524099

Figure 2-1 Project Location- National Context

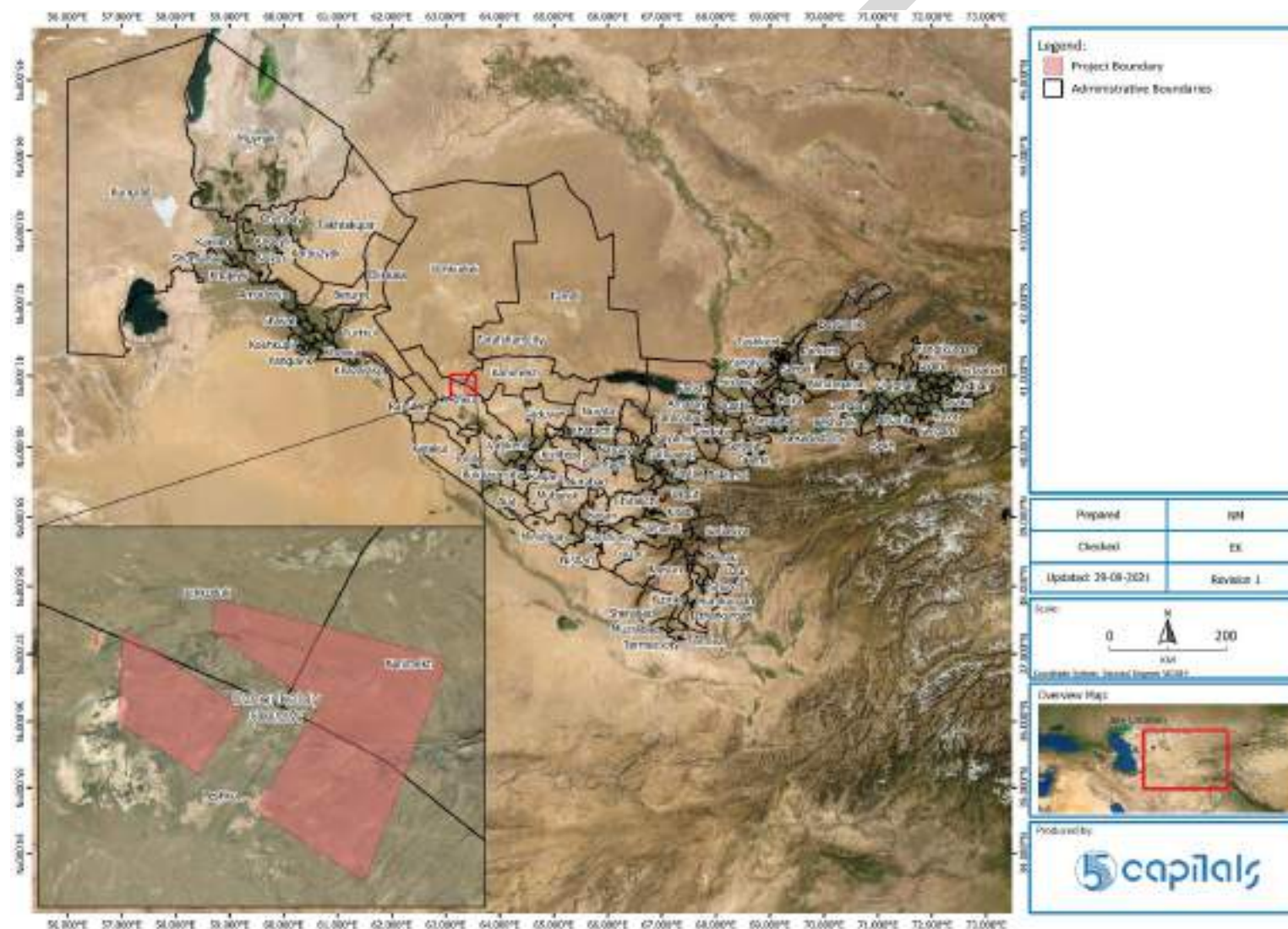


Figure 2-2 Project Location – Local Context

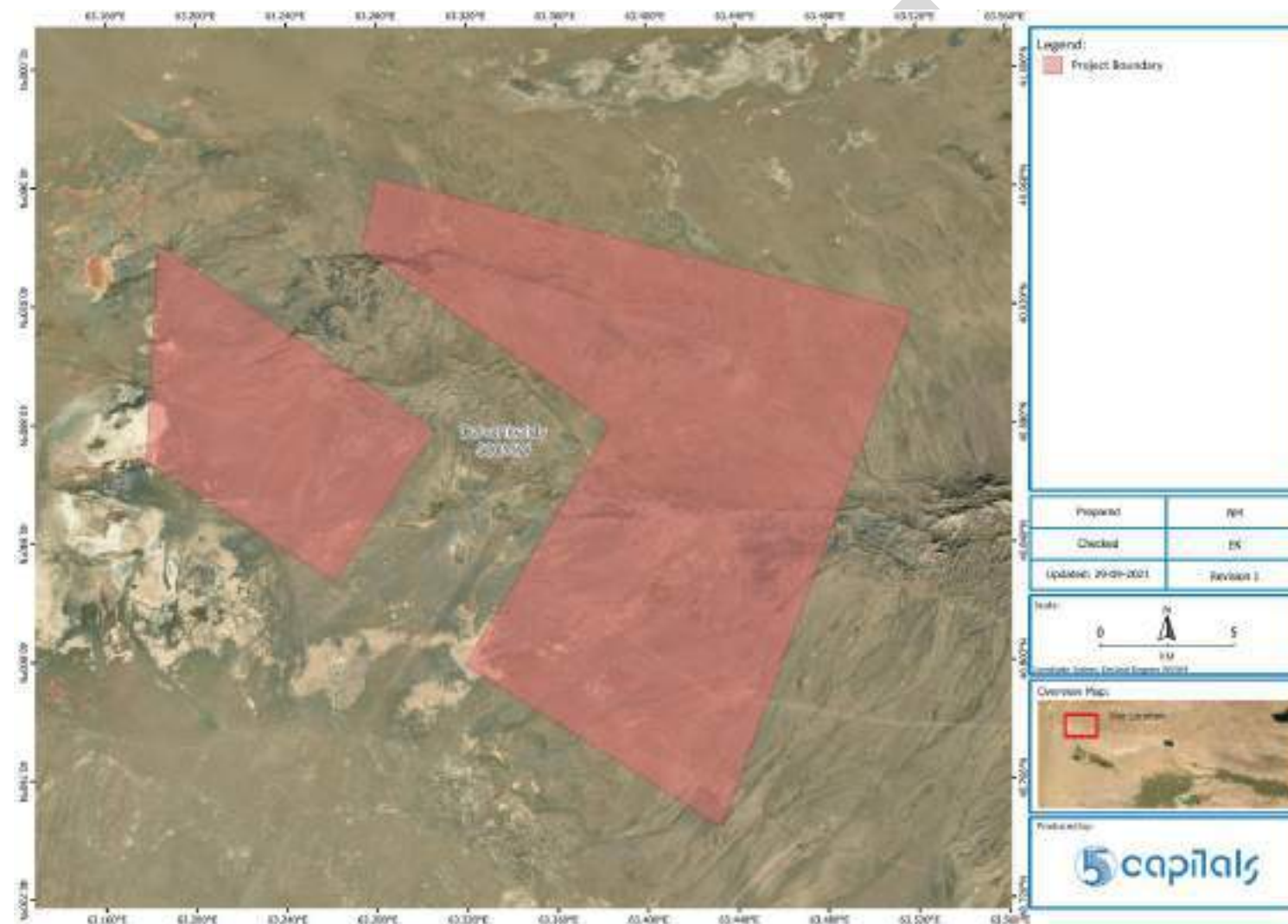
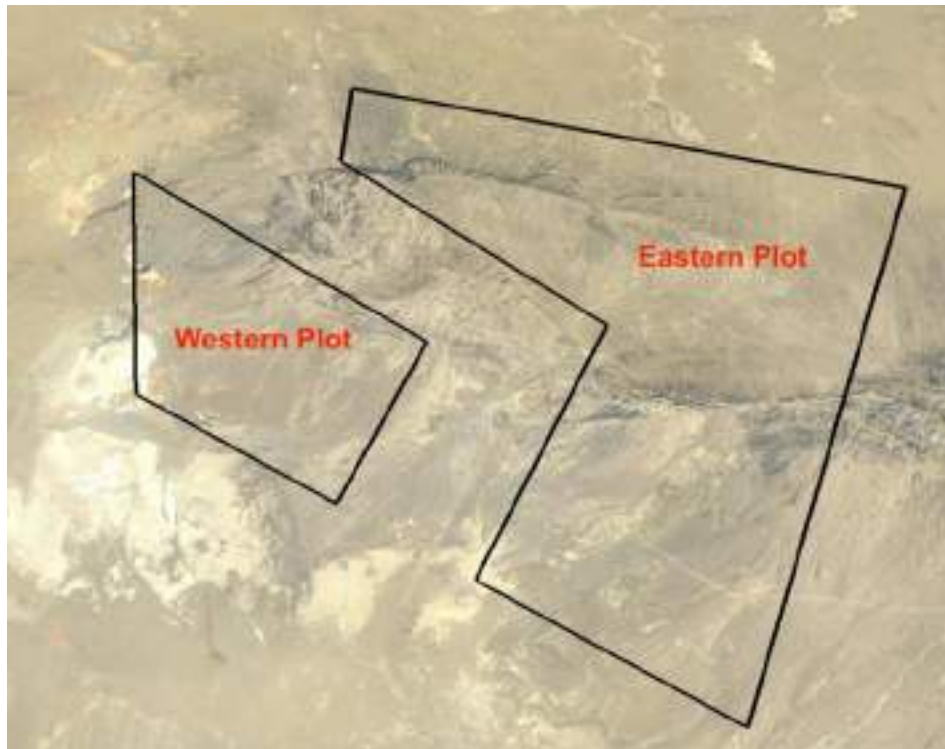


Figure 2-3 Eastern & Western Plots



2.1.2 Overhead Transmission Line

The Project will also include the development of a single circuit 500kV Overhead Transmission Line (OHTL). This OHTL will be 128.5km in length and will run from the Dzhankeldy Wind Farm site to the Bash Wind Farm site located approximately 94km east of the Dzhankeldy Wind Farm site. The OHTL will be developed as part of the Project by the FE "ACWA Power Dzhankeldy Wind" LLC.

The Bash Wind Farm is also going to be developed by ACWA Power alongside the Dzhankeldy ESIA however this is the subject of a separate ESIA.

The table below presents the proposed coordinates of the OHTL routes and the alignment of the OHTL is presented in the following figure.

Table 2-2 Proposed OHTL Coordinates

ID	LATITUDE (N)	LONGITUDE (E)
1	40.871599°	63.391602°
2	40.873830°	63.398702°
3	40.872154°	63.402109°
4	40.888636°	63.467480°
5	40.893794°	63.474995°
6	40.968343°	63.621198°
7	40.988274°	63.645815°
8	40.998865°	63.685715°

ID	LATITUDE (N)	LONGITUDE (E)
9	41.003932°	63.738973°
10	40.994481°	63.811069°
11	40.988620°	63.827835°
12	40.984832°	63.969061°
13	40.966048°	64.084599°
14	40.960308°	64.214270°
15	40.944620°	64.303214°
16	40.920831°	64.364573°
17	40.854876°	64.412343°
18	40.813571°	64.474829°
19	40.816240°	64.496930°
20	40.683620°	64.626660°
21	40.659362°	64.654167°
22	40.657243°	64.668879°

Figure 2-4 Alignment of 128.5km OHTL from the Dzhankeldy Wind Farm to Bash Site



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 Resolution of the President of the Republic of Uzbekistan dated February 2021 PQ-5001 included a requirement for the Khokimiyat of Bukhara region together with the Ministry of Agriculture, within a month, in the prescribed manner, sign an agreement on the transfer of land to the Project Company on the terms of the Investment Agreement and the Agreement on the purchase of electricity with the allocation of the plot of land for the period of implementation of the Investment Agreement.

In addition, the Land Allotment Order issued for the Project on 23rd March 2021 stated that *"the Deputy Mayor and Department of State Cadastre of Peshku district should allocate 280.0ha land from state reserve in Peshku district to "ACWA Power Dzhanakeldy Wind" LLC for construction of wind power plant with a capacity of 300-500 MW"*

These directives have now been superseded by the issuance of the Presidential Decree of the Republic of Uzbekistan No 314 dated 8th July 2022 which includes the following key changes:

- The Khokimiyat of the Bukhara region, by July 30th 2022, to ensure the allocation to the Ministry of Energy of a land plot on the right of permanent use, as well as the land area necessary for the construction of a wind power plant, substation and overhead power lines based on the coordinates of the land occupied by the supporting structures corresponding to the conditions specified in the Investment Agreement and the Agreement about the purchase of electric energy.
- The Ministry of Energy (MoE), for state and public needs, shall ensure the transfer of the lease to the:
 - Project Company a land plot allocated for the construction of a Wind Farm and a substation for a period equal to the period of implementation of the Investment Project.
 - National Electric Grid of Uzbekistan, JSC, a land plot allocated for the construction of the overhead power lines.
- At the same time, the decree includes an exemption for the Project Company and NEGU from compensation for losses in agricultural production (compensation payments) when using agricultural land as part of the implementation of the Investment of the Project.
- Agree with the proposal of the Ministry of Investments and Foreign Trade, the Ministry of Agriculture, the Ministry of Water Resources, the Khokimiyat of Bukhara and Navoi region on the transfer of lands allocated for the investment project with an area of 154.2ha in Peshku and Gijduvan districts of Bukhara region from the category of agricultural land to the category of industrial land in accordance with the annexes of the Resolution.

According to the Presidential Decree, the Project and OHTL have been allocated 154.2ha based on the final project layouts submitted by ACWA Power to the government on 30th June 2022. The land allocation for the different Project components is as provided in the table below (refer to section 4.2.1 for details on land allocated to for the OHTL).

Table 2-3 Land Allocated to the Project based on the Presidential Decree

PROJECT FACILITIES	No. OF WTG/TOTAL KM	TOTAL AREA IN HA	TYPE OF OWNERSHIP
WTG Base (including foundation & hardstand & WTG transformer)	79	39.58	Land lease for project lifetime
Roads	90.282km	50.53	
Underground cable trench	136.56km	27.39	
Wind farm substation (including the switchyard)	-	8.7618	Land lease for project lifetime
Laydown area (Temporary laydown area, yard, office, storage, camp & batching plant)	-	9.0287	Easement ³
Total	n/a	152.23	n/a

Based on this, the land will be allotted to the Ministry of Energy who will sign a Land lease Agreement (LLA) with the Project Company for the Project site as well as the Purchase Electric Facilities (PEF). The signing of the LLA is expected to be undertaken by October 2022.

Refer to Appendix C for the updated Presidential Decree.

2.2.1.2 Land Leases

The wind farm is used by Dzhankeldy Livestock and Sericulture LLC who are a cluster under the Committee for the Development of Sericulture and Wool Industry (the relationship between the Committee and Dzhankeldy LLC is provided below). Consultations with Dzhankeldy LLC have revealed that they have been allocated 756,121ha of grazing land under their management which includes the land within the Project site and in the wider Project area.

Based on the Presidential Decree, the permanent land impact based on the land lease issued for the lifetime of the Project will only impact approximately 0.017% of the total grazing land owned by the LLC while the temporary impact accounts for approximately 0.0011%. Based on this, it is expected that the Project will have limited impact on Dzhankeldy LLC (and its herders) activities and operations. These impacts are addressed in the Project specific RAP.

³ The land easement will be during the construction period which is expected to be undertaken over approximately 2 years.

COMMITTEE FOR THE DEVELOPMENT OF SERICULTURE AND WOOL INDUSTRY

Background

The Presidential Decree “On the organisation of the Committee for the Development of Sericulture and Karakul Development in the Republic of Uzbekistan” was adopted on 2nd September 2021. The decree approved the organisational structure of the “Committee of Development Sericulture and Karakul Farming” as well as the structure of the Central Committee and the model structure of the regional departments.

Figure 2-5 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.
- Obligated 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, Dzhankeldy Livestock and Sericulture LLC is a cluster under the Bukhara Regional Department of Karakul and is the legal land lease holder.

CONSULTATIONS WITH DZHANKELDY LIVESTOCK AND SERICULTURE LLC

A letter requesting additional information on Dzhankely LLC's land lease and use was sent by Juru Energy on 26th May 2021. No response was provided by the chairman of the LLC as he was hospitalised and had not been discharged at the time of writing. Face-to-face consultation was however undertaken with the Director of the LLC on 1st September 2021 and the following information was received:

- No specific land is allocated to herders. All hired herders are free to choose the land that belongs to LLC. After choosing a specific place, hired herder is obliged to inform LLC.
- Local communities are allowed to graze livestock within 5km of their community.
- As majority of herders belong to Kazakh nationality, management of LLC gives them freedom of choosing a land and other activities. This is so as to avoid conflicts between administration of LLC and representatives of Kazakh nationality
- There are no specific parameters or rules for land allocation to herders
- LLC has approximately 50 structures, 12 of which are buildings for living, located all around the land allocated for Dzhankely LLC. The number of LLC buildings and structures within the project site is not known.
- Herders are strictly obliged to get a permission from LLC in order to make any constructions.
- Herders hired by LLC are also allowed to graze their own livestock. The herders are not charged any fees for grazing their own livestock on LLC land
- LLC only monitor the grazing activities of herders they hire. They do not monitor the activities of herders that are not hired by the LLC.
- There is only one settlement within the project site that is owned by LLC. There are also 4 wells that are located within the Project site that are owned by the LLC.
- The Director of Dzhankely LLC stated that he is concerned on the provision of alternative land for grazing and the relocation of herders to a new area. He indicated that for herders grazing their livestock and LLC's livestock, existing water source is important and currently the project site is suitable for grazing as it is a fertile pasture land and there is water available for watering livestock.

During a stakeholder consultation process with Peshku District Municipality, the Deputy Khokim of Peshku District indicated that parts of the land was given to Dzhankely LLC for grazing livestock by order of Khokim of Bukhara region and this LLC have given consent to the construction of the wind farm in an official letter.

A copy of this letter dated 31st December 2021 was from the Committee for the Development of Sericulture and Wool Industry (formerly the Committee for Development of Sericulture and Karakul Farming) and 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 this is provided below. See Appendix D for Consent Letter

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 of the Republic of Uzbekistan – formerly the Committee for Development of Sericulture and Karakul Farming (Committee), a meeting was held on 4th August 2021 and the outcome of this meeting is summarised below:

DATE OF CONSULTATION	4 th 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 ⁴
BUKHARA REGIONAL BRANCH OF THE COMMITTEE FOR THE DEVELOPMENT OF SERICULTURE AND WOOL INDUSTRY OF THE REPUBLIC OF UZBEKISTAN	Head of the Bukhara regional branch of the Committee for the Development of Sericulture and Wool Industry of the Republic of Uzbekistan
REPRESENTATIVE OF DZHANKELDY 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:	

⁴ Karakul association is subordinate organisation of the Committee. This organisation is primary responsible for karakul activities of the Committee

- ACWA Power stated the 280ha allocated to the project will not be fenced and grazing will be possible during operational phase of the project. Due to safety reasons and in line with required buffer zones, the substation will be fenced.
 - In addition, the land allocated to the project will be based on the project layout and BoP and not the entire 280ha
- 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 Karakul 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 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 the land lease agreement should be concluded with. The Bukhara Region Khokimiyat provided ACWA Power with a letter from Peshku District Municipality Mayor dated 20th January 2021 and this letter states that "278 ha of land in Dzhankeldy massive (district) examined by representatives of Ministry of Energy has been taken into state reserve fund for construction of wind farm with total capacity of 500 MW by ACWA Power (Saudi Arabia) based on public-private partnership. We guarantee that indicated land will be allocated project construction".

On 30th September 2021, Bukhara Region Khokimiyat provided ACWA Power with a response to the letter ACWA Power sent on 20th September 2021. This letter states that " As per paragraph 8 of Presidential Decree-5001 on 23.03.2021 "On construction of wind power plant with a capacity of 300-500 MW in Peshku 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-5001 on 23.02.2021 "ACWA Power Dzhankeldy Wind" LLC as well as in signing investment agreement and PPA, Dzhankeldy municipality has allocated required 280 ha of land under the Mayor order No 129 dated 23rd 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".

Based on the Presidential Decree issued on 8th July 2022, the Khokimiyat of the Bukhara region will allocate land to the Ministry of Energy who will sign the LLA with the Project Company. As such, ACWA Power/Project company cannot sign the LLA with the municipality or Committee.

It is understood from ACWA Power that these changes/updates have been communicated across all levels of government.

2.2.1.3 Land Use and Site Condition

The Project site has two (2) adjacent plots and based on numerous site visits and review of satellite imagery, these plots are open, undeveloped mainly comprising of sands and small mountain plains that are predominantly found towards the centre & north of each plot. These mountain plains are more pronounced in the eastern plot where majority of the site includes large undulations with pointy hilltops.

Evidence of areas for runoff drainage are present across the plots as observed via review of satellite imagery. Vegetation is present along these flow paths present on site and in other areas.

Plate 2-1 View of the Eastern Plot from the Southern Extent





Plate 2-2 View of the Western Plot from the Northern Extent



Plate 2-3 View of the Western Plot from the Centre of the Plot



Plate 2-4 Cliffs within the Eastern Plot





Few structures are present within the plot boundaries and these includes:

- One (1) access roads which runs from the south east extent to the south west extent of the eastern plot. This same access roads connects to the western plot and runs from the eastern extent of this plot to the west;
- Another access road that runs from the west to the north east & northern extent of the eastern plot;
- Existing Overhead Transmission Lines (OHTLs) within the eastern and western plot. These 6kV or 10kV OHTLs runs parallel to the access road that connects the eastern plot to the western plot;
- One (1) active settlement within the eastern plot. It is understood that this settlement is used seasonally by shepherds employed by "Dzhankeldy and Sericulture Livestock" LLC.
- One (1) recently constructed settlement within the south east extent of the eastern plot. It is understood that this settlement is used by an Uzbek herder.
- Ruined structure at the south eastern extent of the eastern plot.
- Structures within the eastern and western plots– It is understood that these structures are used by herders grazing at the Project site.
- Two (2) temporary project related meteorological monitoring masts at the eastern & western plot.
- Three (3) livestock stables belonging to herders within the eastern & western plots and
- One (1) water well within the western plot

Plate 2-5 View of the Road & Existing OHTL from the Southern Extent of the Eastern Plot (May 2020)



Plate 2-6 View of the Road & Existing OHTL from the Eastern Extent of the Western Plot (March 2021)



Plate 2-7 View of the Road that Runs from West to North of the Eastern Plot (May, 2020)



Plate 2-8 View of the Active Settlement – Eastern Plot (April, 2021)



Plate 2-9 Livestock Building and Potable Water Tank at Active Settlement – Eastern Plot (April, 2021)



Plate 2-10 View of Newly Constructed Settlement – Eastern Plot (June, 2021)



Plate 2-11 View of the Ruined Structure – Eastern Plot (April, 2021)



Plate 2-12 View of Herders Structure – Eastern Plot



Plate 2-13 View of Inactive Herders Structure – Western Plot



Plate 2-14 View of Temporary Project Related Mast – Eastern Plot



Plate 2-15 View of Temporary Project Related Mast – Western Plot



Plate 2-16 View of A Livestock Stable Within the Project Site



GRAZING AT THE PROJECT SITE

The Project site is predominantly used for grazing activities by 8 herders from Dzhankeldy village, 3 herders from Kalaata village and 2 herders from Bukhara city. 3 of these herders have contracts with Dzhankeldy LLC and while the remaining do not have any contracts with the LLC.

3 of the herders from Dzhankeldy village have settlement and structures within the project site and will require to be resettled. The 2 herders from Bukhara city also have settlement and structures within the site but will not be required to be resettlement due to their distance from project facilities and active construction areas.

The Project has worked closely with Dzhankeldy LLC and Bukhara Municipality and the herders to identify suitable alternative land for the 3 herders that need relocation. However, one of the herders proposed a preferred alternative land. According to the herder, this is said best option for him and other herders that require resettlement as there are two (2) existing wells for watering livestock at this land. 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 2 herders (within the project site) and their 4 permanent and 2 seasonal workers would be impacted.

For other herders from Dzhankeldy and Kalaata village that do not have settlement or structures within the project site, Dzhankeldy LLC has confirmed that these herders can graze on the available land near their villages.

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

2.2.1.4 Local Context & Potential Receptors

HUMAN RECEPTORS

In addition to the few permanent structures & temporary settlement identified within the Project site, few land uses were identified external to the Project site within a 5km radius based on site visits and satellite imagery review.

Approximately 2.5km east of the western plot boundary & 1.4km west of the eastern boundary is Dzhankeldy village. The Kalaata village is located west of the western plot boundary and this plot is approximately 35m to the nearest residential compound of this village. During the site visits, schools, cemetery, farmland, clinics, temporary living place, active and abandoned mines were identified within 5km of the site. Some of these are located within Dzhankeldy village, Kalaata village or few metres from these villages.

An existing road that connects to Highway A380 runs parallel to the western boundary of the eastern plot and this road runs through the plot from the west to the north. A well used by herders to provide water to livestock is located approximately 3.5km east of the western plot. Six (6) mining areas are located in between the eastern and western plot.

A temporary water body was identified to be located approximately 320m south of the eastern plot and livestock were seen to be near the water body. A herder livestock stable was also identified

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

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

ID	DESCRIPTION	RECEPTOR TYPE	APPROXIMATE DISTANCE TO PROJECT SITE
R1	Access road that runs from the south east to the south west extent of the eastern plot	Infrastructure	Within the Site
R2	Access road that runs from the east to the west of the western plot		
R3	Access road that runs from the west to the north east & northern extent of the eastern plot		
R4	Existing OHTL within the eastern plot	Infrastructure	Within the Site
R5	Existing OHTL within the western plot		
R6	Active settlement within the eastern plot	Residential	Within the Site
R7	Newly constructed settlement within the eastern plot	Seasonal Residential	Within the Site
R8	Herders structures within the eastern plot	Structures	Within the Site
R9	Herders structures within the western plot		
R10	Temporary Project Masts at the eastern plot	Infrastructure	Within the Site
R11	Temporary Project Masts at the western plot		
R12	Dzhankeldy Village (including school, farm, cemetery and others)	Mixed Use (residential, educational, agricultural)	2.5km east of the western plot and 1.4km west of the eastern plot
R13	Kalaata Village (including geologist temporary living place, school, farm and others)	Mixed Use (residential, commercial)	Approximately 35m to the western plot
R14	Existing road that runs parallel to western boundary of eastern plot	Infrastructure	1.4km west and runs across the site from the west to the north east & north
R15	A well used by herders to provide water to livestock	Agricultural	3.5km east of the western plot
R16	Mining area 1 owned by "Kogon 97 Avtokorhona" LLC and called "Jankeldi 2" - Geological survey at this mine is currently ongoing and as informed by the State Committee on Geology, extraction of crushed stone will commence once permit issued to the mining company. Survey works are expected to be completed by the end of 2021	Industrial	2.5km west of the eastern plot and 2.8km east of the western plot
R17	Mining area 2 – Inactive & Owner Unknown		1.9km west of the eastern plot and 3.5km east of the western plot
R18	Mining area 3 - Inactive & Owner Unknown		1.1km east of the eastern plot

ID	DESCRIPTION	RECEPTOR TYPE	APPROXIMATE DISTANCE TO PROJECT SITE
R19	Mining area 4 – An inactive mine owned by “Peshku Cement” LLC		1.8km north east of the western plot and 2.8km west of the eastern plot
R20	Mining area 5 – Inactive & Owner Unknown		2.8km west of the eastern plot and 3km north east of the western plot
R21	Mining area 6 - An inactive mine owned by “Asia Cement and Glass” LLC		1.3km west of the eastern plot and 3.3km north east of the western plot
R22	Mining area 7 - Inactive & Owner Unknown		500m south of the eastern plot and 1.8km north of the western plot
R23	Mining area 8 – An inactive mine owned by “Richland international Industry” LLC		570 meters north of the western plot and 1.4km south of the eastern plot
R24	Mining area 9 - Inactive & Owner Unknown		930m north of the western plot and 950m south of the eastern plot
R25	Temporary water body ⁵	Agricultural	320m south of the eastern plot
R26	Livestock and other users of the temporary water body		320m south of the eastern plot
R27	Livestock stable belonging to Herder 4		Within the eastern site
R28	Livestock stable belonging to Herder 8		Within the eastern site
R29	Livestock stable belonging to Herder 11		2 km north-west from Eastern Project site
R30	Livestock stable belonging to Herder 7		Within the western Site
R31	Water well used by herders		Within the western Project site

Note: R – Receptor

Note: The mining areas identified as “inactive” have been included as receptors because it is advised that there is the possibility for mining works to re-commence in the future. As advised by the State Committee on Geology and Mineral Resources, mining companies only commence mining activities after obtaining a licence from the State Committee and after securing funds required to start & complete mining works, purchase equipment & machinery.

Summary of the consultation undertaken with the State Committee on Geology and Mineral Resources is presented in Chapter 10: Soils, Geology, Groundwater & Surface Water in Part A of this ESIA.

⁵ This water body is only present during and after periods of heavy rainfall

Plate 2-17 #R12 - View of the Dzhankeldy Village from the North



Plate 2-18 #R12 - Houses Within Dzhankeldy Village



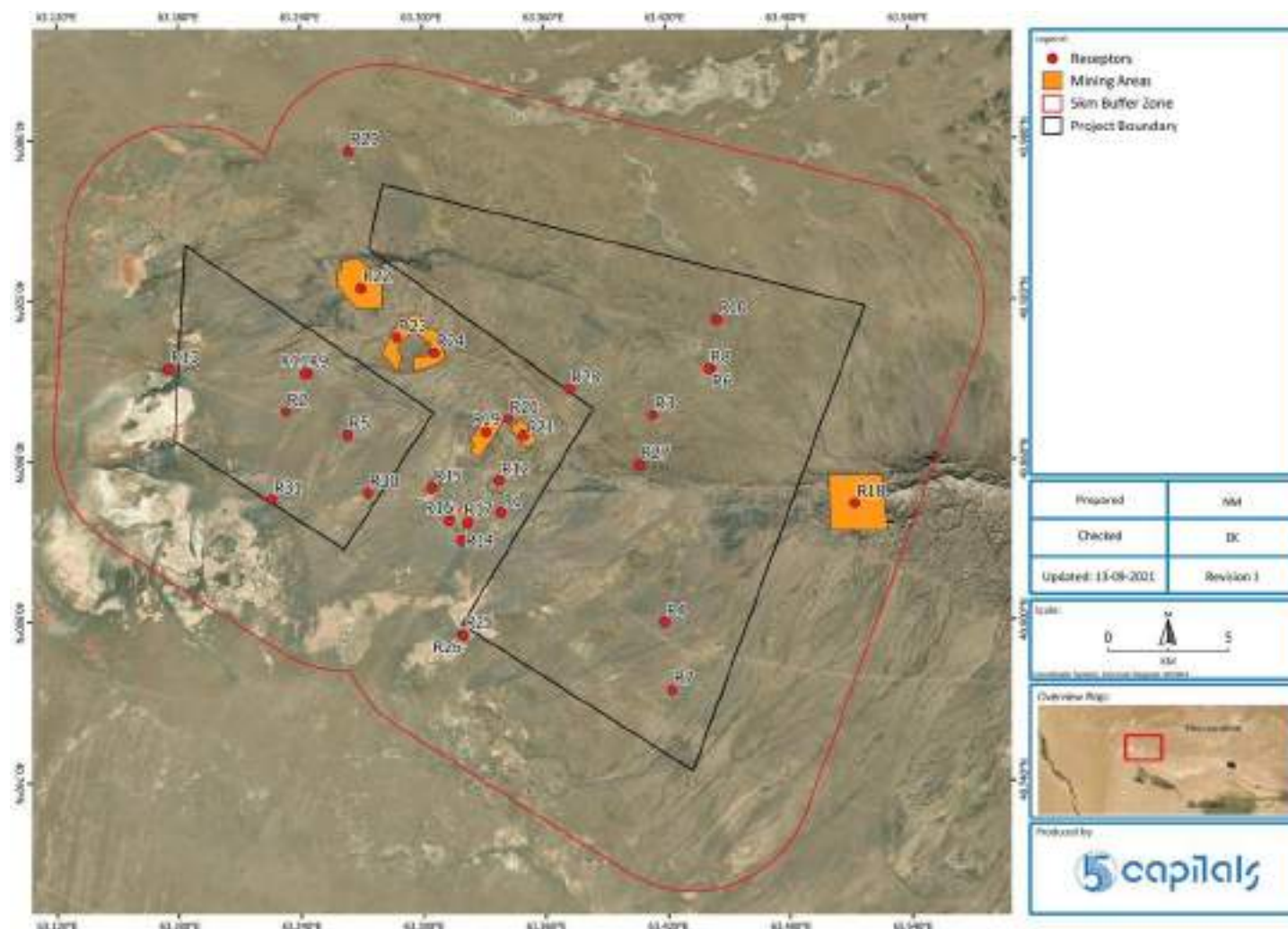
Plate 2-19 #R13 - Geologist Temporary Accommodation at Kalaata Village



Plate 2-20 #R25 & #R26- Evidence of Temporary Water Body



Figure 2-6 Potential Human Receptors Within 5km of the Project Site



CULTURAL & ARCHAEOLOGICAL RECEPTORS

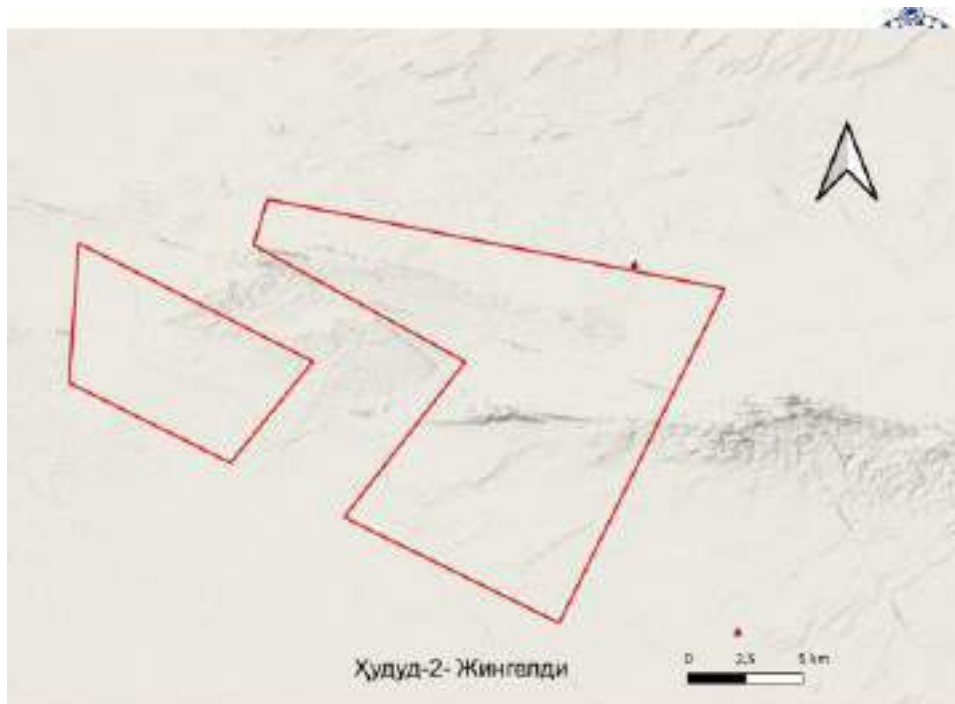
Note: The below only provides a summary of cultural & archaeological receptors. This ESIA includes an Archaeological & Cultural Heritage Chapter in Part A & Part B which provides further details on archaeology, archaeological surveys, receptors, potential impact to the archaeological receptors and mitigation & monitoring measures

On 29th March 2021, Juru Energy sent a consultation letter to the Bukhara Department of Culture (the Ministry of Culture regional representative) and Institute of Archaeology of the Republic of Uzbekistan requesting for information regarding any archaeological or cultural sites within the proposed Project Site and within 5km radius of the site. The Bukhara Department of Culture responded stating that *"there are no archaeological and cultural object/sites within the project site and within 5km radius"*.

The Institute of Archaeology provided an official response on 6th April 2021 stating that there is *"presence of ancient stone age settlements, stone-working workshops and cemeteries of ancient nomads and herders"* in the proposed project area and advised that the Project conduct preliminary archaeological search & control construction works on the Project site. Follow up meetings were held with representatives of the Institute of Archaeology and although the exact locations of these ancient stone age settlements, stone-working workshops and cemeteries of ancient nomads and herders were not provided, preliminary location of the last expedition conducted in 1980 at the project area was provided and this is shown in the figure below. The archaeologist that surveyed the area identified a *Tasqazgan Monument* during the 1980 expedition.

Detailed information on the meetings held with the Institute of Archaeology are provided in Archaeology and Cultural Heritage Chapter in Part A of this ESIA.

Figure 2-7 Preliminary Location of the Area Surveyed in Dzhankeldy in 1980 in Relation to the Project Site (ref. red dot at the northern extent of eastern plot)



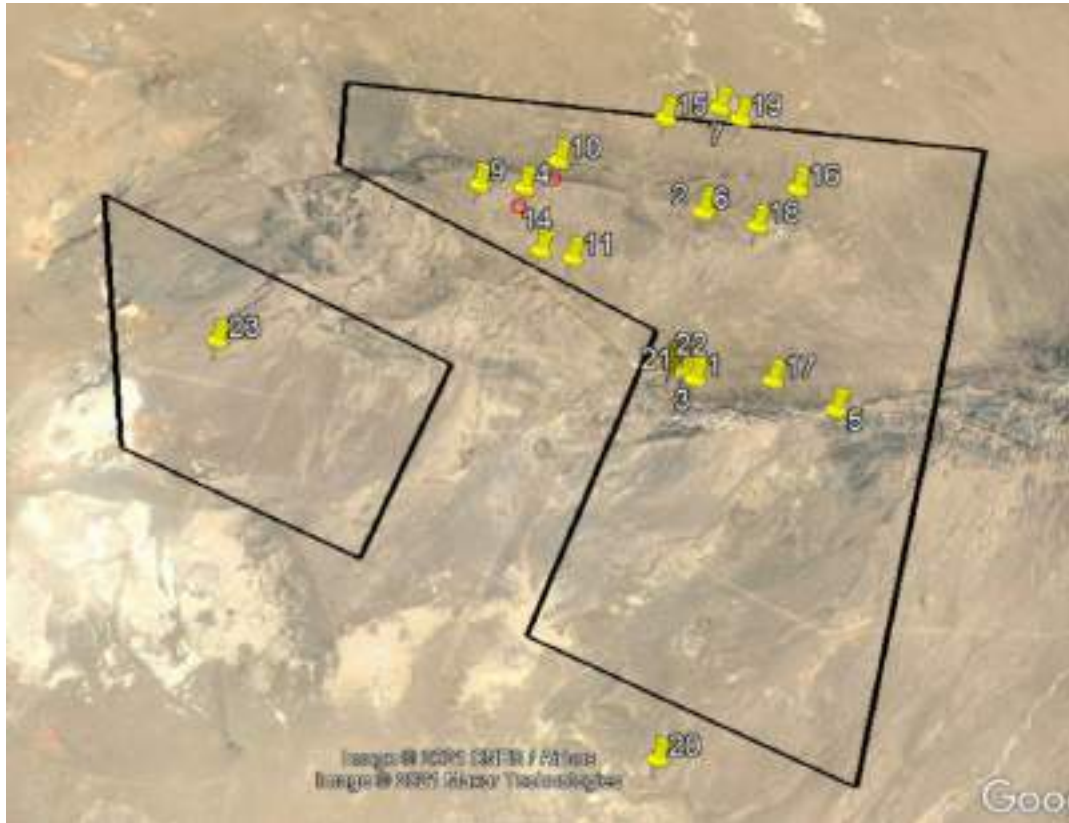
During a site visit in April 2021, a memorial site was identified outskirts of Dzhankeldy village, approximately 3.6km west of the eastern plot and along the existing road that connects the eastern & western plots. According to the writing on the memorial, this is a Muslim grave that possibly belonged to an Individual of Kazakh ethnicity.

Plate 2-21 Memorial Site



Following an archaeological survey undertaken at the Project site in July 2021 by the Institute of Archaeology, a number of archaeological artefacts were encountered within the eastern & western plot of the Project site. Detailed information on the archaeological survey undertaken at the Project site are provided in Archaeology and Cultural Heritage Chapter in Part A of this ESIA.

Figure 2-8 Location of the Archaeological Artefacts Within the Project Site (July, 2021)



Based on further satellite imagery review and desktop research there are no indications of other known cultural or archaeological sites in the vicinity of the proposed Project site. This includes no recorded UNESCO World Heritage sites and other publicly identified or listed archaeological or cultural sites in the local area.

Table 2-5 Archaeological & Cultural Features Within 5km of the Project Site

ID	DESCRIPTION	YEAR	RECEPTOR TYPE	APPROXIMATE DISTANCE TO PROJECT SITE
R32	Tasqazgan Monument	1980	Cultural or Archaeological	Immediately outside the northern boundary of the eastern plot
R33	Memorial Site	-	Cultural	3.6km west of the eastern plot
R34	Existing archaeological artefacts	2021	Cultural or Archaeological	Within the Project site

Note: R - Receptor

2.2.2 Overhead Transmission Line

2.2.2.1 Land Ownership

Based on consultation with the Committee for the Development of Sericulture and Wool Industry confirmed that the section of the OHTL within the wind farm is under the supervision and management of the Committee. The OHTL runs through three (3) different districts and these are Peshku District, Gijduvon District and Konimekh District in Navoi region.

GIJDUVON DISTRICT

The Dzhankeldy-Bash OHTL alignment within their district is located on land that belongs to the Committee for the Development of Sericulture and Wool Industry.

PESHKU DISTRICT

The part of land in Peshku district where Dzhankeldy-Bash OHTL is planned has been allocated to "ACWA Power Dzhankeldy Wind" LLC for the construction of WF.

KONIMEKH DISTRICT

The Dzhankeldy-Bash OHTL alignment within their district is within the territory of Forestry Fund. A section of this land belongs to the Qaraqo'ta LLC (see blue line in figure below) who leases the land from the Committee for the Development of Sericulture and Wool Industry.

Figure 2-9 Dzhankeldy-Bash OHTL Alignment Within Konimekh District (Ref. Blue Line for Section Leased by Qaraqo'ta LLC)



2.2.2.2 Land Lease

ACWA Power will transfer the operation of the OHTL to NEGU after completion of the construction phase. As such and in accordance with the Presidential Decree, ACWA Power will 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 by MoE. The land allocated to the OHTL tower footprint based on the Presidential Decree is provided in the table below.

Table 2-6 Land Allocated to the OHTL based on the Presidential Decree

PROJECT FACILITIES	TOTAL KM	TOTAL AREA IN HA	TYPE OF OWNERSHIP
PEF Facilities OHTL tower footprint	128.5km	17.94 (for the OHTL tower footprint)	Lease during construction
Total	n/a	17.94	-

2.2.2.3 Land Use Along OHTL

As observed during numerous site visits, the 128.5km OHTL route is located in the central part of the Kyzylkum desert and lies on the flat part of the northern foothills of the Kuljuktai Range. From the Project site, this proposed OHTL route runs along/parallel to a local asphalt road (called Zarafshan-Navoi road) that connects the village of Dzhankeldy to the village of Chontabay, Chengeldy, Karakata and Baloakarak approximately 140m, 3.7km, 6.1km and 10km north of the OHTL respectively.

Where the local asphalt road ends, the proposed OHTL route runs further across the hills from the Darbaza to the Kafirtepa Hill after which it crosses and runs parallel to an existing 220kV high voltage transmission line that runs through the Bash site from north to south east. The proposed OHTL also crosses the Navoi-Uchkuduk railway that runs through the Bash site.

The construction of the OHTL crosses through three districts and the land use include grazing and forestry. The construction process will lead to temporary economic impacts and permanent land take where the construction of pylons/towers will be undertaken.

Site visits and consultations have identified four land users which include Kokcha LLC, Dzhankeldy LLC, Karak-ata klister LLC and Kominekh District Forestry Fund. It is noted that only Karak-ata LLC owns structures within the established AoI of 100m and these will be compensated in line with the Project specific RAP. Since these entities own more land within the Project area, the temporary and permanent impacts resulting to the land take are expected to be negligible.

Figure 2-10 Location of Asphalt Road in Relation to OHTL Route (Ref OHTL Route in Blue and Asphalt Road in Red)



Figure 2-11 OHTL Route Crossing Existing Transmission Line (Ref OHTL Route in Blue and Transmission Line in Red)



Figure 2-12 Proposed OHTL Route Crossing Existing Railway Line (Ref OHTL Route in Blue and Railway Line in Black)



2.2.2.4 Local Context & Potential Receptors

HUMAN RECEPTORS

Few human receptors have also been identified within 1km buffer of the OHTL route that runs from Dzhankeldy to Bash. These included the former Chontabay village approximately 160m north of the OHTL, an existing local road and existing railway both of which runs parallel to OHTL Route. The OHTL also runs through a Geological area understood from the State Committee for Geology and Mineral Resources to contain promising blocks of hydrocarbon.

Seven (7) herders settlements were also identified within 1km of the route.

Based on the reconnaissance site visit undertaken by local consultant Juru Energy along the OHTL route from Dzhankeldy to Bash, although the OHTL route runs between two (2) water bodies; the Ayakagitma lake and Karakata depression, these water bodies are not within 5km of the OHTL.

Table 2-7 Potential Human Receptors Within 1km of the OHTL Route

ID	DESCRIPTION	RECEPTOR TYPE	APPROXIMATE DISTANCE TO OHTL ROUTE
R35	Existing local asphalt road that runs parallel to the proposed OHTL route	Infrastructure	120m north of OHTL
R36	Geological Area	Industrial	The OHTL crosses this area
R37	Former Chontabay village *	Residential	331m north of OHTL

ID	DESCRIPTION	RECEPTOR TYPE	APPROXIMATE DISTANCE TO OHTL ROUTE
	Only one house is suitable for living in this village as most structures are ruined		This is the distance of the liveable structure to the OHTL route
R38	Inactive Herders settlement 1 (Suspected to be used temporarily by neighbouring herders)	Temporary Residential	65m south of OHTL
R39	Herders settlement 2	Residential	95m north of OHTL
R40	Herders settlement 3		750m north of OHTL
R41	Herders settlement 4	Residential	551m north of OHTL
R42	Herders settlement 5	Permanent Residential	593m south of OHTL
R43	Herders settlement 6		356m north of OHTL
R44	Active well	Structure	30m north of OHTL
R45	Well used to provide water for livestock	Agricultural	42m north of OHTL
R46	Preserved Borehole	Structure	81m south of OHTL
R47	Herders settlement 7	Residential	163m north of OHTL
R48	Existing railway that runs parallel to the proposed OHTL	Infrastructure	Nearest point is 210m north of OHTL and the OHTL crosses the railway at some point
R49	Existing OHTL that runs parallel to Project OHTL 3 lines of 220kV OHL-Bessapan		Nearest point is 117m south and the Project OHTL crosses the existing OHTL at some point
It should be noted that involuntary resettlement is not required for any of the above mentioned receptors.			

* It is understood that this is no longer a village. A local herder uses this place for keeping livestock. All structures in this place are ruined. There is only one house suitable for living and it is used by herder's worker.

Note: R - Receptor

Figure 2-13 Potential Human Receptors Along Dzhankeldy to Bash OHTL Route



Plate 2-22 View of Settlements Along the OHTL Route





Plate 2-23 View of Active Well and Borehole Along the OHTL Route



CULTURAL & ARCHAEOLOGICAL RECEPTORS

Based on the reconnaissance site visit undertaken by local consultant Juru Energy along the OHTL route from Dzhankeldy to Bash, two (2) memorial sites and one (1) cemetery which has additional buildings used by people from nearby villages for funeral ceremonies is located along the OHTL route. According to the writing on the memorials, the graves possibly belonged to an individual of Kazakh ethnicity.

Plate 2-23 Memorial 1 Site Along OHTL Route**Plate 2-24 Memorial 2 Site Along OHTL Route**

Plate 2-25 Cemetery with Funeral Ceremonies Buildings Along OHTL Route



At this stage no item of archaeological significance has been identified along the OHTL route.

Table 2-8 Cultural Features Within 1km of the OHTL Route

ID	DESCRIPTION	RECEPTOR TYPE	APPROXIMATE DISTANCE TO PROJECT SITE
R50	Memorial Site 1	Cultural	134m north of OHTL
R51	Memorial Site 2		192m north of OHTL
R52	Cemetery		285m north of OHTL

Figure 2-14 Potential Cultural Receptors Along Dzhankeldy to Bash OHTL Route

2.3 Project Description

2.3.1 Wind Farm

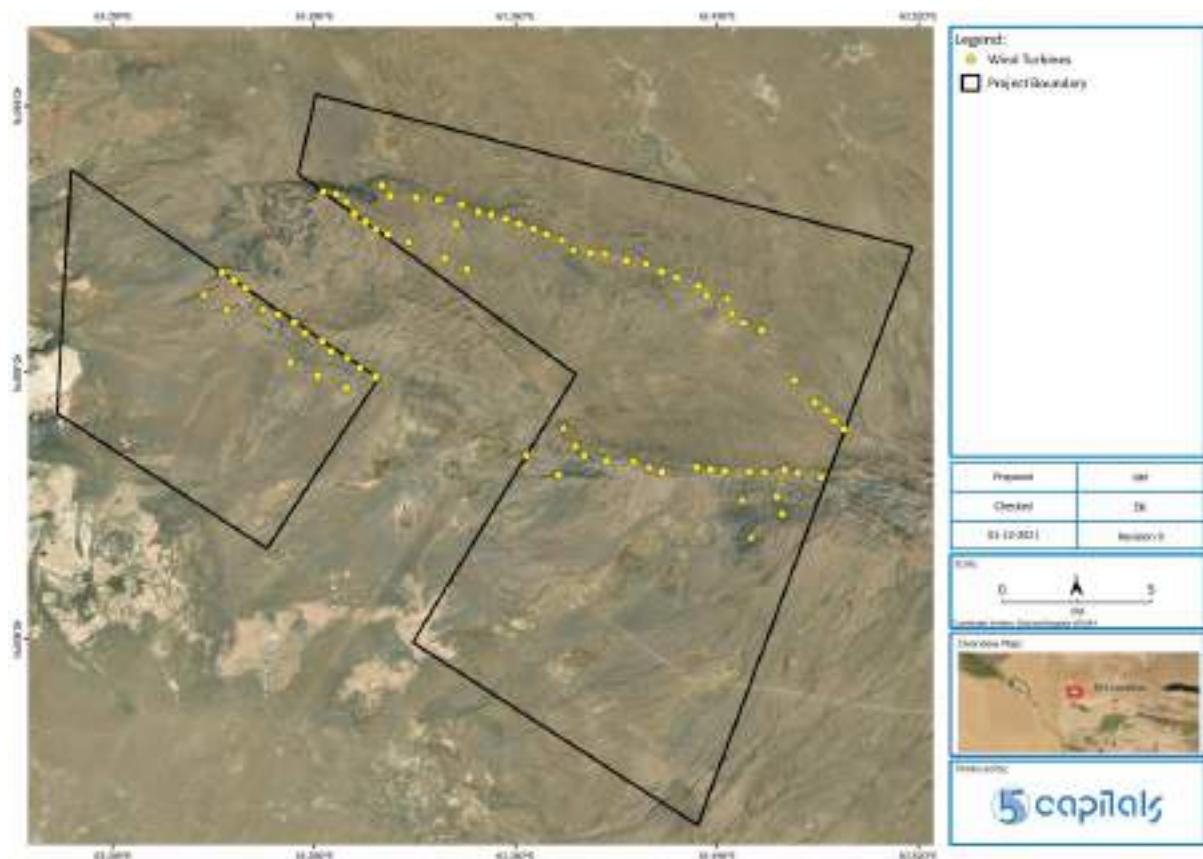
Wind turbines have been used to produce electricity on a commercial scale since the 1990s and are well established as a developed renewable energy technology.

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

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

The Dzhankeldy wind farm will consist of 79 wind turbine generators. The eastern plot will comprise of 62 wind turbines whilst the western plot will comprise of 17 wind turbines. The proposed location of the WTGs within the Project site are presented in the figure below.

Figure 2-15 Proposed Location of the WTGs within the Project Site (November, 2021)



The wind farm will utilize EN 171/6.5 wind turbine for all 79 WTGs within the plots. This turbine features horizontal axis, three blades, upwind rotor, variable speed and pitch regulation. An outline of the EN 171/6.5 wind turbine is shown in the figures below.

The wind turbine chosen for the Project adopts variable speed control and pitch control and advanced control strategies.

2.3.1.1 Wind Farm Components

A brief description of the main components of the WTGs is provided below:

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

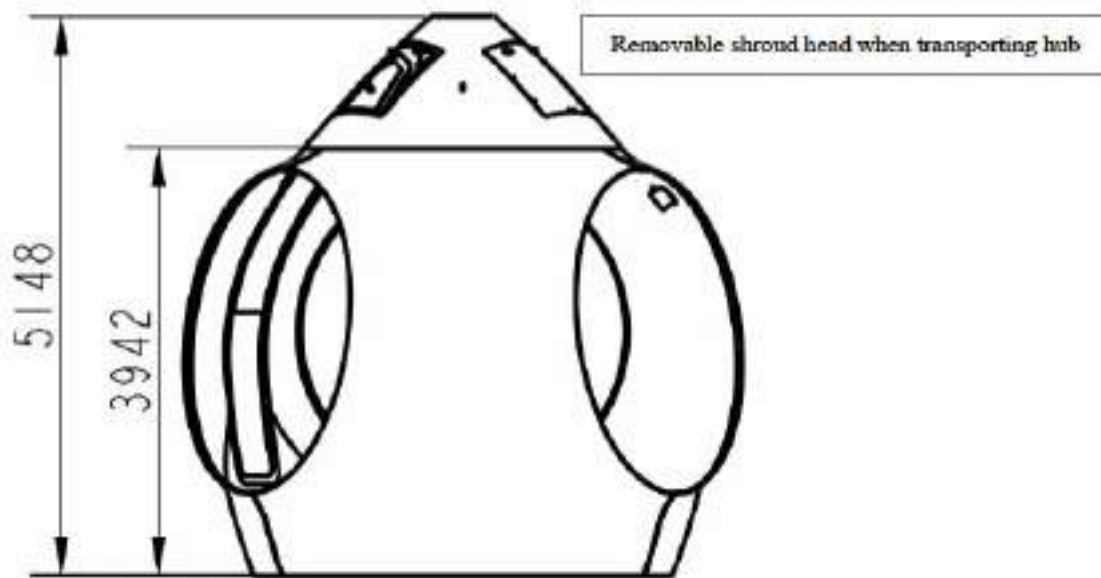
The pitch bearings are used between its hub and blades to transfer loads from blades to the hub. The blades are connected to the inner race of a bearing with root bolts, and the outer race of pitch bearing, and blade pitch bearing is connected to the hub body with bolts. The pitch gears are integrated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

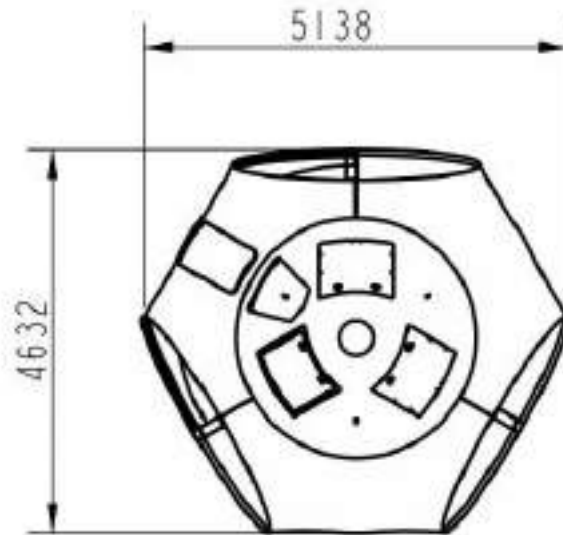
The pitch system consists of two parts; the electrical and mechanical parts. The electrical assembly consists of a control cabinet, a motor and a backup power supply while the mechanical assembly consists of a pitch gearbox, pitch bearings and its connecting parts. The pitch control cabinet of the electrical 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 2-16 Outline of Hub



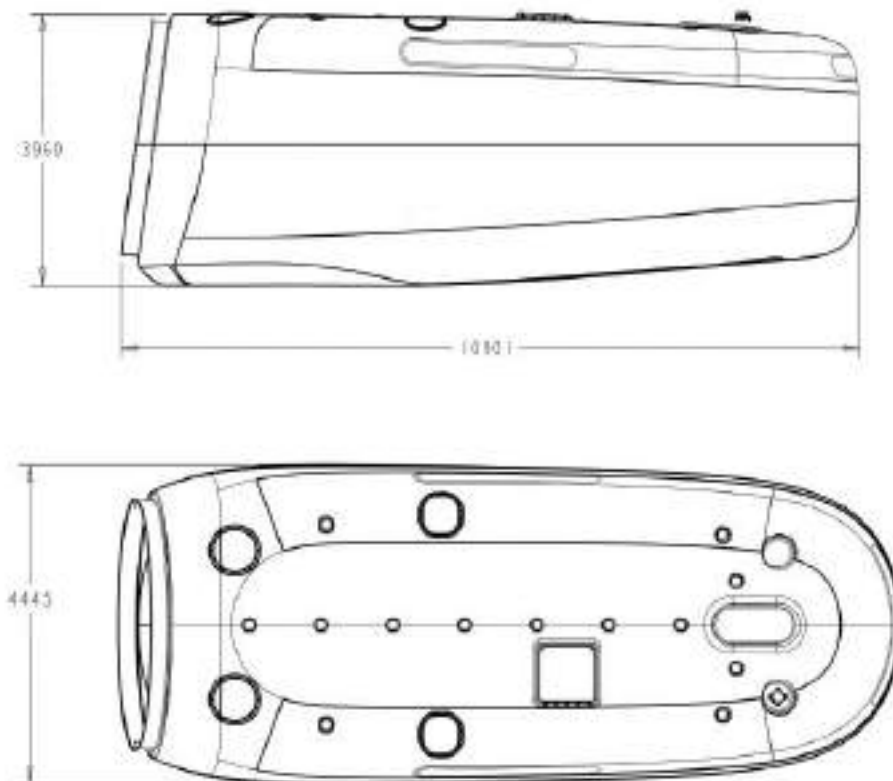


Source: Envision EN 171/6.5 Wind Turbine Specifications

NACELLE

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

Figure 2-17 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 rotor 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.

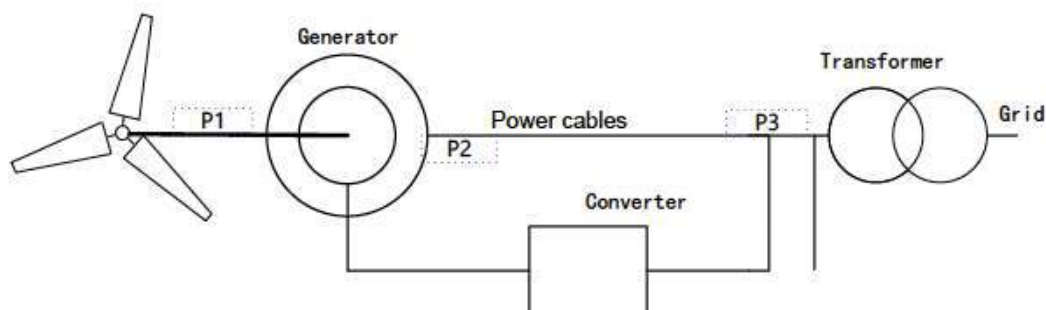
Generator Rotor

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 2-18 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 ladders.

GRID CONNECTION

Each wind turbine will be provided with one transformer to connect with 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 enables the yaw controller to actuate, aligning the wind turbine with 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).

LIGHTING PROTECTION AND GROUNDING

Two (2) independent grounding electrodes; the outer grounding ring and inner foundation ring (or tower structure) will be used for the wind turbine and these electrodes will be designed in accordance with "GBT 33629-2017 Wind turbine lightning protection (IEC61400-24 2010)". The entire system from its blade tips, hub, weather station, nacelle, baseplates, tower to foundation, and from rotating parts to non-rotating parts will be designed to protect wind turbine parts from lightning current.

ELECTRICAL CONTROL SYSTEM

The electrical control system will be designed to ensure the normal control of a wind turbine without going to its nacelle. For emergency shutdown, a local control switch will be available to cut off the remote mode and all other control systems in the wind turbine. Electrical systems will be designed to block, release or block any stored and captured energy that may cause risks during maintenance.

AUTOMATIC FIRE PROTECTION SYSTEM

The WTG will be designed in accordance with Envision Guidelines for Fire Protection Design of Wind Turbine Generators and Guidelines for Safety Design of Wind Turbine Generators, to reduce health and safety risks. In order for the WTG to meet requirements for fire protection, fire-proof materials will be used in the design of key parts for a WTG.

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

Table 2-9 Brief Technical Information of Selected Turbine

ITEM	UNIT	ENVISION 171 6.5MW
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
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

ITEM	UNIT	ENVISION 171 6.5MW
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
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 usually 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. With regards to this wind farm, non-reflective matte finished paint will be used to prevent the reflection of light from the turbine blade (blade glint).

Turbines are 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 be 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
- 33kV OHTL (8.5km buried underground)
- 33/500kV sub-station
- External access road and
- Electrical connections

INTERNAL ACCESS ROAD

Existing roads within the Project site will be used for the Project. Where there are no roads to reach certain WTG locations on site, additional internal access roads between turbines will be developed by the EPC Contractor to enable easy access within the Project site. These internal access roads will be routed such that impact to environmental sensitivities such as water flow paths, etc. will be minimised.

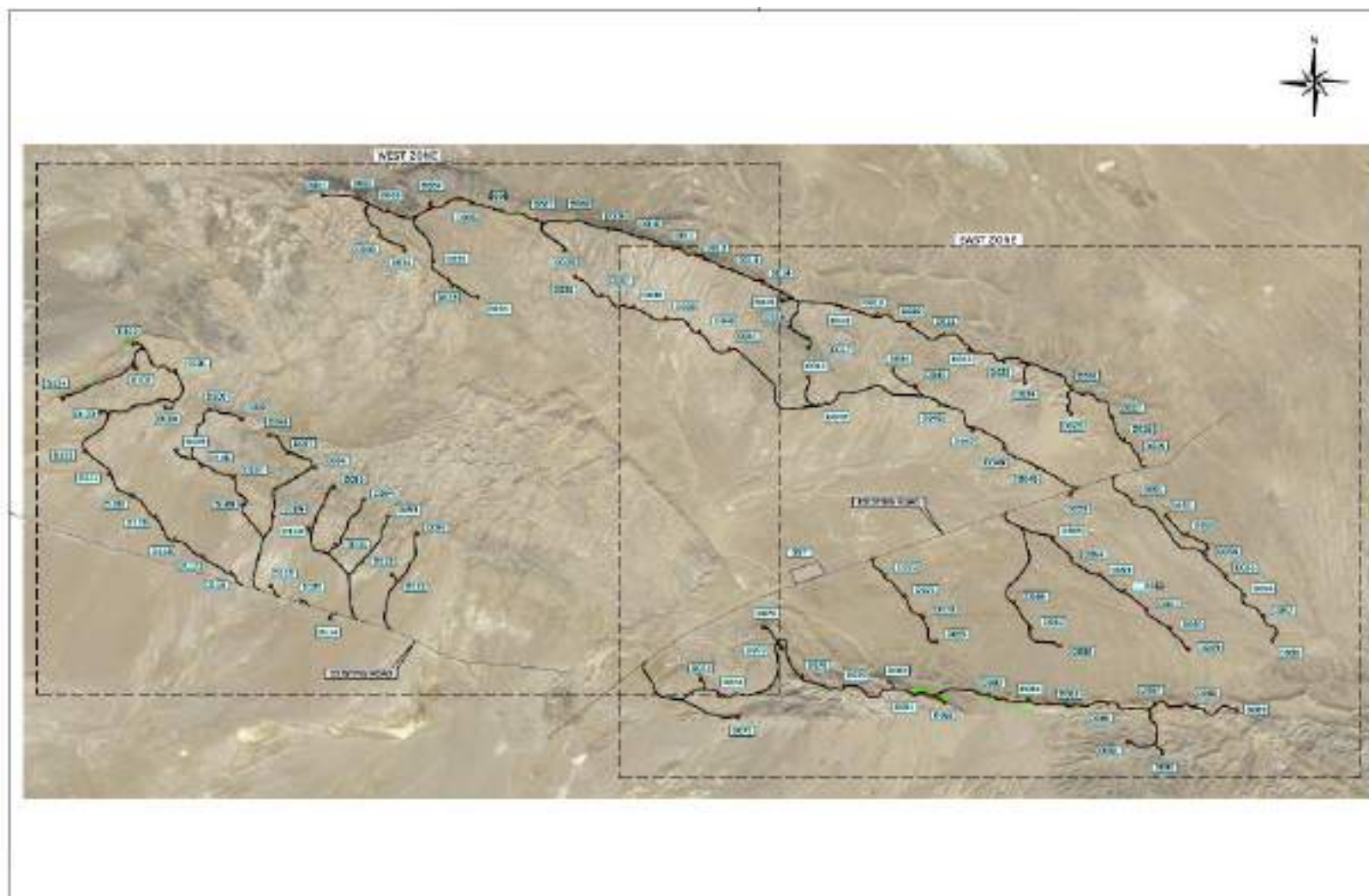
The internal roads will be developed such that they are adequate and suitable to connect to the existing road network external to the southern extent of the Project site in order to facilitate transportation of equipment & workers to and within the site.

The design of the internal roads will ensure that vehicles will be able to manoeuvre easily on a continuous sequence in order to allow vehicle access to cross the different areas of the western & eastern plots to reach the WTGs.

The internal access roads will be 6m wide including shoulders 0.5 +0.5m on either side.

It should be noted that the western and eastern plot will be connected via the internal access road that will be developed. The internal roads will facilitate transportation of equipment & workers between both plots.

Figure 2-19 Layout of Proposed Routing of Internal Access Road (ref. Black Lines)



33kV OHTL

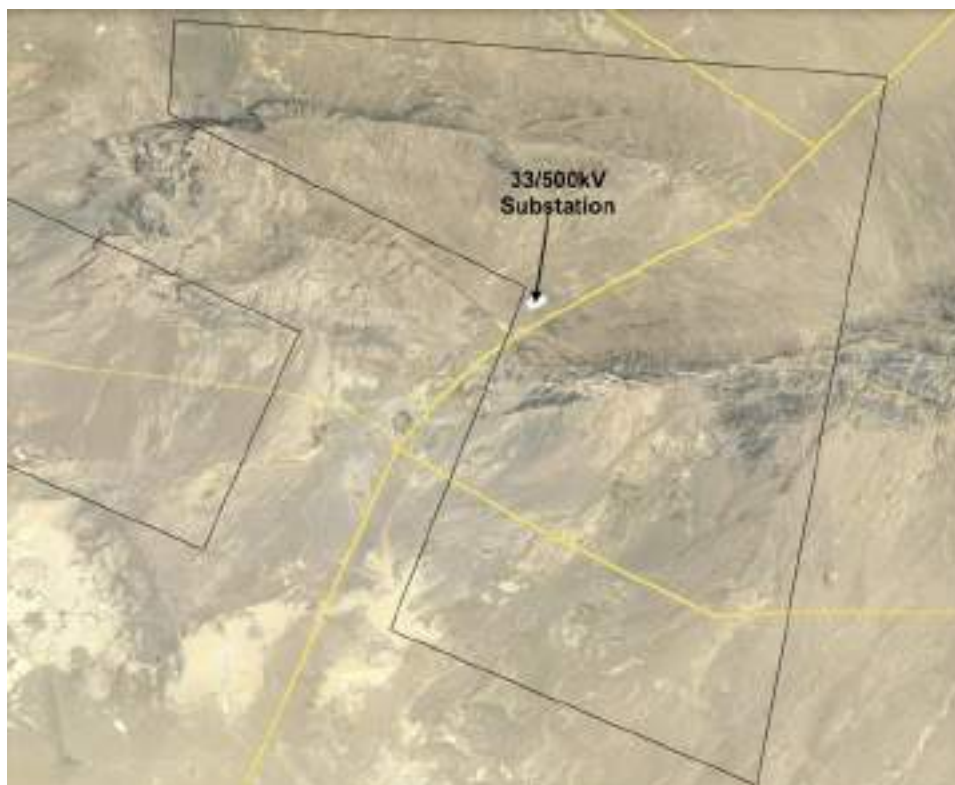
A 33kV overhead transmission line will run from the western plot to the eastern plot of the Project site. This OHTL will be buried underground and will be 8.5km in length (see Figure 2-28 below). The 33kV OHTL will be developed to enable connection of the western wind farm to a 33kV substation located at the eastern plot of the wind farm (see description below). From the 33kV substation, power will be transferred to a 500kV single circuit OHTL as described in sub-section 2.3.2 below.

33/500kV SUBSTATION

A 33/500kV AIS sub-station is proposed at the eastern plot of the Wind Farm. The sub-station will be approximately 200m X 200m with an area of approximately 39,900m². The substation is proposed to be located at the left side of an existing road within the site. The existing road will be approximately 600m in the right direction of the proposed substation location enabling access to the substation during construction & maintenance works.

The figure below shows the proposed location of the substation.

Figure 2-20 Proposed Location of 33/500kV Substation Within the Eastern Plot



ACCESS ROAD

The primary link to the Project site will be via an existing asphalt access roads south of the Project site and runs through the Project site from the west to the northern extent of the eastern

plot. This access road links to Highway A380 and is mainly used by Dzhankeldy and Kalaata residents located near the Wind Farm.

Given the presence of potholes and elevation differences along the access road, it is anticipated that local improvement works such as backfilling and compaction will be undertaken to ensure the road is adequate and suitable to facilitate transportation of project components, equipment & workers to the site.

Figure 2-21 Location of Access Road in Relation to Project Site (ref. Red Line)



Figure 2-22 View of External Asphalt Road Connecting to Highway A380



ELECTRICAL CONNECTIONS

In order to enable connection of the Dzhankeldy Wind Farm to the grid, the Project will require its own electrical connection facility that will consist of a 500kV switchyard and a 33kV substation within the Project site (as described above). These electrical connection facilities will be located within the eastern plot 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 Bash Project site approximately 94km east of the site.

Some of the Project facilities will be shared between ACWA Power's Dzhankeldy 500MW Wind Farm and the Bash 500MW Wind Farm (subject of a separate ESIA). The Project facilities to be shared between the two Projects include:

- Overhead Transmission Lines
- 500kV Pooling Switch Sub-station (located within Bash Wind Farm).

Additional details of the overhead transmission line and 500kV Pooling switch sub-station is provided in the Overhead Transmission Line Sub-section below.

2.3.2 Overhead Transmission Line

In order to enable connection of the Dzhankeldy Wind Farm to the grid, the Project will connect to an overhead transmission line with a rating of 500kV single circuit that will run from the Project site to Bash Project site approximately 94km east of the site. From the Bash site, power will be transferred to the Qurako'l substation.

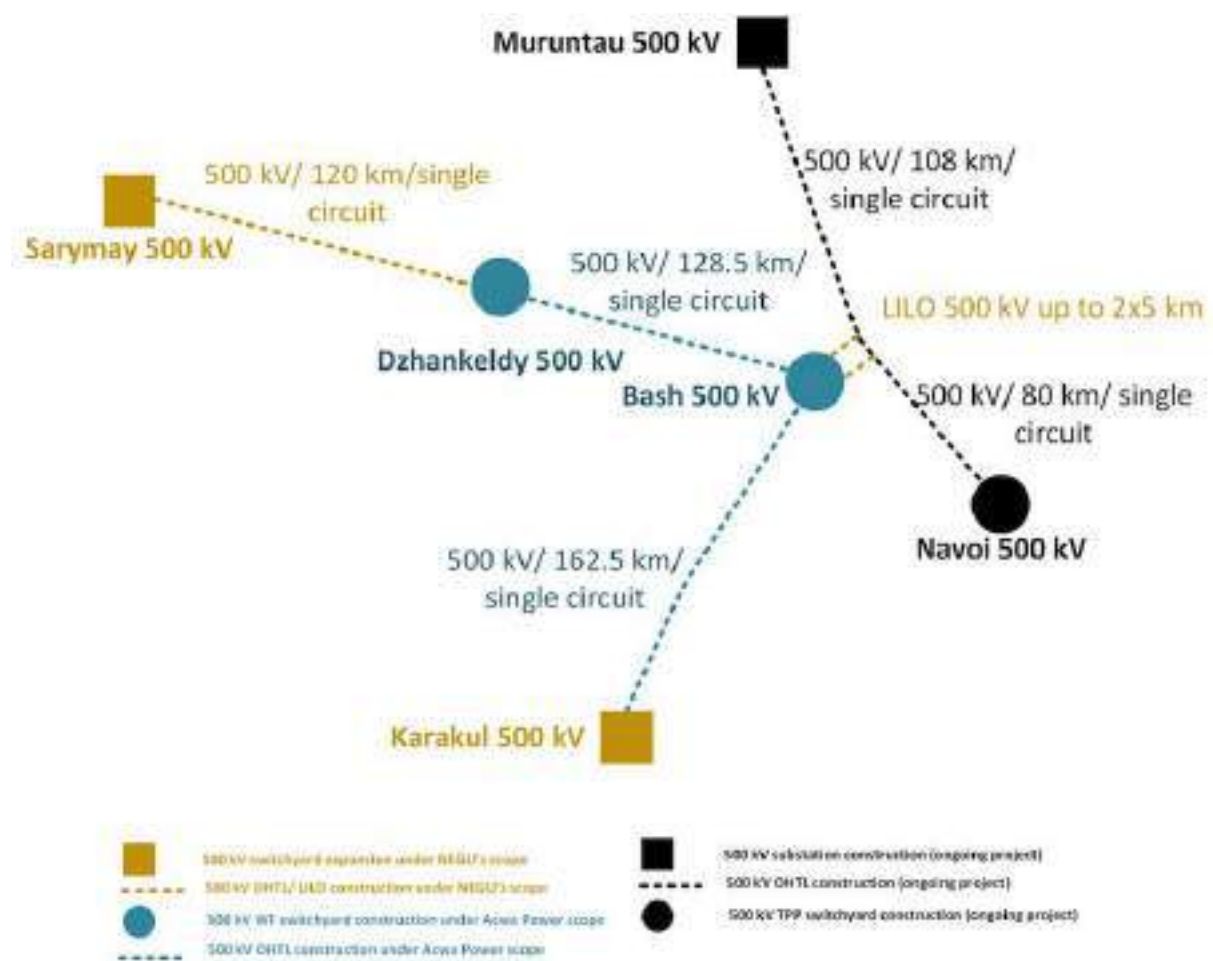
At this stage, It is understood that the proposed overhead transmission line (OHTL) will be a total of 290.5km in length. Approximately 128.5km of the OHTL will run from Dzhankeldy project site to Bash project site (see blue line in figure below (and approximately 162km will run from Bash site to an existing substation in Qurako'l (see green line in figure below).

Figure 2-23 Location of OHTL & substation



The 500kV single circuit OHTL from Dzhankeldy to Bash will connect to the Bash 500kV pooling switch sub-station. The switchyard will be designed to accommodate planned interconnections from Navoi-Muruntau LIL0 and the line from Sarymay to Dzhankeldy as shown in the figure below.

Figure 2-24 Grid Interconnection Option for 1GW ACWA Wind Farms (Dzhankeldy & Bash)

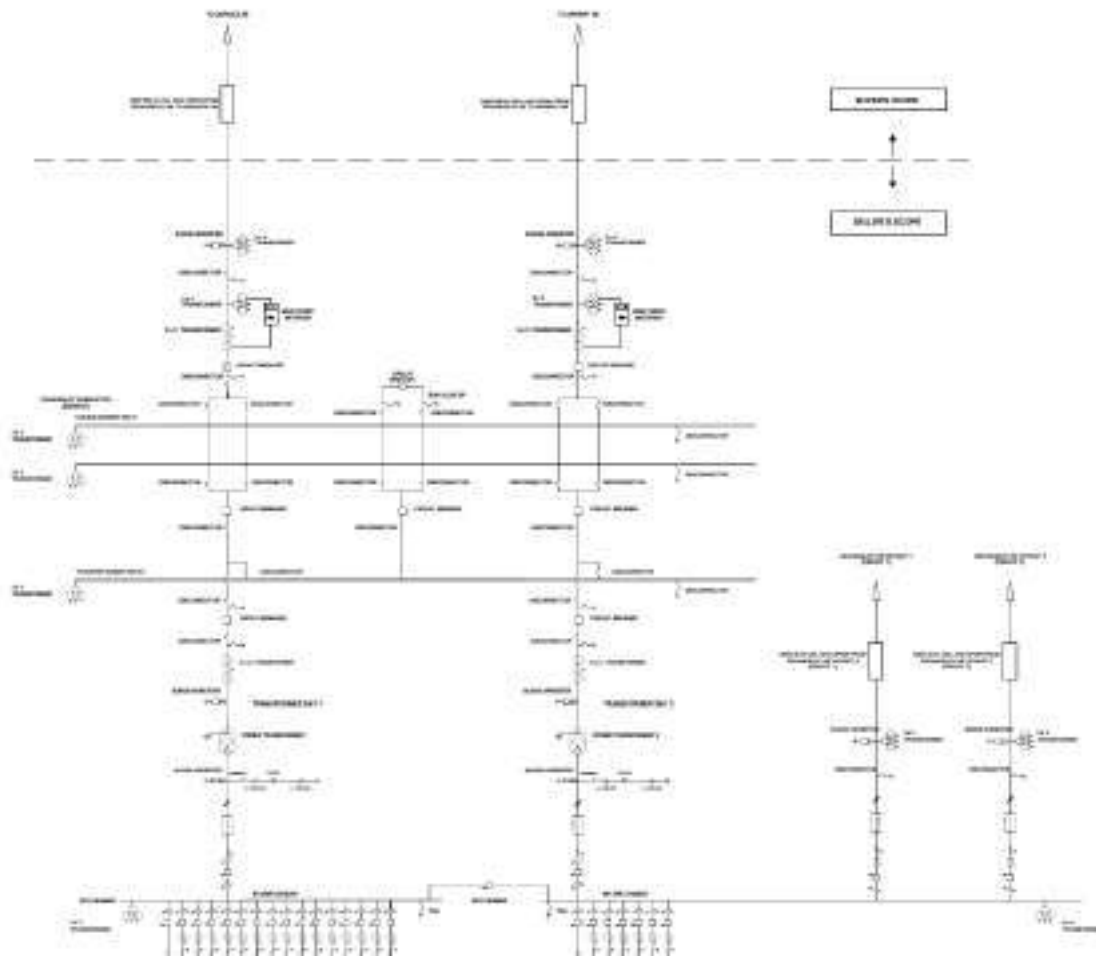


Source: Selection of Interconnection Option

Note: The length of the OHTLs shown in the figure above has since been revised and the figure above is meant to show the interconnectedness between the Dzhankeldy & Bash Projects and the OHTL associated facilities.

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 shown in the figure below and in Appendix E.

Figure 2-25 Proposed Arrangement for AIS



Source: ACWA Power 2021

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

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

Both the AIS for the Dzhankeldy and Bash 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 disconnecter that will be connected after commissioning both Wind Farms.

Figure 2-26 Location of 128.5km OHTL Route from the Project Site to Bash Site



2.3.2.1 OHTL Components

A brief preliminary description of the main components of the transmission line are 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, will consider bird safety from electrocution & collision and will be steel 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 2-26 Example of Typical 500kV Suspension & Angle Angular Towers

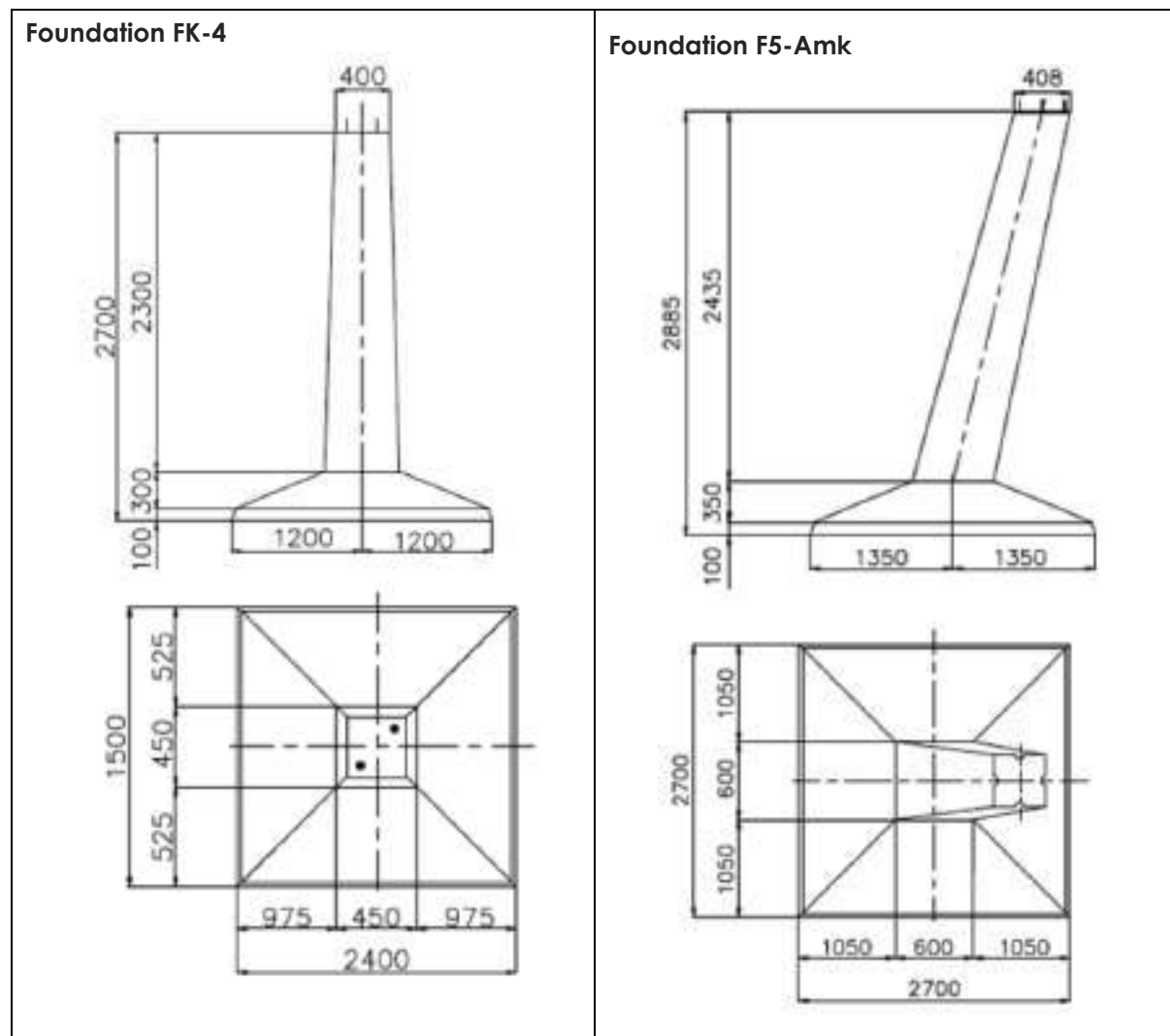


FOUNDATIONS

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 2-27 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 lightning 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 Grid Interconnection Option figure above, the National Grid of Uzbekistan (NEGU) will be responsible for the construction and operation of the OHTL associated facilities. The OHTLs under NEGU's scope are defined below.

- 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.
 - Impacts of the Dzhankeldy – Sarymay OHTL have been assessed and relevant reports disclosed on EBRD's website⁶.

⁶ <https://www.ebrd.com/work-with-us/projects/esia/sarimaydjankeldy-transmission.html>

- Loop In Loop Out to Navoi – Murantau: The LILO will be 500kV and will be u to 2X5km. 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.
 - Disclosed report on the Navoi – Murantau OHTL have been disclosed on EBRD's website⁷.

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

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

2.4 Project Construction Requirements

The land requirement for the construction works and construction facilities at the wind farm is 152.23ha while the land requirement for the OHTL tower footprint is 17.94. See section 2.2.1.1 and section 2.2.21 for a breakdown of the land requirements at the wind farm and OHTL respectively.

2.4.1 Primary Construction Works

2.4.1.1 Wind Farm

Principle construction activities and associated requirements in relation to civil works are anticipated to include but not limited to;

- Detailed project planning, design and consideration of wind farm components by the EPC Contractor;
- Transportation of wind farm 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);

⁷ <https://www.ebrd.com/work-with-us/projects/esia/uzbekenergo-transmission-upgrade.html>

- 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.

2.4.1.2 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

2.4.2.1 Wind Farm

Temporary construction laydown area(s) will be established towards the north eastern extent of the Project site. These areas will be required during the construction phase of the Project for the Wind Farm & the Dzhankeldy to Bash 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.

2.4.2.2 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 approximately 100m X 50m in area and will be in use for a few weeks only. After completion of construction, the construction laydown areas 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 to the west of the eastern plot as shown in Figure 2-18 . This batching plant will be developed and funded as part of the project. The location of the batching plant within the project site ensures a distance of over 500m from the worker accommodation camp which is also located on site and 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, it is understood from the client that the EPC Contractor will establish boreholes on site in order to abstract water to be used at the batching plant. Water availability impact assessment will be undertaken prior to construction or the establishment of any boreholes at the site. 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. All the necessary permits required for the batching plant will be obtained by the EPC Contractor prior to construction

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 and OHTL including power supply, potable water, firefighting supplies and systems, erosion and sedimentation control, waste management and temporary medical and welfare facilities. Where possible, the EPC contractor will connect to existing utilities, where this is not possible utilities will be provided by water tankers and generators.

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, it should be noted that the total electricity consumption and quantity of diesel to be used per month has not been confirmed by the EPC Contractor. The EPC Contractor will obtain the necessary permits required for the diesel generators prior to construction.

WATER SUPPLY

DOMESTIC WATER

During the entire construction phase of the Project, the EPC Contractor estimates approximately 35,000m³ of potable water for 1,000 workers based on 120L/day/per person. This is in line with the IFC & EBRD's Guidance on Worker's accommodation which states that 80 to 180lit of water per person per day should be made available (depending on the weather and accommodation standards).

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

CONCRETE WORKS

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

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

Table 2-10 Estimated Water Consumption for Concrete Works

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

SANITARY FACILITIES

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

2.4.5 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.

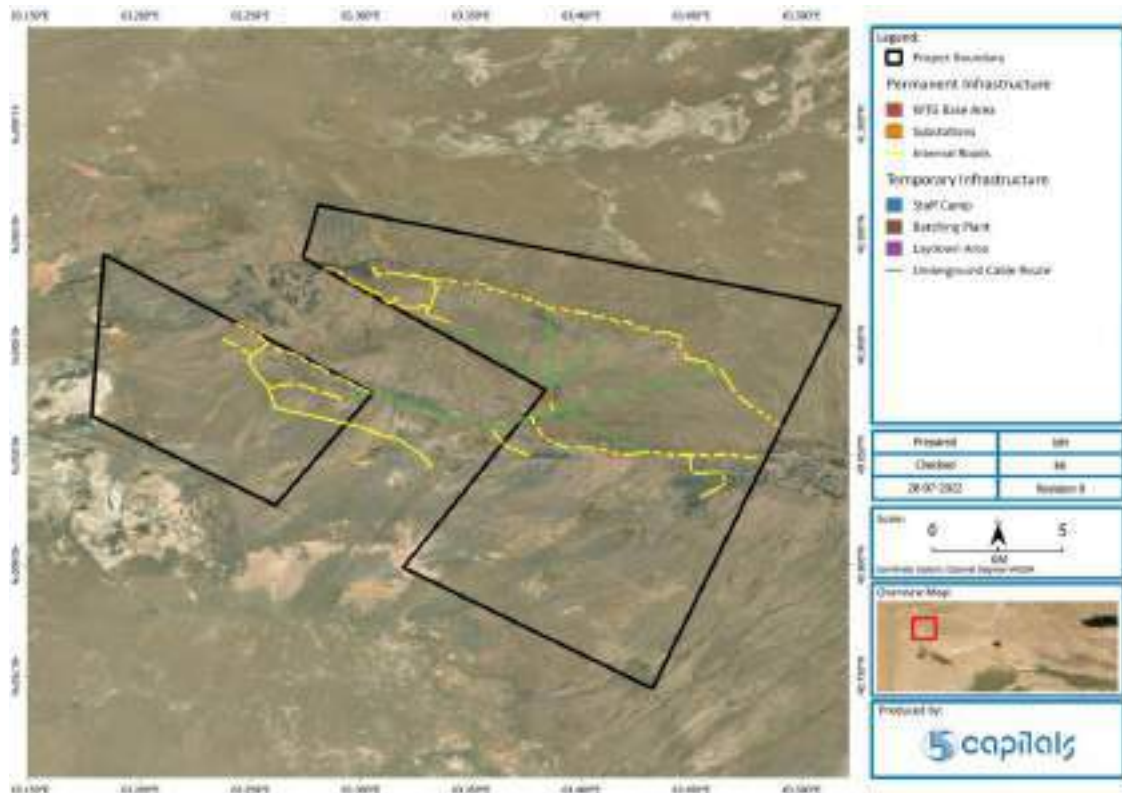
2.4.6 Worker Accommodation

The worker accommodation for the Wind Farm and OHTL will be located within the Project site approximately 200m from the proposed laydown area and 1.6km from the batching plant (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 subcontractor 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 (both EPC as well as subcontractor worker accommodation) 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 2-28 Indicative Location of the Batching Plant, Laydown Areas and Worker Accommodation for Project Company and EPC Contractor Staff



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

Table 2-11 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 Operations & 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.

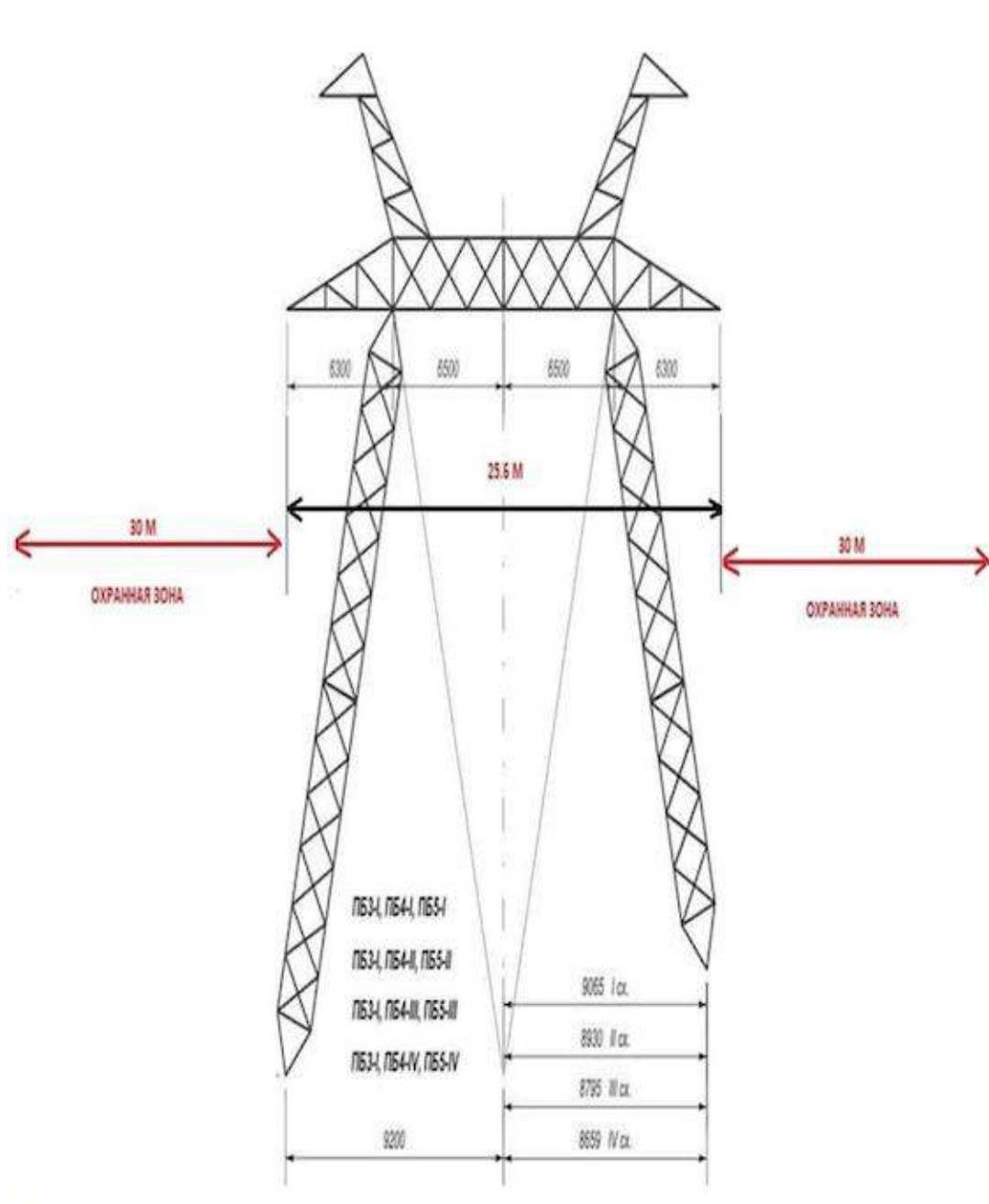
Preventive Maintenance includes works at tower foundation, monitoring of earth resistance values, tree cutting and trimming along the ROW, ground patrolling, thermo-vision scanning on sample basis and attending to defects if any. Corrective Maintenance depends on type of issues.

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 2-29 Illustration of the Width of Right of Way



2.6 Project Milestone

The indicative milestone for the wind farm and the OHTL are provided in the table below

Table 2-12 Key Project Milestone/Timeline Dates

MILESTONES	DATE
Signing Project Agreements (PPA; Investment Agreement)	24 th January 2021
Presidential Decrees	23 rd February 2021 as amended on 8 th July 2022
Land Allotment Orders	19 & 23 March 2021
Limited Notice to Proceed (LNTP)	July 2022
Site Mobilisation	September 2022
Full Notice to Proceed (FNTP)	October 2022
Obtain Permits for Road Modification Works to Allow for Transportation	October 2022
WTG Installation	March 2023
Substation Construction Commencement	Jan 2023
OHTL Design Approval	April 2023
Transmission Line Construction	August 2023
Commencement of WTG Reliability Tests	June 2024
Grid Available for synchronization & full production (Earliest connection date)	February 2024
Wind Farm Substation Commissioning Tests Completion	June 2024
Interconnection and synchronization at wind farm and grid-level substation are completed (Communication is established & ready for evacuation)	June 2024
Early Commercial Operation Date (>10WTG for each site)	July 2024
Project Commercial Operation Date	December 2024
Project Taking Over	December 2024

2.7 Decommissioning of the Project

Potential impacts relating to decommissioning will be similar to those encountered during the construction phase. Due to the small footprint of the project WTG, all structures and infrastructure could feasibly be demobilised with only few elements having the potential to cause long-term legacy impacts or other widespread pollution incidents.

Given that the decommissioning phase is not expected for at least 25 years from the Commercial Operation Date, there are no specific requirements provided for the decommissioning of the project. As such, it is not considered practical or of value to speculate on future environmental and social conditions including the sensitivity of current or future receptors at this time, or facilities that may or may not be present to handle wastes etc., or the extent of environmental and social regulation that may exist.

Hence, it is proposed that all impacts relating to decommissioning stage will be planned to be approached and mitigated via a specific decommissioning plan and updated baseline surveys prepared closer to the time of decommissioning as it would be able to account for

changes in regulation, improvements in technology and requirements for re-use and recycling of components and materials and methods of demobilisation. The decommissioning plan would be developed prior to decommissioning and would be based on the project's ESMS.

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
- 33/500kV Substation Location 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 Dzhankeldy Wind Farm project forms part of the Ministry of Energy's plan to develop and expand renewable use and increase 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 in 2030. Given the requirement 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.

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. The Ministry of Energy proposed specific area within the country where the wind farm can be developed. According to the State Geology Committee of the Republic of Uzbekistan, this area/territory was selected due to the area having less availability of minerals (precious and non-ferrous metals) than other areas/territories within the country. In March 2020, ACWA Power considered four (4) potential sites from the defined area for the development of wind power projects and these sites are as follows:

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

The Dzhankeldy site was selected for this Project due to the wind potential based on the vortex data, wind campaign measurements, geological factors, existing infrastructure and interconnection to the grid.

Besides the above, the site at Dzhankeldy was also selected due to presence of existing road infrastructure in the project area and the location of the site away from protected areas, Important Bird Areas (IBAs) or Key Bird & Biodiversity Areas (KBAs). It should be noted that the Bash, Kanimekh 1 and Kanimekh 2 sites are located approximately 0.5km, 65km and 78km to the nearest IBA - Ayakagitma lake respectively while the Dzhankeldy project site is approximately 86km from this IBA.

The presence of existing road will reduce the need for new access roads to the site thereby minimizing environmental & social impacts of the project facilities while locating the site away from IBA/KBAs will minimize impact to endangered or critically endangered bird species.

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

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

ID	KEY STEP	DATE
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 20 th 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 5 th 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 24 th 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:

Figure 2-30 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
SG6.0-170	Siemens Gamesa
V150-6.0	Vestas

The EN171 6.5MW model was selected for the current layout and was based on the following:

- 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;
- Social impacts which included assessment of current land users, distance to existing houses and settlements.

ECOLOGICAL CONSIDERATIONS

A number of design changes were undertaken to optimise the Wind Farm layout and reduce the overall Project footprint. This included the reduction of the initially proposed 125 WTGs in May 2021 to the current 79 WTGs as shown in the table below.

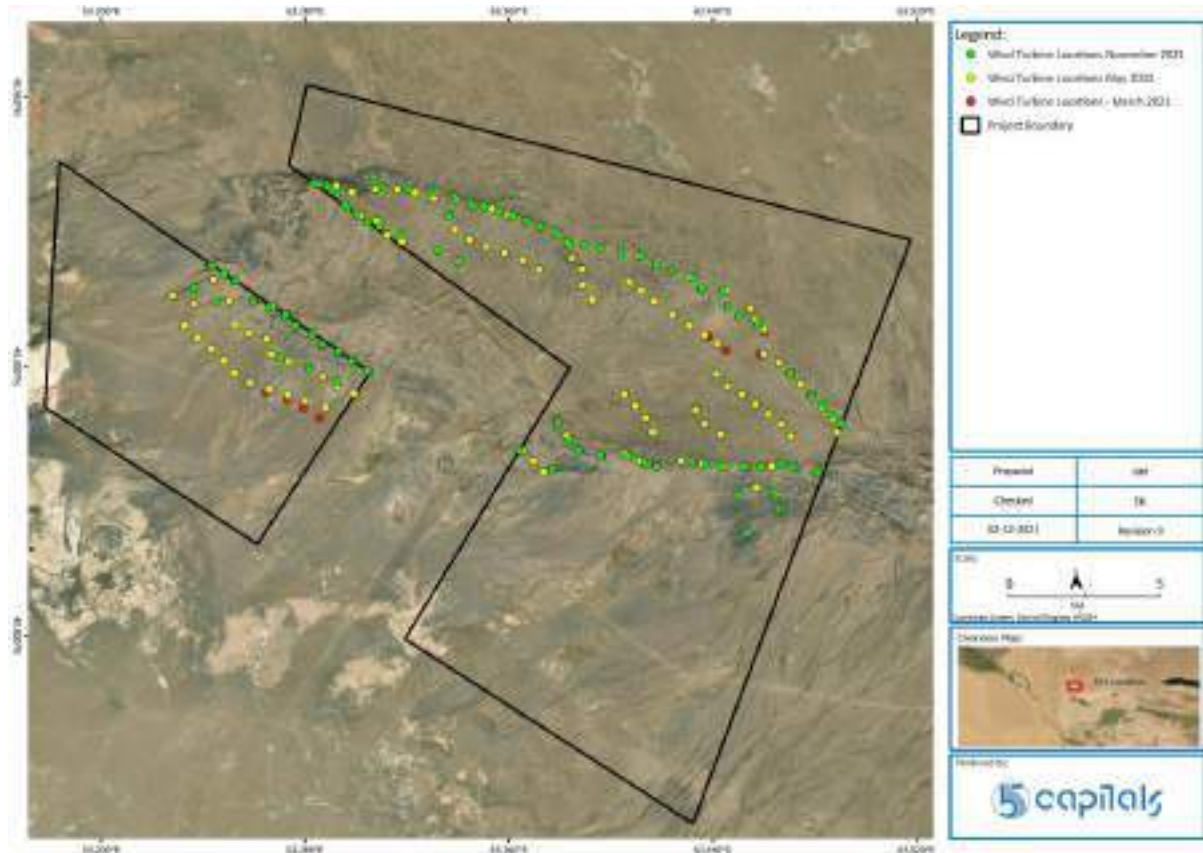
Table 2-13 Optimisation of WTGs for the Dzhankeldy WF

MONTH	NUMBER OF WTGs
March 2021	125
May 2021	125
August 2021	125
November 2021	79

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

- Due to the identification of a critical habitat for the Southern-Even Fingered Gecko within the Southern part of the Wind Farm, approximately 10 WTGs and access roads were removed from the gecko habitat while the substation was relocated further north to avoid impact on critical habitat (reference section 7.3.1.2).
 - In addition, ACWA Power in consultations with SCEEP has identified a gecko reserve south of the Project site where no construction activities will be allowed and where the geckos within construction areas will be relocated to.
- Location of WTGs at least 750m from known active Tier 1 species nests apart from one WTG where ACWA Power has committed to upfront SDOD. This WTG (DZH-01) is within 640m of an active Golden Eagle Nest (Reference Chapter 7 on Terrestrial Ecological).

Figure 2-31 Overlay of WTG Siting Considered in March, May and November 2021 Showing Difference in WTG Location



HUMAN SETTLEMENTS & LAND USE CONSIDERATIONS

The wind farm boundary is located approximately 1.4km from Dzhankeldy village and 35m from Kalaata village. It is noted that the nearest WTG to Kalaata village is located approximately 5km away. This layout and siting of the WTGs ensures that the Project is in line with the required noise health protection zone. Reference Chapter 9 Noise & Vibration and Chapter 27 Community Health, Safety & Security.

The windfarm is used for grazing by 13 herders (8 from Dzhankeldy, 3 from Kalaata villages and 2 from Bukhara city). In order to minimize the impact on grazing land, the BoP area has been optimised and will permanently impact 106.3ha of the 280ha allocated to the Project through a Presidential Decree. To mitigate against construction and operational phase impacts on livelihoods, alternative land outside of the Project boundary has been identified for the herders and grazing can still continue within the gecko reserve (to the south of the project boundary) where no construction activities are permitted (Reference section 2.2.1 and Project specific RAP).

2.8.5 33/500kV Substation Location

The 33/500kV substation is part of the Project's electrical connection facility to aid connection of the Wind Farm to the grid. In June 2021, the substation was proposed to be located within

the eastern plot in proximity to the existing road that runs from west of the plot boundary to the north & north-eastern extent.

During some ecological surveys at the Project site, it was identified that the proposed substation was located within the Southern-Even Fingered Gecko habitat; a critically endangered and endemic species vulnerable to habitat loss. An Environmental & Social Constraint study was conducted by 5 Capitals in August 2021 and it was recommended that the substation be moved to the north or south of the proposed location as there is flat terrain available in those areas and this would relocate the substation out of identified gecko habitat.

Technical studies were undertaken by Juru Energy as part of the OHTL Pre-Feasibility study on behalf of ACWA Power and a new substation location was proposed in September 2021 taking into consideration the environmental recommendations from the E&S Constraint study to utilise land outside of identified suitable gecko habitat.

The location of the 33/500kV substation in June 2021 and the final proposed location (September 2021) are presented in the figures below

Figure 2-32 Location of 33/500kV Substation – June 2021

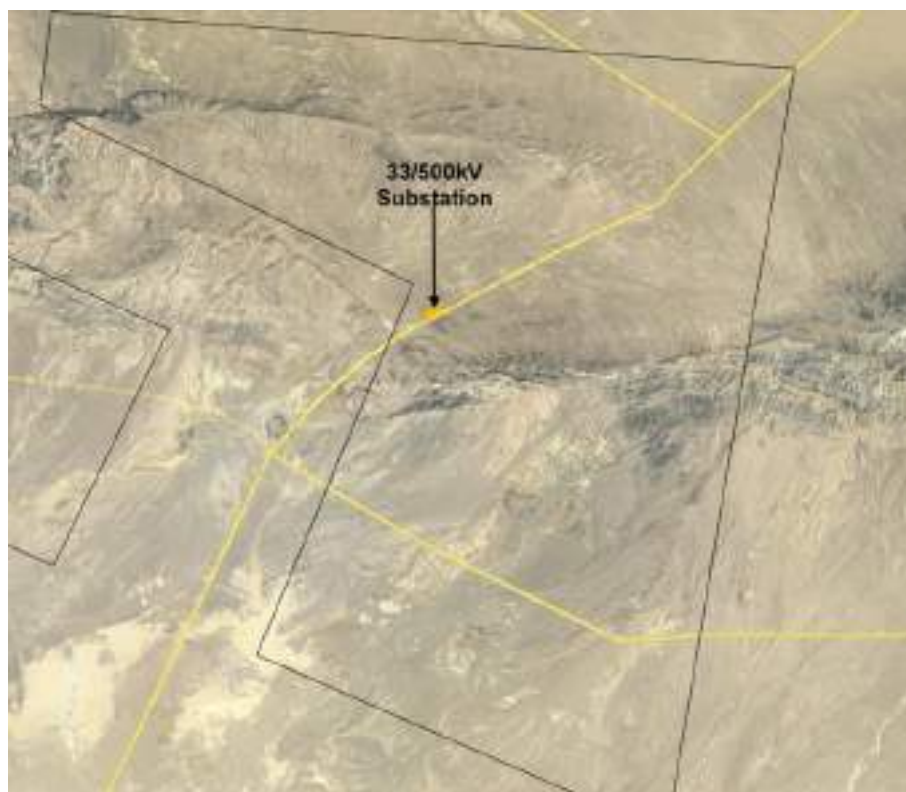


Figure 2-33 Location of 33/500kV Substation – September 2021

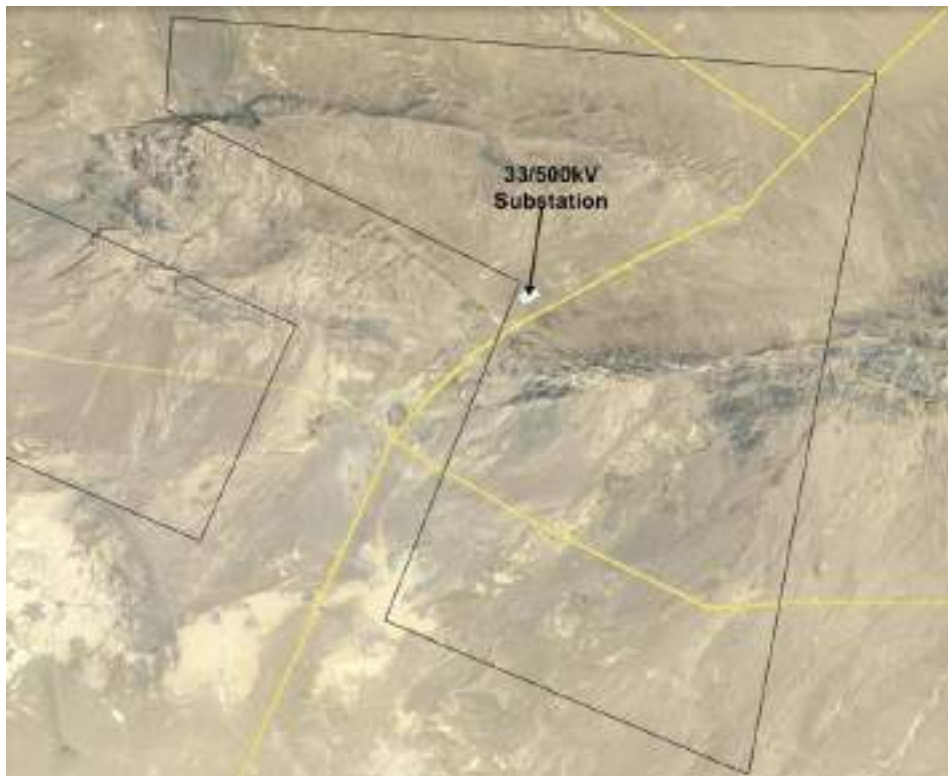


Figure 2-34 Overlay of 33/500kV Substation Considered in June & September 2021 in Relation to Gecko Habitat and Showing Difference in Location



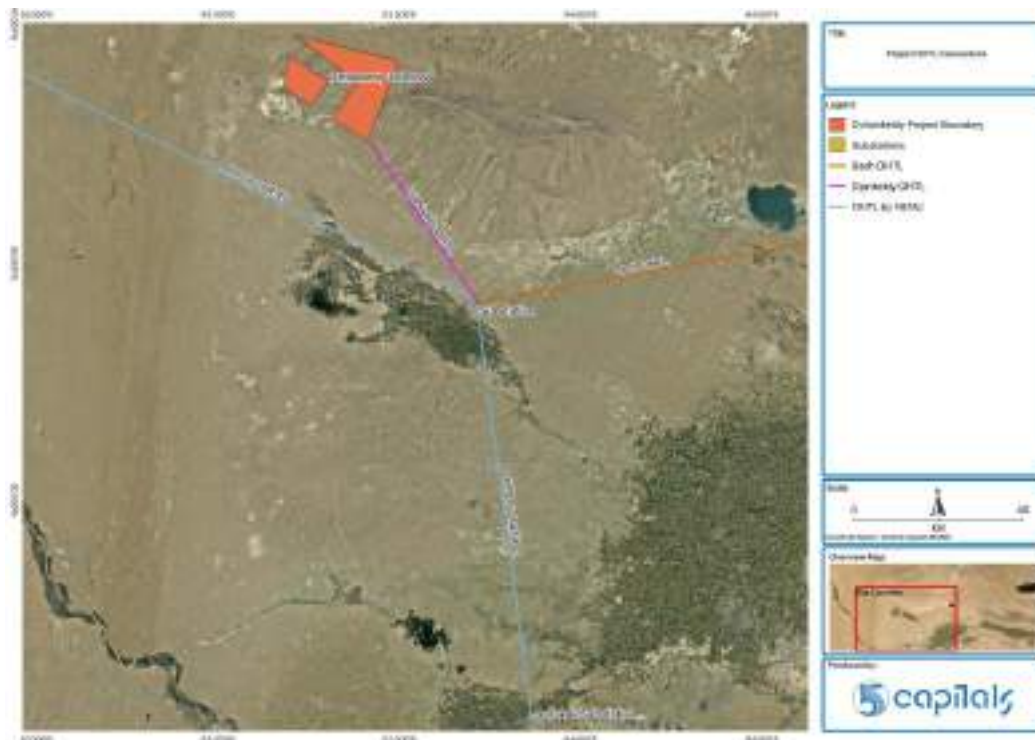
2.8.6 OHTL Routing

In order to connect the Dzhankeldy 500MW Wind Farm project to the national grid, two (2) options were considered for the routing of the proposed OHTL in March 2021 and these options include:

- **Option A:** 60km OHTL from the Project site either with a rating of 220kV double-circuit or 500kV single-circuit that will connect to a newly constructed substation.
- **Option B:** 250km OHTL (from Dzhankeldy Project site to Bash Project site to an existing substation at Karakul) with a rating of 500kV single circuit

Given that the newly constructed substation for Option A will be located in proximity to Karakyr lake – An Important Bird Area (IBA), and the OHTL line from the substation to Karakul substation will run through the Karakyr lake, this option was not chosen due to the potential risk to birds and the proximity to bird migratory flyways (see figure below).

Figure 2-35 OHTL Alignment (Option A) – March 2021



Option B was selected and increased to 290.5km. Approximately 128.5km of the OHTL runs from Dzhankeldy project site to Bash project site and approximately 162km runs from Bash site to an existing substation in Qurako'l.

During the preparation of the scoping report, Option B of the OHTL was shown to run through Lake Ayakagytna which is an Important Bird Area especially for waterbirds.

Figure 2-36 Initial OHTL Alignment & Substation (Option B) – March 2021



Following submission of the scoping report to lenders and receipt of comments from Asian Development Bank (ADB) and International Finance Corporation (IFC) regarding the risk posed by the OHTL to the birds in Lake Ayakagytna, ACWA Power revised the proposed Option B alignment.

The OHTL Option B was revised due to the following reasons:

- To avoid proximity of the OHTL to two Important Bird Areas; the Karakyr lake also called the Karakyr State Nature Sanctuary approximately 20km south of the eastern plot and the Ayakagytna lake; an IBA drainage lake approximately 85km east of the eastern plot.
- To avoid the Kuldjuktan mountain cliffs along the Dzhankeledi to Bash route 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; and
- To select areas for the routing that is close to existing roads and railway.

Figure 2-37 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 (3) OHTL alignments as shown below.

Figure 2-38 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 Route - Line 3 were discontinued along the Bash to Karakul substation and a new route 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 2-39 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

2.8.6.1 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 20-30m along the alignment.

LINE 1 (GREEN LINE)

A summary of Line 1 is as provided below.

Table 2-14 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 2-15 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 2-16 Summary of the OHTL Route between Dzhankeldy - Bash (Line 3)

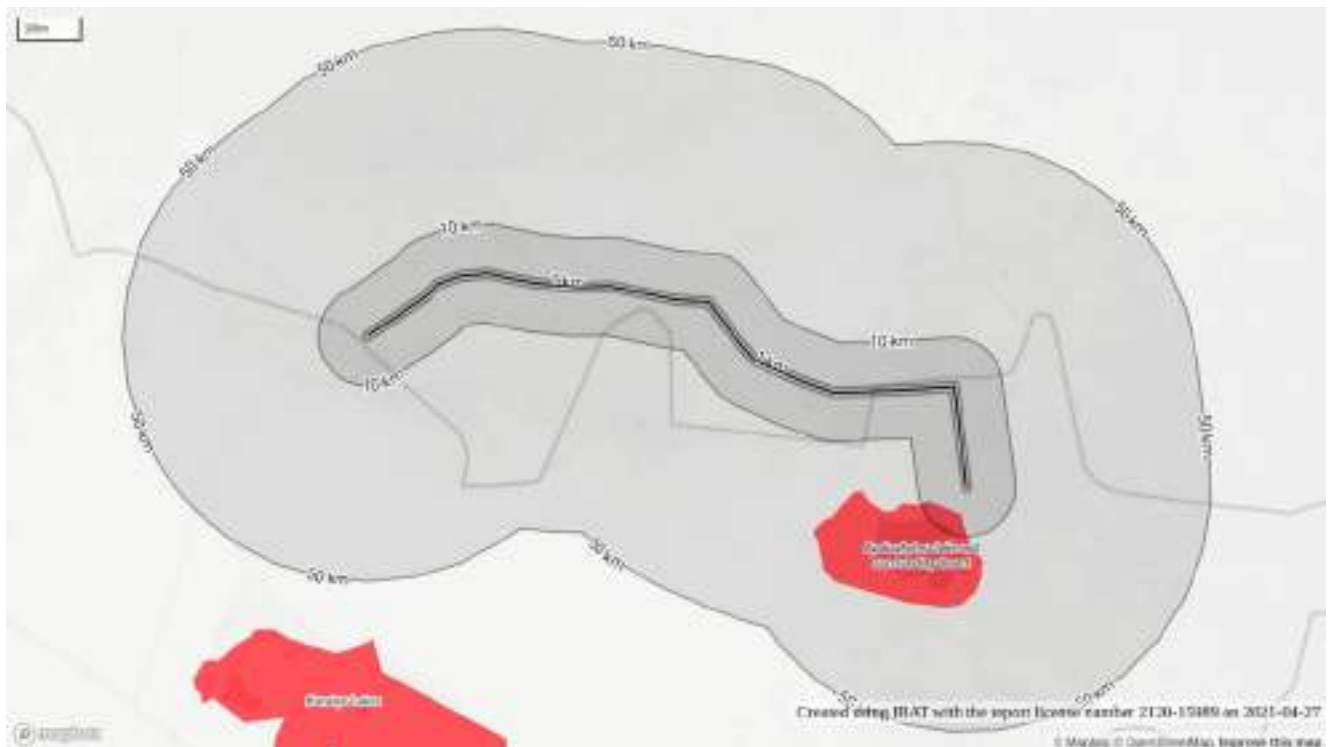
ELEMENT	DESCRIPTION
Name of the OHTL	33/500kV Bash WPP to 33/500 Dzhankeldy substation
Length	128.5km
No of point of intersection	25
Number of transmission line crossing	2
Number of railway crossing	1
Number of pipeline crossing	0
Number of highway crossing	0
Number of small road crossings	1
Number of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

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

Environmental & Social Aspects

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

Figure 2-40 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 approximately 5.4km from the Dzhangeldy Wind Farm. No PAPs were identified along the OHTL but additional assessments are being undertaken in Dzhangeldy Wind Farm as part of the RAP.

According to an Environmental & Social Constraint 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.

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.

Based on the above factors, the pre-feasibility study recommended Line 3 (dark blue) as the best alignment for the Dzhangeldy to Bash 500kV OHTL 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.

2.8.6.2 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 2-17 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 2-18 Summary of the OHTL Route between Bash – Kurakul (Line 2)

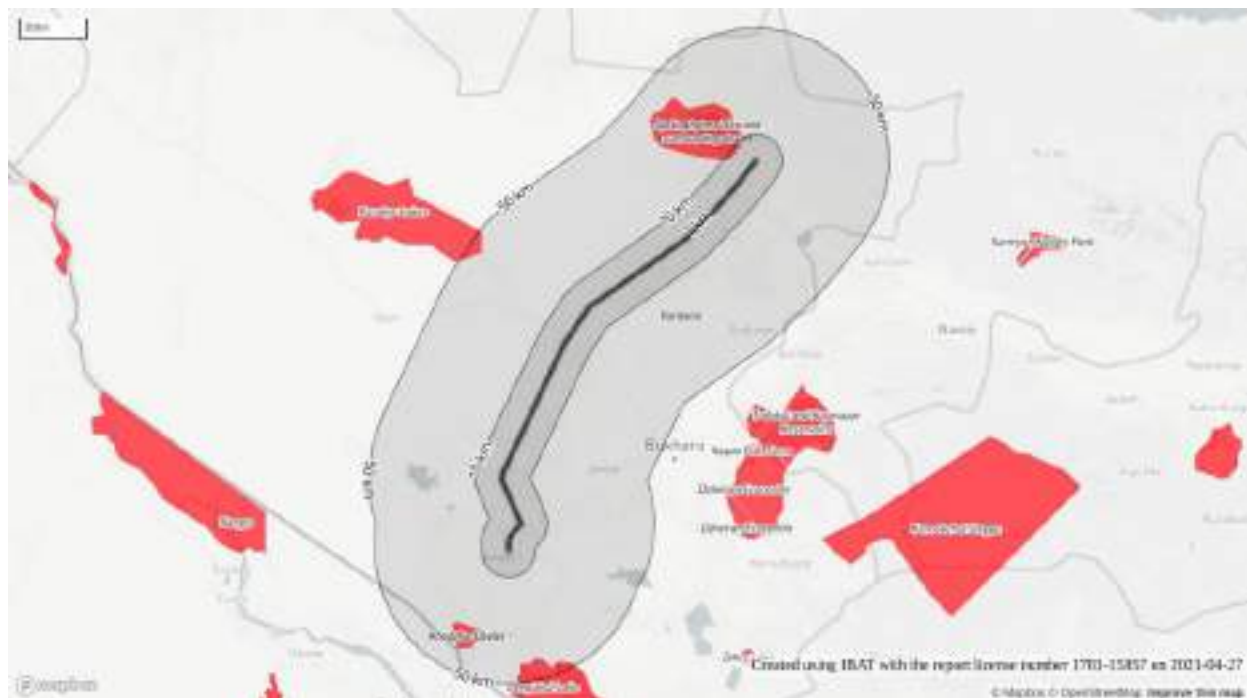
ELEMENT	DESCRIPTION
Name of the OHTL	33/500kV Bash WPP to existing 500kV Karakul substation
Length	162.260km
No of points of intersections	18
Number of transmission line crossings	8
Number of intersections of the design transmission line	1
Number of railway line crossings	3
Number of pipeline crossings	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 Aspects

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 under the Bash 500MW Wind Farm ESIA (subject of a separate ESIA).

Figure 2-41 IBAs found within 1km, 10km & 50km of the OHTL



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

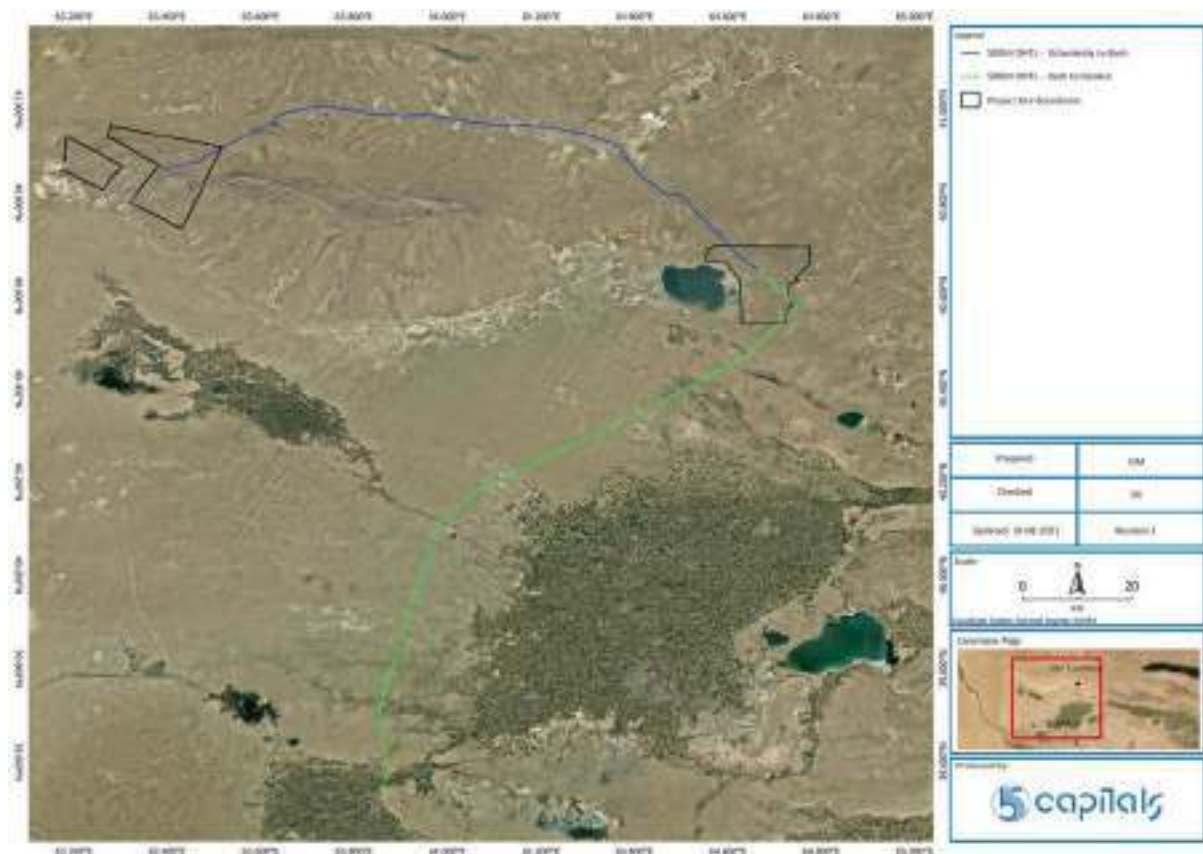
The proposed Line 1 (green) crosses through four agricultural lands owned by local farmers and on the eastern border of land belonging to Qirobod Mavjlari LLC and Kumush Kalava LLC but this land will not be impacted. Line 2 (violet) crosses through five agricultural lands and would not have any impact 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 factors 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 substation.

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

Figure 2-42 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 provides information on the 128.5km Overhead Transmission Line that will run from the Dzhankeldy wind farm project to the Bash site. The 162km OHTL that will run from Bash site to an existing substation in Qurako'l is the subject of another ESIA and as such not described in this ESIA report.

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, except 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 2109, 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 24 of this law states that the State Environmental Expertise (SEE) is a mandatory measure for environmental protection, preceded to decision making process. In addition, the law prohibits the implementation of any Project without approval from SEE.

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, an 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 followings 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 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 Dzhankeldy 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 Environmental Expertise" No.73-II of 25.05.2000 (as amended on 29.04.2021)
- 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).
 - 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.

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 12.01.2021);
- 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.

- Resolution of the Cabinet of Ministers No.146 "On the procedure for compensation for losses of owners, users, tenants and owners of land plots, as well as losses in agricultural and forestry production" dated 25 May 2011
- Resolution of Cabinet of Ministers No.317 "On amending and adding to some decrees of the Republic of Uzbekistan, aimed the further improvement of registration of cadastral document on a real property" dated 21 September 2016
- Resolution of the Cabinet of Ministers No.911 "On additional measures for enhancing modalities of providing compensation on withdrawal and allocation of land plots and safeguard the property rights legal and physical entities" dated 16 November 2019.
- Resolution of the Cabinet of Ministers No 911 "On further improving procedures for providing property rights of individuals and legal entities and procedures for removal and compensation for land plots" dated November 16th 2019
- Resolution of the President of the Republic of Uzbekistan No 3857 "On procedure for preparation and implementation of projects with the participation of International Financial Institutions and foreign Governmental Financial Organizations" dated 16 July 2018
- Presidential Decree No. 5495 "On measures on major improvement of the investment climate in the Republic of Uzbekistan" dated on 1 August 2018

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" as 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 the Table below of which the 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: 12 th October 1999	
Paris Agreement to UNFCCC	Signed: 19 th April 2017	
Montreal Protocol on Substances that Deplete the Ozone Layer (with London, Copenhagen, Montreal amendments)	Accession: 10 th 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: 19 th 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.
Ramsar Convention on Wetland	Accession: 8 th February 2002	The project will support Uzbekistan's contribution towards the conservation and sustainable use of wetlands
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	Accession: 10 th 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: 7 th February 1996	The Project will be required to adhere to all national and international standards for hazardous waste generation and management.
United Nations Convention to Combat Desertification	Ratified: 31 August 1995	The Project will not result in accelerated desertification through sourcing of its materials and will contribute to sustainable development.
Paris Convention on Protection of the World Cultural and Natural Heritage	Succession: 13 th January 1993	The Project will implement mitigation and management measures where items/sites/monuments of cultural or natural heritage are identified within

NAME OF INTERNATIONAL PROTOCOL/CONVENTION	SIGNED/ RATIFIED	RELEVANCE TO THE PROJECT
		or near the Project boundaries and notify the relevant authorities immediately.
Stockholm Convention on Persistent Organic Pollutants	Accession: 28 th 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 ⁸	RATIFIED
Convention No 29 on Forced Labour adopted in 1930	13 th July 1992
Convention No 87 on Freedom of Association and Protection of the Right to Organise, adopted on 17 th of June 1948	12 th December 2016
Convention No 98 on the Right to Organise and Collective Bargaining adopted on 8 th of June 1949	13 th July 1992
Convention No 100 on Equal Remuneration adopted 6 th of June 1951	13 th July 1992
Convention 111 on Discrimination (Employment and Occupation) adopted 4 th of June 1958	13 th July 1992
Convention 138 on Minimum Age adopted 6 th of June 1973	6 th March 2009
Convention 182 on the Worst Forms of Child Labour adopted 17 th June 1999	24 th June 2008
Convention C105 on the Abolition of Forced Labour Convention, 1957	15 th Dec 1997
C187 Promotional Framework for Occupational Safety & Health Convention, 2006	14 th September 2021
C081 Labour Inspection Convention 1947	19 th Nov 2019

3.3 Lender Requirements

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

⁸ ILO: Ratifications for Uzbekistan:

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

- 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 known that the European Bank for Reconstruction and Development (EBRD), and the Asian Development Bank (ADB) are potential lenders. As ACWA Power implements the E&S requirements of IFC on all its projects, the Dzhankeldy 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

The European Bank for Reconstruction and Development (EBRD) has an internal Environmental and Social Policy (2019) and a set of specific Performance Requirement (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 2021 that the ACWA Power Dzhankeldy 500MW Wind Farm falls into this description and that EBRD will target 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 Projects categorisation is based on 3 specific safeguards: Environmental, Involuntary Resettlement, Indigenous People as provided above and it was confirmed by ADB (via virtual

meeting on 23rd March 2021) that the ACWA Power Dzhankeldy 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 site is used for grazing by “Dzhankeldy” LLC and by 11 local herders for livestock grazing. Along the OHTL route, Dzhankeldy LLC and 1 local herder use land within the area of influence. As such, the project falls under **Category B**. Potential impacts to PAPs have been discussed in the project-specific RAP
- Indigenous People: Based on early screening, the project is not expected to have impacts on Indigenous People. Therefore, the project is classified under **Category C**.

3.3.3 Equator Principles

The Equator Principles (EP) is a risk assessment framework used by financial institutions to determine, assess and manage the environmental and social risk in 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 EPIV is due to become 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.

3.3.3.1 Applicable Standards

EPIV establishes the minimum E&S standards to be adopted by EP Financial Institution (EPFIs) as those from IFC Performance Standards on Environmental and Social Sustainability (Performance Standards), the World Bank Group Environmental, Health and Safety Guidelines

(EHS Guidelines) and/or the relevant host country laws, regulations and permits that pertain to environmental and social issues.

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)

3.3.3.2 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 Dzhankeldy 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 EPIV, 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 operations of the Project. The report describes in detail the changes in the project made as a result of the outcomes of Stage 1 and Stage 2, the comments received during public consultations, the environmental standards applicable to the project (as defined by the modelling and assessment process), the environmental monitoring requirements and the main conclusions.

State ecological expertise approval: The State Committee on Ecology and Environmental Protection provides their opinion at Stage I and II is a typically a mandatory document for project financing by Uzbek banks, other Lenders and for Project commissioning at Stage III. 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 Dzhankeldy 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 Analyst, 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
Wind Farm Site		
Landscape Survey		11 th March 2021 29 th July 2021
Ecology Surveys	Installation of bat detectors on wind mast	5 th – 30 th June 2021
	Flora survey	14 th – 16 th May 2021
	Reptile survey	15 th – 17 th April 2021 25 th – 27 th June 2021
	Invertebrates	15 th – 17 th April 2021
	Mammals	15 th – 17 th April 2021 and 24 th to 27 th June 2021
	Bat roost search	15 th – 17 th April 2021 and 21 st to 22 nd June 2021
	Houbara survey	19 th – 21 st April 2021 and 19 th to 21 st May 2021
	Raptor Nest survey	22 nd – 24 th April 2021
Bird Survey	Spring	3 rd – 21 st May 2020 10 th March – 20 th May 2021
	Summer	15 th May 2020 – 31 st August 2020
	Autumn	1 st September – 23 rd November 2020
	Winter	16 th November 2020 – 7 th March 2021
Bats Monitoring	Summer	14 th August – 2 nd September 2020
	Autumn	14 th – 30 th September 2020 and 14 th – 31 st October 2020
Noise Monitoring Survey	Construction Noise Monitoring Survey	12 th to 13 th April 2021
	Detailed Noise Survey	20 th July – 9 th August 2021
Air Quality Monitoring Survey	Continuous Monitoring	13 th – 16 th April 2021
	Particulate Matter Monitoring	15 th – 17 th June 2021
Soil Survey		5 th April 2021
Socio Economic Survey	Household Surveys	23 rd – 24 th April 2021
	Herders Survey	23 rd April 2021
Archaeological Survey		5 th – 26 th July 2021
Stakeholder Consultations		This has been ongoing with different stakeholders between March and August 2021 through official letters, calls and public consultation meetings.
Public Consultations as part of the National EIA		15 th April 2021
Public Consultations as part of the ESIA (project site)		21 st to 22 nd June 2021
Overhead Transmission Line		
Ecology Surveys along OHTL	Reconnaissance Survey	17 th – 19 th April 2021
	Flora survey	14 th May 2021 29 th June – 1 st July 2021

SITE SURVEYS		PERIOD
	Reptile survey	3 rd May 2021 28 th – 30 th June 2021
	Invertebrates	3 rd May 2021
	Mammals	24 th -25 th June 2021
	Bird Monitoring	7 th May 2021, June, July, August, September, October and November 2021
Soil Survey		18 th August 2021
Landscape Survey		29 th July 2021
Archaeological Survey Walkover		N/A
Socio-economic Surveys		Completed
Stakeholder Consultations	Interest Based Stakeholders	July 2021 – November 2021
	Public Consultations	3 rd to 7 th October 2021
Resettlement Action Plan		
Resettlement Surveys		Completed

The baseline survey data for the different environmental and social aspects 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 (physical, biological, social/human right/socio-economic and cultural impacts and/or risks) needs to be a robust, consistent and transparent process. The methodology to assess 'impact significance' is outlined below and follows an International Best Practice guideline⁹ 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.

⁹ 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.

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, cultural heritage); 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.

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

VALUE (SENSITIVITY)	DESCRIPTION OF VALUE
	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 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 environmental 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 environmental 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 environmental impact.

Impacts can be either beneficial or adverse. The table below shows the criterion used for determining the significance of environmental 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.

SIGNIFICANCE CATEGORY	CRITERIA
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 than 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 Dzhankeldy 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 (public assembly is restricted due to Covid-19). 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

The 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 built 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

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- 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 F 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/M ³)			
	ONE-TIME	24-HOUR	MONTHLY	ANNUAL
NO₂	0.085	0.06	0.05	0.04
NO	0.6	0.25	0.12	0.06
CO	5	4	3.5	3
SO₂	0.5	0.2	0.1	0.05
NH₃	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 ($\mu\text{g}/\text{m}^3$ unless stated)

POLLUTANT	CONCENTRATION	AVERAGING PERIOD	PERMITTED EXCEEDANCES PER YEAR
PM_{2.5}	25	Annual	n/a
PM₁₀	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/m ³	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/m ³	Annual	n/a
Cadmium	5 ng/m ³	Annual	n/a
Nickel	20 ng/m ³	Annual	n/a
PAH	1 ng/m ³ (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 purposes/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 ($\mu\text{g}/\text{m}^3$ unless otherwise specified)

PARAMETER	24 HOUR	ANNUAL
PM₁₀	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)
NO₂	200 (1 hour)	40
SO₂	125 (Interim target 1)	500 (10-minute guideline)

PARAMETER	24 HOUR	ANNUAL
	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)

SANPiN 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 applications 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	7am to 11pm	55dB(A)
	11pm to 7am	45dB(A)

LOCATION	TIME	SANPIN No. 0339-16
the disabled and elderly, and pre-schools		

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 100 139μT).

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 Archaeology and Cultural Heritage

5.7.1 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.

5.7.2 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.

When a project is located in areas where physical cultural resources are expected, the ADB Safeguard Policy Statement requires the use of "chance find" procedures that include a pre-approved management and conservation approach for materials that may be discovered during project implementation.

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.

5.8 Landscape and Visual Amenity

5.8.1 National Regulations

Specific legislation in regard to landscape and visual assessment has not been published in Uzbekistan. In accordance with lender requirements, where standards do not exist, an international good practice standard should be used as a benchmark reference. 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.

5.8.2 Lender Requirements

EPFIs AND ADB

- IFC EHS Guidelines for Wind Energy (2015)

Landscape & Visual Impacts

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.'

5.9 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.

According to Paragraph 39 of the Guideline, *'If it is not possible to locate the wind energy facility/turbines such that neighbouring receptors experience no shadow flicker effects, it is recommended that the predicted duration of shadow flicker effects experienced at a sensitive receptor not exceed 30 hours per year and 30 minutes per day on the worst affected day, based on a worst-case scenario'*.

5.10 Socio-Economics

5.10.1 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.
- Resolution of the Cabinet of Ministers No.911 "On additional measures for enhancing modalities of providing compensation on withdrawal and allocation of land plots and safeguard the property rights legal and physical entities" dated 16 November 2019.
- Resolution of the Cabinet of Ministers No 911 "On further improving procedures for providing property rights of individuals and legal entities and procedures for removal and compensation for land plots" dated November 16th 2019
- Resolution of Cabinet of Ministers No.317 "On amending and adding to some decrees of the Republic of Uzbekistan, aimed the further improvement of registration of cadastral document on a real property" dated 21 September 2016
- Resolution of the President of the Republic of Uzbekistan No 3857 "On procedure for preparation and implementation of projects with the participation of

International Financial Institutions and foreign Governmental Financial Organizations" dated 16 July 2018

- Presidential Decree No. 5495 "On measures on major improvement of the investment climate in the Republic of Uzbekistan" dated on 1 August 2018
- Law of the Republic of Uzbekistan on Procedures for Withdrawal of Land Plots for Public Need with Compensation Approved May 28, 2022 (to be in effect on October 1st 2022)

5.10.2 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 Safeguard Requirement 2 on Involuntary Resettlement safeguard requires socio-economic surveys and census to be undertaken to identify all persons who will be displaced by the project and to assess the project's socioeconomic impacts on them.

ADB's SR2 also aims to avoid involuntary resettlement where possible; to minimise involuntary resettlement by exploring project and design alternatives; to enhance at least restore, the livelihoods of all displaced persons in real terms relative to pre-project levels; and to improve the standards of living of the displaced poor and other vulnerable groups.

The safeguard also requires adverse economic, social or environmental impacts from project activities other than land acquisition such as loss of access to assets or resources or restrictions on land use to be avoided, or at least minimized, mitigated or compensated for through the environmental assessment process. Where such impacts are found to be adverse, the borrower/client is required to develop and implement a management plan to restore the livelihood of affected persons to at least pre-project level or better

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.

5.11 Stakeholder Engagement and Consultations

5.11.1 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.

5.11.2 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 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

ADB

ADB SPS Safeguard Requirement on Involuntary Resettlement requires meaningful consultation to be undertaken with affected persons, their host communities and civil society for every project with the potential for involuntary resettlement impacts. Consultation should be undertaken in a manner commensurate with the impacts on affected communities paying particular attention to the need of disadvantaged or vulnerable groups.

This Safeguard Requirement also requires the establishment of a grievance redress mechanism to receive and facilitate the resolution of concerns and grievances from affected persons about physical and economic displacement and other project impacts, paying particular attention to the impacts on vulnerable groups.

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 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.

5.12 Solid Waste & Wastewater Management

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

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

5.12.2 Lenders Requirements

SOLID WASTE

EBRD

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.

5.13 Community Health, Safety and Security

5.13.1 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.
- Article 18 of the Air Code for the Republic of Uzbekistan
 - This 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 Regulation 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.

5.13.2 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 & 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.

5.14 Labour and Working Conditions

5.14.1 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 (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 entrepreneurs 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.

5.14.2 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.'*

The ADB Social Protection Strategy requires client to promote efficient labour markets, diminish peoples exposure to risks and comply with core labour standards which includes: (a) freedom of association and the effective recognition of the right to collective bargaining, (b) the abolition of all forms of forced or compulsory labour, (c) the elimination of discrimination in respect of employment and occupation and (d) the elimination of child labour.

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 with 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 may be 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.

5.15 Human Rights

5.15.1 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).

5.15.2 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.

5.16 Climate Affairs

5.16.1 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.

5.16.2 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

According to 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 quantities of greenhouse gases, defined as amounting to 100,000 tCO₂e 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 for the Wind Farm are presented in Part A of this ESIA (Chapter 7 - Chapter 15) while site specific baseline conditions along the OHTL route are presented in Part B of this ESIA (Chapter 16 - Chapter 25).

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 State Committee on Ecology and Environmental Protection, 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 threat to biodiversity in Uzbekistan includes 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 temperate climatic zone. According to the Third National Communication under the UNFCCC, 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 cold period is from November to March. The hottest month in the country is July with average mean monthly air temperature ranging 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 reaches 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.

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.

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 $M > 6.5$ passes through the Project site (both western & eastern plots). Another seismic zone; the Predkyzylkum which has an earthquake potential with magnitude of $M > 5.5$ also passes through the southern part of the Project area.

Based on the above, the possible seismic activity which could affect the Project area is considered as $M > 6.5$.

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 6-2 Earthquakes with $M > 5$ Occurred Around the Project Area (Adapted from UzAssystem, 2021)

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

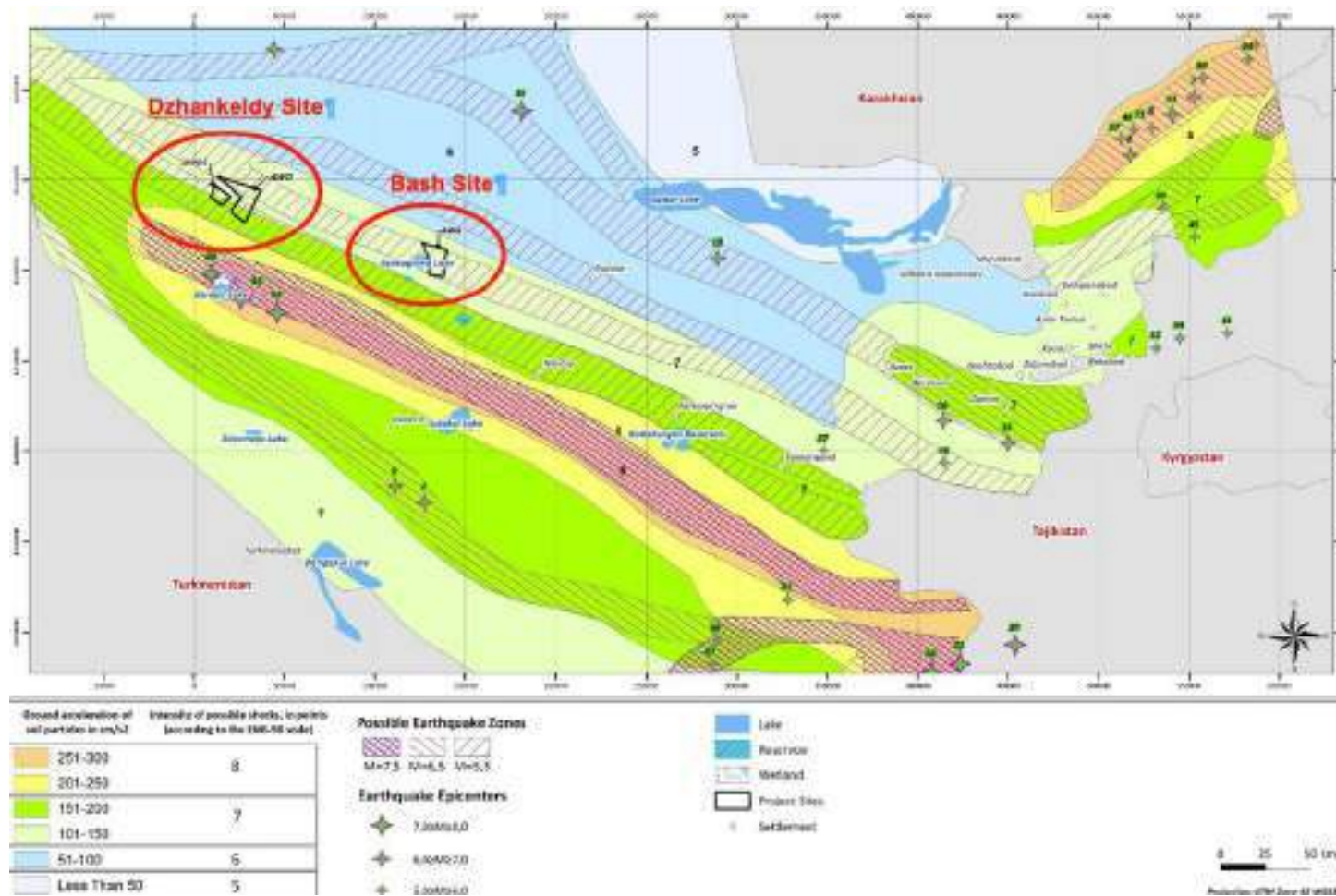
Note:

- *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 (Medvedev et al., 1964).
- **Intensity degree 9 means that general panic occurs. People may be forcibly thrown to the ground. Many monuments and columns fall or are twisted. Waves are seen on soft ground. Substandard structures may collapse. Substantial

damages may happen to well-constructed structures. Underground pipelines rupture. Ground fracturing and widespread landslides may occur (Medvedev 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 (Medvedev et al., 1964).

Figure 6-1 Location of Earthquakes with M>5 in Relation to the Dzhankeldy Project Site (Adapted from UzAssystem, 2021a)



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).

According to the Annual Report of Surface Water Quality in the Territory of Uzhydromet (2018), 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. Irrigation farming is the largest water consumer in the region.

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).

Hydrogeological conditions are characterized by the development of groundwater horizon at a depth of 2.1 to 2.9 m. The groundwater level reaches its maximum in the months of April and May and reaches its the minimum in the months of December and January.

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 6-3 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	138	115
Itchan Kala (1990)		242	261
Historic Center of Shakhriyabz (2000)		350	257
Samarkand – Crossroad of Cultures (2001)		327	227
Western Tiern – Shan (2016)	Natural Heritage site	568	484

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

Table 6-4 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

ELEMENT	DESCRIPTION (SUMMARY)	REGION WHERE IT IS COMMONLY PRACTICED
Khorazm dance, Lagzi (2019)	This dance reflects the sound and phenomena of surrounding nature, feelings of love and happiness. Lagzi is transmitted across generations through creation of new versions of performances. It is performed through national holidays and folk festivities as well as in the daily-based interpretation during family events.	Mainly in Khorazm Region but it has also spread to other regions in Uzbekistan.
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 represent beliefs, world views and lifestyles in a pictorial fashion and has also been influenced by Islam.	Bukhara 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 performances, 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,	Ferghana Valley in Uzbekistan and Tashkent region

ELEMENT	DESCRIPTION (SUMMARY)	REGION WHERE IT IS COMMONLY PRACTICED
	At present there are more than 30 forms of Askiya some professionals and others amateurs.	
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 idioms 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, an assessment of the project impacts on these elements is provided in Chapter 12 for the Wind Farm and Chapter 23 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%, Tatar 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.

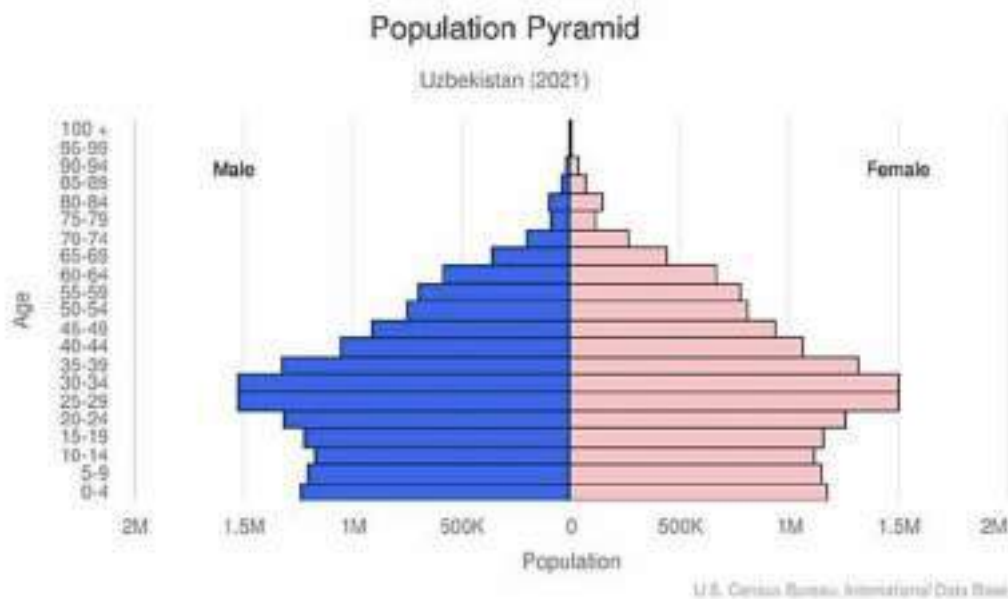
The table below gives a summary of Uzbekistan population information.

Table 6-5 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 6-2 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 6-6 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 a visible gender segregation by industry where women are well represented in the public sector such as education, healthcare and in culture and arts with lower salaries, 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.

According to a gender assessment report by the Asian Development Bank (2018), traditional gender contracts (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 of 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).

The Commission on Ensuring Gender Equality of the Republic of Uzbekistan has developed a draft Strategy for achieving gender equality of the Republic of Uzbekistan 2020-2030. Nevertheless, the share of women in formal employment (45.7%) is still lower than that of men (54.3%). This is due to the fact that the concepts of motherhood and family are very important in Uzbek society.

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 Labor 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. According to the National Agency on Land and Property Cadastre, 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, Syrdarya 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 39.4 thousand km². As of April 1, 2020, the permanent population in Bukhara region was 1929.1 thousand people.

The region is divided into 11 administrative districts 2 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.

NAME OF DISTRICT	KEY SOCIO-ECONOMIC CHARACTERISTICS
Peshku District (Wind Farm)	This district has a total area of 8,200km² 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 nationalities¹⁰.

¹⁰ **Source:** <https://tochka-na-karte.ru/Goroda-i-Gosudarstva/10230-Peshkuns-kij-rajon.html>
Accessed 3rd June 2021

NAME OF DISTRICT	KEY SOCIO-ECONOMIC CHARACTERISTICS
Gijduvon District (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 Uzbekistan 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.

Figure 6-3 Administrative Districts of Bukhara Region



6.5.3 Navoi Region

Navoi region is located in the central north/northwest part of Uzbekistan and is the largest region in the country occupying 110,800km² of land. It borders with Kazakhstan, Smarqand Region, Bukhara Region, Jizzakh Region and the Krakalpakstan Republic. The area of Bukhara region is 39.4 thousand km². According to the 2019 Statistics Committee of Uzbekistan, the population size of the region is 974,000 people with about 473,000 residing in cities and 501,000 living in rural area.

The region is divided into 8 administrative districts one (1) of which is where the OHTL run through. The key socio-economic characteristic of this districts is provided in the table below.

NAME OF DISTRICT	KEY SOCIO-ECONOMIC CHARACTERISTICS
Konimekh District (OHTL)	This district has one (1) town and seven (7) communities. As of 2019, It has an estimated population of 35,100 people. This district is occupied by 16,600 hectares of forestry land with sexual and cottonwood being the main trees in the forest. The district also has a phosphor combinate, more than 100 small private enterprises, 20 public enterprises and more than a dozen stock companies

Specific socio-economic characteristics of communities living near the Wind Farm and OHTL is provided in Chapter 15 and 25 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 as direct contamination to water bodies potentially leading to severe environmental and public health issues downstream.

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 over 150km 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 m³ /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 SPS¹¹.

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.

Based on a survey conducted in 2019 with 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 Peshku district. The Bukhara Region Water Supply and Sewerage Project (BRWSSP) plans to develop a treatment plant of 1500m³/day capacity in the district¹².

¹¹ Rehabilitation of treatment facilities and sewerage systems of Bukhara

¹² Bukhara Region Water Supply and Sewerage Project (BRWSSP)

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 the 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.

6.7.2 National Context

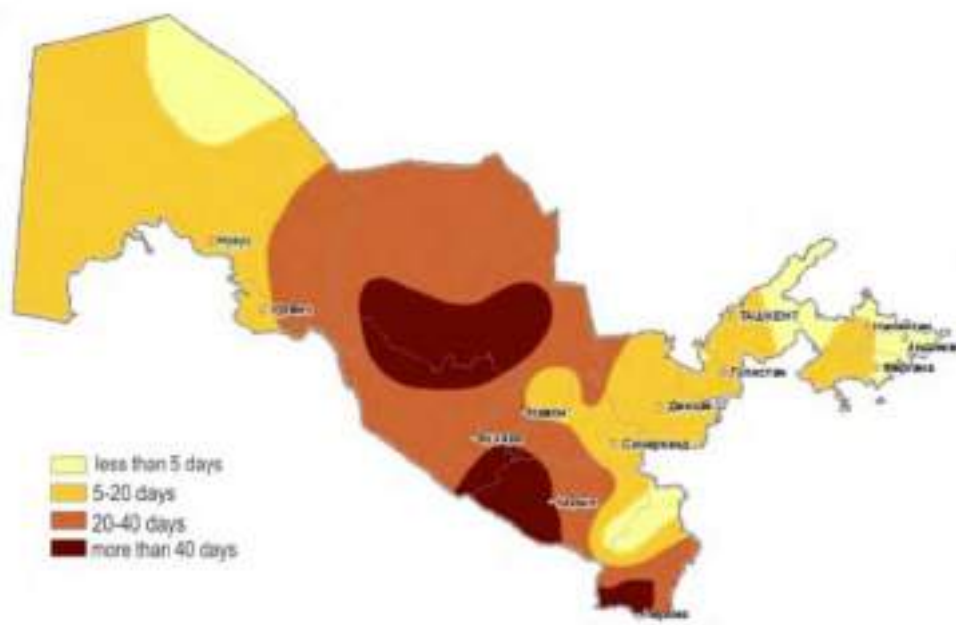
Uzbekistan is among the countries most vulnerable to climate change and has identified agriculture, economy, population health, energy, water resource management and disaster risk reduction as its most vulnerable sectors (WBG, 2021). Increase in average annual temperature with a warming rate of 0.29°C 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 Dzhankeldy 500MW Wind Project) 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 Dzhankeldy 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 is resulting in 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 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 6-4 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).

According to the Third National Communication of the Republic of Uzbekistan (2016), the development of 'green industries', the continued reduction of emissions and improved monitoring GHG emissions in the country have been identified as fundamental steps in building a more resilient population and economy to the anticipated climate change impacts.

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).

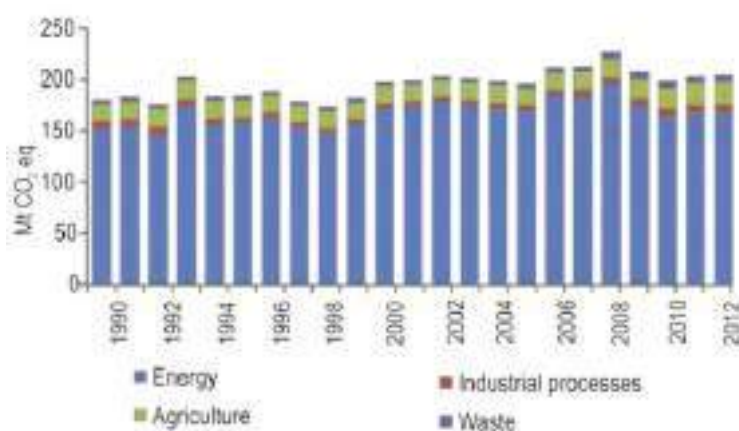
6.7.4 Greenhouse Gases Trends by Sector

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 CO₂eq. while the agricultural sector contributed to 21.6 1Mt CO₂eq. 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 6-5 Greenhouse Gas Emissions by Sector



Sector	1990	1995	2000	2005	2010	2012	$\Delta_{(2012-1990)}$
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	195,1	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 (Aol) 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 Wind Farm. 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 in Volume 4 for survey methodology, location coordinates, maps, and full datasets of results.

7.1.1.2 Results

HABITATS

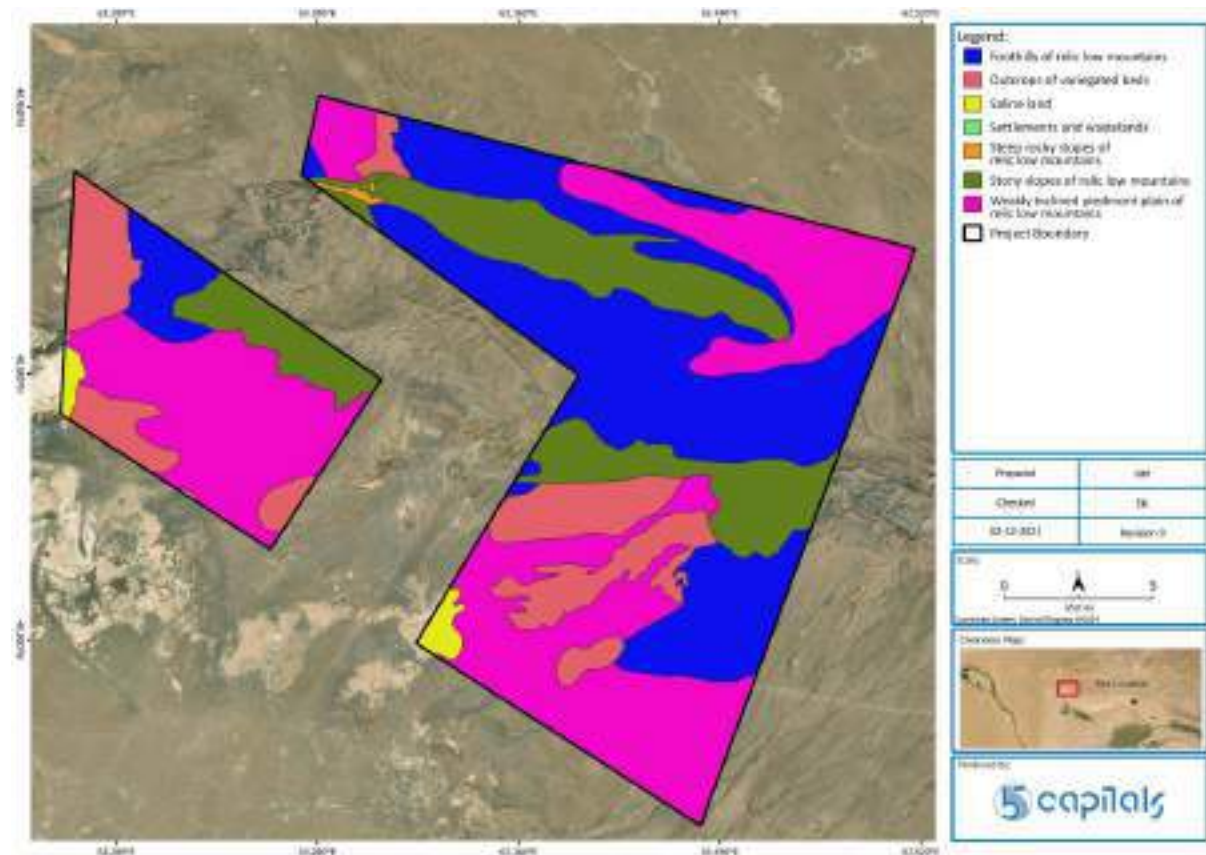
The following habitats were identified throughout the Dzhankeldy Wind Farm site:

- 115.73 km² of Weakly inclined piedmont plain of relic low mountains
- 0.59 km² of Steep rocky Slopes of relic low mountains
- 0.02km² of Settlements and wastelands

- 96.93 km² of Foothills of relic low mountains
- 39.96 km² of Outcrops of variegated beds
- 52.82 km² Stony slopes of relic low mountains

The following figure showcases the habitat map for the wind farm site.

Figure 7-1 Habitat Map for Dzhankeldy Wind Farm Site



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 endangered and three (3) are listed as vulnerable on the Uzbekistan Red Data Book. These are presented in the table below. All four endemic species satisfy the EBRD range restricted species requirement and qualify as PBFs.

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

SPECIES	ABUNDANCE ON SITE	RANGE	IUCN /RDB STATUS
<i>Acanthophyllum cyrtostegium</i> Vved.	Rare	Endemic	Not Evaluated (NE) / UzbrDB 3

SPECIES	ABUNDANCE ON SITE	RANGE	IUCN / RDB STATUS
			(vulnerable, declining species)
<i>Calligonum zakirovii</i> (Khalk.) Czerep.	Rare	Endemic	Not Evaluated (NE) / UzbRDB 1 (endangered species)
<i>Eremurus korolkowii</i> Regel (see note below)	Occasional to Rare	Endemic	Not Evaluated (NE) / UzbRDB 2 (rare species) in former editions, currently excluded
<i>Ferula kyzylkumica</i> Korovin	Occasional to Rare	Endemic	Not Evaluated (NE) / UzbRDB 3 (vulnerable, declining species)
<i>Tulipa lehmanniana</i> Merckl.	Occasional to Rare	Regional	Not Evaluated (NE) / UzbRDB 3 (vulnerable, declining species)

Further, White Saxaul and Black Saxaul were both identified during surveying, which are nationally protected trees.

Plate 7-1 Flowering *T. lehmanniana* at Dzhankeldy



Plate 7-2 *Ferula kyzylkumica* at Dzhankeldy



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



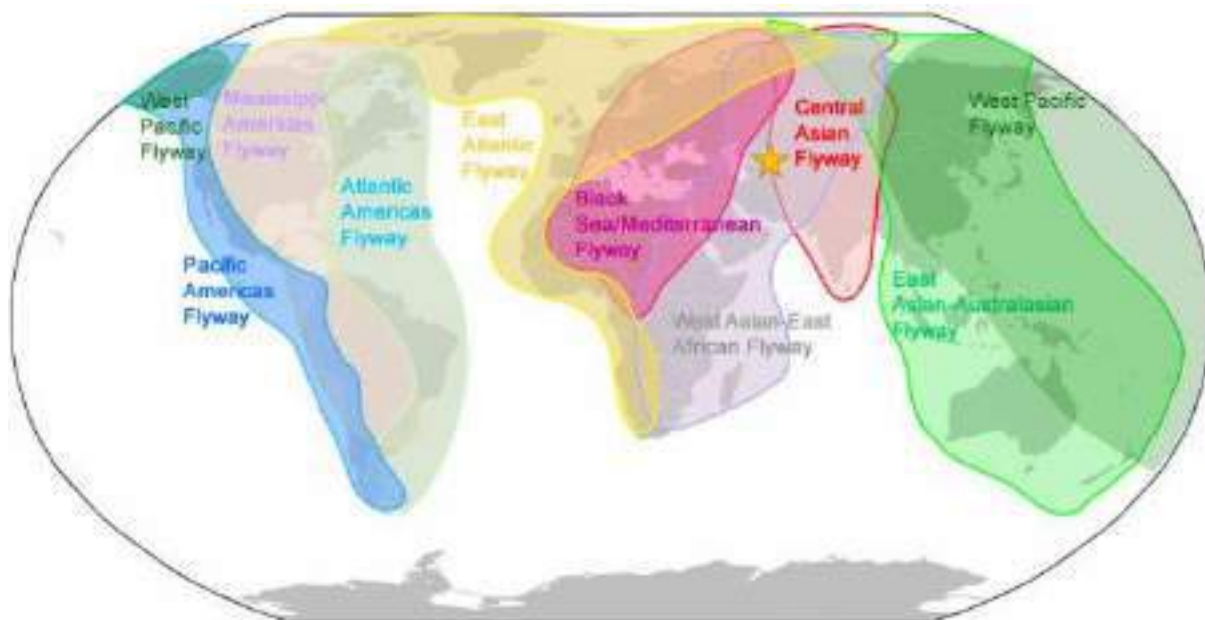
The following IBAs are within a 100km buffer zone of the project site:

- Karakyr Lakes, located 30km to the south, a prominent wintering site for waterfowl and waterbirds;
- Buzaubay, located 80km to the north; a stretch of desert steppe habitat wherein 36 species of birds have been recorded to breed;
- Ayakagitma lake and surrounding desert, located 85km to the east; a prominent wintering site for waterfowl and waterbirds; and
- Gorelde, located 85km to the west; about 160 species have been recorded from the IBA (29% of the avifauna of Central Asia), the site is part of the major migratory flyway of waterbirds and waterfowl along the Amudarya valley.

MIGRATORY FLIGHT PATHS

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



7.1.2.2 Survey Methodology

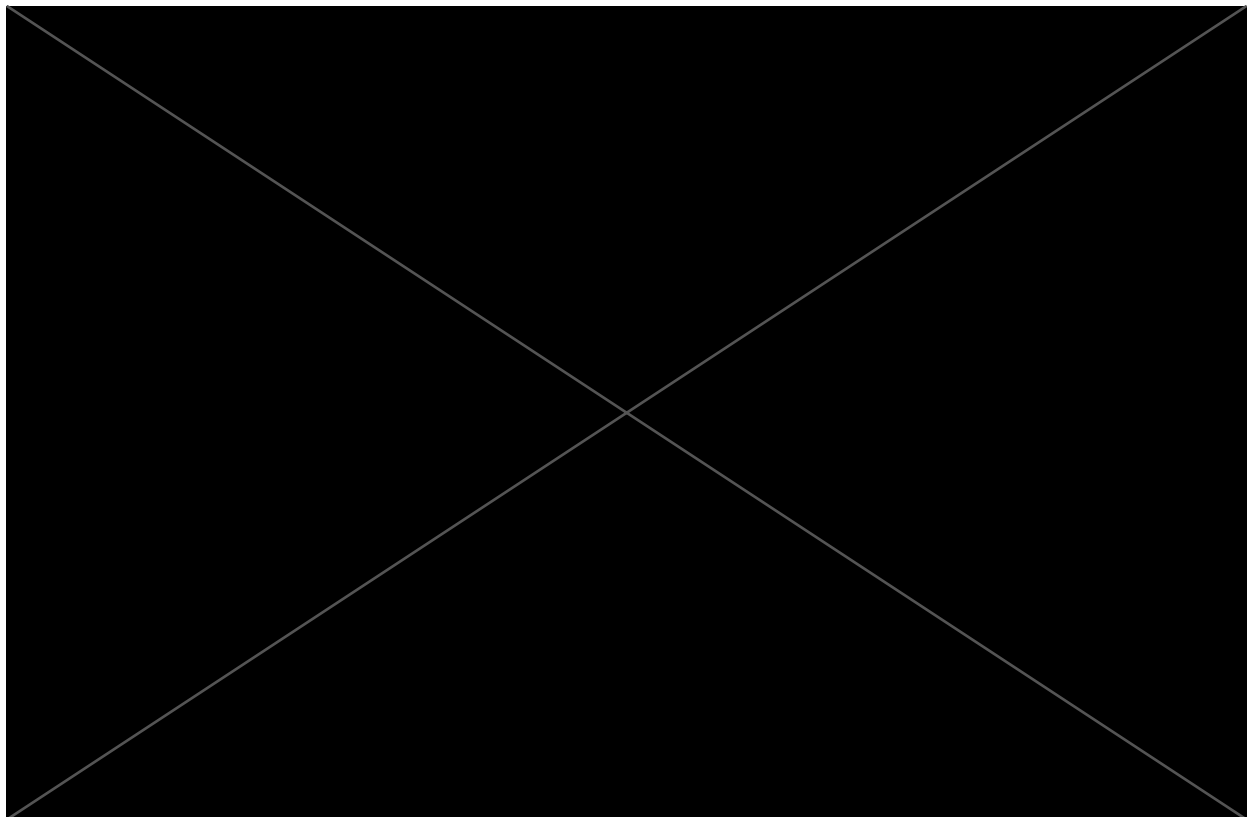
SURVEYING TECHNIQUE

For the purposes of Collision Risk Assessment, the wind farm site was comprehensively surveyed over a full year, 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 10 (ten) 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.

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 species' intensively secretive and shy nature.

Figure 7-4 Vantage Points at Dzhankeldy Wind Farm Site



COVERAGE AND TIMING/DATES

Bird surveys were carried out covering the following seasons:

- VP surveys during Summer 2020, Autumn 2020, Winter 2021 and Spring 2021. A total of 36 hours were surveyed per VP per season
- Raptor Nest Search and Breeding Surveys during Summer 2020, Spring 2021.
- Houbara Breeding Survey, during Spring 2021 and
- Raptor Nest Search and Breeding Surveys during Spring 2022 – Ongoing

Refer to the detailed reports in Appendix B-1 in Volume 4 for location coordinates, maps, and full datasets of results.

7.1.2.3 Results

VP SURVEYS

The VP surveys recorded 4 globally and 9 nationally threatened species. The following table summarises the results of the bird survey.

Table 7-2 Dzhankeldy Wind Farm – VP Surveys Results

SCIENTIFIC NAME	ENGLISH COMMON NAME	UZBEK STATUS	IUCN STATUS	VP OBSERVATIONS			
				SUMMER 2020	AUTUMN 2020	WINTER 2021	SPRING 2021
Tier 1							
<i>Chlamydotis macqueenii</i>	Houbara Bustard	VU	VU				1
<i>Microcarbo pygmaeus</i>	Pygmy Cormorant	NT	LC		22	7	17
<i>Pelecanus onocrotalus</i>	Great White Pelican	VU	LC		16		
<i>Neophron percnopterus</i>	Egyptian Vulture	VU	EN	31	1		12
<i>Aegypius monachus</i>	Cinereous Vulture	NT	NT	3	14	6	3
<i>Gyps fulvus</i>	Eurasian Griffon	VU	LC	4			
<i>Circaetus gallicus</i>	Short-toed Snake-Eagle	VU	LC		1		
<i>Aquila nipalensis</i>	Steppe Eagle	NT	EN	2	9	6	
<i>Aquila heliaca</i>	Imperial Eagle	VU	VU		2		
<i>Aquila chrysaetos</i>	Golden Eagle	VU	LC			3	6
<i>Haliaeetus albicilla</i>	White-tailed Eagle	VU	LC			8	1
<i>Falco naumanni</i>	Lesser Kestrel	NT	LC	5	1		
Tier 2							

SCIENTIFIC NAME	ENGLISH COMMON NAME	UZBEK STATUS	IUCN STATUS	VP OBSERVATIONS			
				SUMMER 2020	AUTUMN 2020	WINTER 2021	SPRING 2021
<i>Grus grus</i>	Common Crane		LC				11
<i>Circus aeruginosus</i>	Eurasian Marsh-Harrier		LC	12	16	2	11
<i>Circus cyaneus</i>	Hen Harrier		LC	7	16	21	19
<i>Milvus migrans</i>	Black Kite		LC		4		2
<i>Accipiter nisus</i>	Eurasian Sparrowhawk		LC	3			
<i>Buteo buteo</i>	Common Buzzard		LC	6	27	3	6
<i>Buteo rufinus</i>	Long-legged Buzzard		LC	15	51	11	37
<i>Falco tinnunculus</i>	Eurasian Kestrel		LC	19	54	47	51
Tier 3							
<i>Tadorna ferruginea</i>	Ruddy Shelduck		LC		30		
<i>Anas strepera</i>	Gadwall		LC		31		27
<i>Anas platyrhynchos</i>	Mallard		LC		110		
<i>Anas crecca</i>	Green-winged Teal		LC		7	6	42
<i>Chroicocephalus ridibundus</i>	Black-headed Gull		LC		23	6	18
<i>Larus cachinnans</i>	Caspian Gull		LC			6	31
<i>Phalacrocorax carbo</i>	Great Cormorant		LC		24		
<i>Ardea cinerea</i>	Gray Heron		LC		5	6	13
<i>Ardea purpurea</i>	Purple Heron		LC				1
<i>Ardea alba</i>	Great Egret		LC		2		
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron		LC		6		

Among the globally threatened species, the IUCN EN Egyptian Vulture was the most commonly observed species during the VP surveys of the project site with a total of 44 individuals recorded over the course of one year. This species was most frequently seen during the Summer VP surveys. Other commonly observed raptor species of this group is the Cinereous Vulture (NT) and the Steppe Eagle (EN) registering 26 and 17 individuals respectively.

Majority of the species of this group were registered during the Autumn surveys. The Cinereous Vulture was the only raptor recorded throughout the year. The IUCN VU Eastern Imperial Eagle was one of the least observed species in the project area, with 2 individuals recorded during the Autumn Survey. Other Nationally Red Listed raptor recorded during the VP surveys include Eurasian Griffon (VU), Short-toed Snake Eagle (VU), Golden Eagle (VU), White-tailed Sea Eagle

(VU) and Lesser Kestrel (NT) with less than 10 individuals of each species observed over the course of one year.

Only a single Houbara Bustard (VU) was recorded during the VP surveys. This is not unusual as VP surveys are not suited for observations of this shy and cryptic ground bird. In order to address this limitation, specialised Houbara Bustard surveys were conducted during the Spring.

The waterbird species Pygmy Cormorant and Great White Pelican observed during the VP surveys were likely transiting through the project site possibly to the Karakir Lakes 22km south of the WF area. Of these two, the Pygmy Cormorant registered a total of 46 individuals and the Great White Pelican registered a total of 16 individuals during the VP surveys.

Non-threatened raptor species were observed in large numbers in the project site with Eurasian Kestrel and Long-legged Buzzard registering a total of 171 and 114 individuals respectively. Other raptors were recorded in moderate numbers; Hen Harrier (61 individuals), Eurasian Marsh Harrier (41 individuals) and Common Buzzard (42 individuals). The Eurasian Sparrowhawk and the Black Kite were the least frequently observed species of this group.

Some non-threatened waterbirds may be susceptible to WF projects. No water bodies exist within the project site. These species are likely transiting through the project airspace and were recorded mostly during the Autumn and Spring surveys. Mallard, which registered the highest number of individuals (110), was recorded only during the Autumn VP surveys. The Green-winged Teal, Black-headed Gull and the Gray Heron were recorded in relatively moderate numbers during the Autumn, Winter and Spring Surveys. The Great Egret, Black-crowned Night Heron and Purple Heron were the least frequently observed species of this group on the project area.

As per the EBRD PR6 requirements, CHA shows that none of the above species with the exception of the Houbara Bustard, 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 and Steppe Eagle 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.

The Eastern Imperial Eagle recorded two individuals during seasonal VP surveys. Given that this species was recorded in low numbers during the baseline surveys, it is not considered that criticality would be triggered in the project area. However, this species is listed as Vulnerable

on the IUCN Red List thus satisfying for Priority Biodiversity Feature designation for which impact mitigation will be addressed in the impact assessment.

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 in Volume 4 for CRM methodology, detailed analysis and results.

NEST SEARCHES

A number of cliffs and exposed rock ledges on the northern face of the Kuljuktai mountain range present suitable habitat for nesting birds of prey. Nest searches were undertaken to establish if there was past or present breeding activity in the area.

Refer to the detailed nesting survey reports in Appendix B-1 in Volume 4 for location coordinates, maps, and full datasets of results.

Table 7-3 Dzhankeldy Wind Farm – Species observed during Nest Search Surveys (August 2020)

LATIN NAME	ENGLISH NAME	NUMBER	IUCN STATUS	UZBEKISTAN RED BOOK STATUS
<i>Neophron percnopterus</i>	Egyptian Vulture	1	EN	2 (VU:D)
<i>Falco tinnunculus</i>	Common Kestrel	1	LC	-
<i>Columba livia</i>	Pigeon	14	LC	-
<i>Pterocles orientalis</i>	Black-bellied Sandgrouse	2	LC	-
<i>Merops superciliosus</i>	Blue-cheeked Bee-eater	22	LC	-
<i>Hirundo rustica</i>	Barn Swallow	6	LC	-
<i>Galerida cristata</i>	Crested Lark	15	LC	-
<i>Calandrella rufescens</i>	Lesser Short-toed Lark	38	LC	-
<i>Oenanthe isabellina</i>	Isabelline Wheatear	4	LC	-

In Spring of 2021, six nests were located during a wider search of the area. Five nests were empty. Stakeholder accounts show that that one of these nests was used by Saker Falcon in 2018. One nest was occupied by a Long-legged Buzzard incubating three eggs. A subsequent site visit 36 days later recorded three hatchlings within the nest. This active nest was not located within the vicinity of any turbines. The following table provides the location of nests observed during the 2020/2021 nest surveys.

Table 7-4 Location of nests found during the 2020/2021 nest search surveys

NEST	SPECIES	DESCRIPTION	DISTANCE TO NEAREST TURBINE
	Unidentified species	Unidentified inactive raptor nest. Found in 2020 and 2021	0.15 km
	Unidentified species	Spring 2021; Unidentified inactive raptor nest	1.96 km
	Long-legged Buzzard	Spring 2021; Unidentified inactive raptor nest	1.51 km
	Unidentified species	Spring 2021; Unidentified inactive raptor nest	2.33 km
	Unidentified species	Spring 2021; Active Long-legged Buzzard nest with 3 eggs	2.64 km
	Unidentified species	Spring 2021; Inactive Saker Falcon nest	0.26 km

Figure 7-5 Nests Found in Spring 2021

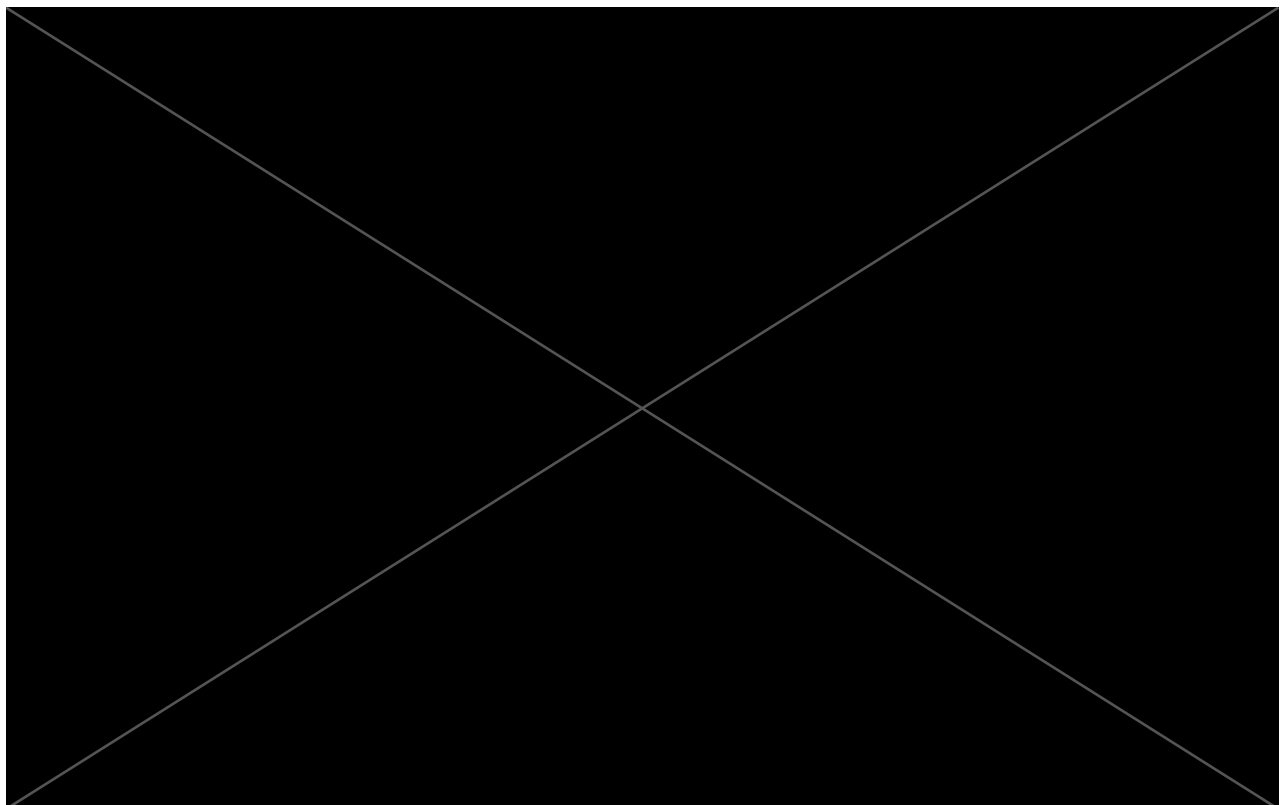


Plate 7-3 Egyptian Vulture (EN) Sighting in Spring 2021

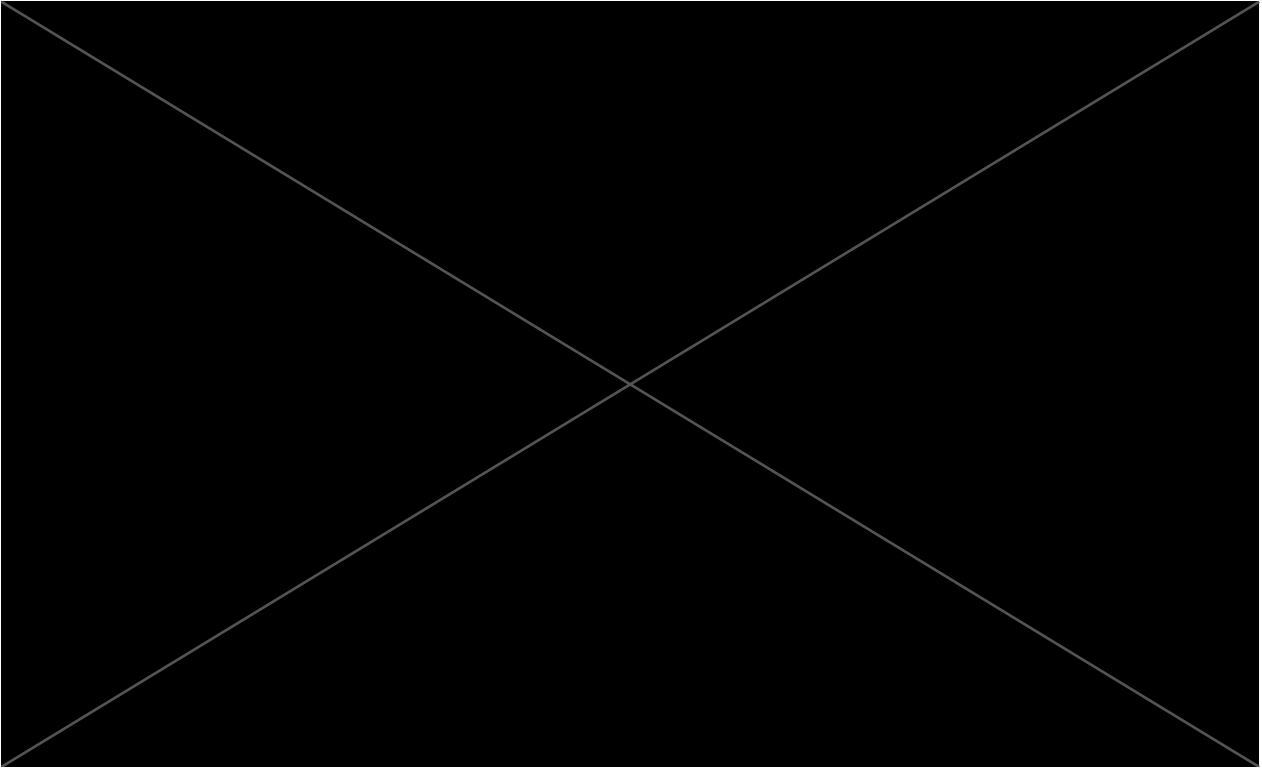


Plate 7-4 Marsh Harrier Sighting in Spring 2021

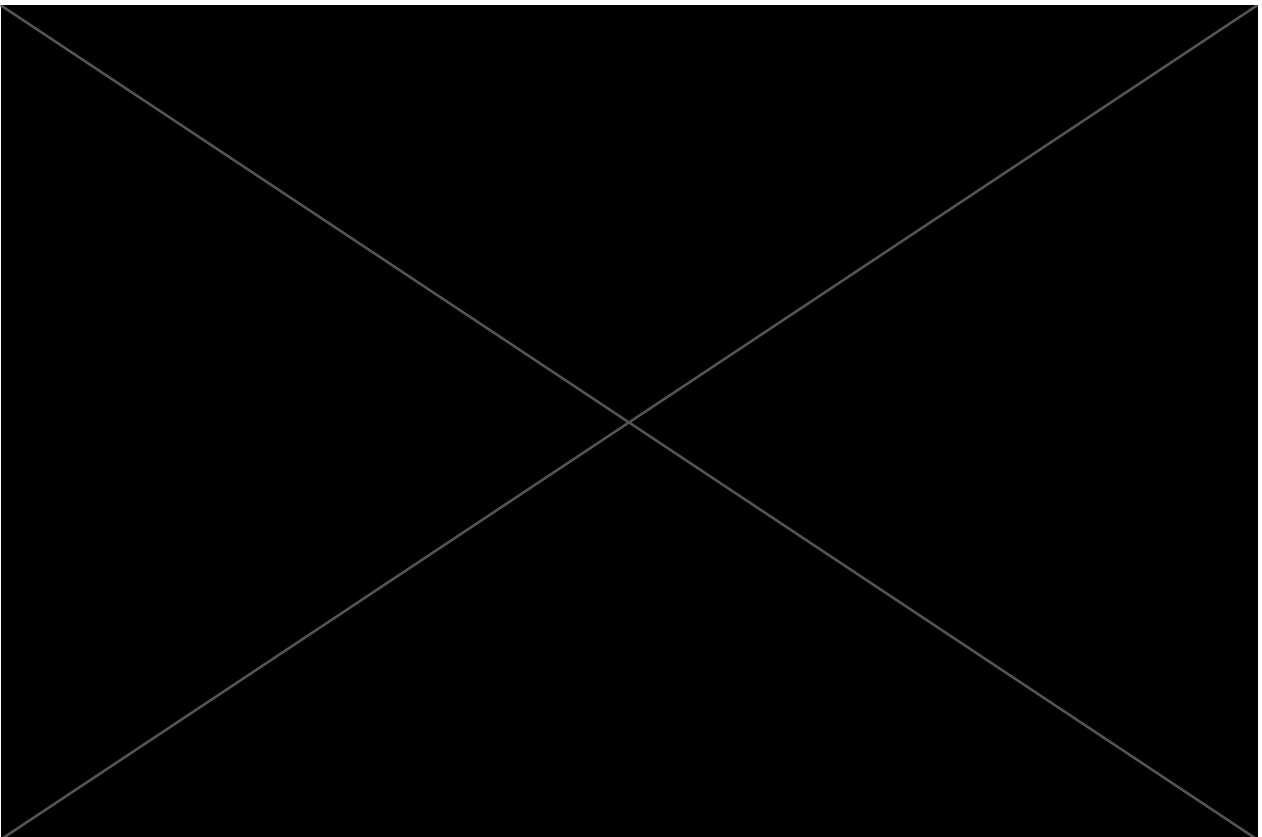
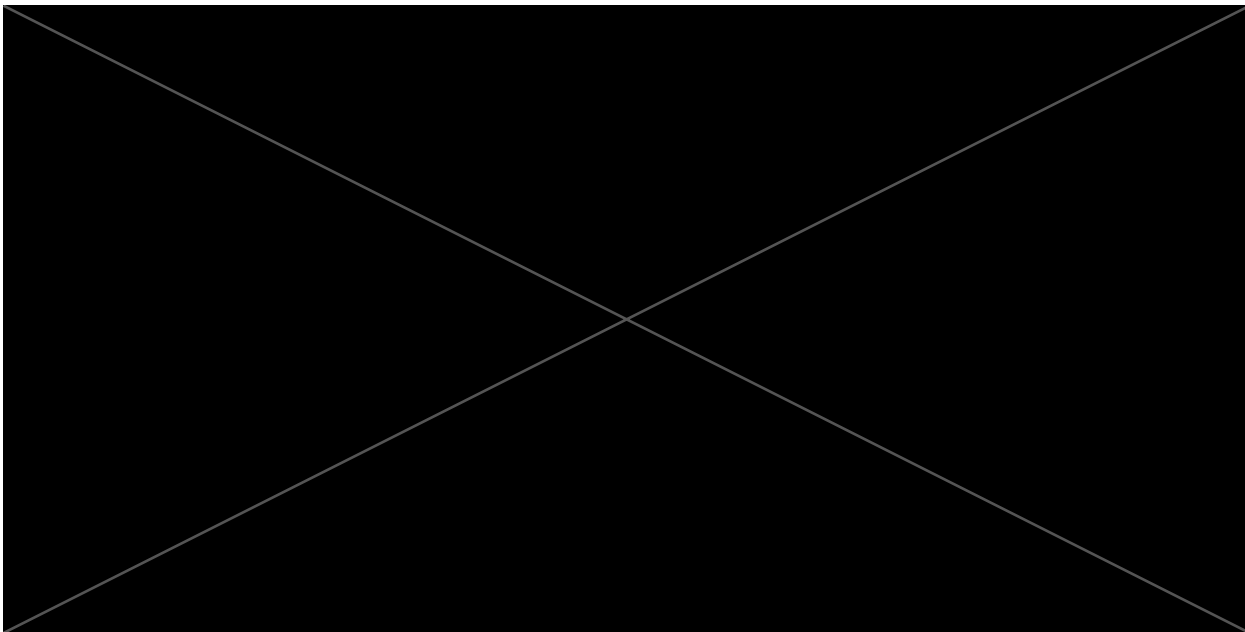
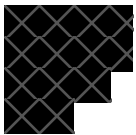
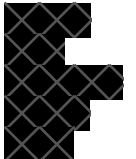
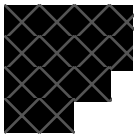
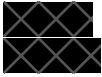


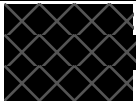
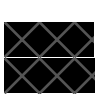
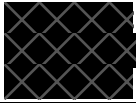
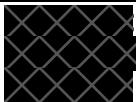
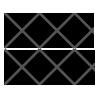
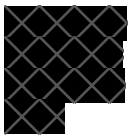
Plate 7-5 Cinereous Vulture (NT) Sighting in Summer 2020



The Spring 2022 nesting survey is complete and the following table provides the status of nests recorded during the nests search surveys to date.

Table 7-5 Nest Search (2022) Survey Results

DATE	NEST NUMBER	DISTANCE TO TURBINE	SPECIES	BREEDING STATUS	NOTES
22/03/2022 08/04/2022 26/05/2022			<i>Aquila chrysaetos</i>	Adult birds stayed near the nest from March until May.	In May, movement observed in the nest (possible hatchlings).
26/05/2022			<i>Falco tinnunculus</i>	Possible nesting in this area Kestrel observed only in May,	Kestrel attack Golden Eagle over the rock with eagle's nest
23/03/2022 27/05/2022			<i>Falco tinnunculus</i>	From March until May Common Kestrel flew over this rock. Breeding is active and successful	-
23/03/2022 10/04/2022			<i>Buteo rufinus</i>	Not used in 2022. In April birds	In spring 2021, this nest with 3 eggs

25-27/05/2022				were observed around the nest. No birds were observed in May.	observed. Later observed with hatchlings
07/04/2022 25/05/2022			<i>Aquila chrysaetos</i>	Empty, no birds	In August 2020, this nest was empty
08/04/2022 25-27/05/2022			<i>Neophron percnopterus</i>	Not used, but birds are present around the nest in April and May	In August 2020, this nest was empty, no birds were observed in the area
10/04/2022 25-27/05/2022			<i>Neophron percnopterus</i>	Not used, but birds are present around the nest in April and May	In spring 2021, this nest was empty
10/04/2022		-	-	-	Open steppe. No nests found
10/04/2022		-	-	-	Small ravine. No nests found
24/05/2022			<i>Neophron percnopterus</i>	Two birds observed flying. Landed in a hole on the rock	No birds observed in April
Spring 2021			Unidentified species Historical record of Saker Falcon nest (2018)	-	Nest was empty in 2021

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 in Volume 4 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 km^2 even in good quality habitat (Hardouin et al. 2015). Habitat mapping exercises undertaken during the baseline survey indicated that the project site is dominated desert plains characterized by Sagebrush (*Artemisia* sp) covering an area of 317km^2 . M. Koshkin's¹³ study on density of Houbara in relation to shrub assemblages estimates density of this species on *Artemisia* habitat to be 0.090 (0.081 - 0.1) birds (males)/ km^2 (95% CI).

During the specialised Houbara Bustard survey, a total of five (5) bustards were recorded. The population density was calculated to be 0.04 birds/ km^2 , 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 population density of the species on *Artemisia* habitat [0.090 (0.081 - 0.1) males/ km^2] to the *Artemisia* habitat mapped in the project area (317km^2). The extrapolated male population in the project site is estimated to be 29 individuals, which when extrapolated to include females if the sex ratio was 1:1¹⁴ would give a total population of 58 breeding individuals.

However, considering the nature of this cryptic species and possible bias due to sampling size and survey period, secondary information was utilized to inform a population estimate. During the stakeholder consultation exercises, Dr. John Burnside, based on years of field study estimated the density of Asian Houbara in the project area to be $0.284 - 0.416$ birds / km^2 . The extent of suitable habitat within the EAAA covers 2125.98 km^2 . Therefore, the total population within the EAAA is actually considered to be 671.08 - 982.99 birds. As per the CHA, this number of potential birds within the EAAA triggers criticality and Houbara Bustard is therefore reflected as an important Sensitive Receptor in the ecological impact assessment.

¹³ 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

¹⁴ 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.

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.

Figure 7-6 Satellite tracked data of tagged Asian Houbara

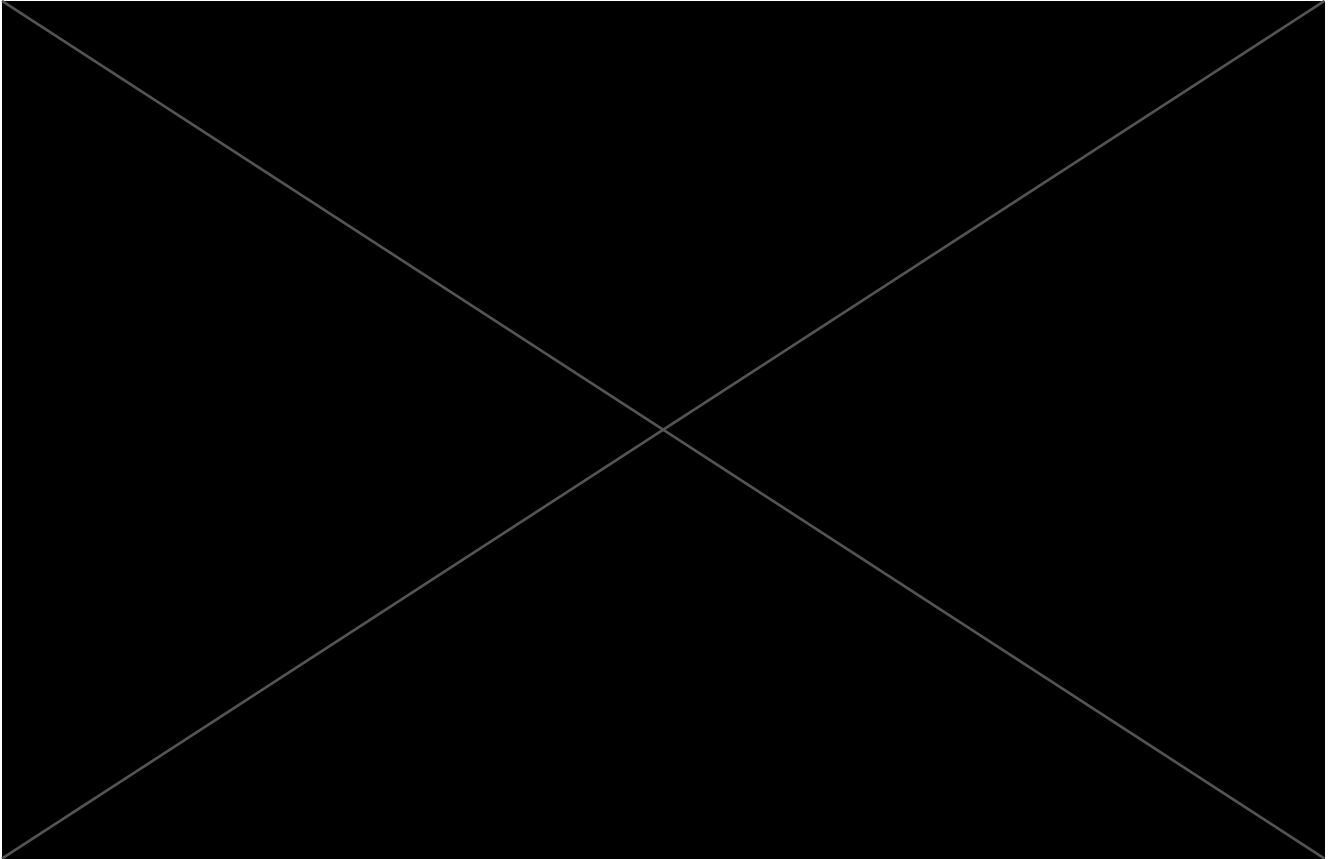


Plate 7-6 Houbara Bustard (VU) Sighting in Spring 2021

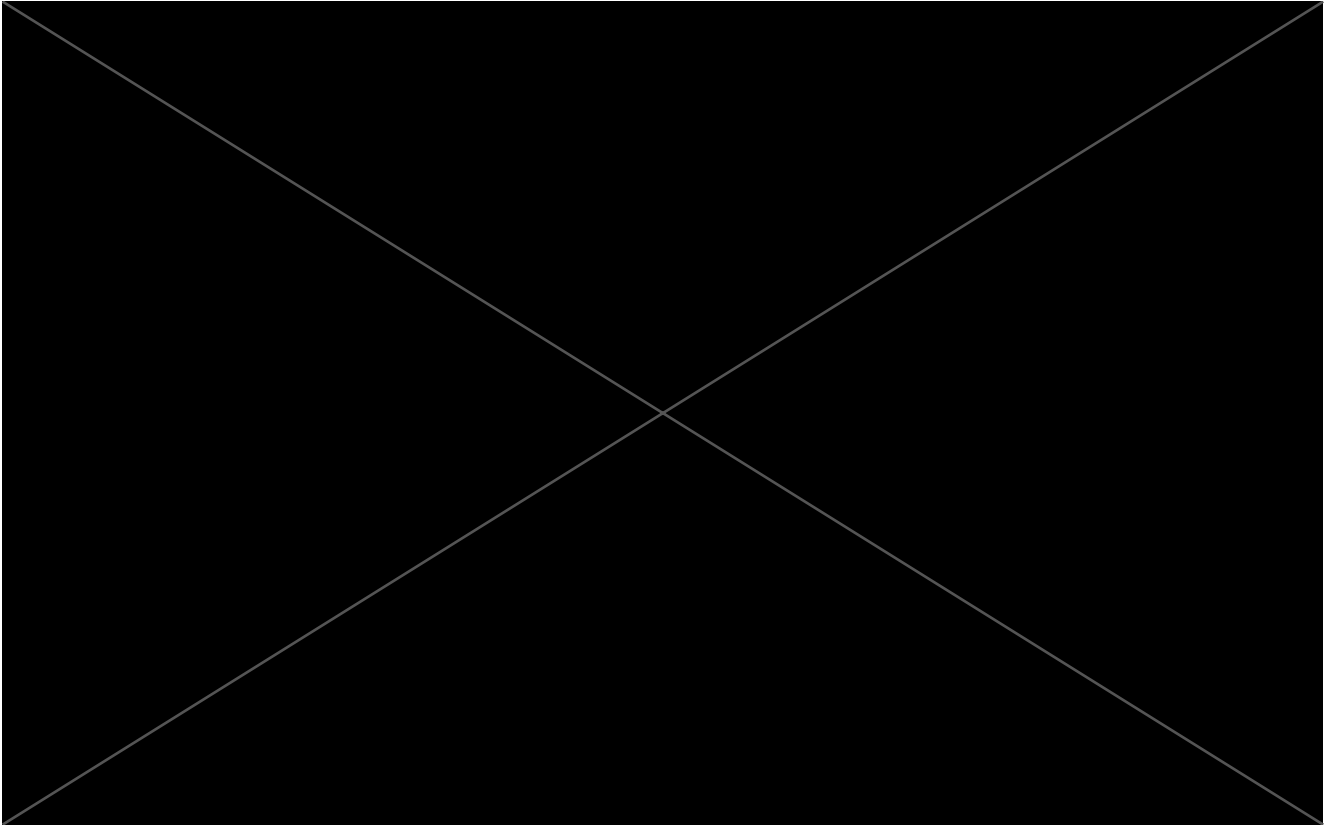
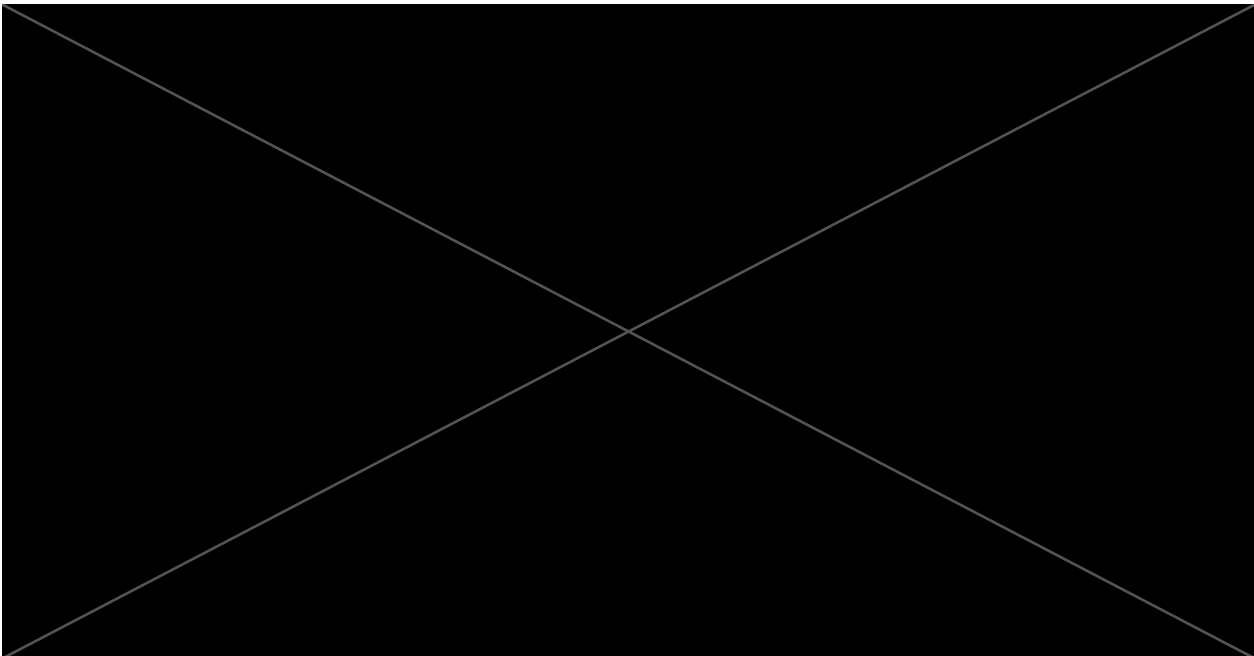


Plate 7-7 Houbara Bustard Chicks Caught on Camera Trap During Mammal Survey



OBSERVATIONS OF BIRD AND MAMMAL MORTALITIES

Surveyors also documented other observations throughout the various seasons of surveying which are of significance for avian fauna at the site. Several bird mortalities were recorded

from what appears to be collision with the guy lines supporting the meteorological masts. All affected species recorded were of Least Concern status.

The following figure shows the location of met masts in the project area. 5 bird mortalities were recorded across at MM1, MM2, MM4 and MM6 during the spring survey. One mortality was recorded at a mast that was not erected by the project proponent at [REDACTED]

Plate 7-8 Bird Mortality from Collision with Meteorological Mast Guy Lines



A number of non-avian species mortality was recorded along the existing road as victims of vehicular collision, including jerboa, hare, hedgehog, and lizards. While no bird mortality from vehicular collision was recorded, some scavenging species (vultures) which may feed on the carcasses could be at increased risk of vehicular collision themselves.

Plate 7-9 Mammal Mortality from Vehicular Collision that may attract scavenging Bird Species



OBSERVATIONS OF LIVESTOCK CARCASSES

A similarly important finding was related to livestock herding carcasses.

During the bird monitoring period, JE's local ornithologists regularly observed the corpses of livestock in the territories of both 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.

The following table lists the number of dead livestock from August 2020 to August 2021 according to the data received from the herders in the Dzhankeldy WF areas.

Table 7-6 Number of dead livestock in Dzhankeldy WF from August 2020 to August 2021

HERDER'S NAME	SHEEP/LAMBS	CAMELS	GOATS	HORSES
Galim	40	6		
Gaybiddin	4			
Maksad	40	20		
Djanibek	4			
Omongeldy				
Alimjan	50			
Fahriddin+Ramazon	400 lambs		50	
Tolboy	50			
Urinbay	40			
Akberdy	6+8 lambs			
Perdesh	40	8	15	
Erhan	20			
Total	702	34	65	0

Plate 7-10 Dead Sheep in Dzhankeldy WF area (April 2021)



If the dead livestock belong to the LLC, most often shepherds either photograph or dry the corpses on the roof of their huts in order to prove that these animals were not lost or not stolen but died due to natural causes. In rare cases, the corpses of animals are buried or burned.

Plate 7-11 Dead Sheep being dried on the roof of a herder's structure (August 2021)



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 when feeding vultures consumed large amounts of carcass and subsequently 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 in Volume 4 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 7-7 Dzhankeldy Wind Farm – Bat Acoustic Surveys Results (Autumn 2020)

SPECIES	SUMMER AND AUTUMN		
	ALL	RELATIVE ABUNDANCE, %	FREQUENCY OF OCCURRENCE, %
<i>Eptesicus bottae</i>	12	15,8	60
<i>Eptesicus serotinus</i>	23	30,3	100
<i>Nyctalus noctula</i>	3	3,9	60
<i>Pipistrellus pipistrellus</i>	2	2,6	40
<i>Rhinolophus bocharicus</i>	6	7,9	100
<i>Vespertilio murinus</i>	30	39,5	100
Total:	76	100,0	
Days of work	43		
Acoustic activity index (AI)	1,77		

Table 7-8 Dzhankeldy WF – Bat Acoustic Surveys Results (Spring 2021)

SPECIES	29 APRIL - 1 MAY				23-25 MAY				TOTAL CALLS	AVG BAT CALLS/NIGHT (AI)
	MM-1 (METEOMAST 13)		MM-6 (METEOMAST 15)		MM-1 (METEOMAST 13)		MM-6 (METEOMAST 15)			
	CALL PASS	RA, %	CALL PASS	RA, %	CALL PASS	RA, %	CALL PASS	RA, %		
<i>Eptesicus</i> sp. (<i>E. bottae</i> + <i>E. serotinus</i>)	3	7,7	6	46,2	6	42,9	5	35,7	20	1,7
<i>Vespertilio murinus</i>	36	92,3	7	53,8	8	57,1	9	64,3	60	5
Total:	39		13		14		14		80	6,7

Calls of genus *Eptesicus* and *V. murinus* are dominant in the datasets. Calls of this species dominate in both summer and autumn. Calls of other bat species are much less common.

A low density of the bat population is typical for the project's area (total AI = 1.77 signals per day). Activity Index (AI) differs between different locations no more than twofold (from 1.2 to 2.4).

The data obtained in 2021 indicate very large fluctuations in bats activity in the project area, from 0 to 358 registrations of flights per night. Nights with high activity of bats (more than 50 registrations per night) are very rare - approximately once every 10 days.

The periods of highest activity during the 2021 monitoring period are as follows:

- Meteomast 1 (13) – from 28 April (19:45) to 29 April (4:53); from 6 May (20:19) to 7 May (04:24); from 17 May (20:54) to 18 May (03:17);
- Meteomast 6 (15) – from 28 April (20:04) to 29 April (5:04); from 4 May (20:26) to 5 May (05:06); from 18 May (20:25) to 19 May (00:55).

Without these "nights of high activity" the average activity of bats in the project area is rather low - about 6,7 registrations per night. The reasons for the bursts of bats activity are not known in certainty. This may be an activity associated with bats migration through the project area, or due to the temporary attractiveness of the vicinity of the meteorological masts for some feed objects, which in turn attract bats. Typically, bat activity is higher during warmer nights, post-rain, when wind speeds are low.

Bat roost searches found a high number of suitable roosting locations, both anthropogenic and natural; two species were recorded during roost searches, *Rhinolophus bocharicus* and *Eptesicus bottae*. The locations of roosting colonies are provided in the following maps.

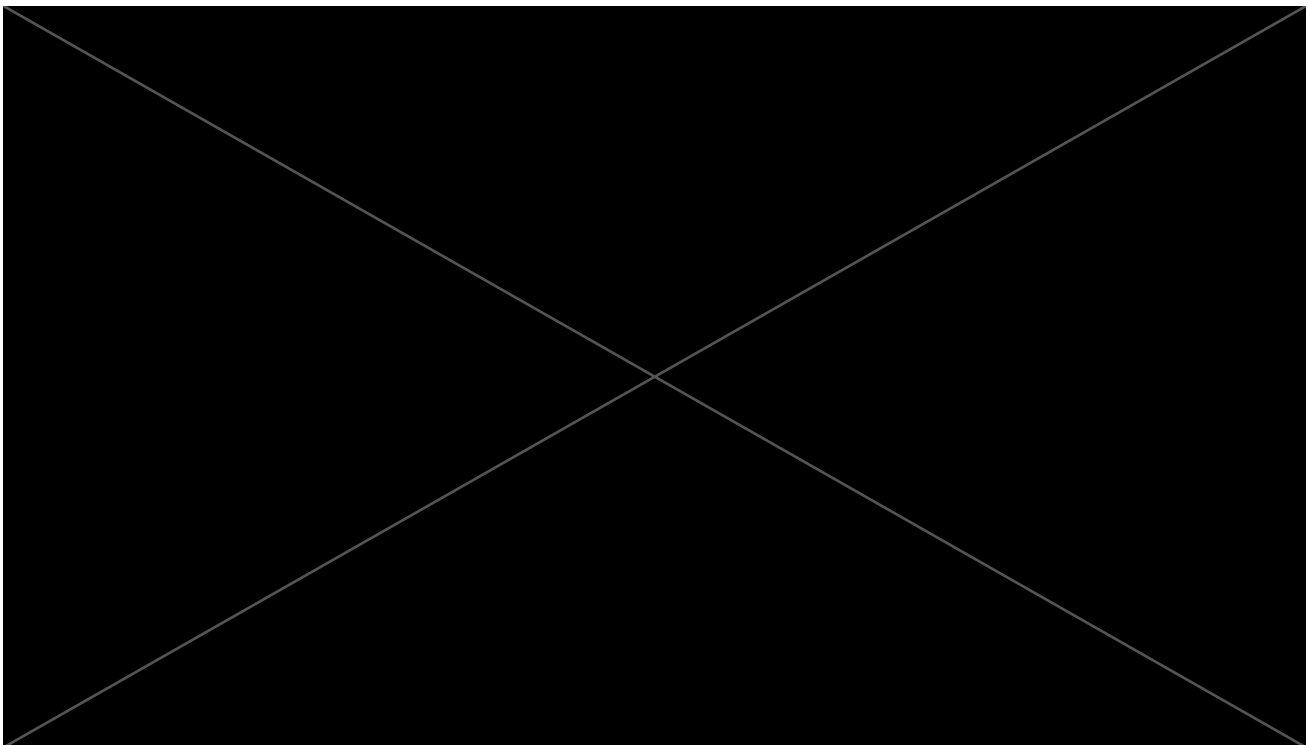


Plate -12 *Rhinolophus bocharicus* at Beltau, An Area Close to Dzhankeldy

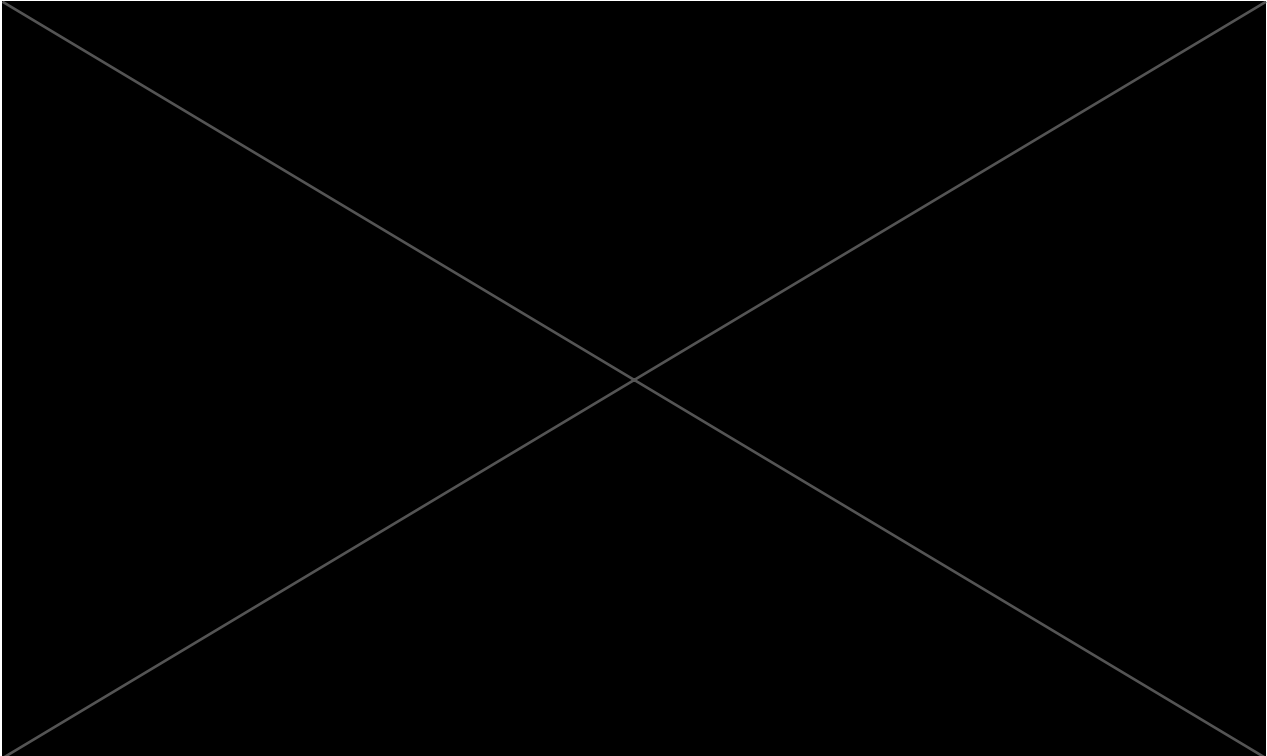


Plate 7-13 *Rhinolophus bocharicus* at Beltau, An Area Close to Dzhankeldy

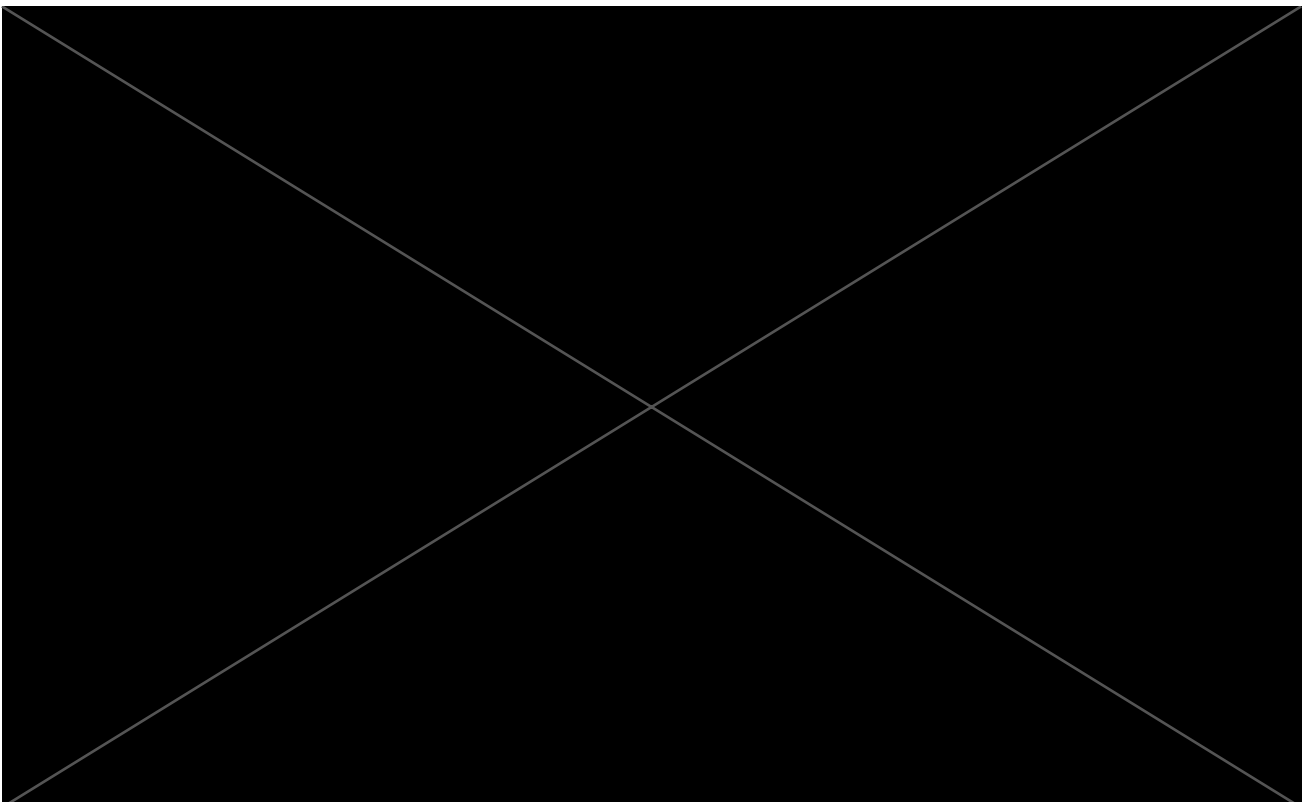


Figure 7-8 Roosting Bat Colonies *Eptesicus bottae*

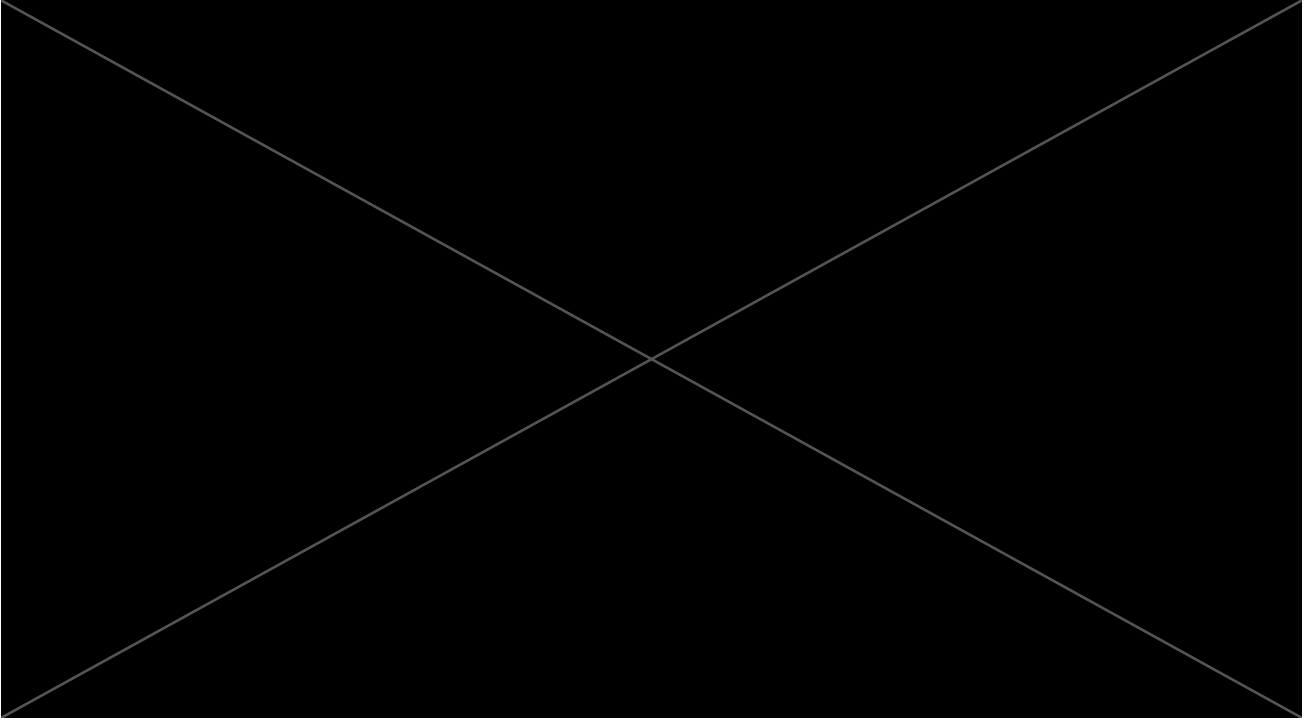


Plate 7-14 *Eptesicus bottae* Inside Concrete Drainage Tunnel

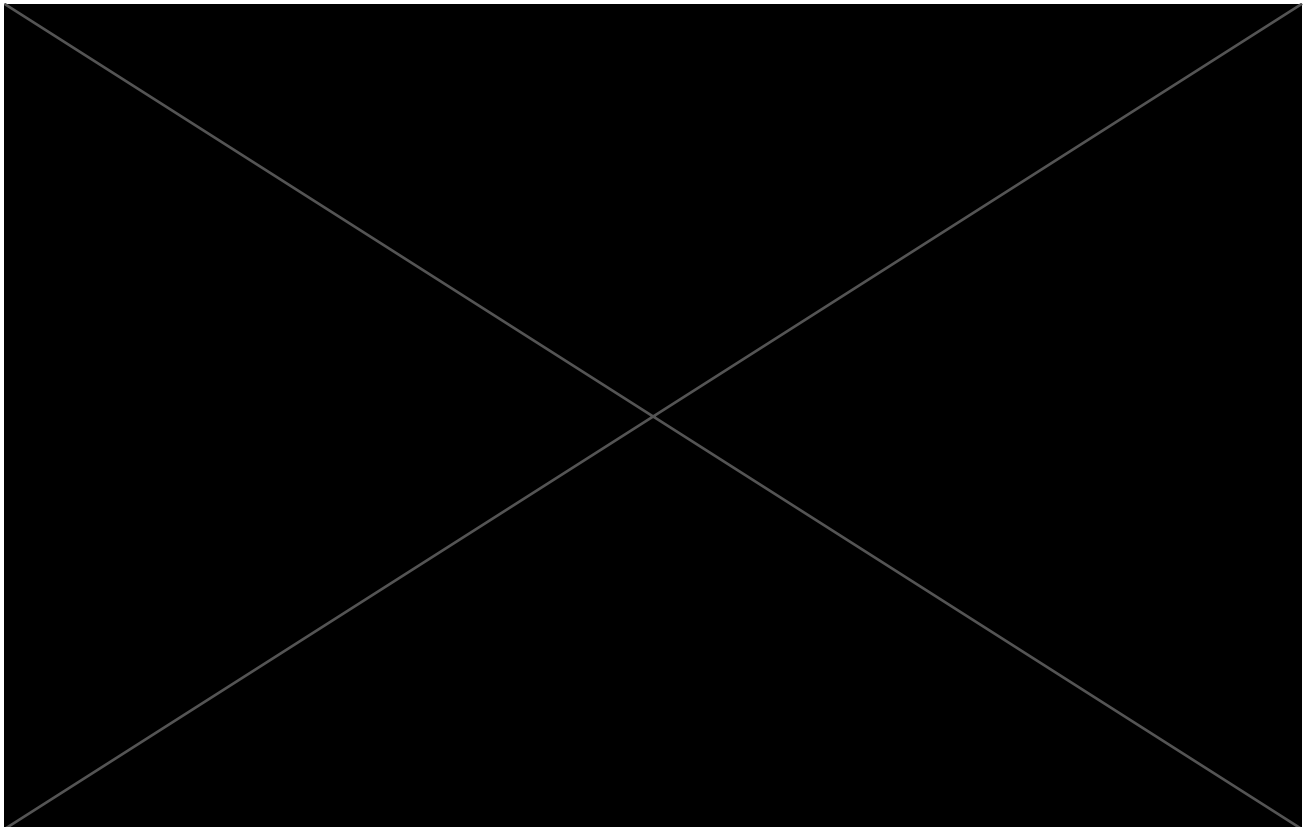
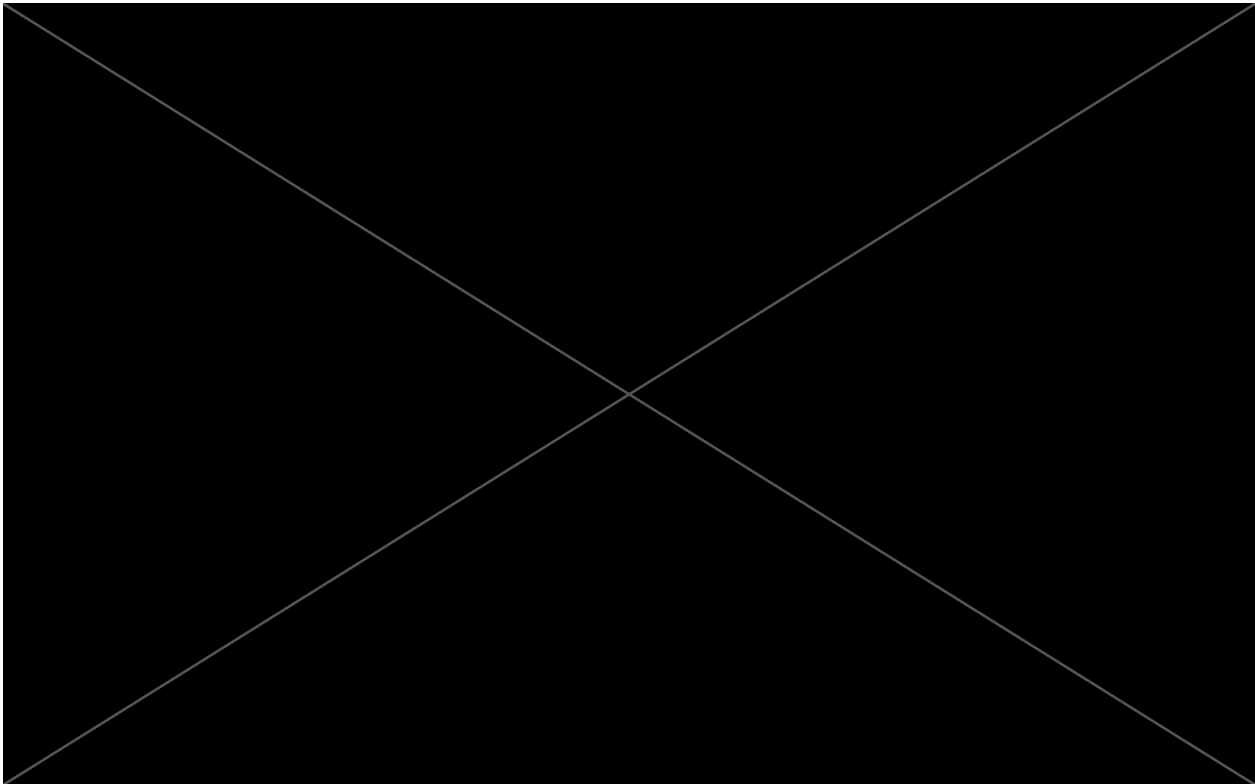


Plate 7-15 *Eptesicus bottae* Inside Concrete Drainage Tunnel



In conclusion, low levels of bat activity occur, punctuated by sporadic highs. Roosting bats are present, including species that are sensitive to wind farms. No threatened species of concern were recorded, although a total of 5 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).

Bats play an important role in the control of insect populations and are thus 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 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 in Volume 4 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 at the Project site.

Table 7-9 Dzhankeldy Wind Farm – Mammal Survey Results (Spring/Summer 2021)

NAME OF SPECIES		IUCN /RDB STATUS	TOTAL NO. OBSERVED
LATIN	ENGLISH		
<i>Hemiechinus auritus</i>	Long-eared hedgehog	LC/-	1 individual
<i>Paraechinus hypomelas</i>	Brandt's hedgehog	LC/3NT	4 individuals/12 camera trap captures
<i>Lepus totai</i>	Tolai hare	-	2 individuals/6 camera trap captures
<i>Ellobius tancrei</i>	Zaisan Mole Vole	LC/-	20 inhabited colonies/1 camera trap capture
<i>Phombomys opimus</i>	Great gerbil	LC/-	7 inhabited colonies
<i>Meriones libycus</i>	Libyan jird	LC/-	11 inhabited colonies/16 camera trap captures
<i>Mus musculus</i>	House mouse	-	3 individuals
<i>Vulpes vulpes</i>	Red fox	LC/-	2 individuals/9 camera trap captures
<i>Felis silvestris ornate</i>	Asiatic wildcat	-	1 individuals/4 camera trap captures
<i>Gazella subgutturosa</i>	Goitered Gazelle	VU/3(VU)	2 individuals

A total of ten (10) mammalian species were recorded in the Dzhankeldy project area, including 2 species listed in the Red Data Book of Uzbekistan and IUCN Red List: Brandt's Hedgehog (NT, UzRB/LC, IUCN) PCand Goitered Gazelle (VU, UzRB/VU, IUCN).

Historical and stakeholder accounts confirm the presence of the Caracal (CR, UzRB/LC, IUCN), Sand Cat (NT, UzRB/LC, IUCN and Marbled Pole Cat (VU, UzRB/VU, IUCN) in the project area (Zakhidov, 1971; Gristina 2016, 2019).

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 as per the EBRD PR6 GN6 criteria.

Plate 7-16 Brandt Hedgehog in Northern Kuldzhuktau



A number of mammal mortality was recorded along the existing road as victims of vehicular collision, including jerboa, hare, and hedgehog.

Plate 7-17 Mammal mortality from vehicular collision





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 late Spring 2021 and mid-Summer 2021, as these represent the seasons of highest reptile activity.

Refer to the detailed herpetology survey reports in Appendix B-1 in Volume 4 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 7-10 Dzhankeldy Wind Farm – Herpetofauna Survey Results (Spring/Summer 2021)

NAME OF SPECIES		IUCN /RDB STATUS	TOTAL NO. OBSERVED	
LATIN	ENGLISH		SPRING	SUMMER
<i>Testudo horsfieldii</i>	Russian tortoise	VU/ 2 (VU)	17	-
<i>Alsophylax laevis</i>	Southern Even-fingered Gecko	CR/2(VU:D)	7	47
<i>Tenuidactylus caspius</i>	Caspian thin-toed gecko	LC/-	2	6
<i>Tenuidactylus fedtschenkoi</i>	Turkestan thin-toed gecko	LC/-	2	3
<i>Trapelus sanguinolentus</i>	Steppe Agama	-/-	18	3
<i>Phrynocephalus helioscopus</i>	Sunwatcher toad-headed agama	-/-	1	2
<i>Phrynocephalus reticulatus</i>	Reticulated toad-headed agama	LC/-	11	4
<i>Eremias intermedia</i>	Aralo-Caspian racerunner	LC/-	12	-
<i>Eremias lineolata</i>	Striped racerunner	LC/-	1	-
<i>Eremias velox</i>	Rapid racerunner	-/-	3	1
<i>Eryx miliaris</i>	Desert sand boa	-/3(NT)	1	
<i>Hemorrhois ravergieri</i>	Spotted whip snake	-/-	-	1

A total of four (4) species of heightened concern were recorded.

- Russian Tortoise is listed as Vulnerable and a large number were recorded during the spring. Lack of sightings during the summer survey are attributed to the species' hibernation period which begins in late May.
 - 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.
- Desert Sand Boa is nationally threatened (listed on the Uzbekistan Red Data Book) although considered of least concern globally (on the IUCN Red List). One individual was recorded during surveying. CHA found that this species does not trigger criticality nor meet the conditions for classification as priority biodiversity feature.
- Southern Even-fingered Gecko is a Critically Endangered gecko. Nearly 50 individuals were located during summer survey efforts. Local experts estimate the sex ratio of the Southern Even-fingered gecko to be 2 males :1female. The species has a viable population. The following map indicates the extent of suitable habitat for the species (see subsequent figure).
 - Although there are no global estimates for the species, the available literature and stakeholder engagement indicates that any viable population would be considered as more than 0.5% of the global population. Adding to the fact that the Uzbekistan population may be a genetically unique endemic species, the CHA has concluded that criticality is triggered for the Southern Even-fingered Gecko in the wind farm project site as well as specific segments of the OHTL corridor.

Plate 7-18 Desert Sand Boa recorded at Dzhankeldy WF



Plate 7-19 Russian Tortoise (VU) in Northern Kuldzhuktau



Plate 7-20 Desert Monitor (NT) in Southern Kuldzhuktau



Plate 7-21 Sighting of Southern Even-Fingered Gecko in April 2021



Figure 7-9 Reptile Survey Effort throughout Dzhankeldy Area of Influence

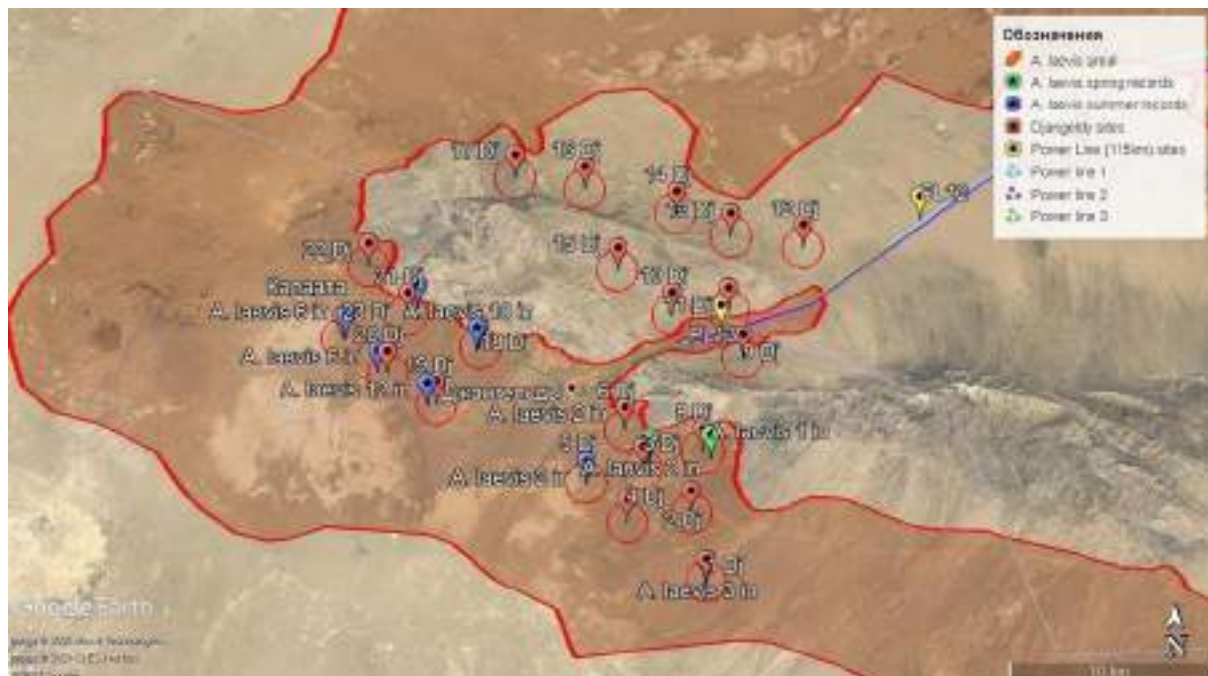


Figure 7-10 Suitable Habitat & Sighting Locations of Southern Even-Fingered Gecko



OTHER

Reptile mortality was recorded along the existing road as victims of vehicular collision, including lizards.

Plate 7-22 Reptile mortality from vehicular collision



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 in Volume 4 for methodology, location coordinates, maps, and full datasets of results.

7.1.6.2 Results

Table 7-11 Dzhankeldy Wind Farm – Invertebrate Survey Results (Spring 2021)

ID	INVERTEBRATES	
	TAXONOMIC ORDER	NO. OF SPECIES
1	Hymenoptera	15
2	Coleoptera	3
3	Diptera	2
4	Blattodea	1
5	Hemiptera	2
6	Araeae	1
7	Scorpiones	1
8	Scolopendromorpha	1

The recorded entomofauna was typical for this area. No species listed in the Red Book of Uzbekistan or IUCN Red List were found.

7.2 Receptors

7.2.1 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 Aol varies considerably. The paragraphs below provide the Aol 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.

7.2.2 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 surveys as well as sensitive species that are anticipated to possibly occur within the area of influence

Table 7-12 Potential Terrestrial Ecology Receptors – Wind Farm

GROUP	RECEPTOR(S)	JUSTIFICATION	VALUE
Natural Habitats	Weakly inclined piedmont plain of relic low mountains	- terrain is flat, wavy or gently hilly, sometimes with dry riverbeds and debris cones - vegetation is represented with native ephemeroid-sagebrush, ephemeroid-saltwort-sagebrush, sagebrush-saltwort and saltwort plant communities on sabulous, loamy, slightly saline, gypsaceous or skeleton sabulous-loamy grey-brown desert soil - The canopy cover is sparse (10–30% or less), and plant species diversity is low (8 to 18 species) - One nationally red-listed species, <i>Tulipa lehmanniana</i>, occurs sporadically within all territory of this habitat type of the project area.	Medium
	Steep rocky Slopes of relic low mountains	- This habitat type is characterized by strongly rugged terrain, and the vegetation is represented by native sagebrush-saltwort and ephemeroid-saltwort-sagebrush vegetation on loamy and skeleton grey-brown desert soils with outcrops of bedrocks. The slopes are eroded and dissected with numerous dry riverbeds. - The canopy cover is 5–30%. 43 plant and 1 moss species were recorded (Table 45), none of them are alien. Two species, <i>Ferula kyzylkumica</i> and <i>Tulipa lehmanniana</i> (photo 100), are listed in the Red Data Book of Uzbekistan	High
	Foothills of relic low mountains	- This habitat type is characterized by more or less rugged hilly terrain, and the vegetation is represented with native saltwort-sagebrush vegetation on sandy-loamy, loamy, more or less skeleton grey-brown desert soils. The slopes of foothills are dissected with dry riverbeds - The canopy cover is 20–30%. 31 plant and 1 moss species were recorded 3 species, <i>Acanthophyllum cyrtostegium</i>, <i>Ferula kyzylkumica</i> and <i>Tulipa lehmanniana</i>, are listed in the Red Data Book of Uzbekistan	High
	Outcrops of variegated beds	- Variegated hills composed with outcrops of gypsaceous red, yellow or white clays, sandstones and limestones are very widely distributed in the southern and northern piedmonts of Kuldzhuktau Mountains. - canopy cover is 1–10% (); 22 plant species were recorded (); red-listed and alien plants are absent. One species, <i>Eremurus korolkowii</i>, is national endemic of Uzbekistan and endemic to relic mountains of Kyzylkum	Medium
	Stony slopes of relic low mountains	This habitat type is characterized by strongly rugged terrain, and the vegetation is represented by native sagebrush-saltwort and ephemeroid-	High

GROUP		RECEPTOR(S)	JUSTIFICATION	VALUE
			saltwort-sagebrush vegetation on loamy and skeleton grey-brown desert soils with outcrops of bedrocks. The slopes are eroded and dissected with numerous dry riverbeds. The canopy cover is 5–30%. 43 plant and 1 moss species were recorded (Table 45), none of them are alien. Two species, <i>Ferula kyzylkumica</i> and <i>Tulipa lehmanniana</i> (photo 100), are listed in the Red Data Book of Uzbekistan	
		Settlements and wastelands	- Areas of anthropogenic influence with several small villages and farmsteads. - Impact of mining operations are evident with abandoned mines and quarries; canopy cover is extremely sparse - Dense thickets of <i>Peganum garmala</i> typical for degraded rangelands of arid zone of Uzbekistan occur around settlements, farmsteads and wells. Halophytic shrubs (<i>Lycium ruthenicum</i>, <i>Halimodendron halodendron</i>, <i>Tamarix hispida</i> and <i>Tamarix laxa</i>) grows near the springs and wells	Low
Endangered Flora		<i>Calligonum zakirovii</i> (PBF)	Listed as Endangered on the Uzbekistan Red Book.	Very High
Threatened Flora		<i>Acanthophyllum cyrtostegium</i> <i>Ferula kyzylkumica</i> <i>Tulipa lehmanniana</i> <i>Eremurus korolkowii</i>	Listed as Vulnerable on the Uzbekistan Red Book.	High
Protected Flora		Black Saxaul, White Saxaul	Nationally Protected	High
All other Flora		All other Flora	Listed as Least Concern, not considered to be of national importance .	Low
Endangered Birds	Raptors	Egyptian Vulture (PBF) Steppe Eagle (PBF) Saker Falcon (PBF) Pallas's Fish-Eagle (not confirmed)	Listed as critically endangered or endangered on IUCN Red List.	Very High
	Waterbirds	Sociable Lapwing (not confirmed) White-headed Duck (not confirmed)	Listed as critically endangered or endangered on IUCN Red List	Very High

GROUP		RECEPTOR(S)	JUSTIFICATION	VALUE
Threatened Birds	Raptors	Greater Spotted Eagle (not confirmed) Eastern Imperial Eagle (PBF) Cinereous Vulture (PBF) Eurasian Griffon(PBF)	Listed as vulnerable or near threatened on the IUCN Red List	High
	Waterbirds	Marbled Teal(not confirmed) Lesser White-fronted Goose (not confirmed) Common Pochard (PBF)	Listed as vulnerable or near threatened on IUCN Red List.	High
	Groundbirds	Great Bustard (not confirmed) Asian Houbara (Critical)	Listed as vulnerable or near threatened on IUCN Red List.	High
	Songbirds/ Allies	European Turtle Dove(not confirmed) Yellow-eyed Pigeon (not confirmed)	Listed as vulnerable or near threatened on IUCN Red List.	High
Nationally-threatened Birds	Raptors	Short-toed Snake Eagle (PBF) Golden Eagle (PBF) White-tailed Sea 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	Dalmatian Pelican (not confirmed) Pygmy Cormorant Great White Pelican (PBF)		
Non-threatened Birds	Raptors	Eurasian Marsh-Harrier Hen Harrier Black Kite Eurasian Sparrowhawk Common Buzzard Long-legged Buzzard Eurasian Kestrel	Classified as Least Concern on the global IUCN Red List, but separated categories due to increased sensitivity to wind farm impacts..	Low / Lower
	Waterbirds	Common Crane		

GROUP		RECEPTOR(S)	JUSTIFICATION	VALUE
		Ruddy Shelduck Gadwall Mallard Green-winged Teal Black-headed Gull Caspian Gull Great Cormorant Grey Heron Purple Heron Great Egret Black-crowned Night Heron		
All other Birds		All other Bird species	Listed as Least Concern on the IUCN Red List, not of national importance.	Low / Lower
Bats		<i>Rhinolophus bocharicus</i> (PBF) <i>Eptesicus bottae</i> (PBF) <i>Eptesicus serotinus</i> (PBF) <i>Pipistrellus pipistrellus</i> (PBF) <i>Vespertilio murinus</i> (PBF) <i>Nyctalus noctule</i> (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 as per EBRD PR6 for ecological function in top-down control of insect populations	Medium
Threatened Mammals		Goitered Gazelle <i>Gazella subgutturosa</i> (PBF)	This species is listed as vulnerable on the IUCN Red List.	High
		Marbled Polecat <i>Vormela peregusna</i> (Not confirmed)	This species is listed as vulnerable on the IUCN Red List.	High
Nationally Threatened Mammals		Caracal <i>Caracal caracal</i> (Not confirmed)	The regional subspecies of caracal is considered critically endangered in the Uzbekistan Red Data Book.	High
		Corsac Fox <i>Vulpes corsac</i> (PBF)	These species are listed as vulnerable or near threatened in the Uzbekistan Red Data Book.	Medium

GROUP		RECEPTOR(S)	JUSTIFICATION	VALUE
		Sand cat <i>Felis margarita</i> (PBF)		
		Steppe Polecat <i>Mustela eversmanii</i> (PBF)		
		Brandt's hedgehog <i>Paraechinus hypomelas</i> (PBF)		
Non-threatened Mammals	Carnivores	Grey wolf <i>Canis lupus</i> Red fox <i>Vulpes vulpes</i> Asiatic wildcat <i>Felis sylvestris ornate</i>	This carnivore acts as top-down control on prey populations and help control disease. However, these species are not threatened or endemic and are common and widespread.	Low / Lower
	Hedgehog	Long-eared Hedgehog <i>Hemiechinus auratus</i>	Insectivores are an important top-down control for various invertebrate populations. However, these species is not threatened or endemic and are common and widespread.	Low / Lower
	Hare	Tolai hare <i>Lepus totai</i>	Hare are an important prey species, however this species is not threatened or endemic and are common and widespread.	Low / Lower
	Shrews	Lesser white-toothed shrew <i>Crocidura suaveolens</i> Piebald shrew <i>Diplomesodon pulchellum</i>	Shrews are an important top-down control for various invertebrate populations, an important prey species and contribute to soil health via burrow aeration. However, these species are not threatened or endemic and are common and widespread.	Low / Lower
	Rodents	Long-clawed ground squirrel <i>Spermophilopsis leptodactylus</i> Yellow ground squirrel <i>Spermophilus fulvus</i> Small five-toed jerboa <i>Allactaga elater</i> Severtzov's jerboa <i>Allactaga severtzovi</i> Great gerbil <i>Phomomys opimus</i> Libyan jird <i>Meriones libycus</i>	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

GROUP		RECEPTOR(S)	JUSTIFICATION	VALUE
		Midday jird <i>Meriones meridianus</i> Grey dwarf hamster <i>Cricetulus migratorius</i> Zaisan Mole Vole <i>Ellobius tancrei</i>		
Endangered Herptiles		Southern Even-fingered Gecko <i>Alsophylax laevis</i> (Critical)	This species is listed as critically endangered on the IUCN Red List and is considered regionally endemic. Consultation with expert stakeholders indicate that the Uzbekistan population may be genetically distinct and possibly form a separate species. Criticality has been triggered for this during the CHA for the project.	Very High
Threatened Herptiles		Russian tortoise <i>Testudo horsfieldii</i> (PBF)	This tortoise is listed as Vulnerable on the IUCN Red List. Meets criteria for PBF as per EBRD PR6.	High
Nationally important Herptiles		Caspian Monitor <i>Varanus griseus caspius</i> (PBF)	This species is listed as vulnerable in the Uzbekistan Red Data Book.	Medium
		Desert sand boa <i>Eryx miliaris</i> (PBF)	This species is listed as near threatened in the Uzbekistan Red Data Book.	Medium
Non-threatened Herptiles	Amphibians	Turan Toad <i>Bufo turanensis</i> Marsh frog <i>Pelophylax ridibundus</i>	These species are not threatened and are common and widespread.	Low / Lower
	Geckos and Lizards	Caspian Bent-Toed Gecko <i>Tenuidactylus caspius</i> Turkistan thin-toed gecko <i>Tenuidactylus fedtschenkoi</i> Steppe agama <i>Trapelus sanguinolentus</i> Sunwatcher toad-headed agama <i>Phrynocephalus helioscopus</i>		

GROUP		RECEPTOR(S)	JUSTIFICATION	VALUE
		Reticulated toad-headed agama <i>Phrynocephalus reticulatus</i> Rapid Lizard <i>Eremias velox</i> Aralo-Caspian racerunner <i>Eremias intermedia</i>		
	Snakes	Sand racer <i>Psammophis lineolatus</i> Spotted whip snake <i>Hemorrhois ravergeri</i> Spotted desert racer <i>Platycephalus karelinii</i> Dice Snake <i>Natrix tessellata</i>		
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

7.3 Potential Impacts, Mitigation, Management & Residual Impacts

7.3.1 Construction Phase

7.3.1.1 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 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.
- The allowed construction buffer around the lay down area (LDA) will not exceed a maximum 30m buffer.

Table 7-13 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)
Foothills of relic low mountains habitat	2.54 km ²	0.46 km ²
Outcrops of variegated beds habitat	0.17 km ²	-
Steep rocky slopes of relic low mountains habitat	0.009 km ²	0.001 km ²
Stony slopes of relic low mountains habitat	6.01 km ²	1.07 km ²
Weakly inclined piedmont plains of relic low mountains habitat	1.99 km ²	0.28 km ²
Settlements and wastelands habitat	0.12 km ²	-

Habitat loss is permanent within the WTG and sub-station footprint and the impact duration is beyond the project lifetime. 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 7-14 Significance of Habitat Loss

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Natural Habitats (Weakly inclined piedmont plain of relic low mountains)	Medium	Moderate	Moderate
Natural Habitats (Foothills of relic low mountains)	High	Moderate	Moderate to Major
Natural Habitats (Outcrops of variegated beds)	Medium	Minor	Minor
Natural Habitats (Stony slopes of relic low mountains)	High	Moderate	Moderate to Major
Natural Habitats (Steep Rocky slopes of relic low mountains)	Medium	Minor	Minor
Settlement and Wasteland	Low / Lower	Minor	Negligible to Minor

Habitat loss impact can be further mitigated by the following mitigation measure:

- The EPC contractor will commit to the restoration of habitat post-construction in unused land areas that are not required for O&M maintenance. The Restoration Action Plan will provide the restoration measures that will be undertaken for natural habitats, post-construction restoration via seeding, re-planting, and landscaping with native, high-value species, monitoring and reporting requirements of the plan.

With post-construction restoration, the residual significance is Negligible to Minor.

Table 7-15 Residual Significance of Habitat Loss

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL SIGNIFICANCE
Natural Habitats (Weakly inclined piedmont plain of relic low mountains)	Medium	Moderate	Moderate
Natural Habitats (Foothills of relic low mountains)	High	Minor	Minor to Moderate
Natural Habitats (Outcrops of variegated beds)	Medium	Minor	Minor
Natural Habitats (Stony slopes of relic low mountains)	High	Minor	Minor to Moderate
Natural Habitats (Steep Rocky slopes of relic low mountains)	Medium	Minor	Minor

7.3.1.2 Biodiversity Loss

EARTHWORKS (CLEARING, EXCAVATION)

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 Features (PBFs) respectively. Active only during a few 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. Therefore, the impacts of direct loss and mortality due to clearing, excavation and earthworks on this species is considered to have a major significance.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 7-16 Significance of Vegetation Removal

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Major	Major
Threatened & Protected Flora	High	Major	Major
All Other Flora	Low / Lower	Major	Minor to moderate

Table 7-17 Significance of Earthworks Mortality

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Non-threatened Mammals	Low / Lower	Major	Minor to moderate

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Southern Even-fingered Gecko	Very High	Major	Major
Russian Tortoise	High	Major	Major
Nationally Important Herptiles	Medium	Major	Moderate to Major
Non-threatened Herptiles & Invertebrates	Low / Lower	Major	Minor to moderate

However, the following mitigation measures will be implemented to reduce the impacts on floral species:

- As part of the pre-construction Biodiversity Management Program (BMP), a Flora Conservation Action Plan has been prepared, which outlines the locations, timings and methodology of pre-construction flora surveys undertaken for the purposes of seed collection, seed storage, demarcation of areas to be protected, and translocation of whole specimens if deemed feasible for endangered and threatened flora during appropriate season.
- The EPC contractor will commit to the restoration of habitat post-construction in unused land areas that are not required for O&M maintenance. The Restoration Action Plan will provide the restoration measures that will be undertaken for natural habitats, post-construction restoration via seeding, re-planting, and landscaping with native, high-value species, monitoring and reporting requirements of the plan.

The following mitigation measures will be implemented to reduce the impacts on fauna species and provide a basis for the mechanisms for achieving>NNL:

- 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);
- A Reptile Relocation Plan has been prepared for the Southern Even-fingered Gecko and the Russian Tortoise which outlines the methodology and results of the identification of release sites, erection of fencing to exclude relocated tortoises in the construction footprint, designation and erection of livestock exclusion fencing gecko release sites, monitoring and reporting requirements as well as assigned roles and responsibilities. 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.
- As part of the CESMP, a 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.
- A Chance Find Procedure has been included within the CESMP to provide general guidance on potential ecological triggers for work stoppage and will be implemented by the Ecologist and EPC contractor team. For non-threatened species such as other herptiles, rodents, and invertebrates, chance-find procedures with individual relocations as deemed necessary may be sufficient

- The Biodiversity Action Plan (BAP) provides the strategy designed to achieve to Net Gain (NG) for the Southern Even-fingered Gecko and No Net Loss (NNL) for the Russian Tortoise
- Compensation Offset Plan has been prepared which details the measures that will be implemented to offset gecko loss, if any, and achieve NG.

SOUTHERN EVEN-FINGERED GECKO

As an identified critical species as per the CHA, any impacts on the Southern Even-Fingered Gecko must be mitigated to ensure Net Gain (NG).

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.

Earlier project designs included a number of WTG which fell within the critical habitat area, as well as extensive use of critical habitat area for the balance of plant, including access roads, turbine pads, and substations. The design team and engineers have worked with 5 Capitals and local environmental experts to minimize project footprint on critical habitat as much as possible. The final layout of the WTGs and BoP with critical habitat for the Southern Even-fingered Gecko is shown below.

Care was taken to relocate the WTGs outside of the designated Critical Habitat as much as possible. The substation was similarly relocated outside of the designated Critical Habitat. The remaining Balance of Plant roads are overlapping with existing roads within the region except for a limited number of secondary roads connecting WTG clusters to the existing regional roads.

Figure 7-11 Final Project Design Overlaid on Gecko CH with Minimal Overlap

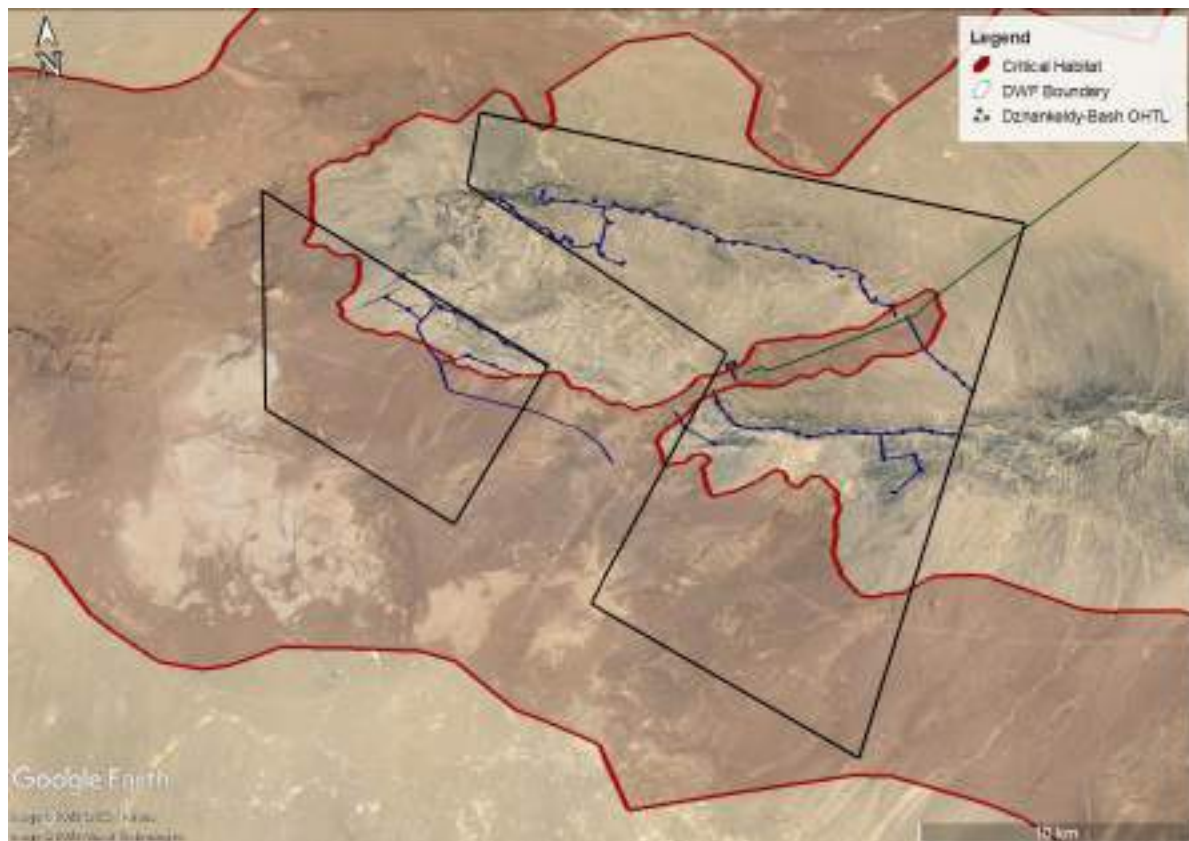


Figure 7-12 Location of Substation in June & September 2021 in Relation to Gecko CH



In order to ensure no net loss and to additionally provide beneficial net gain for the gecko population, two areas south of the existing roads have been suggested to be identified as release sites for geckos relocated as per the Reptile Relocation Plan. No activities will be allowed within these areas, they will be signposted, and livestock exclusion fencing will be erected around these release sites. Fencing of these core areas will allow the geckos to move freely within the reserve while obstructing grazing livestock. The measure was recommended by regional experts following consultations with relevant stakeholders. These areas will not be designated as local/regional/national protected areas but will be maintained and monitored long -term during the lifetime of the project.

The BAP outlines the strategy to achieve NG for this species in the project site which includes the protocols outlines in the Reptile Relocation Plan and Compensation Offset Plan, monitoring and reporting requirements as well as roles and responsibilities of entities involved.

With the above measures, the residual significance is presented in the following table.

Table 7-18 Residual Significance of Vegetation Removal

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Negligible	Minor
Threatened & Protected Flora	High	Negligible	Minor
All Other Flora	Low / Lower	Minor	Negligible to minor

Table 7-19 Residual Significance of Earthworks Mortality

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Non-threatened Mammals	Low / Lower	Minor	Negligible to Minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major
Threatened Herptiles	High	Minor	Minor to Moderate
Nationally Important Herptiles	Medium	Minor	Minor
Non-threatened Herptiles & 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 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 7-20 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	High	Minor	Minor to Moderate
Nationally Threatened Mammals	Medium	Moderate	Moderate
Non-threatened Carnivores	Low / Lower	Moderate	Minor
Non-threatened Mammals (Non-carnivores)	Low / Lower	Major	Minor to moderate
Southern Even-fingered Gecko	Very High	Major	Major
Threatened Herptiles	High	Moderate	Moderate to Major
Nationally Important Herptiles	Medium	Moderate	Moderate
Non-threatened Herptiles & Invertebrates	Low / Lower	Major	Minor to moderate

However, the following mitigation measures will be implemented to reduce the risks from these potential 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;

- The CESMP will include protocol for removal of any road-kill carcasses immediately upon observation to at least 10 meters away from the access roads during the construction phase by the EPC contractor.

With the above measures, the residual significance is presented in the following table.

Table 7-21 Residual Significance of Vehicular Collision

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds (Raptors)	Very High	Negligible	Minor
Threatened Birds (Raptors)	High	Negligible	Minor
Threatened Birds (Ground birds) - Houbara Bustard	High	Negligible	Minor
Nationally Threatened Birds (Raptors)	Medium	Negligible	Negligible to minor
Non-threatened Birds (Raptors)	Medium	Negligible	Negligible to minor
Threatened Mammals (Goitered Gazelle)	High	Negligible	Minor
Threatened Mammals (Marbled Polecat)	High	Negligible	Minor
Nationally Threatened Mammals (Caracal)	High	Negligible	Minor
Nationally Threatened Mammals (Corsac Fox)	Medium	Negligible	Negligible to minor
Nationally Threatened Mammals (Sand Cat)	Medium	Negligible	Negligible to minor
Nationally Threatened Mammals (Steppe Polecat)	Medium	Negligible	Negligible to minor
Nationally Threatened Mammals (Brandt's Hedgehog)	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

“TAKE” (POACHING, HUNTING, FISHING, 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 7-22 Significance of “Take”

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Protected Flora (Black Saxaul, White Saxaul)	High	Major	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	Medium	Minor	Minor
Threatened Mammals (Goitored Gazelle)	High	Minor	Minor to moderate
Nationally Threatened Mammals	Medium	Minor	Minor
Non-threatened Carnivores	Low / Lower	Minor	Negligible to minor
Non-threatened Mammals (Non-Carnivores)	Low / Lower	Minor	Negligible to minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major
Threatened Herptiles	High	Minor	Minor to moderate
Nationally Important Herptiles	Medium	Minor	Minor
Non-threatened Herptiles & Invertebrates	Low / Lower	Minor	Negligible to minor

However, the following mitigation measures will be implemented to reduce the impacts:

- Strict controls forbidding the gathering, poaching or otherwise disturbance of any flora or fauna on site, included in induction training.
- 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 7-23 Residual Significance of “Take”

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Protected Flora (Black Saxaul, White Saxaul)	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 (Goitered Gazelle)	High	Negligible	Minor
Threatened Mammals (Marbled Polecat)	High	Negligible	Minor
Nationally Threatened Mammals	Medium	Negligible	Negligible to minor
Non-threatened 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

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 7-24 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	Medium	Minor	Minor
Threatened Mammals	High	Minor	Minor to moderate
Nationally Threatened Mammals	Medium	Minor	Minor
Non-threatened Mammals (Carnivores)	Low / Lower	Minor	Negligible to minor
Non-threatened Mammals (Non-carnivores)	Low / Lower	Minor	Negligible to minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major
Threatened Herptiles	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 of these potential impacts:

- Preparation of a Waste Management Plan as one of the supplementary plans to the CESMP;
- Training will be provided to staff such as tool box meetings which include waste management training
- 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 7-25 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
Threatened Mammals	High	Negligible	Minor
Nationally Threatened Mammals	Medium	Negligible	Negligible to minor

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
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 (Russian Tortoise)	High	Negligible	Minor
Nationally Important Herptiles (Desert Sand Boa)	Medium	Negligible	Negligible to minor
Non-threatened Herptiles	Low / Lower	Negligible	Negligible to minor

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 Goitered Gazelle and bustard species, although most wildlife which is not already habituated to anthropogenic disturbance is anticipated to be negatively affected.

Particularly, breeding birds especially those with fidelity to nesting sites, will be negatively affected if works occur during the breeding season.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 7-26 Significance of General Disturbance

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
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

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Threatened Herptiles	High	Moderate	Moderate to 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 risk of these potential impacts occurring:

- Minimize construction footprint buffer zones and temporary laydown areas.
- A Breeding Bird Protection Plan has been prepared which provides the protection measures and protocols i.e., buffers to be implemented at known nest locations based on species sensitivity. The plan also outlines the monitoring and reporting requirements of the construction phase as well as the assigned roles and responsibilities of the involved entities.
- The Restoration Action Plan will provide the restoration measures that will be undertaken for natural habitats, post-construction restoration of temporary laydown areas and buffer zones via seeding, re-planting, and landscaping with native, high-value species, monitoring and reporting requirements of the plan as well assigned roles and responsibilities.

With the above measures, the residual significance is presented in the following table.

Table 7-27 Residual Significance of General Disturbance

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
Threatened Mammals	High	Minor	Minor to moderate
Nationally Threatened Mammals	Medium	Minor	Minor
Non-threatened Mammals (Carnivores)	Low / Lower	Minor	Negligible to minor
Non-threatened Mammals (Non-carnivores)	Low / Lower	Minor	Negligible to minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major
Threatened Herptiles	High	Minor	Minor to moderate

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Nationally Important	Medium	Minor	Minor
Non-threatened Herptiles	Low / Lower	Minor	Negligible to minor

7.3.1.3 Biodiversity Displacement

DISPERSAL AND COMPETITION

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 7-13 Available Habitat Outside Project Area for Potentially Dispersed Species



PROLIFERATION OF GENERALIST SPECIES

The dispersal of shy 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 7-28 Significance of Proliferation

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
Threatened Mammals	High	Moderate	Moderate to Major
Nationally Threatened Mammals	Medium	Moderate	Moderate
Non-threatened Mammals (Carnivores)	Low / Lower	Minor	Negligible to 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:

- Development of a solid waste management strategy
- Preparation of a Waste Management Plan as one of the supplementary plans to the CESMP;
- Training will be provided to staff such as tool box meetings which include waste management training
- 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 7-29 Residual Significance of Proliferation

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
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

7.3.1.4 Biosecurity Risks

INTRODUCTION OF PATHOGENS & INVASIVE SPECIES

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 7-30 Significance of Introduced Species

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Major	Major

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
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 reduce the 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 7-31 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

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
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 NO_x, SO_x, 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 7-32 Significance of Fugitive Dust

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Minor	Moderate to Major
Threatened & Protected Flora	High	Minor	Minor to moderate
Non-threatened Flora	Low / Lower	Minor	Negligible to minor

Table 7-33 Significance of Air Pollution

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
Threatened Mammals	High	Minor	Minor to moderate
Nationally Threatened Mammals	Medium	Minor	Minor
Non-threatened Mammals (Carnivores)	Low / Lower	Minor	Negligible to minor
Non-threatened Mammals (Non-carnivores)	Low / Lower	Minor	Negligible to minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major
Threatened Herptiles	High	Minor	Minor to moderate
Nationally Important Herptiles	Medium	Minor	Minor
Non-threatened Herptiles & Invertebrates	Low / Lower	Minor	Negligible to minor

However, the following mitigation measures will be implemented to reduce the 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 7-34 Residual Significance of Air Pollution

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

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
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

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 7-35 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	Minor to 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

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
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
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.
- A Breeding Bird Protection Plan has been prepared which provides the protection measures and protocols i.e., buffers to be implemented at known nest locations based on species sensitivity. The plan also outlines the monitoring and reporting requirements of the construction phase as well as the assigned roles and responsibilities of the involved entities.
- 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 7-36 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	Low / Lower	Minor	Negligible to minor
Threatened Mammals	High	Minor	Minor to moderate
Nationally Threatened Mammals	Medium	Minor	Minor
Non-threatened Mammals (Carnivores)	Low / Lower	Minor	Negligible to minor
Non-threatened Mammals (Non-Carnivores)	Low / Lower	Minor	Negligible to minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major
Threatened Herptiles	High	Minor	Minor to moderate

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Nationally Important Herptiles	Medium	Minor	Minor
Non-threatened Herptiles & Invertebrates	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 7-37 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	Low / Lower	Major	Minor to moderate
Threatened Mammals	High	Moderate	Moderate to Major
Nationally Threatened Mammals	Medium	Major	Moderate to Major
Non-threatened Mammals (Carnivores)	Low / Lower	Major	Minor to moderate
Non-threatened Mammals (Non-Carnivores)	Low / Lower	Major	Minor to moderate
Southern Even-fingered Gecko	Very High	Major	Major
Threatened Herptiles	High	Moderate	Moderate to Major
Nationally Important Herptiles	Medium	Major	Moderate to Major
Non-threatened Herptiles Invertebrates	Low / Lower	Major	Minor to moderate

However, the following mitigation measures will be implemented to reduce the potential impacts:

- 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 7-38 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
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

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 7-39 Significance of Contamination

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Natural Habitats (Weakly inclined piedmont plain of relic low mountains)	Medium	Moderate	Moderate
Natural Habitats (Foothills of relic low mountains)	High	Moderate	Moderate to Major
Natural Habitats (Outcrops of variegated beds)	Medium	Moderate	Moderate
Natural Habitats (Stony slopes of relic low mountains)	High	Moderate	Moderate to Major
Endangered Flora	Very High	Moderate	Major
Threatened & 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	Minor
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 reduce the potential impacts:

- Refer to hazardous materials control measures, emergency action plan and spill prevention and clean up measures.

With the above measures, the residual significance is presented in the following table.

Table 7-40 Residual Significance of Contamination

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Natural Habitats (Weakly inclined piedmont plain of relic low mountains)	Medium	Negligible	Negligible to minor
Natural Habitats (Foothills of relic low mountains)	High	Negligible	Minor
Natural Habitats (Outcrops of variegated beds)	Medium	Negligible	Negligible to minor
Natural Habitats (Stony slopes of relic low mountains)	High	Negligible	Minor
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

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 7-41 Significance of Soil Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Natural Habitats (Weakly inclined piedmont plain of relic low mountains)	Medium	Moderate	Moderate
Natural Habitats (Foothills of relic low mountains)	High	Moderate	Moderate to Major
Natural Habitats (Outcrops of variegated beds)	Medium	Moderate	Moderate
Natural Habitats (Stony slopes of relic low mountains)	High	Moderate	Moderate to Major

However, the following mitigation measures will be implemented to reduce the potential impacts:

- Minimize construction footprint and strict controls to prevent driving out of designated corridors.
- The Restoration Action Plan will provide the restoration measures that will be undertaken where appropriate, post-construction restoration of temporary laydown areas and buffer zones via seeding, re-planting, and landscaping with native, high-value species, monitoring and reporting requirements of the plan as well assigned roles and responsibilities

With the above measures, the residual significance is presented in the following table.

Table 7-42 Residual Significance of Soil Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Natural Habitats (Weakly inclined piedmont plain of relic low mountains)	Medium	Negligible	Negligible to minor
Natural Habitats (Foothills of relic low mountains)	High	Negligible	Minor
Natural Habitats (Outcrops of variegated beds)	Medium	Negligible	Negligible to minor
Natural Habitats (Stony slopes of relic low mountains)	High	Negligible	Minor

7.3.2 Operation Phase

7.3.2.1 Ecosystem Function

HABITAT FRAGMENTATION (BARRIER EFFECT)

Development and operation of large-scale and linear alignment projects will fragment the landscape's existing habitats, reducing overall ecosystem connectivity and function. This in turn reduces the ability for vegetation recruitment and wildlife movement between habitat patches. Species with large home range requirements and migratory species in particular may be affected by fragmented habitat. Long-term fragmentation caused by physical barriers may also lead to a reduction in genetic exchange which is a concern for r-selected species with rapid generation turnover.

The Wind Farm will not be fenced; therefore, there will be no physical barriers to movement. However, turbines may deter 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 of the potential impact for endangered birds has been determined to be negligible given that the project site does not represent a migratory corridor bottleneck for waterbirds as evidenced by survey results which did not record the presence of any endangered waterbirds.

Table 7-43 Significance of Habitat Fragmentation

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds (Waterbirds)	Very High	Negligible	Minor
Threatened Birds (Waterbirds)	High	Minor	Minor to Moderate
Nationally Threatened Birds (Waterbirds)	Medium	Minor	Minor
Non-threatened Birds (Waterbirds)	Medium	Minor	Negligible to Minor

HABITAT DEGRADATION (EDGE EFFECT)

Ecosystem function is reduced at the ecotone between developed areas and undeveloped natural habitat. The edge effect results in a general degradation of quality around the boundaries of development. Wildlife are likely to avoid the edges of development, which further reduces habitat availability and creates a zone with lower biodiversity.

Species that are likely to be particularly affected include those that show avoidance behaviour from anthropogenic developments, which may avoid the boundary of the wind farm and thus experience inflated habitat loss. Species such as Houbara Bustard may experience an increase in the effect of habitat loss, due to similar macro-avoidance behaviour from areas of disturbance, which could include wind farms.

The magnitude and **unmitigated** significance calculations are presented in the table below. The magnitude of the potential impact has been determined to be minor given the relatively large expanse of available similar habitat in the wider region.

Table 7-44 Significance of Edge Effect

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	Negligible to minor
Threatened Mammals	High	Minor	Minor to moderate
Nationally Threatened Mammals	Medium	Minor	Minor
Non-threatened Mammals (Carnivores)	Low / Lower	Minor	Negligible to minor
Non-threatened Mammals (Non-Carnivores)	Low / Lower	Minor	Negligible to minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major
Threatened Herptiles	High	Minor	Minor to moderate
Nationally Important Herptiles	Medium	Minor	Minor
Non-threatened Herptiles & Invertebrates	Low / Lower	Minor	Negligible to minor

However, the following mitigation measures can serve to reduce the impacts:

- Minimize project footprint as much as possible.
- Restore habitat post-construction in unused land areas that are not required for O&M maintenance; and
- 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. It is noted that consultations with the Emirates Bird Breeding Center for Conservation (EBBC) are currently on-going.

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.

Further, a corresponding amount of Foothill and Stony slopes habitats that are lost will be compensated via protection and/or restoration of similar habitat in areas outside of the operational footprint. The exact locations will also be determined in the Restoration Action Plan.

With the above measures, the **residual** significance is presented in the following table.

Table 7-45 Residual Significance of Edge Effect

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
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

7.3.2.2 Biodiversity Loss

TURBINE COLLISION (BIRDS)

Wind Farms pose a unique threat to birds due to the potential for collision with moving turbines. It has been well documented at existing wind farm developments that turbine collisions result in mortality of birds. However, the magnitude of risk and significance of the potential impact is highly dependent upon the location of the wind farm and landscape context, spatial layout, height and length of turbines, and the types and numbers of birds present. In order to assess the potential impacts, separate assessments are undertaken which are species-specific, location specific and season-specific.

- Generally, larger soaring birds and 'poor fliers' with high wing-loading are thought to be at higher risk.
- 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, Volume 4).

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 7-46 Estimated Rates of Collisions Year for Bird Species at the Dzhankeldy Wind Farm

English Common Name	Species Sensitivity	Using Lower Bound CA Values for Each Season		Using Most Realistic CA Values for Each Season	
		Collisions/Year	Years to 1 Collision	Collisions/Year	Years to 1 Collision
Tier 1 Target Species					
Houbara Bustard	High	0.0294	34	0.00589	169
Pygmy Cormorant	Medium	1.39	<1	0.277	3
Great White Pelican	Medium	0.299	3	0.0598	16
Egyptian Vulture	Very High	0.145	6	0.0606	16
Cinereous Vulture	High	0.299	3	0.150	6
Eurasian Griffon	High	0.0646	15	0.0323	30
Short-toed Snake-Eagle	Medium	0.0184	54	0.00406	246
Steppe Eagle	Very High	0.467	2	0.103	9
Imperial Eagle	High	0.0389	25	0.00859	116
Golden Eagle	Medium	0.217	4	0.0479	20

ENGLISH COMMON NAME	SPECIES SENSITIVITY	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
White-tailed Eagle	Medium	0.698	1	0.349	2
Lesser Kestrel	Medium	1.62	<1	0.397	2
Saker Falcon	Very High	0.0402	24	0.0161	62
Tier 2 Target Species					
Common Crane	Low / Lower	0	N/A	0	N/A
Eurasian Marsh-Harrier	Low / Lower	1.71	<1	0.340	2
Hen Harrier	Low / Lower	4.48	<1	0.896	1
Black Kite	Low / Lower	0.114	8	0.0455	21
Eurasian Sparrowhawk	Low / Lower	0.134	7	0.0670	14
Common Buzzard	Low / Lower	0.987	1	0.224	4
Long-legged Buzzard	Low / Lower	2.75	<1	0.625	1
Eurasian Kestrel	Low / Lower	66.7	<1	16.2	<1
Tier 3 Non-Target Species					
Ruddy Shelduck	Low / Lower	0.560	1	0.112	8
Gadwall	Low / Lower	2.99	<1	0.597	1
Mallard	Low / Lower	5.28	<1	1.05	<1
Green-winged Teal	Low / Lower	2.93	<1	0.585	1
Black-headed Gull	Low / Lower	0.678	1	0.271	3
Caspian Gull	Low / Lower	1.71	<1	0.684	1
Great Cormorant	Low / Lower	0.715	1	0.143	6
Gray Heron	Low / Lower	2.24	<1	0.907	1
Purple Heron	Low / Lower	0.0645	15	0.0258	38
Great Egret	Low / Lower	0.172	5	0.0688	14
Black-crowned Night-Heron	Low / Lower	0.706	1	0.142	7

Findings showcase that the collision risk for the majority of target species is extremely low-moderate. The predicted collision rates resulting from CRM analysis did not indicate any species for which population-level impacts are likely.

No globally threatened species are predicted to experience collisions more frequently than one fatality per 2 years under the realistic collision avoidance rate scenarios modelled. Five of the following bird species are predicted to experience at least one collision in 10 years (Pygmy Cormorant, Cinereous Vulture, Steppe Eagle, White-tailed Eagle, and Lesser Kestrel) whereas three following species are predicted to experience at least one collision in 20 years (Great White Pelican, Egyptian Vulture, and Golden Eagle). Egyptian Vulture and Steppe Eagle are designated as PBF.

Only the Eurasian Kestrel, a widespread and abundant species that does not have elevated conservation status at the national or international levels, was predicted to experience more than one collision per year under the most likely collision avoidance scenarios modelled (16.2 collisions per year).

The CRM analysis predicts collision rates as high as 1.05 collisions per year for Mallard under the most realistic CA parameter values, and collision rates more frequent than once per 5 years for five additional species of water bird (Gray Heron – 0.907 collisions per year, Gadwall – 0.597 collisions per year, Green-winged Teal – 0.585 collisions per. year, Caspian Gull – 0.684 collisions per year, and Black-headed Gull – 0.271 collisions per year). For all other species non-threatened species, collision rates are predicted to be once every 6 years or rarer under the most realistic CA values. At this level of predicted collision risk, the WF 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 7-47 Significance of Turbine Collision (Birds)

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds (Raptors) - Egyptian Vulture	Very High	Minor	Moderate to Major
Endangered Birds (Raptors) - Steppe Eagle	Very High	Minor	Moderate to Major
Endangered Birds (Raptors) - Saker Falcon	Very High	Negligible	Minor
Threatened Birds (Raptors) - Eurasian Griffon	High	Negligible	Minor
Threatened Birds (Raptors) - Cinererous Vulture	High	Negligible	Minor
Threatened Birds (Raptors) - Eastern Imperial Eagle	High	Negligible	Minor
Threatened Birds (Groundbirds) - Houbara Bustard	High	Negligible	Minor
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

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Nationally Threatened Birds (Raptors) - Golden Eagle	Medium	Negligible	Negligible to minor
Nationally Threatened Birds (Raptors) - Lesser Kestrel	Medium	Negligible	Negligible to minor
Nationally Threatened Birds (Waterbirds) - Great White Pelican	Medium	Negligible	Negligible to minor
Nationally Threatened Birds (Waterbirds) - Pygmy Cormorant	Medium	Negligible	Negligible to minor
Non-threatened Birds (Raptors) - Eurasian Marsh-Harrier	Medium	Negligible	Negligible to minor
Non-threatened Birds (Raptors) - Hen Harrier	Medium	Negligible	Negligible to minor
Non-threatened Birds (Raptors) - Black Kite	Medium	Negligible	Negligible to minor
Non-threatened Birds (Raptors) - Eurasian Sparrowhawk	Medium	Negligible	Negligible to minor
Non-threatened Birds (Raptors) - Common Buzzard	Medium	Negligible	Negligible to minor
Non-threatened Birds (Raptors) - Long-legged Buzzard	Medium	Negligible	Negligible to minor
Non-threatened Birds (Raptors) - Eurasian Kestrel	Medium	Negligible	Negligible to minor
Non-threatened Birds (Waterbirds) - Common Crane	Low / Lower	Negligible	Negligible to minor
Non-threatened Birds (Waterbirds) - Ruddy Shelduck	Low / Lower	Negligible	Negligible to minor
Non-threatened Birds (Waterbirds) - Gadwall	Low / Lower	Negligible	Negligible to minor
Non-threatened Birds (Waterbirds) - Mallard	Low / Lower	Negligible	Negligible to minor
Non-threatened Birds (Waterbirds) - Green-winged Teal	Low / Lower	Negligible	Negligible to minor
Non-threatened Birds (Waterbirds) - Black-headed Gull	Low / Lower	Negligible	Negligible to minor
Non-threatened Birds (Waterbirds) - Caspian Gull	Low / Lower	Negligible	Negligible to minor
Non-threatened Birds (Waterbirds) - Great Cormorant	Low / Lower	Negligible	Negligible to minor
Non-threatened Birds (Waterbirds) - Grey Heron	Low / Lower	Negligible	Negligible to minor
Non-threatened Birds (Waterbirds) - Purple Heron	Low / Lower	Negligible	Negligible to minor
Non-threatened Birds (Waterbirds) - Great Egret	Low / Lower	Negligible	Negligible to minor
Non-threatened Birds (Waterbirds) - Black-crowned Night Heron	Low / Lower	Negligible	Negligible to minor

The following mitigation measures can serve to further reduce collision risk:

- Project Design; changes in WTG number and layout to 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 (BMP) includes a Post-Construction Fatality Monitoring Plan (PCFM) which entails detailed and intensive carcass searches that 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 consultation with the lenders.
- A Potential Biological Removal (PBR) analysis was undertaken to determine the thresholds for acceptable levels of annual losses. Should the PCFM prove that thresholds for any particular species are reached, this will trigger an upscaling of mitigation as provided in the Collision Risk Management Plan (CRMP).
- The CRMP provides the details of the automated Shut-Down on Demand (SDOD) system, Identiflight, and shut-down protocols that will be implemented at the project site. The plan details process of the Adaptive Management that will be implemented as necessary, roles and responsibilities of entities involved as well as the resourcing requirements to fulfil the management protocols outlined the CRMP
- The Biodiversity Action Plan (BAP) provides the strategy for No Net Loss (NNL) for PBF species and Net Gain (NG) for the CH species, Asian Houbara.
- The Compensation Offset Plan details the offset measures that will be implemented for the Asian Houbara if the PCFM exceeds the PBR thresholds.
 - The plan includes the preferred option for the project to sponsor a Project-generated addition to an existing Asian Houbara captive breeding and wild release program located within Uzbekistan. This collaboration leverages the pre-existing facility, resources, knowledge and experience of the program to generate the required conservation gains for the HB through their production and release to the wild.

MITIGATION FOR NESTING BIRDS

- A Breeding Bird Protection Plan has been prepared which provides the protection measures and protocols such implementation of construction buffers during the construction phase
- CRMP provides the detailed mitigation strategy for nest protection during the operations phase wherein the camera imaging-based system, Identiflight, will be

installed to cover all turbines which are within 1km of known nest locations. The six turbines that will be covered include (DZH 01, 02, 03, and DHZ 62, 63, 64).

If required, mitigation will be upscaled as per the Adaptive Mitigation detailed in the Collision Risk Management Plan.

With the above measures, the **residual** significance is presented in the following table.

Table 7-48 Residual Significance of Turbine Collision (Birds)

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds (Raptors) - Egyptian Vulture	Very High	No change	Neutral
Endangered Birds (Raptors) - Steppe Eagle	Very High	No change	Neutral
Endangered Birds (Raptors) - Saker Falcon	Very High	No change	Neutral
Threatened Birds (Raptors) - Eurasian Griffon	High	No change	Neutral
Threatened Birds (Raptors) - Cinererous Vulture	High	No change	Neutral
Threatened Birds (Raptors) - Eastern Imperial Eagle	High	No change	Neutral
Threatened Birds (Groundbirds) - Houbara Bustard	High	No change	Neutral
Nationally Threatened Birds (Raptors) - Short-toed Snake Eagle	Medium	No change	Neutral
Nationally Threatened Birds (Raptors) - White-tailed Sea Eagle	Medium	No change	Neutral
Nationally Threatened Birds (Raptors) - Golden Eagle	Medium	No change	Neutral
Nationally Threatened Birds (Raptors) - Lesser Kestrel	Medium	No change	Neutral
Nationally Threatened Birds (Waterbirds) - Great White Pelican	Medium	No change	Neutral
Nationally Threatened Birds (Waterbirds) - Pygmy Cormorant	Medium	No change	Neutral
Non-threatened Birds (Raptors) - Eurasian Marsh-Harrier	Medium	No change	Neutral
Non-threatened Birds (Raptors) - Hen Harrier	Medium	No change	Neutral
Non-threatened Birds (Raptors) - Black Kite	Medium	No change	Neutral
Non-threatened Birds (Raptors) - Eurasian Sparrowhawk	Medium	No change	Neutral
Non-threatened Birds (Raptors) - Common Buzzard	Medium	No change	Neutral
Non-threatened Birds (Raptors) - Long-legged Buzzard	Medium	No change	Neutral

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Non-threatened Birds (Raptors) - Eurasian Kestrel	Medium	No change	Neutral
Non-threatened Birds (Waterbirds) - Common Crane	Low / Lower	No change	Neutral
Non-threatened Birds (Waterbirds) - Ruddy Shelduck	Low / Lower	No change	Neutral
Non-threatened Birds (Waterbirds) - Gadwall	Low / Lower	No change	Neutral
Non-threatened Birds (Waterbirds) - Mallard	Low / Lower	No change	Neutral
Non-threatened Birds (Waterbirds) - Green-winged Teal	Low / Lower	No change	Neutral
Non-threatened Birds (Waterbirds) - Black-headed Gull	Low / Lower	No change	Neutral
Non-threatened Birds (Waterbirds) - Caspian Gull	Low / Lower	No change	Neutral
Non-threatened Birds (Waterbirds) - Great Cormorant	Low / Lower	No change	Neutral
Non-threatened Birds (Waterbirds) - Grey Heron	Low / Lower	No change	Neutral
Non-threatened Birds (Waterbirds) - Purple Heron	Low / Lower	No change	Neutral
Non-threatened Birds (Waterbirds) - Great Egret	Low / Lower	No change	Neutral
Non-threatened Birds (Waterbirds) - Black-crowned Night Heron	Low / Lower	No change	Neutral

During the impact assessment and formulation of the mitigation strategy for bird turbine collision, the measure of painting a single turbine blade black on all WTGs was included in the previous version of this ESIA. Following discussions with the supplier and project proponent it was deemed that this measure would not be financially viable to the project. The following table provides the rationale behind the exclusion of this measure from the mitigation strategy.

Table 7-49 Rationale for Excluding Painting of Turbine Blade from Mitigation

PART	INITIAL COST (CAPEX)	OPERATIONAL COST (OPEX)	PERFORMANCE IMPACT
Blade	Modify the original white paint coating process, select new coating materials: 750USD/pc. Total cost = 118500 USD (158 sets WTG)	1. It needs to be reapplied every 15 years, and a single operation needs to be down for 5 days. 2. Operating cost: 7600USD/time/set. Total cost = 1200800USD (158 sets WTG) + 5 days shut down of each WTG in 25y lifetime	1. Due to the absorption of more UV radiation, the aging of the blades is accelerated. It will cause the three blades to lose balance and increase the frequency of blade replacement. It cannot be quantified due to the lack of testing at

PART	INITIAL COST (CAPEX)	OPERATIONAL COST (OPEX)	PERFORMANCE IMPACT
			the moment. 2. About 1.5% power loss due to leading edge corrosion, anti-fouling performance and impeller imbalance
Environmental control	NA	NA	The bottom of the tower is painted black, which causes the temperature in the tower to rise, which causes the inverter to stop. Combined with the temperature of the project site, it is estimated that the number of shutdowns due to heating will increase by 2.5%, and the average power generation will be lost for 4 hours per shutdown;
Tower	Modify the original white paint coating process, select new coating materials: 750USD/pc. Total cost =118500 USD (158 sets WTG)	The light surface will become lighter, resulting in color difference. Refinishing and brushing is required every 15 years, with each downtime of about 5 days: 3700USD/time/set. Total cost =584600USD (158 sets WTG) + 5 days shut down of each WTG in 25y lifetime	NA

Note: The above costs include the cost of turbines for both the Bash Wind Farm and the nearby Dzhankeldy Wind Farm (i.e., 79+79=158 WTGS)

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. The current specifications include a hub height of 100m and rotor radius of 85; so the altitude of rotor swept area is 15m to 185m.
 - *Vespertilio murinus* and *Nyctalus noctula* (25-200 m, majority activity at 50-100 m (Voigt et al., 2021)) are a high-flying species;
 - *Eptesicus* and *Pipistrellus* species (5-65 m and above (Wellig et al., 2018)) are a medium-flying species; and
 - *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 7-50 Significance of Turbine Collision (Bats)

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
<i>Vespertilio murinus</i>	Medium	Major	Moderate to Major
<i>Pipistrellus pipistrellus</i>	Medium	Major	Moderate to Major
<i>Eptesicus bottae</i>	Medium	Major	Moderate to Major
<i>Eptesicus serotinus</i>	Medium	Major	Moderate to Major
<i>Nyctalus noctula</i>	Medium	Major	Moderate to Major
<i>Rhinolophus bocharicus</i>	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), high sodium vapor lights are the most attractive to insects and will not be used.
- Post-construction Biodiversity Management Program includes a Post-Construction Fatality Monitoring Plan (PCFM) which entails detailed and intensive carcass searches that 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 PCFM will be continued for 5 years until the risk to bats is considered 'negligible' in consultation with the lenders;
- A Potential Biological Removal (PBR) analysis was undertaken to determine the thresholds for acceptable levels of annual losses. Should the PCFM indicate that thresholds for any particular species are reached, this will trigger an upscaling of mitigation as provided in the Collision Risk Management Plan (CRMP).
- The Collision Risk Management Plan has been prepared that provides a detailed adaptive Cut-in Speed Curtailment Program, wherein turbines are shut-down and prevented from moving, during periods of high bat activity.
- The proposed Cut-in Speed Curtailment Program, if triggered, would be an increase in cut-in speed to 6m/s during the hours as timings as follows:
 - During the 6-week period of August 1-September 15
 - One hour immediately preceding and 3 hours immediately following sunset, as well as the 3 hours immediately preceding and 1 hour immediately following sunrise.
- However, adaptive management will take place such that the findings of acoustic monitoring, meteorological studies and fatality monitoring will be used to determine the best cut in speed curtailment regime so that it may be modified if needed.

With the above measures, i.e. careful monitoring of fatalities post-construction and the adaptive management program, the **residual** significance is presented in the following table.

Table 7-51 Residual Significance of Turbine Collision (Bats)

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
<i>Vespertilio murinus</i>	Medium	Negligible	Negligible to minor
<i>Pipistrellus pipistrellus</i>	Medium	Negligible	Negligible to minor
<i>Eptesicus bottae</i>	Medium	Negligible	Negligible to minor
<i>Eptesicus serotinus</i>	Medium	Negligible	Negligible to minor
<i>Nyctalus noctula</i>	Medium	Negligible	Negligible to minor
<i>Rhinolophus bocharicus</i>	Medium	Negligible	Negligible to minor

HERBICIDE / PESTICIDE

The application of herbicides and pesticides can have direct consequences on flora and invertebrates as well as secondary impacts on other fauna.

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 7-52 Significance of Herbicide/Pesticide Use

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora (<i>Calligonum zakirovii</i>)	Very High	Major	Major
Threatened Flora	High	Major	Major
Protected Flora (Black Saxaul, White Saxaul)	High	Major	Major
All Other Flora	Low / Lower	Major	Minor to moderate
Endangered Herptiles (Southern Even-fingered Gecko)	Very High	Moderate	Major
Threatened Herptiles (Russian Tortoise)	High	Moderate	Moderate to Major
Nationally Important Herptiles (Desert Sand Boa)	Medium	Moderate	Moderate
Non-threatened Herptiles (Amphibians, Lizards, Geckos, Snakes)	Low / Lower	Moderate	Minor
Non-threatened Invertebrates	Low / Lower	Major	Minor to moderate

However, the following mitigation measures will be implemented to reduce the impacts:

- Restricting use to only when absolutely necessary.
- Using only non-toxic forms of deterrents.

With the above measures, the **residual** significance is presented in the following table.

Table 7-53 Residual Significance of Herbicide/Pesticide Use

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Minor	Moderate to Major
Threatened Protected Flora	High	Minor	Minor to moderate
Non-threatened Flora	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

VEHICULAR COLLISION

Wildlife can be runover or collide with, motorized vehicles and equipment.

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 (as the site vehicles will be traveling under speed restrictions and large equipment movement such as cranes and turbine parts will be very slow). This could also apply to endangered, threatened and non-threatened raptors which may scavenge from road-kill.

However, the impact from use of roads during the operational phase is relatively minor given the low volume of traffic during operation.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 7-54 Significance of Vehicular Collision

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Raptors	Very High	Minor	Moderate to Major
Threatened Raptors	High	Minor	Minor to moderate
Threatened Groundbirds	High	Minor	Minor to moderate
Nationally Threatened Raptors	Medium	Minor	Minor
Non-threatened Raptors	Medium	Minor	Minor
Threatened Mammals	High	Minor	Minor to moderate
Nationally Threatened Mammals	Medium	Minor	Minor

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Non-threatened Mammals (Carnivores)	Low / Lower	Minor	Negligible to Minor
Non-threatened Mammals (Non-carnivores)	Low / Lower	Minor	Negligible to Minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major
Threatened Herptiles	High	Minor	Minor to moderate
Nationally Important Herptiles	Medium	Minor	Minor
Non-threatened Herptiles & Invertebrates	Low / Lower	Minor	Negligible to Minor

However, the following mitigation measures will be implemented to reduce the 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 7-55 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
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

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Nationally Important Herptiles	Medium	Negligible	Negligible to minor
Non-threatened Herptiles& Invertebrates	Low / Lower	Negligible	Negligible to minor

“TAKE” (POACHING, HUNTING, FISHING, GATHERING)

The presence of site workers may lead to increased hunting, poaching, or gathering on site. Flora and vegetative matter might 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 7-56 Significance of “Take”

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Protected Flora (Black Saxaul, White Saxaul)	High	Major	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	Medium	Minor	Negligible to minor
Threatened Mammals	High	Minor	Minor to moderate
Nationally Threatened Mammals	Medium	Minor	Minor
Non-threatened Mammals (Carnivores)	Low / Lower	Minor	Negligible to minor
Non-threatened Mammals (Non-carnivores)	Low / Lower	Minor	Negligible to minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major
Threatened Herptiles)	High	Minor	Minor to moderate
Nationally Important Herptiles	Medium	Minor	Minor
Non-threatened Herptiles & Invertebrates	Low / Lower	Minor	Negligible to minor

However, the following mitigation measures will be implemented to reduce the impacts:

- Strict controls forbidding the gathering, poaching or otherwise disturbance of any flora or fauna on site, included in induction training

- 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 7-57 Residual Significance of “Take”

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Protected Flora (Black Saxaul, White Saxaul)	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-carnivore)	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

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 7-58 Significance of Littering

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Minor	Moderate to Major

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Threatened Birds	High	Minor	Minor to moderate
Nationally Threatened	Medium	Minor	Minor
Non-threatened Birds	Medium	Minor	Negligible to minor
Threatened Mammals	High	Minor	Minor to moderate
Nationally Threatened Mammals	Medium	Minor	Minor
Non-threatened Mammals (Carnivores)	Low / Lower	Minor	Negligible to minor
Non-threatened Mammals (Non-carnivores)	Low / Lower	Minor	Negligible to minor
Southern Even-fingered Gecko)	Very High	Minor	Moderate to Major
Threatened Herptiles	High	Minor	Minor to moderate
Nationally Important Herptiles	Medium	Minor	Minor
Non-threatened Herptiles & Invertebrates	Low / Lower	Minor	Negligible to minor

However, the following mitigation measures will be implemented to reduce the 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 7-59 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
Threatened Mammals	High	Negligible	Minor

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Nationally Threatened Mammals	Medium	Negligible	Negligible to minor
Non-threatened Mammals (Carnivores)	Low / Lower	Negligible	Negligible to minor
Non-threatened Mammals (Non-carnivore)	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

7.3.2.3 **Biodiversity Displacement**

DISPERSAL AND COMPETITION

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.

Houbara Bustard are significantly shy species and may show to avoidance of tall structures (WTGs) in the WF area. Therefore, dispersal and permanent displacement from the WF area is a possible impact. Mitigation for this impact is addressed in the BAP and the Compensation Offset Plan.

Figure 7-14 Adjacent Habitat Available for Dispersed Species



PROLIFERATION OF GENERALIST SPECIES

The dispersal of shy 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 7-60 Significance of Proliferation

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	Minor
Threatened Mammals	High	Moderate	Moderate to Major
Nationally Threatened Mammals	Medium	Moderate	Moderate

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Non-threatened Mammals (Carnivores)	Low / Lower	Minor	Negligible to minor
Non-threatened Mammals (Non-carnivores)	Low / Lower	Moderate	Negligible to minor
Endangered Herptiles (Southern Even-fingered Gecko)	Very High	Moderate	Major
Threatened Herptiles (Russian Tortoise)	High	Moderate	Moderate to Major
Nationally Important Herptiles (Desert Sand Boa)	Medium	Moderate	Moderate
Non-threatened Herptiles (Amphibians, Lizards, Geckos, Snakes)	Low / Lower	Moderate	Minor
Non-threatened Invertebrates	Low / Lower	Moderate	Minor

However, the following mitigation measures will be implemented to reduce the 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;
- Training will be provided to staff such as tool box meetings which include waste management training
- 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 7-61 Residual Significance of Proliferation

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
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

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
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

7.3.2.4 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 measured at <20 dB, whilst at wind speeds of 10 m/s the typical levels were approximately 40 dB.
- At night-time wind speeds of 2 m/s the typical ambient background noise was measured >20 dB, whilst at wind speeds of 10 m/s the typical levels were approximately 30 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 levels 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 7-62 Significance of Noise Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds (Raptors, Waterbirds)	Very High	Moderate	Major
Threatened Birds (Raptors, Waterbirds, Groundbirds, Songbirds)	High	Moderate	Moderate to Major
Nationally Threatened Birds (Raptors, Waterbirds)	Medium	Moderate	Moderate
Non-threatened Birds (Raptors, Waterbirds)	Medium	Moderate	Moderate
All other Birds	Low / Lower	Moderate	Minor
Threatened Mammals (Goitered Gazelle)	High	Minor	Minor to Moderate
Threatened Mammals (Marbled Polecat)	High	Minor	Minor to Moderate
Nationally Threatened Mammals (Caracal)	High	Minor	Minor to Moderate
Nationally Threatened Mammals (Corsac Fox)	Medium	Minor	Minor
Nationally Threatened Mammals (Sand Cat)	Medium	Minor	Minor
Nationally Threatened Mammals (Steppe Polecat)	Medium	Minor	Minor
Nationally Threatened Mammals (Brandt's Hedgehog)	Medium	Minor	Minor
Non-threatened Mammals (Carnivores)	Low / Lower	Minor	Negligible to Minor
Non-threatened Mammals (Hedgehog)	Low / Lower	Minor	Negligible to Minor
Non-threatened Mammals (Hare)	Low / Lower	Minor	Negligible to Minor
Non-threatened Mammals (Shrews)	Low / Lower	Minor	Negligible to Minor
Non-threatened Mammals (Rodents)	Low / Lower	Minor	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 (Desert Sand Boa)	Medium	Minor	Moderate
Non-threatened Herptiles (Amphibians, Lizards, Geckos, Snakes)	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 7-63 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	Minor to Moderate
Threatened Mammals	High	Moderate	Moderate to Major
Nationally Threatened Mammals	Medium	Major	Moderate to Major
Non-threatened Mammals (Carnivores)	Low / Lower	Major	Minor to moderate
Non-threatened Mammals (Non-carnivores)	Low / Lower	Major	Minor to moderate
Southern Even-fingered Gecko	Very High	Major	Major
Threatened Herptiles	High	Moderate	Moderate to Major
Nationally Important Herptiles	Medium	Major	Moderate to Major
Non-threatened Herptiles & Invertebrates	Low / Lower	Major	Minor to moderate

However, the following mitigation measures will be implemented to reduce the impacts:

- 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 7-64 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
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

7.3.3 Decommissioning Phase

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 and measure performance. A Biodiversity Management Plan has been prepared which details the management plan to be implemented during each phase of the project, monitoring and reporting requirements i.e., the Biodiversity Monitoring and Evaluation Plan (BMEP) as well the entity responsible for the implementation of each plan.

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, and exclusion of roosting and perching opportunities

7.4.2 Pre-Construction

Refer to the BMP for implementation of management plans for the pre-construction phase and BMEP for ongoing monitoring and reporting requirements for each plan. The following outline the mitigation requirements pre-construction:

- Review of Construction Methodology by environmental consultant
 - Site Clearance and Layout
 - Timing and method of emissions-generating works
 - Lighting Strategy
 - Solid Waste Management Strategy
- Preparation of Biodiversity Action Plan which illustrates the pathway to NG for CH species and NNL for PBF species which include the following plans:
 - 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 survey, 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

Refer to the BMP for implementation of management plans for the post-construction phase and BMEP for ongoing monitoring and reporting requirements for each plan. 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 the Chance Find Procedure
- 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.

7.4.4 Post Construction

The following outline the mitigation requirements post-construction:

- Implementation of Restoration Action Plan
- Carrying out restoration works
- Post-restoration survey
- Compensation Offset Plan
- Habitat restoration offset works
- Biodiversity Monitoring and Evaluation Programme BMEP

7.4.5 Operation

Refer to the BMP for implementation of management plans for the operations phase and BMEP for ongoing monitoring and reporting requirements for each plan. 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
 - Post-Construction Fatality Monitoring Plan
 - Collision Risk Management Plan, which includes PBR thresholds, proposed SDOD mechanism, and Cut-in Curtailment criteria.
 - Compensation Offset Plan
 - Compliance checks and reporting include:
 - Daily Checklist
 - Weekly Inspection
 - Monthly Reporting
 - Quarterly Auditing
 - Biodiversity Monitoring and Evaluation Programme BMEP

8 AIR QUALITY

8.1 Observation and Baseline Conditions

8.1.1 Local Meteorological Conditions

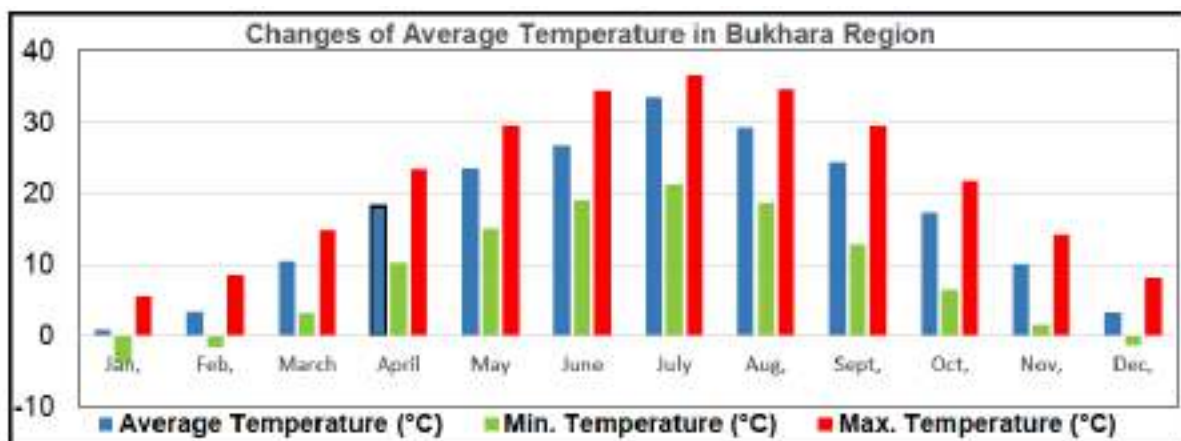
The climatic characteristics of the Project area are monitored by the observation post of Bukhara station located at Dzhankeldy village (UzAssystem 2021b). The table and figures below present the monthly temperature, humidity, rainfall, wind speed and wind direction for the period of 20 years (2000 – 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 Project area 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.

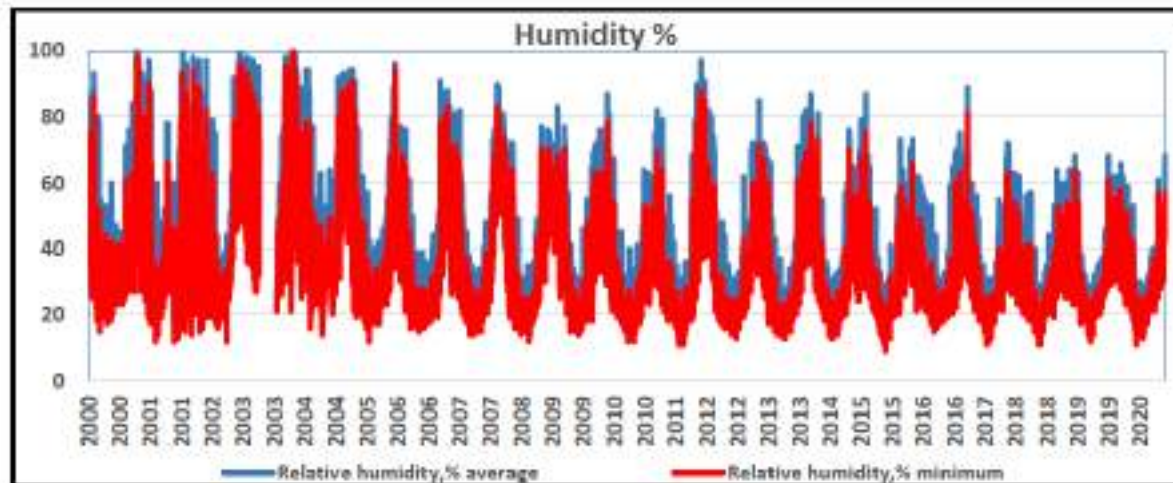
Figure 8-1 Monthly Average, Minimum and Maximum Temperature at the Project Area (UzAssystem, 2021b)



The climate of the Project area 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 Project area 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 Project Area (UzAssystem, 2021b)



The mean monthly, mean annual wind speed and wind direction distribution data are presented in the figures below.

Figure 8-3 Mean Monthly Wind Speed at the Project Area (UzAssystem, 2021b)

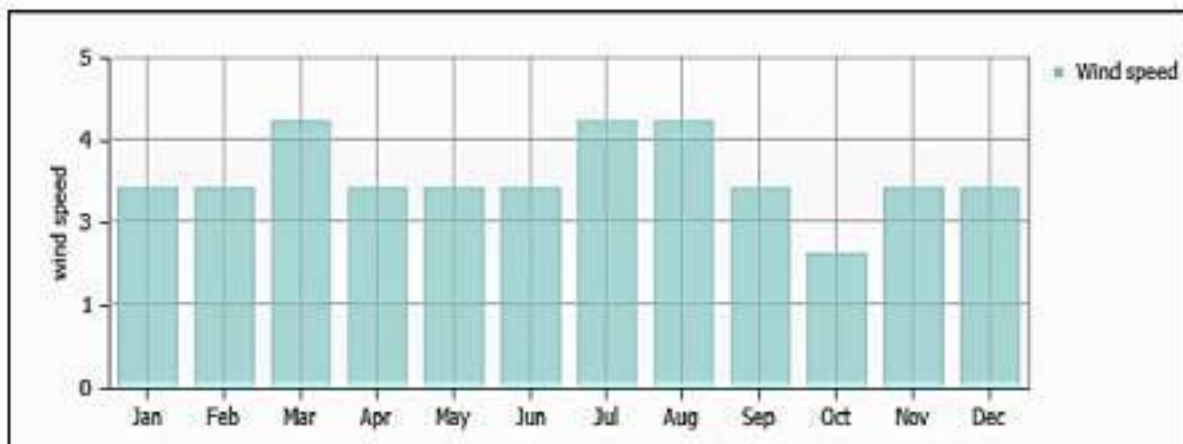
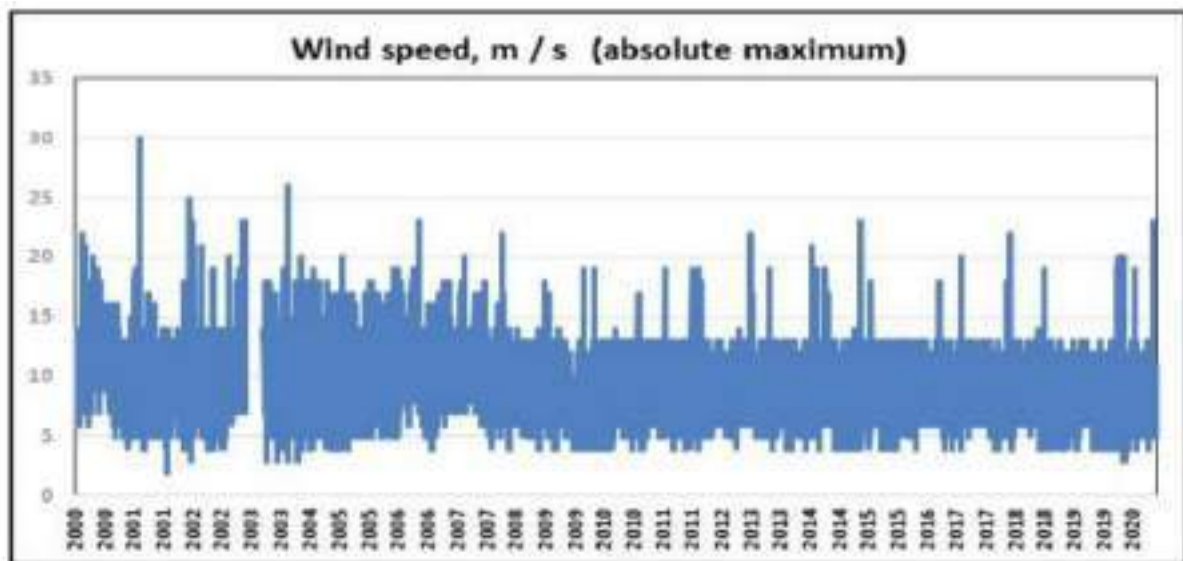


Figure 8-4 Mean Annual Wind Speed at the Project Area (UzAssystem, 2021b)



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)

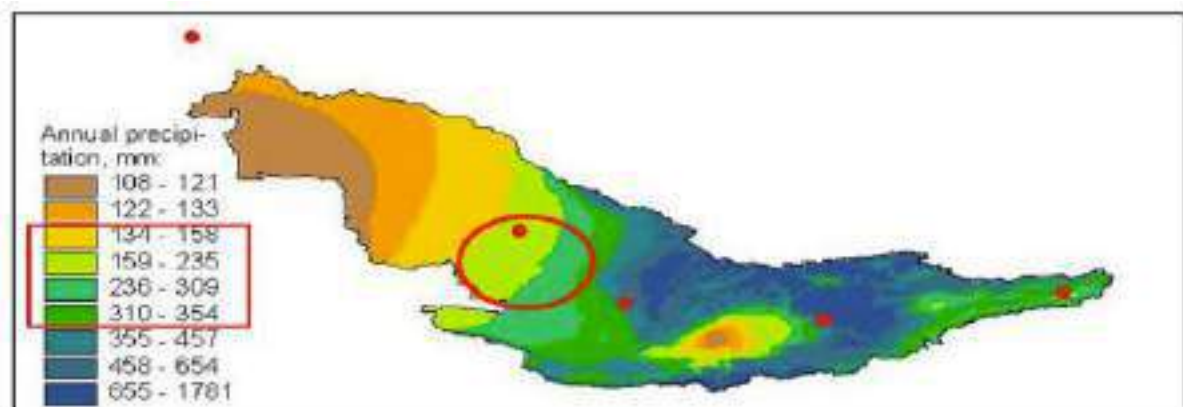
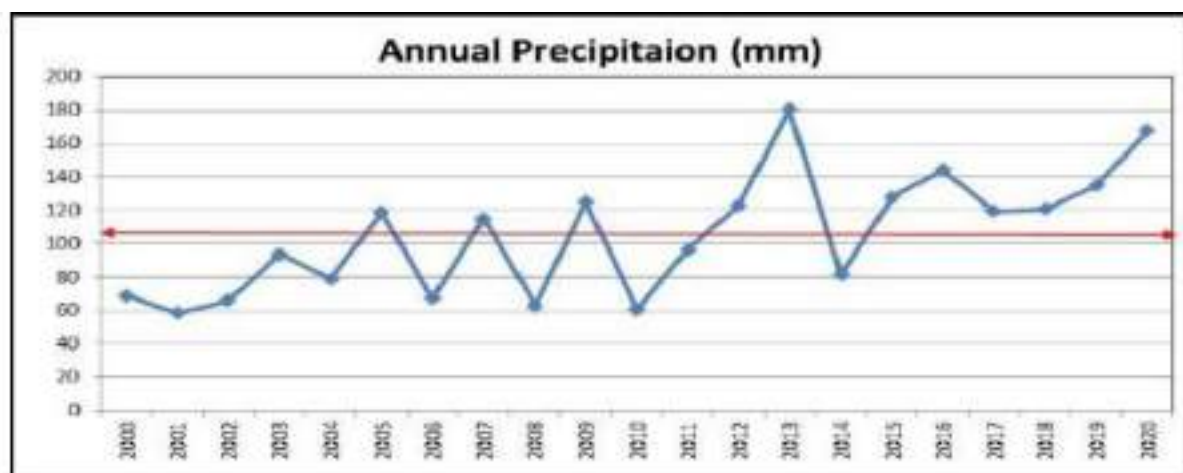


Figure 8-6 The average annual rainfall Values of the Bukhara Basin Between 2000 & 2020



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.

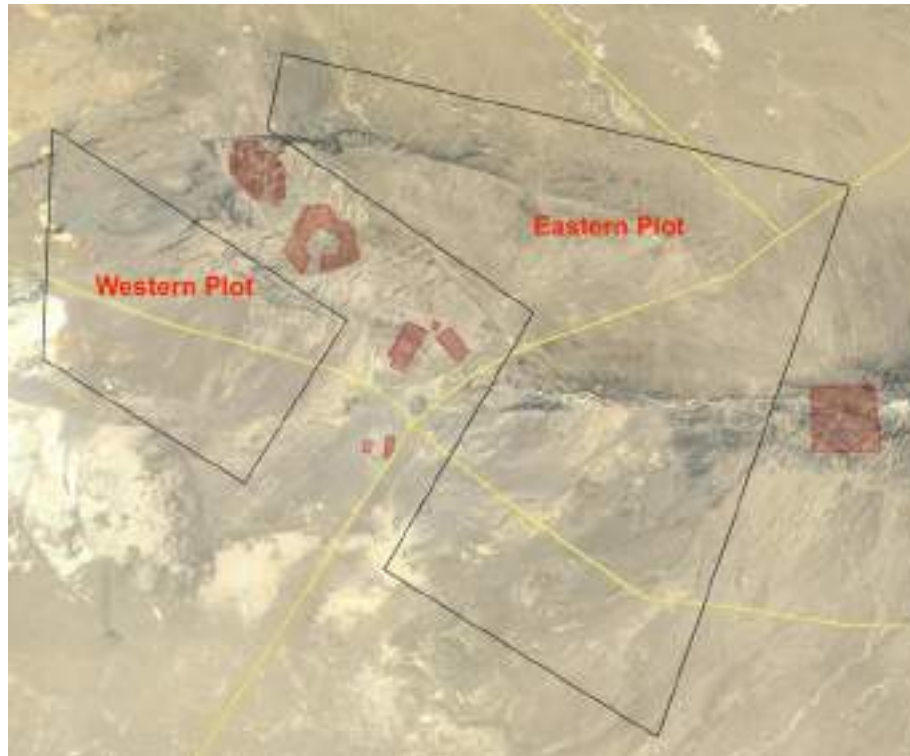
The Project site is located in a remote area and based on numerous site visits and review of satellite imagery, there are no industrial facilities or known key point sources of air emissions (such as point sources) at the site or in the immediate surroundings.

The only source of emission will be mobile emissions from vehicles moving along the local roads that runs through the Project site and directly outside the southern extent. Once mining activities commences, there will also be dust emission from the mines between the project plots identified during site visits to be inactive .

Mobile source emissions from vehicles have the potential to contribute to ambient concentrations of Nitric Oxide, NO₂, SO₂, VOC's, CO and Particulate Matter (i.e. PM_{2.5} & PM₁₀) in the local air shed. Given the remote nature of the Project area and the expected low vehicle flows on the local roads, any mobile emissions are not expected to be distinguishable from background concentrations.

If mining activities commences at the nine (9) mines located in-between the Project plots, such activities have the potential to result in an increase in Particulate Matter (i.e. PM_{2.5} & PM₁₀) concentration in the local air shed.

Figure 8-7 Existing Road Route Within the Project Site and In the Project Area and Location of Mines in Relation to Project Site (ref red polygons)



8.1.3 Ambient Air Quality Monitoring

Due to the limited influences on ambient air quality and the Wind Farm project (i.e. without air emissions), spot ambient air quality monitoring was conducted from 13th to 15th March 2021 within the project site and at two (2) receptor locations to monitor the ambient concentration of nitrogen dioxide (NO₂), sulphur dioxide (SO₂), carbon dioxide (CO) and dust at each location. During the monitoring campaign, meteorological conditions (temperature, pressure, & wind speed) were also recorded. Ambient air quality was monitored for 20 minutes at each location two (2) times daily for three (3) days.

The air quality monitoring location is presented in the figure below and coordinates provided in the table below. Calibration certificates of the instruments used are presented in Appendix I.

Figure 8-8 Ambient Air Quality Monitoring Location



Table 8-2 Ambient Air Quality Monitoring Locations

SAMPLE	LOCATION OF THE AIR MONITORING	COORDINATES	
		NORTHING	EASTING
AQ_1	At Kalaata village	40.869299°	63.388575°
AQ_2	At Dzhankeldy village	40.853707°	63.334642°
AQ_3	At the Eastern extent of the eastern plot of the Project	40.895153°	63.173539°

Plate 8-1 Air Quality Monitoring Device Used for Monitoring at the Project Site



Plate 8-2 Evidence of Air Measuring Equipment Installation



AMBIENT AIR QUALITY MONITORING RESULTS

The results of the ambient air monitoring are presented in the table below. These results have been compared with Maximum Permissible Concentrations (MPC) established by Uzbekistan.

Table 8-3 Ambient Air Quality Monitoring Result

LOCATION	TIME	NO ₂ MG/M ³	SO MG/M ³	CO MG/M ³	DUST	WIND SPEED M/S	WIND DIRECTION
MPC ONE TIME (MG/M ³)		0.085	0.5	5	NA	NA	NA
MPC, 24 HRS (MG/M ³)		0.06	0.2	4			
13 th April 2021							
AQ_1	11:55	0.00	0.006	4.1	0.1	2.2	NW
	14:40	0.01	0.018	3.1		3.5	N
Daily Average		0.005	0.012	3.6	-	-	-
AQ_2	13:00	0.02	0.005	3.6	0.0	2.5	W, N
	15:30	0.03	0.020	4.4		3.6	N, NW

LOCATION	TIME	NO ₂ MG/M ³	SO MG/M ³	CO MG/M ³	DUST	WIND SPEED M/S	WIND DIRECTION
MPC ONE TIME (MG/M ³)		0.085	0.5	5	NA	NA	NA
MPC, 24 HRS (MG/M ³)		0.06	0.2	4			
Daily Average		0.025	0.013	4.0	-	-	-
AQ_3	13:45	0.02	0.001	3.1	0.0	4.0	NW
	16:00	0.03	0.002	3.5		6.0	W, NW
Daily Average		0.025	0.002	3.3	-	-	-
14 th April 2021							
AQ_1	12:15	0.03	0.005	2.8	0.1	4.9	NW
	14:45	0.02	0.002	3.5		1.7	NW
Daily Average		0.025	0.004	3.15	-	-	-
AQ_2	12:55	0.01	0.001	3.8	0.2	3.4	NW
	14:05	0.00	0.003	3.4		2.9	NW
Daily Average		0.005	0.002	3.6	-	-	-
AQ_3	13:30	0.02	0.016	2.5	0.1	3.5	NW
	15:35	0.02	0.003	3.5		6.8	NW
Daily Average		0.02	0.010	3.0	-	-	-
15 th April 2021							
AQ_1	11:30	0.03	0.004	3.5	0.0	1.8	SW
	13:50	0.01	0.010	2.5		5.2	W
Daily Average		0.02	0.007	3.0	-	-	-
AQ_2	12:15	0.02	0.012	2.3	0.1	3.3	W
	14:25	0.00	0.012	3.9		4.0	SW
Daily Average		0.01	0.012	3.1	-	-	-
AQ_3	12:55	0.02	0.002	2.1	0.1	3.6	W
	15:00	0.00	0.017	1.6		5.5	SW
Daily Average		0.01	0.010	1.85	-	-	-

When the results obtained was compared to SANPin No 0293-11 MPC requirements, the concentration of NO₂, SO₂ and CO were recorded well within the one-time and 24hr established standards.

Meteorological Data

Based on the measurements during the survey period, average air temperature ranged from 21°C to 26.5°C. Humidity ranged from 43-56%, atmospheric pressure ranged from 733-750mmHg, wind speed ranged from 1.7-6.8m/s and wind direction was predominantly from north-west.

8.1.4 Dust Monitoring

METHODOLOGY

Monitoring for PM₁₀ and PM_{2.5} was undertaken at the Project site from 15th to 17th June 2021 at the three (3) locations monitored during the ambient air quality monitoring as detailed above. The dust monitoring campaign ran for a total of nine (9) hours at each monitoring location 3 hours in the day time (9:00 – 12:00), 3 hours in the afternoon (13:00 – 16:00) and 3 hours in the evening (17:00-20:00)). During the monitoring campaign, meteorological conditions (temperature, pressure, & wind speed) were also recorded.

The monitoring location is presented in the Ambient Air Quality Monitoring sub-section herein and the 24-hourly PM₁₀ & PM_{2.5} results are presented in the table below. Calibration certificate of the instruments used for dust monitoring is presented in Appendix J.

RESULT

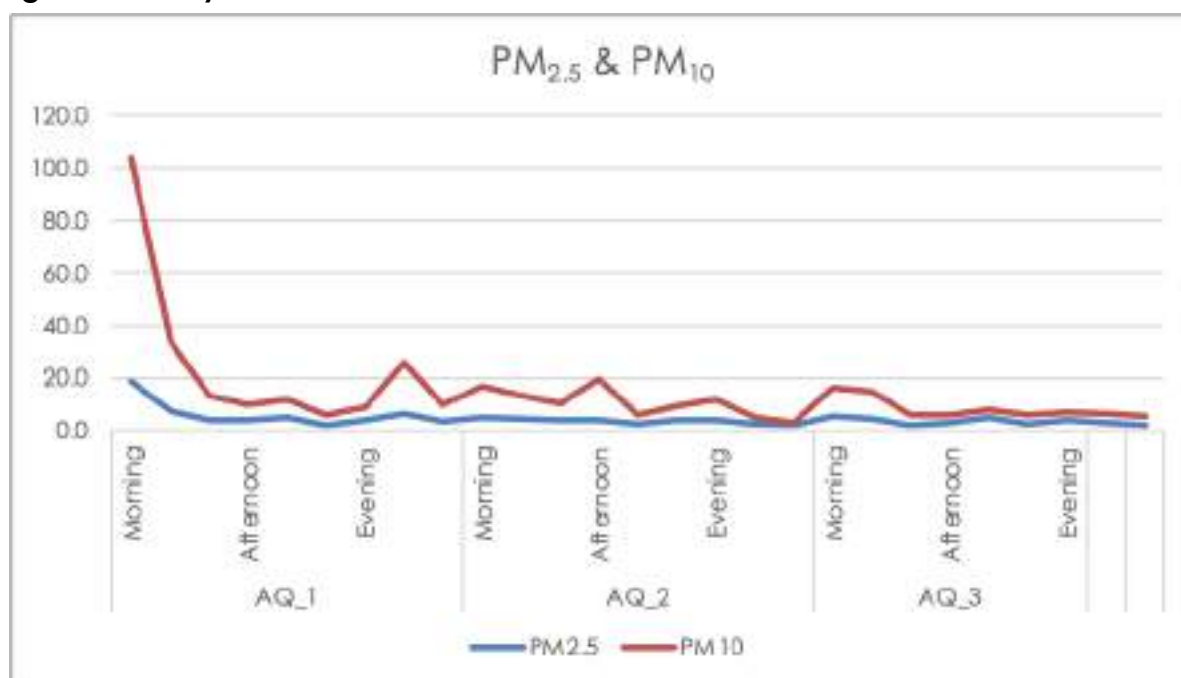
The result presented below have been compared with WHO 24-Hourly standards for PM₁₀ & PM_{2.5}.

Table 8-4 Dust Monitoring Result

MONITORING LOCATION	PM _{2.5} μG/M ³	PM ₁₀ μG/M ³	TEMPERATURE	WIND SPEED
AQ_1	6.2	24.8	36.7	3.6
AQ_2	3.7	10.7	34.0	4.2
AQ_3	3.5	8.4	35.1	4.8
WHO Standard	25	50	-	-

The average PM_{2.5} & PM₁₀ results obtained at all monitoring locations were recorded well below the WHO established limit of 25μg/m³ for PM_{2.5} and 50μg/m³ for PM₁₀. Given that the monitoring locations are situated near areas that may generate dust (near roads and livestock shelter – see Ambient Air Quality Monitoring Location), the low concentration of both pollutants (PM₁₀ and PM_{2.5}) provides an indication of good air quality in the project area.

Figure 8-9 Daily Concentration of PM_{2.5} and PM₁₀



As can be seen from the figure above, sudden increase in PM₁₀ concentration was recorded during the morning hours of the monitoring period at location AQ₁. The only influence observed by the monitoring team during this period was a herder using his motorcycle near the monitoring location AQ₁ from 9:09am to 9:15am to encourage livestock to leave their enclosure. There was no other observable influences during the monitoring.

8.2 Receptors

In relation to ambient air quality impacts from the project, the only impacts may 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).

It should be noted that the zone of 1km has been chosen as a conservative approach as it is large enough to account for any worse case scenarios and cumulative effects.

Numerous site visits and review of satellite imagery have identified residential, commercial & agricultural receptors within 1km of the proposed wind farm Project site that may be susceptible to changes in ambient air quality. Such receptors include active settlements within the site, residents of Kalaata village (<1km from the western plot boundary), mining area 7 (approximately 500m south of the eastern plot), mining area 8 (approximately 570m north of the western plot), mining area 9 (approximately 930m north & 950m south of the western &

eastern plots respectively) and users of a temporary water body (approximately 320m south of the eastern plot).

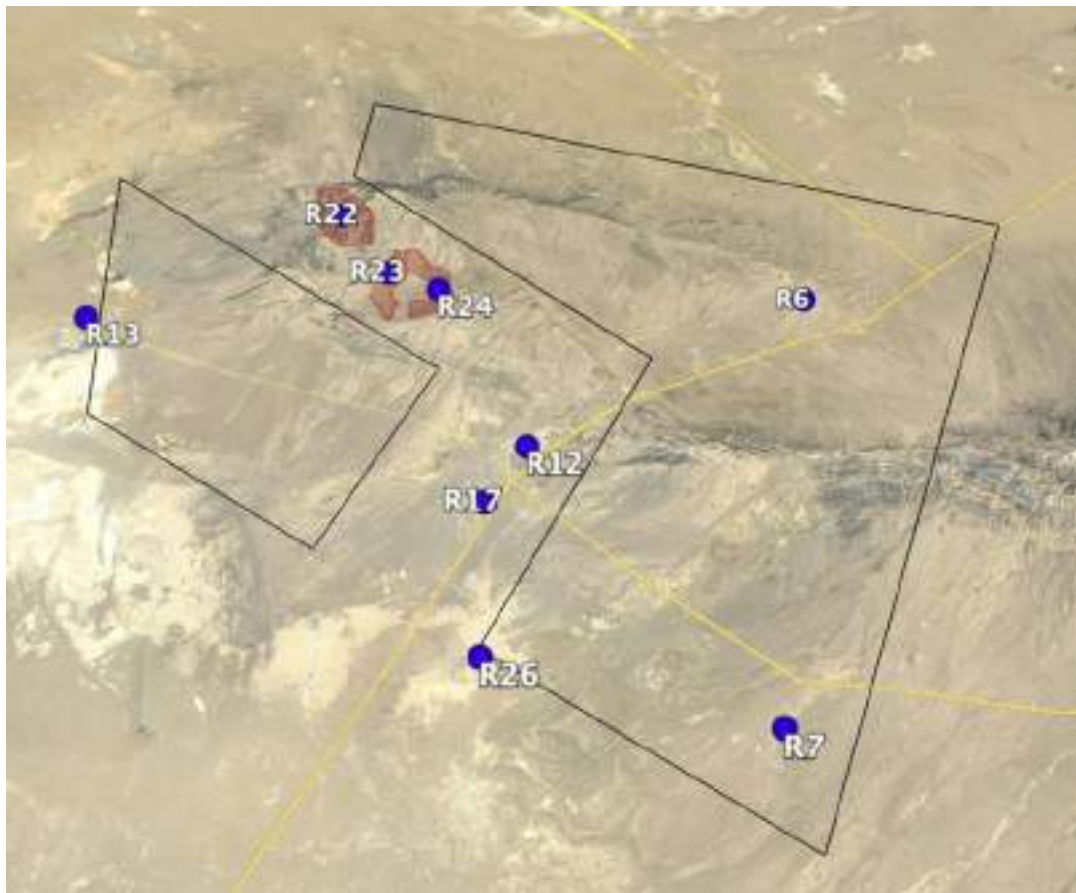
As the local access road runs through the Project site and falls within 1km of the Wind farm, receptors in proximity to this road could also be susceptible to changes in ambient air quality related to increases in vehicle movements due to the Project. As such, residents of Dzhankeldy village and mining area 2 have also been identified as receptors.

Table 8-5 Potential Air Quality Receptors – Wind Farm

RECEPTOR ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
R6	Active settlement within the eastern plot	Residential	High	Residents at the active settlements will be vulnerable to changes in ambient air quality.
R7	Newly constructed settlement within the eastern plot	Residential	High	
R12	Residents of Dzhankeldy village	Residential	High	
R13	Residents of Kalaata village	Residential	High	
R17	Mining Area 2 (including mine workers)	Industrial	Low	If mining activities commence 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.
R22	Mining Area 7 (including mine workers)	Industrial	Low	
R23	Mining Area 8 (including mine workers)	Industrial	Low	
R24	Mining Area 9 (including mine workers)	Industrial	Low	
R26	Herders, livestock and other users of the temporary water body	Agricultural	Medium	Herders, livestock & others that use this water body will be relatively vulnerable to changes in ambient air quality as they are at the temporary water body for a short duration.

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 specific Resettlement Action Plan (RAP).*

Figure 8-10 Receptors within 1km of the Project Site and 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 dioxides, carbon monoxide, carbon dioxide, VOCs, particulates and BTEX.

The principal 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 truckloads (if uncovered) and from materials/aggregates at the batching plant (if uncovered);
- Vehicle and Construction equipment emissions (e.g. NO_x, SO_x and CO, CO₂, 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 principal 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 EMISSIONS & 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 such as 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 are some residents of Dzhankeldy village (R12) and mining area 2 (R17) located in proximity to the local access road that runs through the project site. As such there is the potential for impacts relating to dust generation or particulate emissions as a result of increase vehicle movement on this route.

DUST EMISSION AND PARTICULATE DISPERSION FROM STORAGE OF BATCHING PLANT MATERIALS

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

In accordance with the UK's Institute of Air Quality Management (IAQM) for dust, detailed assessment relating to dust generation is required where there is a 'human receptor' within 350m of the boundary of the site (in this case within 350m of the batching plant). The batching plant is located approximately 1.6km 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 principal 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 8-6 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

NAME	QUANTITY	TYPE OF FUEL
Road roller	2	Diesel
Dump truck	10	Diesel
Platform lorry	1	Diesel
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 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 receptors within 200m from the project boundary include some residents at Kalaata village (R13). Receptors within 50m of local access road are some residents of Dzhankeldy village (R12) and the mining area 2 (R17) located in proximity to the local road that runs from the eastern plot through to the western plot.

Considering that the ambient air quality of the Project area is representative of a remote location without key influences and is well below established Uzbekistan Maximum Permissible, concentration of NO₂, SO₂ & CO, the release of pollutants from vehicles or equipment is not expected to result in noticeable incremental impacts to the local air shed of the Project area. In addition, neither is it expected to result in distinguishable changes in local ambient air quality at these receptor locations.

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 construction laydown areas. 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 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 staff and 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 the release of odour to the immediate surrounding areas from inappropriate containment and coverage associated with wastewater holding/septic tanks. Such impacts may therefore be limited to the immediate surrounding area where the laydown down areas and/or storage yards are located.

Table 8-7 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	Some residents of Dzhankeldy village (R12) – only those residents located in the immediate proximity of construction works	High	Minor to Moderate	- 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 (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 losses en-route.	Negligible to Minor
	Minor Negative	Mining Area 2 (including mine workers) (R17) - only when mining activities commences	Low	Negligible to Minor	- Cement and other fine powders will be sealed or covered after use, stored and transported in enclosed or banded 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 so it reduces vehicular power consumption.	Negligible

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 minimise 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 ($\geq 15\text{km/h}$). - All dust generating materials at the batching plant will be adequately covered and stored in enclosed or bunded containers - The EPC Contractor will obtain all the necessary permits related to the construction and operation of the batching plant. - Where applicable, the EPC Contractor will obtain all necessary permits required for the operation of HGV and diesel generators within emission standards.	

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
Gaseous emissions – From vehicle exhaust	Minor Negative	Some residents of Dzhankeldy village (R12)	High	Minor to Moderate	- Construction roads in the site will be designated and made clear to the drivers with signage for directions and speed limits placed all along the roads. - Unnecessary usage of vehicles, plant and equipment will be minimised – No unnecessary idling. - Deliveries of equipment/plant to the site will be efficiently managed to reduce the number of trips. - Exhaust fumes and particulates emitted from trucks and vehicles will be minimised by ensuring the use of good condition vehicles (e.g. compliant to vehicle emission requirements). - Lorries and trucks engines will be turned off while waiting on site to minimize gaseous emissions. Air-conditioned or heated shelters will be provided for drivers in designated waiting, loading and unloading areas to prevent drivers waiting in vehicles. - There will be pre-requisite requirements of site vehicles to ensure no black smoke before entering site and that any identified machinery or vehicles with black smoke will require maintenance and re-assessment before it is returned.	Negligible to Minor
	Minor Negative	Some Residents of Kalaata village (R13)	High	Minor to Moderate		Negligible to Minor
	Minor Negative	Mining Area 2 (including mine workers) (R17) - only when mining activities commences	Medium	Minor		Negligible
Emissions of VOCs and other hazardous volatiles	Negligible Negative	No Receptor	N/A	N/A	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	N/A

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					routes, away from the site boundary and away from receptor locations (where possible). • Volatile fuels and chemicals (including hazardous wastes) will be stored in sealed containers. On site storage of large quantities of volatile fuels will be avoided, equally prolonged exposure to direct sun and heat will be avoided. • Fires and material burning will not be allowed on the Project site. • Chemical storage areas will be purpose built and well maintained. A data log of all chemicals with MSDSs will be provided at the storage facility within easy access.	
Odour from onsite sanitary facilities	Negligible Negative	No Receptor	N/A	N/A	• Adequate and sufficient sanitary facilities for site workers must be provided in accessible locations to working areas. • Effective cleaning and maintenance of toilets is to be undertaken to avoid odour and cleaning records/inspection sheets displayed in the toilets. • All septic tanks must be sealed (with applicable vents) and fully functioning. • Septic tanks must be operated and maintained according to manufacturer recommendations. • Sanitary wastewater will be removed from site by licensed contractors and disposed in waste treatment facilities approved by the local municipality. • Where possible, all sanitary facilities and septic tanks will be sited away from receptor locations.	N/A

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.

Although 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 a discernible impacts at receptors.

Table 8-8 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	Active settlement within the eastern plot (R6)	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
	Negligible Negative	Newly constructed settlement within the eastern plot (R7)	High	Minor		Negligible
	Negligible Negative	Some residents of Dzhankeldy village (R12)	High	Minor		Negligible
	Negligible Negative	Some Residents of Kalaata village (R13)	High	Minor		Negligible

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACT
	Negligible Negative	Mining Area 2 (including mine workers) (R17) – only when mining activities commences	Low	Negligible to 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 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 8-9 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 and if dust is visible and/or complaints/grievances are received, dust meter should be used to quantitatively monitor dust.	Access Road to the Project site, Construction site and laydown areas, Batching plant, Dispersion to external receptors from point of generation. If complaints are received, monitoring will be undertaken at the three (3) ambient air quality locations monitored
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	Odour & VOCs	Daily olfactory observations for odour- as part of maintenance and inspection checks	All sanitary facilities available within the laydown areas, accommodation camps and work fields.

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
Material stores		Daily inspection of hazardous materials storage areas for any leaks or emission of VOCs	All hazardous material, chemical and fuel stores.
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.

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.

The only notable anthropogenic noise sources include a limited number of local roads that run through the project plots. Due to the remote nature of the Project area, it is observed that only residents of the Kalaata village and Dzhankeldy village use these local roads. As such, the few vehicles using these roads only occasionally generate discernible noises.

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 within and outside the Project site in order to quantify existing noise levels at the Project site and at receptor locations. Due to the lack of noise sources within or outside the site (with the exception of local roads), noise monitoring was undertaken at four (4) locations.

Noise monitoring was undertaken from 13th to 15th April 2021 at Kalaata village, Dzhankeldy village, the herder's house at the Project site and near some of the mining areas.

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 K). 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 (Day-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 LMax, LAmin, LA10, LA50, 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

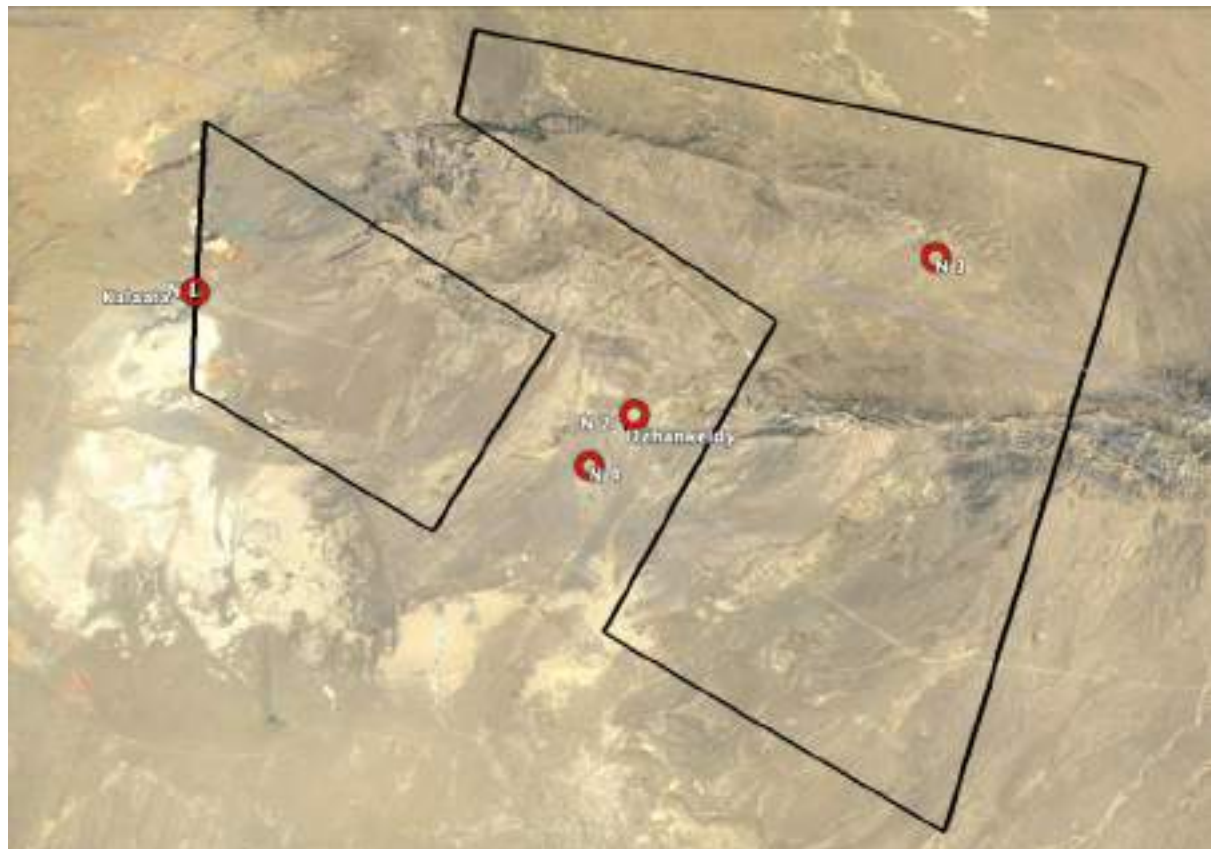


Table 9-1 Noise Monitoring Locations and Site Observations

ID	LOCATION	COORDINATES		PHOTOS	SITE OBSERVATION
		NORTHING	EASTING		
N-1	Kalaata village; at the corridor where vehicles move from Dzhankeldy village to Kalaata village	40.893343°	63.179218°	 View of Noise Meter	The monitoring location is generally quiet. However, occasional source of noise at this location was from local people and livestock. As the selected noise monitoring location was situated at the “corridor” of cars moving from Dzhankeldy village to Kalaata village, noise from moving cars were also discernible.
N-2	Dzhankeldy village approximately 350m to the nearest residential houses	40.855401°	63.332725°	 View of Noise Meter	The monitoring location is generally quiet. However, occasional source of observable noise at this monitoring location was from the frequent passing of motorcycle approximately 80m to the road. Local shepherd were also observed periodically grazing their livestock

ID	LOCATION	COORDINATES		PHOTOS	SITE OBSERVATION
		NORTHING	EASTING		
N-3	Herder's house within the site	40.894198°	63.441245°	 View of Noise Meter	Only the herder's family were present at this noise monitoring location. As such, the only noise source was from the motorcycle which the herder drove to Dzhankeldy village and from livestock (sheep, goat, donkeys, dogs)
N-4	Near the mining area, approximately 800m from the main road	40.842335°	63.316466°	 View of Noise Meter	Although the mining area was active, noise from mining activities was barely discernible. The primary source of noise at this location was from trucks and vehicles crossing through the noise monitoring location

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 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
- LMax – 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.

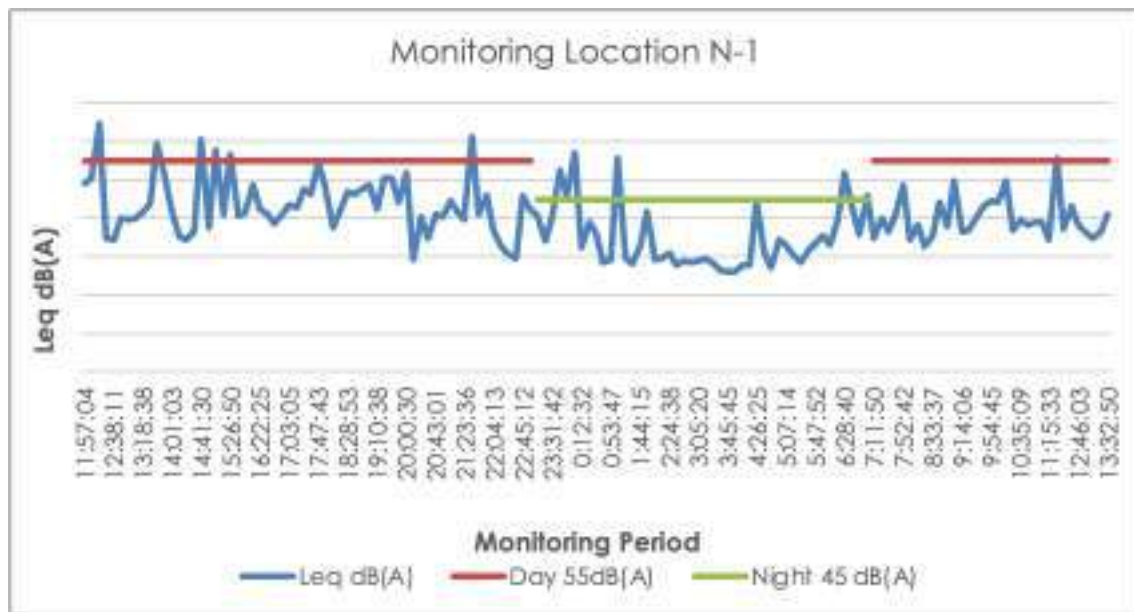
A summary of the noise levels recorded at noise monitoring location N-1 is presented below

Table 9-2 Summary of Daytime and Night time Noise Results at N-1

MONITORING PERIOD	LEQ dB(A)	LMAX dB(A)	LA90 dB(A)
Average			
Daytime	42.4	63.9	27.8
Night time	34.6	58.7	20.8
Minimum			
Daytime	29.2	51.9	19.3
Night time	25.9	48.5	18.4
Maximum			
Daytime	64.7	93.9	40.2
Night time	57	79.4	43

The noise results (Leq) obtained at monitoring location N-1 ranged from 29.2dB(A) to 64.7dB(A) between the daytime hours of 07:11am to 22:55pm and ranged from 25.9dB(A) to 57dB(A) between the night time hours of 23:11pm to 06:59am. From the table above, the day time & night time average Leq was recorded as 42.4dB(A) and 34.6dB(A) respectively. Upon comparison of this average results with the Uzbekistan day and night time standard, the average daytime and night time noise level (Leq (dBA)) were well below the limit of 55dB(A) and 45dBA respectively.

Figure 9-2 Noise Monitoring Result at N-1



From the figure above, peaks in noise were recorded above limit were recorded a total of seven (7) times during the day time monitoring period and four (4) times during the night time monitoring period. The highest noise level of 64.7dB(A) was recorded at 12:17pm on 13th April 2021 and reduced to 34.7dB(A) after 10 minutes. This high noise level followed by a sudden decrease might be due to vehicle or motorcycle movement at the time of monitoring as noted by the monitoring team.

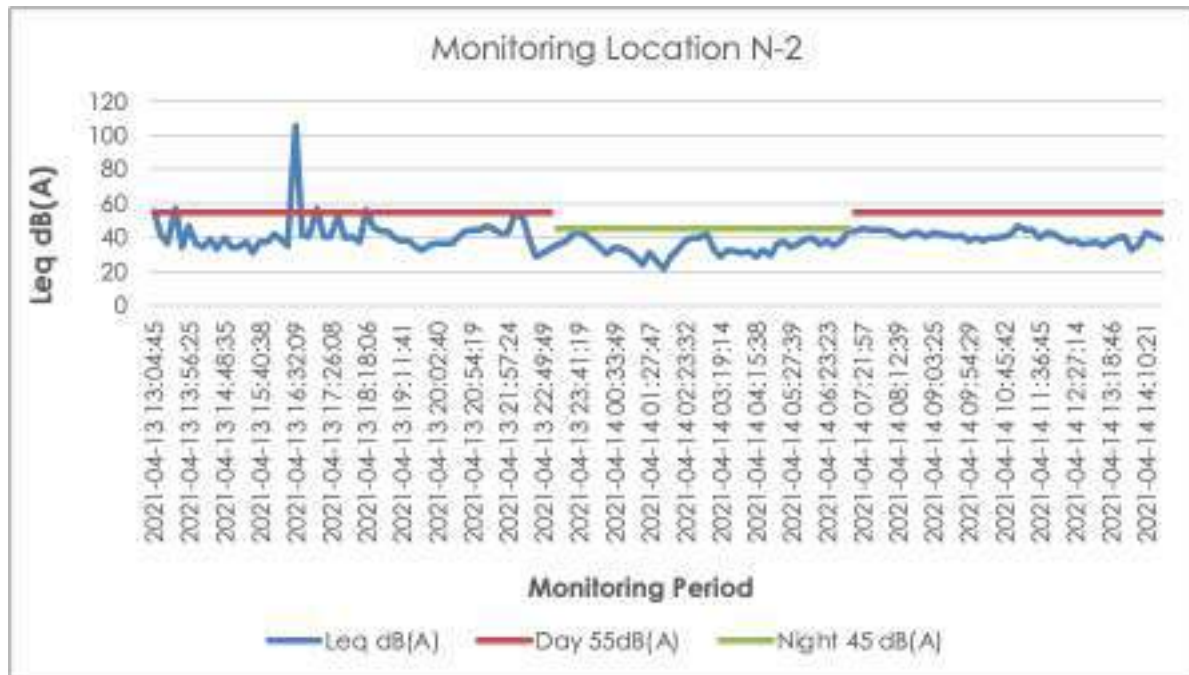
Table 9-3 Summary of Daytime and Night time Noise Results at N-2

MONITORING PERIOD	LEQ dB(A)	LMAX dB(A)	LA90 dB(A)
Average			
Daytime	41.3	58.6	28.1
Night time	34.5	52.5	26.4
Minimum			
Daytime	28.5	43.8	19.1
Night time	22	46.2	18.1
Maximum			
Daytime	106.1	106.8	50.8
Night time	43.6	64.9	36.6

The noise results (Leq) obtained at monitoring location N-2 ranged from 28.5dB(A) to 106.1dB(A) between the daytime hours of 07:11am to 22:59pm and ranged from 22dB(A) to 43.6dB(A) between the night-time hours of 23:10pm to 06:54am (see figure below). Upon comparison of the average Leq results obtained with Uzbekistan day and night time standard, the average daytime noise level of 41.3dB(A) and night time noise level of 34.5dB(A) were well below the limit of 55dB(A) and 45dBA respectively.

The noise levels recorded at noise monitoring location N-2 is presented in the figure below

Figure 9-3 Noise Monitoring Result at N-2



From the figure above, peaks in noise level were recorded only during daytime for a total of four (4) times. The highest noise level of 106.1dB(A) was recorded at 16:32pm on 13th April 2021 and reduced to 41dB(A) after 10 minutes. During the 10-minute monitoring period when this high noise level was recorded, local people were observed by the monitoring team to be talking near the monitoring location and sheep were grazing close to the monitoring location. This one-time high noise level seems to be an anomaly as people talking and sheep grazing is not expected to result in such high noise level.

Table 9-4 Summary of Daytime and Night time Noise Results at N-3

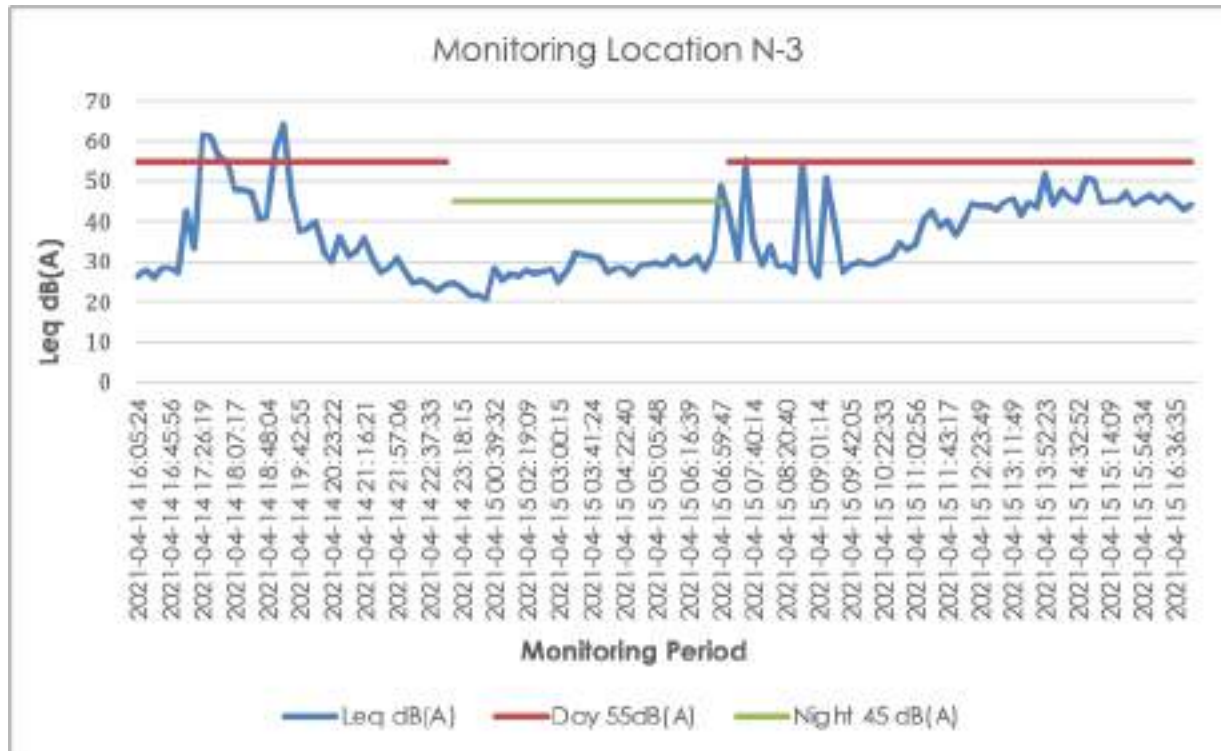
MONITORING PERIOD	LEQ dB(A)	LMAX dB(A)	LA90 dB(A)
Average			
Daytime	38.9	59.0	26.4
Night time	28.4	57.9	18.5
Minimum			
Daytime	22.8	45.1	17.6
Night time	20.4	46.5	17.4
Maximum			
Daytime	64.2	92.8	52.1
Night time	48.8	66.9	24

The noise results (Leq) obtained at this monitoring location ranged from 22.8dB(A) to 64.2dB(A) between the daytime hours of 07:09am to 22:57pm and ranged from 20.4dB(A) to 48.8dB(A) between the night-time hours of 23:08pm to 06:59am (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 38.9dB(A) and night time noise level of 28.4dB(A) were well below the limit of 55dB(A) and 45dB(A) respectively.

The noise levels recorded at noise monitoring location N-3 is presented in the figure below.

Figure 9-4 Noise Monitoring Result at N-3



From the figure above, peaks in noise level above 55dB(A) were recorded a total of six (6) times at daytime and once at night time. The highest Leq noise level of 64.2dB(A) was recorded at 19:09pm on 14th April 2021. During the 10 minute monitoring period when this high noise level was recorded, a motorcycle was passing by the monitoring location and auto signal was also noted.

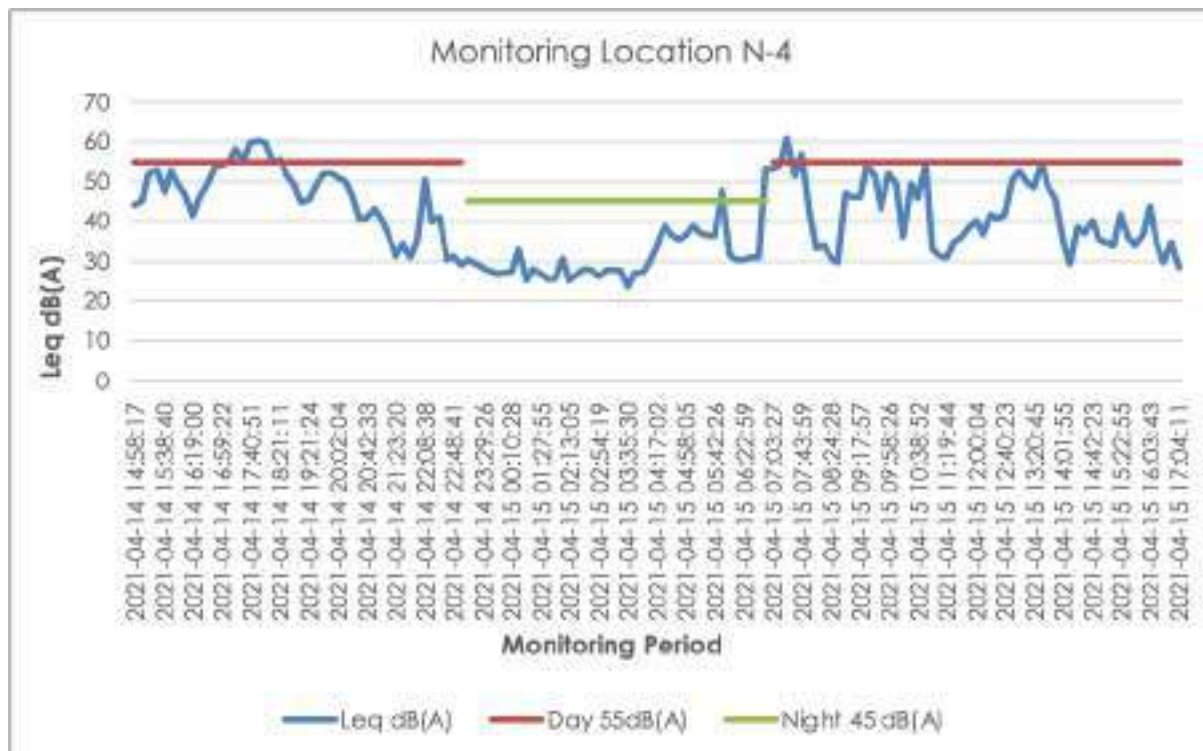
Table 9-5 Summary of Daytime and Night time Noise Results at N-4

MONITORING PERIOD	LEQ dB(A)	LMAX dB(A)	LA90 dB(A)
Average			
Daytime	43.8	62.9	30.8
Night time	30.9	55.1	21
Minimum			
Daytime	28.5	48.4	17.2
Night time	23.6	48.4	16.8
Maximum			
Daytime	60.7	91.5	53.9
Night time	53.2	82.9	32.8

The noise results (Leq) obtained at this monitoring location ranged from 29dB(A) to 60.7dB(A) between the daytime hours of 07:03am to 22:58pm and ranged from 23.6dB(A) to 53.2dB(A) between the night-time hours of 23:09pm to 06:53am (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 43.8dB(A) and night time noise level of 30.9dB(A) were well below the established Uzbekistan noise limit of 55dB(A) and 45dB(A) respectively.

The noise levels recorded at noise monitoring location N-4 is presented in the figure below.

Figure 9-5 Noise Monitoring Result at N-4



9.1.1.3 Conclusion of Construction Noise Baseline

Considering all noise measurements, it is evident that peak noise levels at the monitoring locations were recorded more during the daytime hours than at night. The graphs presented show a trend that noise level decreased at night time and started increasing between 6:00am and 7:00am.

It is noted that the average noise levels (Leq) recorded at all noise monitoring locations is well within the established regulatory limits and the minimum noise levels at all monitoring locations is below 30dB(A) which indicates limited noise influences. The short duration peaks in noise recorded more during daytime hours and 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

In terms of a baseline, no noticeable vibrations were encountered at any time during the site visit and site survey undertaken in April 2021. 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 from areas of works (WTG areas). Findings from the numerous site visits and review of satellite imagery has identified residential, commercial & agricultural receptors within 2km of the proposed Project site and within 2km from each wind turbine that may be susceptible to changes in noise levels.

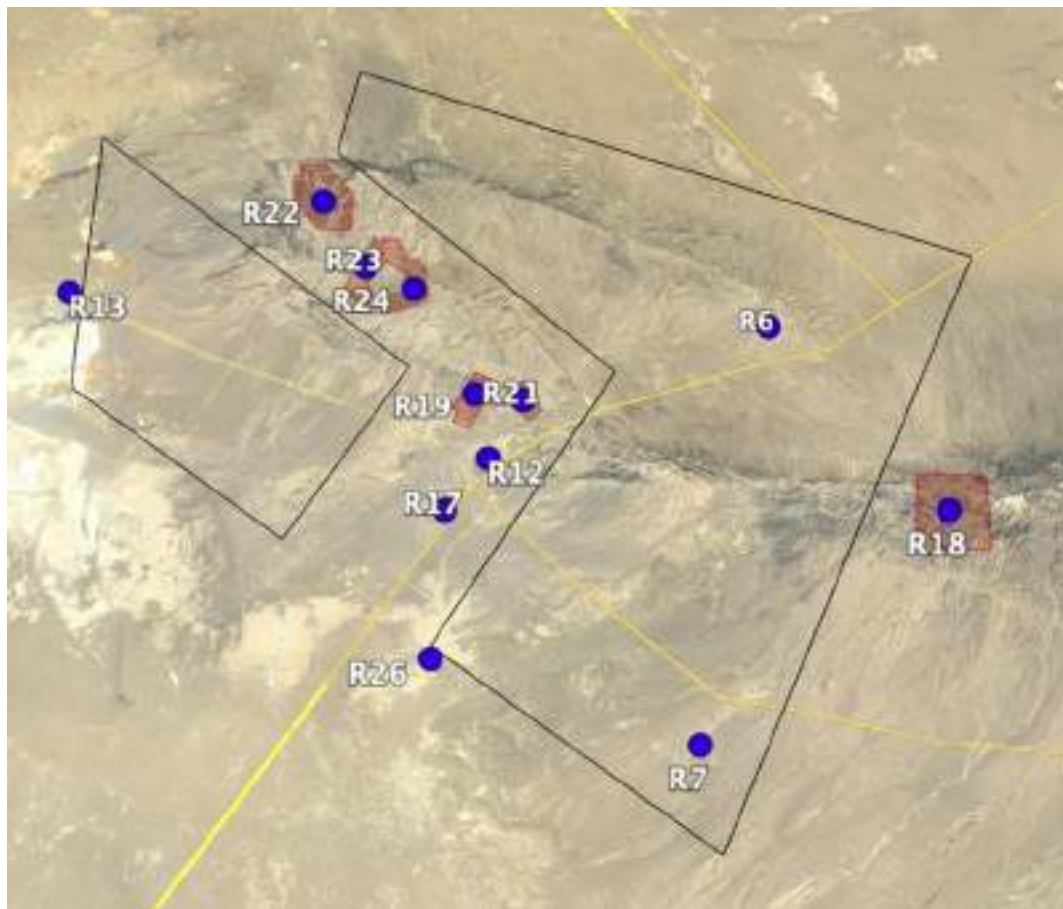
These included users of the settlements within the project site, residents of Dzhankeldy village within 2km of the eastern plot, residents of Kalaata village within 2km of the western plot, mining area 2 approximately 1.9km west of eastern plot, mining area 3 approximately 1.1km east of eastern plot, mining area 4 approximately 1.8km north east of western plot, mining area 6 approximately 1.3km west of eastern plot, mining area 7 approximately 500m south of eastern plot mining area 8 approximately 570m north of the western plot, mining area 9 approximately 930m north & 950m south of the western & eastern plots respectively and users of the temporary water body approximately 320m south of the eastern plot.

Table 9-6 Potential Noise and Vibration Receptors – Wind Farm

RECEPTOR ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
R6	Active settlement within the eastern plot	Residential	High	Residents at the active settlements and in the villages will be sensitive to changes in noise levels.
R7	Newly constructed settlement within the eastern plot	Residential	High	
R12	Residents of Dzhankeldy village	Residential	High	
R13	Residents of Kalaata village	Residential	High	
R17	Mining area 2 (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.
R18	Mining area 3 (including mine workers)		Low	
R19	Mining area 4 (including mine workers)		Low	

RECEPTOR ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
R21	Mining area 6 (including mine workers)		Low	
R22	Mining area 7 (including mine workers)		Low	
R23	Mining area 8 (including mine workers)		Low	
R24	Mining area 9 (including mine workers)		Low	
R26	Herders and Livestock at temporary water body	Agricultural	Medium	Herders & livestock that use this water body will be relatively vulnerable to changes in noise level as they are at the temporary water body for a short duration.
-	Construction workers living on site	Residential	High	Workers living in the accommodation camp at the site will be particularly vulnerable to changes in ambient noise levels as they will be living on site during the construction phase of the Project.

Figure 9-6 Receptors within 2km of the Project Site



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 (e.g. earthworks, compaction)
- Civil Works (
- Construction and Installation;
- Internal Road Paving/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 and such receptors within 2km of each wind turbine included; Dzhankeldy village (R12), mining area 3 (R18), mining area 6 (R21), mining area 7 (R22), mining areas 8 (R23) and mining area 9 (R24)

Note: The livestock stable and settlement on site will not be on the project site during construction and as such they have not been identified as receptors to construction phase impacts

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 -9-7 Noise Level of Proposed Construction Equipment

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

EQUIPMENT	BS 5228-1:2009 REFERENCE	SPL dB (A)
50t truck crane	Table C. 4, 46	67
Gantry crane	Table C.4,52	75
Tower crane	Table C.4.48	76
Vehicle crane	Table C. 4, 50	71
Diesel Generator	Table C.4, 84	74
Truck	Table C.4, 62	66
Forklift	Table D.7 96	77
Batching Plant Works		
Concrete pump truck	Table C.4, 30	79
Concrete delivery truck	Table C.4, 20	80
Truck	Table C.4, 62	66
Diesel generator	Table C.4, 84	74
Wheel loader	Table C.6, 28	76
Backhoe excavator	Table C.2,3	78
Crawler bulldozer	Table C.6,29	88
Dump truck	Table C.2, 30	79

Predicted noise levels for construction plant impacts at receptors have been calculated using the noise ratings for equipment (as above), in combination with distance attenuation to receptors. The phases of construction have been split (as above) and the noise pressure levels from expected equipment have been combined. The predictions assume that each piece of equipment will only be operational for 50% of the working day. The predictions also work on the basis that all of the equipment is located at the same location at the boundary of the site and boundary of the batching plant as applicable (a worst-case).

In order to derive representative noise level 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 ' $25 \times \log(10/\text{Distance to receptor}) + 2$ '. **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 (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 9-8 Construction Phase Noise - ABC Assessment

ASSESSMENT CATEGORY AND THRESHOLD VALUE PERIOD (L_{Aeq})	THRESHOLD VALUE, IN DECIBELS - dB(A)		
	CATEGORY A	CATEGORY B	CATEGORY C
Daytime (0700 to 1900 hrs) and Saturdays (0700 to 1300 hrs)	65	70	75
Evenings & Weekends	55	60	65
Night-time (2300 to 0700 hrs)	45	50	55
NOTE 1 A significant effect has been deemed to occur if the total L_{Aeq} 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 L_{Aeq} 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 9-9 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
R12	N-2	41.3	34.5	35.2	42.3	37.9	1.0	3.4
R21	N-2	41.3	34.5	36.0	42.4	38.3	1.1	3.8

In accordance with the ABC method, as the daytime & night time ambient noise level at R12 (when rounded to the nearest 5dB(A)) are less than category A values, this means Category A threshold values are applicable to these residential receptors.

The day time & night time noise impacts at the residential receptor (R12) is below the threshold value of 65dB(A) for daytime & 45dB(A) for night time.

As R21 is not residential receptors, 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 site preparation, earth & civil works impacts from the Project to receptors at this location would not be discernible both at day time and at night time.

The table below shows the anticipated noise levels for those receptors located away from baseline noise monitoring locations

Table 9-10 Site Preparation, Earth & Civil Works Noise Attenuation by Distance at R18, R22, R23 & R24,

RECEPTOR	DISTANCE FROM SOURCE	PREDICTED NOISE LEVEL
Source Noise: 86.9dB(A) (at 10m)		
R18	1100	37.8
R22	500	46.4
R23	570	45.0
R24	930	39.7

Note: Where receptors are located at different distance from the eastern & western plot, the anticipated noise level at the nearest distance has been presented

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 9-11 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
R12	N-2	41.3	34.5	36.0	42.4	38.3	1.1	3.8
R21	N-2	41.3	34.5	36.8	42.6	38.8	1.3	4.3

In accordance with the ABC method outlined above, as the daytime & night time ambient noise level at R12 (when rounded to the nearest 5dB(A)) are both 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 the residential receptor (R12) is below the threshold value of the Category A (65dBA)).

As R21 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 & foundation works impacts from the Project to receptors at these locations would not be discernible both at day time and at night time at R21.

The table below shows the anticipated noise levels for those receptors located away from baseline noise monitoring locations

Table 9-12 Building & Foundation Works Noise Attenuation by Distance at R18, R22, R23 and R24

RECEPTOR	DISTANCE FROM SOURCE	PREDICTED NOISE LEVEL
Source Noise: 87.6dB(A) (at 10m)		
R18	1100	38.6
R22	500	47.1
R23	570	45.7
R24	930	40.4

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 81.5dB(A) as perceived at 10m distance.

Table 9-13 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
R12	N-2	41.3	34.5	29.8	41.6	35.8	0.3	1.3
R21	N-2	41.3	34.5	30.6	41.7	36.0	0.4	1.5

In accordance with the ABC method outlined above, as the daytime & night time ambient noise level at R12 (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 the residential receptor (R12) is below the threshold value of the Category A (65dBA)).

As R21 is not residential receptors, 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 mechanical & installation works impacts from the Project to receptors at these locations would not be discernible both at day time and at night time at R21.

The table below shows the anticipated noise levels for those receptors located away from baseline noise monitoring locations

Table 9-14 Mechanical & Installation Works Noise Attenuation by Distance at R18, R22, R23 and R24

RECEPTOR	DISTANCE FROM SOURCE	PREDICTED NOISE LEVEL
Source Noise: 81.5dB(A) (at 10m)		
R18	1100	32.4
R22	500	41.0
R23	570	39.6
R24	930	34.3

BATCHING PLANT WORKS

Where all equipment is operating at the same location for 50% of the working day, the continued cumulative noise level from the batching plant would be 87.1dB(A) as perceived at 10m distance.

Table 9-15 Summary of Batching Plant 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	46.6	47.2	47.0	8.8	10.3
Mining area 2- includes worker accommodation areas	N4	39.0	33.8	40.2	42.7	41.1	3.7	7.3

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 batching plant work impacts from the Project to this receptor would not be discernible at daytime but may be slightly discernible at night time as the cumulative noise level at this receptor location at night time is slightly above the established limits.

The table below shows the anticipated noise levels for those receptors located away from baseline noise monitoring locations

Table 9-16 Batching Plant Works Attenuation by Distance

RECEPTOR	DISTANCE FROM SOURCE (BATCHING PLANT)	PREDICTED NOISE LEVEL
Source Noise : 87.1dB(A) (at 10m)		
R23	8678	15.6
R24	7152	17.7
R25	7739	16.9
R26	10361	13.7
R28	10500	13.6
R29	7000	18.0
Mining Area 1	6852	18.2

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. 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 local road which runs from the south east extent to the south west extent of the eastern plot and connects to the western plot from the east of this plot to the west has a very low traffic (i.e. one (1) vehicle per 10 minutes during daytime and one (1) vehicle per 1 hour at night time, based on site observations). 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. This will influence noise levels and impacts to users of these roads. 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, herders grazing their livestock in nearby lands and residents of Kalaata village located close to the western plot boundary. 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.

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 residential houses of the Kalaata village within 500m may be negligible while impacts at receptor location over 500m are not expected to be discernible due to the attenuation of vibration over distance.

With respect to the fauna, vibration associated with construction may trigger a flight response for livestock drinking and resting at the temporary water body approximately 350m south of the eastern plot.

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 north eastern extent of the Project site. This will potentially expose the workers to construction phase noise. Given that the worker accommodation is located approximately 200m from the proposed laydown and 1.6km from the batching plant, the anticipated noise levels that will be perceived at the worker accommodation as a result of site preparatory works, building & foundation works, mechanical & installation works and batching plant activities is presented in the table below

Table 9-17 Summary of Noise Assessment at Worker Accommodation

CONSTRUCTION ACTIVITY	SOURCE NOISE AT 10M dB(A)	DISTANCE OF WORKER ACCOMMODATION FROM LAYDOWN (M)	PREDICTED NOISE LEVEL
Site Preparation, Earth & Civil Works	86.9	200	56.3
Building & Foundation Works	87.6		57.1
Mechanical & Installation Works	81.5		50.9
Batching Plant	87.1	1600	34.0

Based on the above table, the predicted noise level at the worker accommodation is above the IFC & Uzbekistan noise limit of 55dB(A) during daytime for site prep, earth & civil works and building & foundation works only.

Table 9-18 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	Some residents of Dzhankeldy village (R12)	High	Minor	- Consideration of noise fences, or other methods to attenuate construction noise, will be required close to non-mobile equipment such as generators or at boundaries for key receptors that may have higher assessed impacts. - The EPC Contractor will, at all times, carry out all work in such a manner as to keep any disturbance from noise to a minimum (by phasing noisy works). - Acoustic covers on machine engines to remain closed at all times as applicable. - Where practical, electrically powered plant will be preferred to mechanically powered alternatives. - All mechanically powered plant, diesel engine vehicles and compression equipment will be fitted with noise control equipment (exhaust silencers, mufflers) as available from the manufacturer. - Where possible, the highest noise emitting activities will be undertaken in a central site area, or within an enclosed structure. For example, fabrication of materials will be carried out away from the site boundaries and or within structures. - 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	Negligible to Minor
	Negligible Negative	Mining Area 3 (including mine workers) (R18)	Low	Negligible to Minor		Negligible
	Negligible Negative	Mining Area 6 (including mine workers) (R21)	Low	Negligible to Minor		Negligible
	Negligible Negative	Mining Area 7 (including mine workers) (R22)	Low	Negligible to Minor		Negligible
	Negligible Negative	Mining Area 8 (including mine workers) (R23)	Low	Negligible to Minor		Negligible

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
	Negligible Negative	Mining Area 9 (including mine workers) (R24)	Low	Negligible to Minor	exceed 70dB(A) and maximum noise level at 1m from open air installations do not exceed 85dB(A). - 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. - Night time construction works will be avoided as much as practicable to prevent noise impact at the accommodation camp. 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 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
Vehicular Noise- Noise from movement of	Negligible Negative	Some residents of Dzhankeldy village (R12)	High	Minor	Limit unnecessary usage of vehicles/equipment – No idling – Equipment to be shut or throttled down when in intermittent use.	Negligible

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
construction vehicles	Negligible Negative	Some residents of Kalaata village (R13)	High	Minor	- Delivery vehicles will be prohibited from waiting outside the site or at the project western plot boundary 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. - Notify Kalaata village residents residing near the western plot boundary of noisy activities to be conducted nearby the boundary with a minimum one week notice in advance	Negligible
	Negligible Negative	Mining Area 2 (including mine workers) (R17) – only when mining activities commences	Low	Negligible to Minor	- 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 western plot boundary, the need for trucks to reverse will be minimized as far as practicable. This is so as to minimize noise impact at some Kalaata village residence and reduce the frequency at which disturbing but necessary reverse warnings sirens will be used. - Speed limits established in the Traffic & Transportation Management Plan will be adhered to.	Negligible

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
Construction vibration impacts (including vehicle vibration)	Negligible Negative	Some residents of Kalaata village (R13)	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 particularly the western plot boundary. - 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 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

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
Impacts at the accommodation areas located at the Project site	Minor Negative	Construction Workers living on site	High	Minor to Moderate	- 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 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.	Minor

9.3.2 Operational Phase

9.3.2.1 Wind Turbine Noise

During the operation of the wind turbines, noise will be generated from a number of different mechanism grouped into mechanical and aerodynamic sources. Both mechanical and aerodynamic noise will result in the propagation of noise 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 emissions from the operation of the wind farm, a preliminary noise modelling study was undertaken in accordance with IFC EHS Guideline on Wind Energy. This preliminary noise modelling study was undertaken due to the presence of noise sensitive receptors within proximity of the Project. The preliminary noise modelling study considered the wind turbine location, receptor locations, model of turbine, number of wind turbines and sound power levels based on data supplied by 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 location was 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 was 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 9-19 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
				LA90,T DB					
R6	Residential	DZH36	533	39.5	41.9	45.3	48.1	49.5	49.8
R7	Residential	DZH55	6784	15.7	18.2	21.5	24.4	25.8	26.1
R12	Mixed Use (residential, educational)	DZH70	2264	26.0	28.4	31.8	34.6	36.0	36.3
R13	Mixed Use (residential, commercial)	DZH83	5244	17.3	19.8	23.1	26.0	27.4	27.7
R25	Agricultural	DZH70	7657	15.1	17.6	20.9	23.8	25.2	25.5
R26	Agricultural	DZH70	7668	15.1	17.6	20.9	23.8	25.2	25.5

Note:

- **R6** – Active settlement within the eastern plot boundary,
- **R7** - Newly constructed settlement within the eastern plot
- **R12** – Dzhankeldy village;
- **R13** – Kalaata village;
- **R25** – Temporary water body
- **R26** - Livestock and other users of the temporary water body

Based on the table above, predicted noise emissions from wind turbines at the assessed receptors ranged between approximately 25.5dB(A) to 49.8dB(A) at 10m/s. The predicted noise levels at R7, R13, R25 & R26 are well within the 35dB LA90 noise limit established within the IFC EHS Guidelines: Wind Energy indicating that detailed modelling is not required at these locations. However, the predicted noise level at R6 & R12 are above the 35dB LA90 noise limit and as such, detailed modelling is required at these locations.

The figures below present the noise dispersion plots centred at Receptors R6 & R12 at wind speeds 5m/s and 10m/s

Figure 9-7 Noise Contour at Receptor R6 (5m/s Wind Speed)



Figure 9-8 Noise Contour at Receptor R6 (10m/s Wind Speed)

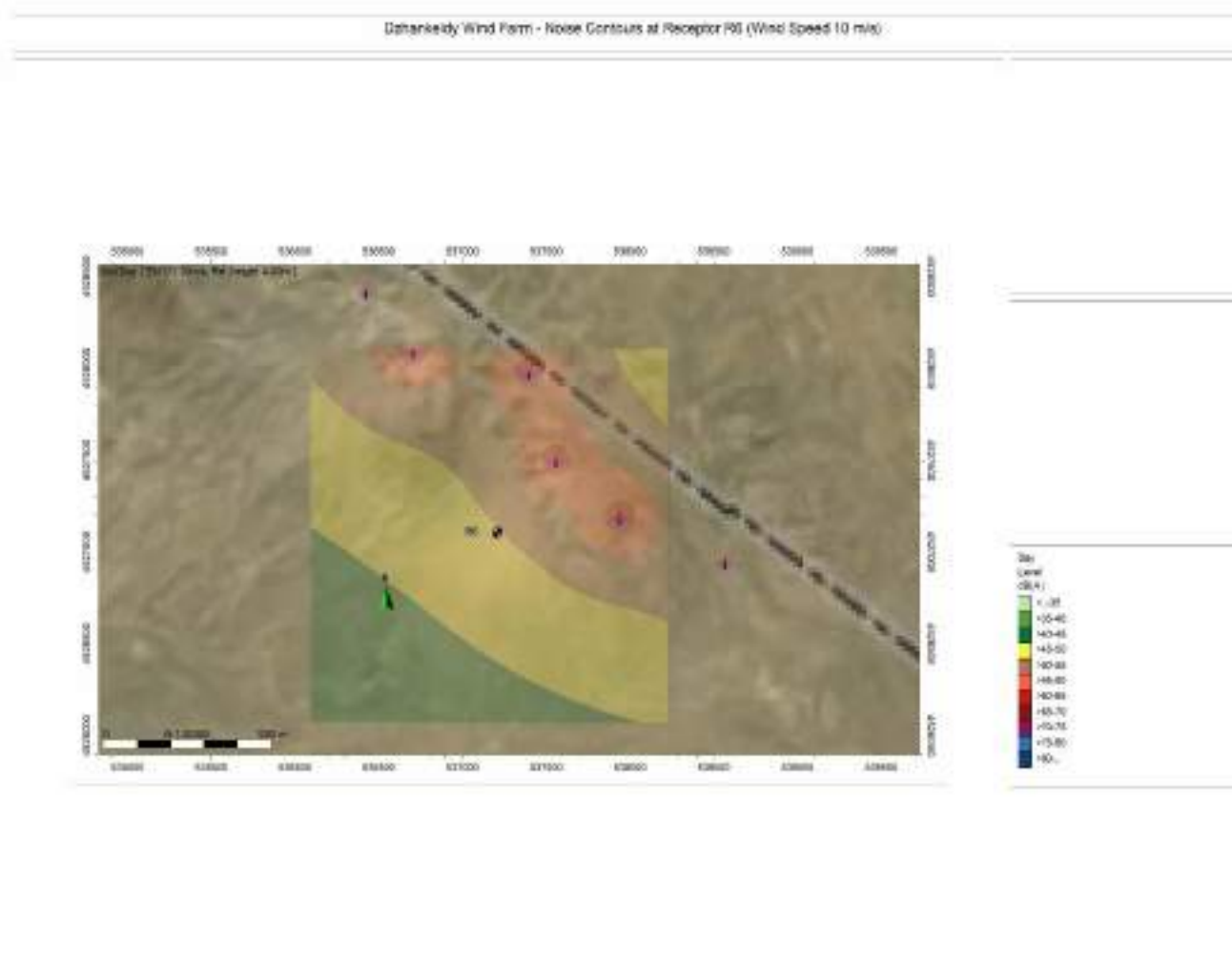


Figure 9-9 Noise Contour at Receptor R12 (5m/s Wind Speed)

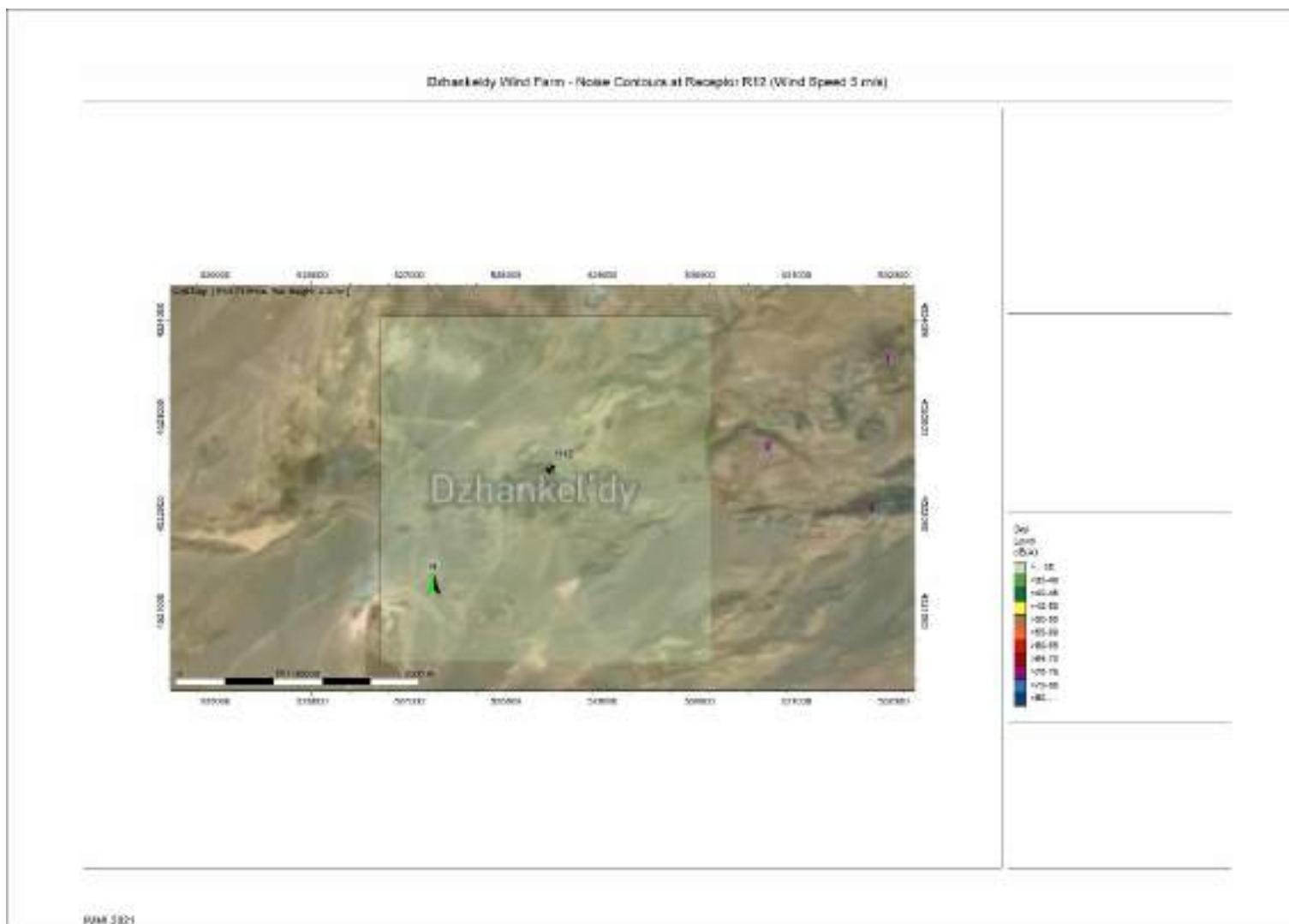


Figure 9-10 Noise Contour at Receptor R12 (10m/s Wind Speed)



Table 9-20 Compliance Status with IFC/Uzbekistan Assessment Limits

RECEPTOR	RECEPTOR TYPE	COMPLIANCE STATUS		
		INITIAL IFC 35 dB LA90,T CRITERION	IFC GENERAL / UZBEKISTAN DAYTIME 53 dB CRITERIA	IFC GENERAL / UZBEKISTAN NIGHT-TIME 43 dB CRITERIA
R6	Residential	N	Y	N
R7	Residential	Y	Y	Y
R12	Mixed Use (residential, educational)	N	Y	Y
R13	Mixed Use (residential, commercial)	Y	Y	Y
R25	Agricultural	Y	Y	Y
R26	Agricultural	Y	Y	Y

Note: **Y:** Yes and **N:** No

As can be seen from the table above, only receptor R6 (located within the project site) is above the night-time criteria set out by IFC General Guidance/Uzbekistan national guidance and will therefore require mitigation measures.

The detailed noise modelling undertaken at R6 & R12 are described below.

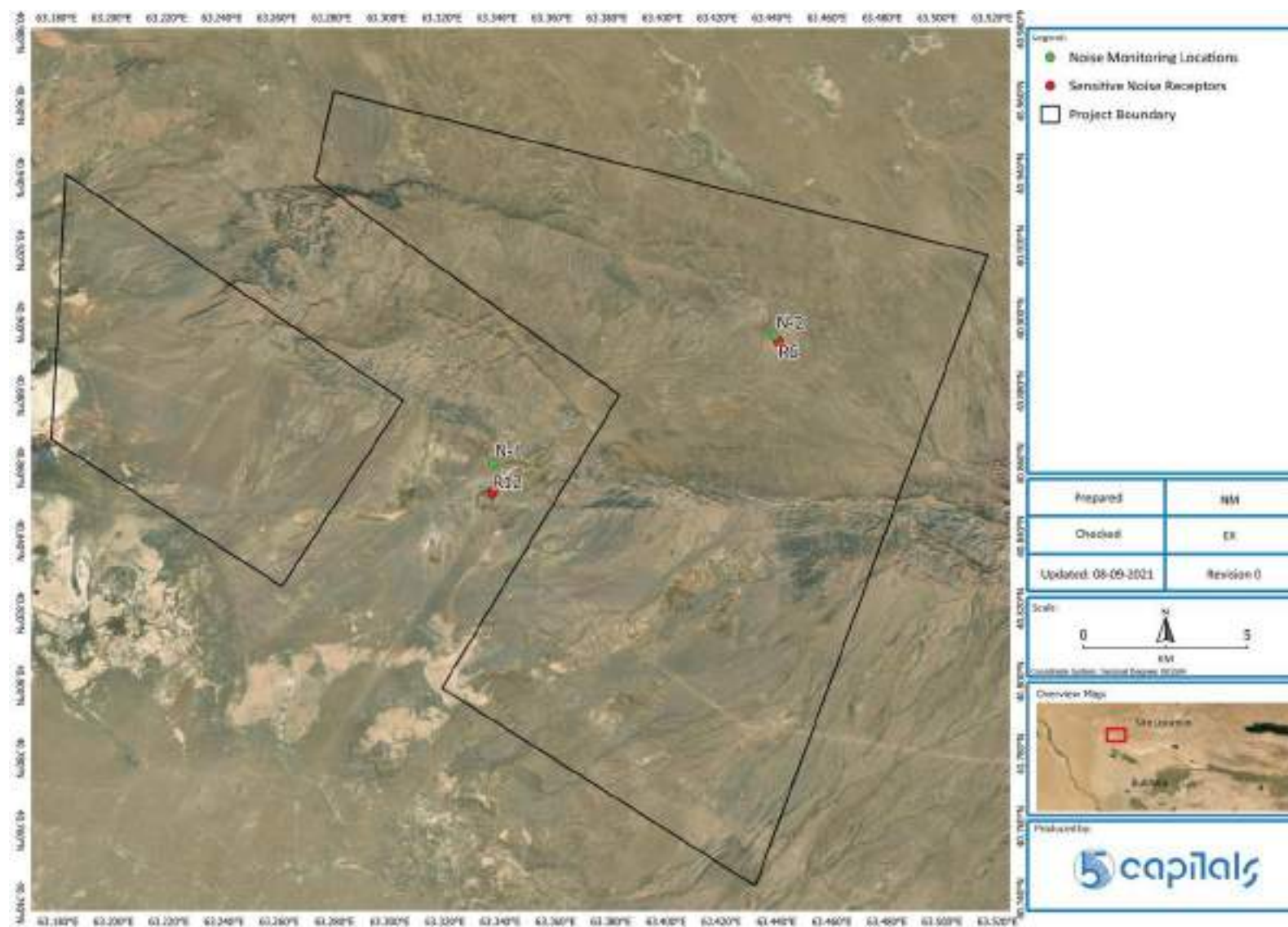
DETAILED NOISE MODELLING

As two (2) receptors have been identified to be non-compliant with the initial IFC 35 dB LA90,T criterion, a more detailed modelling, including background ambient noise measurements is required.

5 Capitals conducted continuous background noise monitoring at two proxy locations, NM1 and NM2 between the 20th of July 2021 and 9th August 2021. The two locations, were chosen to represent the two (2) non-compliant receptors identified in the preliminary model. Noise data were recorded in ten-minute intervals, with LA90,10min readings synchronised with the on-site wind mast data.

The noise monitoring locations in relation to receptor location is shown in the figure below

Figure 9-11 Detailed Noise Monitoring Locations



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. It should be noted that the final layout, number and WTG model/specification is still under review, however, the noise modelling was undertaken using the WTG layout and specification detailed outline in the Project Description chapter of this ESIA

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.

As observed over the course of the monitoring survey, it was evident that besides noise from wind blowing, there was no other significant noise source(s). Therefore, to gather sufficient data for the regression analysis, daytime and evening periods were aggregated to the period 0700 to 2300 hrs (as per the adopted criteria). The night-time period remains between 2300 to 0700 hrs.

RESULTS

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

Figure 9-12 Regression Analysis at Survey Location NM1

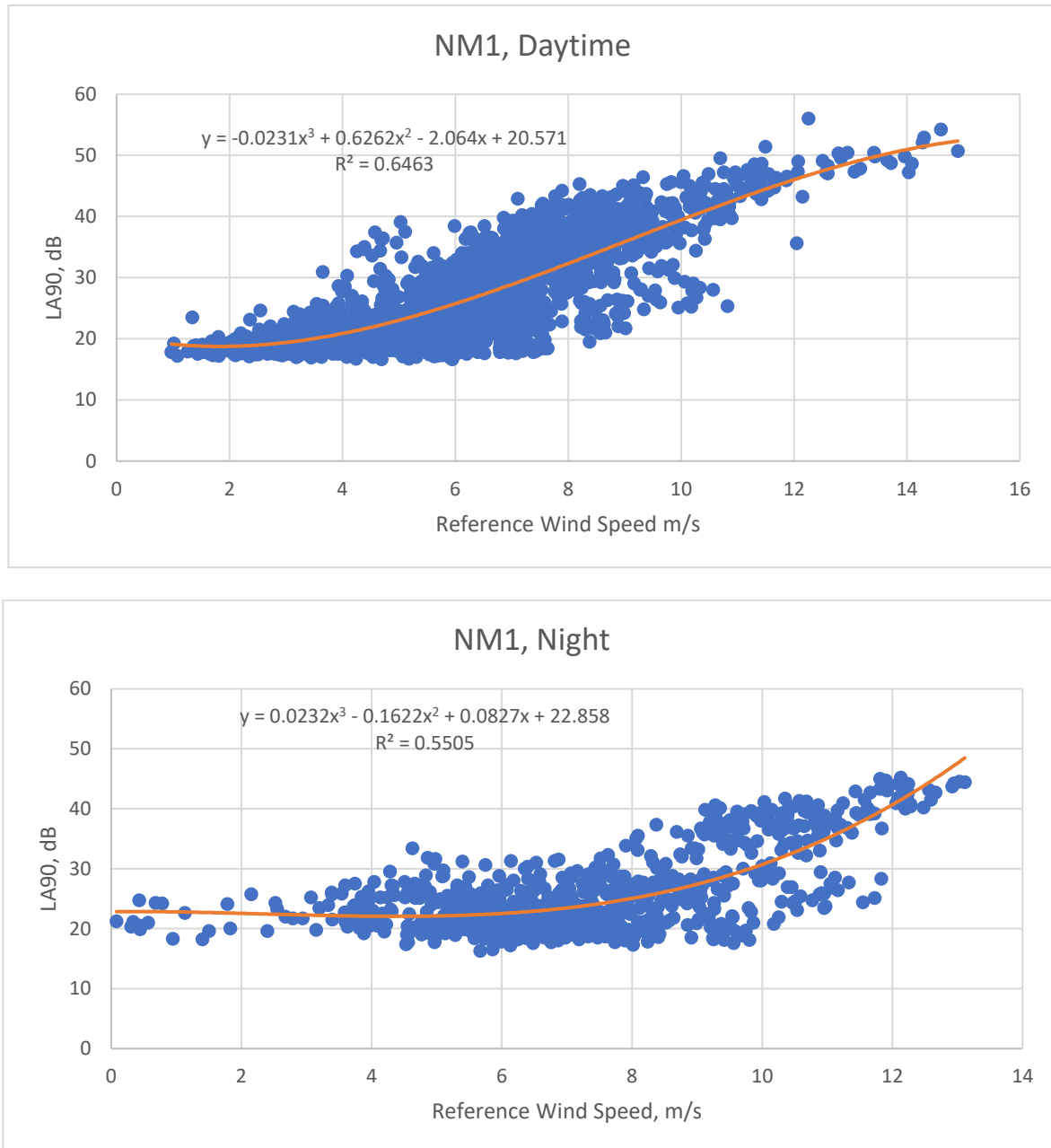
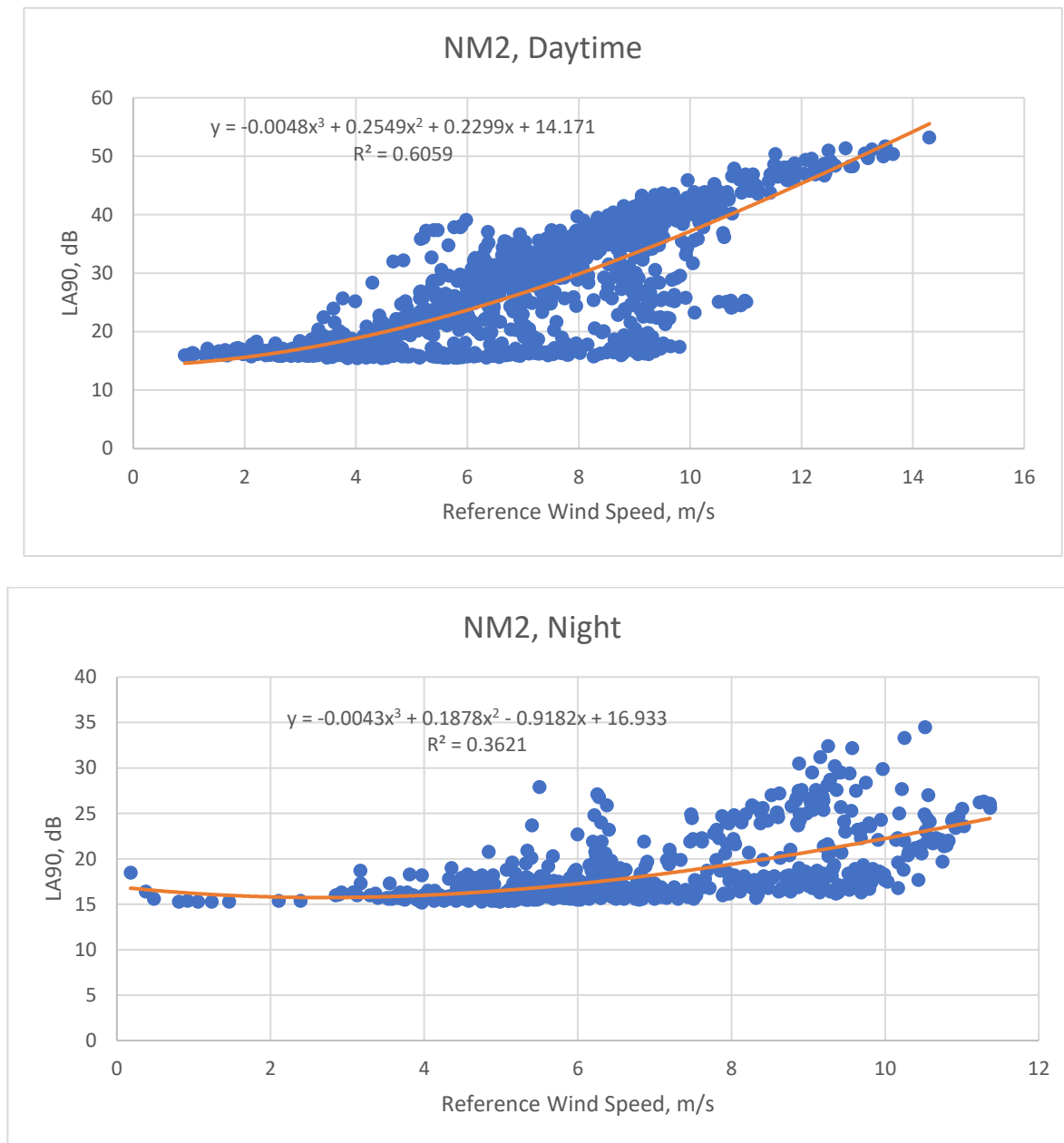


Figure 9-13 Regression Analysis at Survey Location NM2



The Institute of Acoustics guideline states that 'for the protection of sleep of occupants within buildings an external free-field level of 43 dB LA90 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 (see table 9-16)

Table 9-21 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
R6	37/22	53/43	49.8
R7	40/31	53/43	26.1
R12	40/31	53/43	36.3
R13	40/31	53/43	27.7
R25	40/31	53/43	25.5
R26	40/31	53/43	25.5

As presented in the table above, noise contributed from the WTGs is higher (49.8dB(A)) than the night-time background noise (43 dB(A)) at R6.

It is important to note that R6 includes an active settlement used by three (3) herders from the same extended family. This settlement is used by all three (3) herders and their families all year round with one (1) family occupying the settlement during a given time, therefore the sensitivity of this receptor is considered to be 'High'.

The magnitude of impact at 10m/s wind speed is anticipated to be Moderate for R6 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 L.

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 a key 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 9-22 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 Turbine Noise	Moderate Negative	Active settlement within the eastern plot (R6)	High	Moderate to Major	Relocation of the settlement will be undertaken in accordance with the Project's Resettlement Action Plan	n/a
	Negligible Negative	Newly constructed settlement within the eastern plot (R7)	High	Minor	- Third parties/ herders will have access to a grievance mechanism in order to make any complaints regarding noise during the operation phase. - Wind turbines will be operated in reduced noise mode according to IFC EHS Guideline on Wind Energy - WTG operations will be curtailed above the wind speed at which turbine noise becomes unacceptable at receptor locations	Negligible
	Negligible Negative	Residents of Dzhankeldy village (R12)	High	Minor		Negligible
	Negligible Negative	Residents of Kalaata village (R13)	High	Minor		Negligible
	Negligible Negative	Temporary water body (R25)	Medium	Negligible to Minor		Negligible
	Negligible Negative	Herders and Livestock at temporary water body (R26)	Medium	Negligible to 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 need to 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 9-23 Noise Monitoring Requirements

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
Construction			
Day time noise	Leq(A)	Weekly for 10-15 minutes periods at each location	Baseline receptor locations, 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 other 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

Based on the numerous site visits undertaken to date and review of satellite imagery, mining areas were identified to be located in-between the western & eastern plots of the Project. As such consultation was undertaken with the State Committee on Geological and Mineral Resources in order to understand the nature of the mining activities at these mining areas, workers involved in mining activities and the potential use of the Project site.

CONSULTATION WITH STATE COMMITTEE ON GEOLOGY & MINERAL RESOURCES

Consultation with the State Committee on Geological and Mineral Resources commenced via letter correspondence on 29th March 2021 and response received from the State Committee revealed that the mining areas identified in March were all inactive and not in use. Face-to-face meeting with the State Committee was organised on 17th July 2021 and it was revealed that a total of nine (9) mining areas were located in-between the western & eastern plots of the Project site majority of which were inactive (seven (7)).

Geological survey is currently ongoing at two (2) active mines and as indicated by the State Committee, extraction of crushed stone will commence once permit is issued to the mining companies.

Description of these mining areas & location of these areas in relation to the Project site is presented in the Local Context & Potential Receptors sub-section of this ESIA.

A summary of the consultation held with the State Committee on Geological & Mineral Resources confirming the nine (9) mining areas is presented below.

DATE OF CONSULTATION	17 th 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	Mr. Akbar Mavlonov – Business Manager (ACWA Power) Mrs Zilola Kazakova – Social Consultant (Juru Energy) Mr Sirojiddin Berdiyev – Chief OHTL engineer
MATERIALS USED	Kmz files related to the Project

MAIN OUTCOMES

- Owners of the mining areas R16 and R17 were identified by the committee and have license to undertake research works. The owners of the mining areas R18, R20, R22, R22 could not be identified by the Committee and as such are considered inactive mining areas whereas mining areas R19, R21 and R23 are inactive mining areas as the committee has no information on their license.
- 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 activities, 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.

After the receipt of information on the owners of some mining areas, phone call consultations were held with Peshku Cement LLC and Kogon 97 Avtokorhona LLC on 19th & 20th August 2021 requesting for additional information about their mining activities. Direct consultation with Asian Cement and Glass LLC and Richland International LLC could not be undertaken as representatives of these mining companies were not reachable. However, the Deputy Director of Samarkand-Bukhara Regional Inspectorate for Mining and Geological Activities Control was consulted and he provided information regarding the mining areas in the Project area.

The table below presents a summary of the findings on the nine (9) mining areas based on consultation with owners and the Deputy Director of Samarkand-Bukhara Regional Inspectorate for Mining and Geological Activities.

Table 10-1 Summary of Findings on Mining Area

MINING AREA	MINING COMPANY	REPRESENTATIVE	DATE OF CONSULTATION	RESPONSE
Mining area 4 (R19)	Peshku Cement LLC	Bafoyev Jasur - Owner	19 th August 2021	Mining Area is currently inactive and the process of obtaining a license for mining activities has commenced. The date for start of mining activities cannot be provided at this stage but once the license has been obtained, mining activities will be undertaken for a duration of 64 years
Mining area 1(R16)	Kogon 97 Avtokorhona LLC	Khamrayev Komil Kasimovich - Owner	20 th August 2021	Geological Survey is currently on going and mining activities is anticipated to commence in the next year. However, this is highly

MINING AREA	MINING COMPANY	REPRESENTATIVE	DATE OF CONSULTATION	RESPONSE
				dependent on securing funds required for mining. Duration of the mining activities is dependent on the conclusions of geological survey.
Mining Area 6 (R21)	Asia Cement and Glass LLC	Sattarov Salohiddin – Deputy Director Samarkand-Bukhara Regional Inspectorate for Mining and Geological Activities Control	25 th August 2021	This mine is on the list of Presidential Investment Projects. In accordance with a Presidential Decree, the mining area has been issued a licence for the extraction of cement raw materials
Mining area 8 (R23)	Richland international Industry LLC			Permission contract has been issued to the mining company by the State Committee on Geology and Mineral Resources
Mining area 2, 3, 5 & 7 (R17, R18, R20 & R22)	Inactive and unnamed mining area			As advised by Bukhara Regional Inspectorate for Mining and Geological Activities Control, these mining areas do not have license but will be auctioned to investors.

10.1.1 Project Site Conditions

10.1.1.1 Geology

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 including geological observations at both plots, geotechnical drilling works and geophysical field tests.

WESTERN PLOT

During field work, six (6) different geological units were observed. A map showing the location of these geological units are shown in the figure below. A brief summary of these different geological units at the western plot of the Project site are presented in the table below.

Note: The layout of the western plot 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 because of the change made to the layout in March 2021 in order to minimise potential environmental & social impacts and minimise interferences with existing houses and settlements. See the Project Alternatives Sub-section for more details.

Table 10-2 Summary of Geological Units within the Western Plot of the Project Site

ID	GEOLOGICAL UNIT	DESCRIPTION	FIGURES	
1	S-L1 Silurian – Dark grey, black dolomitic limestone	This moderately hard and moderately weathered geological unit covers the north western extent of the plot. The Rocks are blocky to very blocky containing regular and irregular discontinuities with CaCO_3 infilling and Fe_2O_3 coating. There are some zones containing high amount of hematite. Recrystallized levels and slightly silicified levels are observed within these rocks		
2	S-L2 Silurian – Grey recrystallized limestone	This moderately to highly weathered geological unit comprises of rocks that are blocky to disturbed and slightly folded due to the regional tectonics. The layer thickness varies between 50cm and 2m		
3	Cr-C1 Cretaceous – Yellow brown conglomerates, sandstones and mudstones	This unit consist of sandstone and mudstone alternation with thickness of the beddings ranging from 5cm to 1m. From the top, the sequence starts with moderately to highly weathered, weak to moderately hard conglomerates about 1mm to 10cm in size, sub-angular / sub-rounded, polygenetic gravels of surrounding rocks. Light brown sandstones conformably lie below the conglomerates. This is highly to		

ID	GEOLOGICAL UNIT	DESCRIPTION	FIGURES	
		extremely weathered and very weak to weak unit containing fossils at some levels Mudstone below these units is greenish yellow coloured, highly to completely weathered and very weak unit		
4	Cr-CB1 Cretaceous – Reddish dark brown altered sandstones and basaltic sill and lava flow	This bedding of this unit range from 1cm to 70cm. It is found majorly at the southern extent of the plot and on small scaled outcrops at the northwestern part. Some zones and blocks indicate lava flow on the basaltic rocks. Alterations due to intrusion are observed to be highly to extremely weathered and very weak to weak sandstones		

ID	GEOLOGICAL UNIT	DESCRIPTION	FIGURES	
5	Cr-CB2 Cretaceous – Altered clastic sedimentary units and basaltic intrusive	This unit includes clastic sedimentary rocks which are extremely to completely altered and extremely to completely weathered due to basaltic intrusions. Altered units are very weak, behaving like almost residual soil at some locations and no silicification is observed on the outcrops. Colour of the units is changing from white to dark brown according to their alteration degree. Intrusive rocks are basaltic and brecciated, highly to extremely weathered and very weak to weak units and show no sill or dyke formation on the surface		
6	Qa Quaternary – Alluvium	Recent river-bed deposits, alluvial fans, in-situ and talus deposits are observed within the Quaternary alluvial units. These units are mapped together as Quaternary Alluvium and not divided into sub-units in the geology map above. This geological unit is found in the south west & southern extent of the plot. These areas are covered with dry lake/river deposits containing high amount of salt. These river bed deposits and alluvial fans contain loose unconsolidated fluvial deposit including sub-angular/sub-rounded polygenetic gravels of surrounding geological units.		

EASTERN PLOT

The eastern plot is geologically more complicated than the western plot and because of this complexity, a total of 101 observation points were visited at the eastern plot and eighteen (18) different geological units were observed. A map showing the different geological units at the eastern plot of the Project site are present in the figure below.

Note: The layout of the eastern plot 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 because of the change made to the layout in March 2021 in order to minimise potential environmental & social impacts and minimise interferences with existing houses and settlements. See Project Alternatives Sub-section for more details.

[illegible]

Table 10-3 Summary of Geological Units within the Eastern Plot of the Project Site

ID	GEOLOGICAL UNIT	DESCRIPTION	FIGURES	
1	CO-L Cambrian-Ordovician – Brownish grey limestone	This geological unit is observed on the East-West trending ridge in the middle part of the plot. It consists of light brownish grey coloured, highly weathered and moderately hard to hard limestone. Most of the unit is highly deformed and disturbed by more than one tectonic phase. Some levels are sheared due to faulting. Rocks are brecciated, very blocky and seamy.		
2	O-L Upper Ordovician – Grey, light grey recrystallized limestone	This geological unit lies at the northern parts of the plot. Light grey / greenish grey limestone is recrystallized. It is hard to very hard and slightly to moderately weathered. Some brecciated levels are observed. Layer thickness is approximately 10cm to 30cm. Oxidation effect is observed on some regular discontinuity surfaces.		
3	US-C Upper Silurian – Dark brown conglomerates and sandstones	This geological unit lies at the north-western part of the E-W trending ridge in the middle of the plot. Rocks are intensely silicified and very hard. Normal grading is observed within the conglomerates. Polygenetic gravels within the conglomerate are 1mm to 5cm sized and sub-rounded.		

ID	GEOLOGICAL UNIT	DESCRIPTION	FIGURES	
4	S-L3 Silurian – Light grey recrystallized limestone	This geological unit covers most of the E-W trending ridge in the middle of the plot. Limestone is blocky to very blocky and moderately to highly weathered. The unit is mostly hard but some weak to moderately hard zones are observed at especially around deformation zones		
5	S-L4 Silurian – Dark grey limestone	This unit consists of dark grey / black limestone. It is observed as intercalated with the S-L3 and CO-L limestone described above, bounded by tectonic contacts. Small-scaled secondary faults are also observed within the unit. Limestone is highly deformed, weak to moderately hard and highly to extremely weathered		
6	S-L5 Silurian – White limestone	This unit lies at the western part of the E-W trending ridge. Limestone is hard to very hard, recrystallized and silicified at some locations. It is mostly moderately weathered and tectonically deformed		

ID	GEOLOGICAL UNIT	DESCRIPTION	FIGURES	
7	S-C Silurian - Conglomerates	This conglomerate unit is observed at the northern part of plot. It covers most of the smooth ridge trending NW-SE in the plot. The unit is generally reddish grey coloured, highly to extremely weathered and very weak to weak. Almost residual soil levels with 20cm to 30cm thickness are covering the conglomerate layers at some location.		
8	SD-L Devonian – Grey limestone	This unit is located at the SE of the steep ridge in the plot. It has a tectonic contact with the S-L3 and S-L5, offset by the main strike-slip fault of the project area. Most of the unit, highly weathered and hard limestone layers. Some levels are highly deformed, brecciated and silicified		

ID	GEOLOGICAL UNIT	DESCRIPTION	FIGURES	
9	D-C Devonian – Dark brown conglomerates and sandstones	This clastic unit includes yellowish mudstones, brownish grey conglomerates and dark brown sandstones. Observable thickness of this unit is approximately 50m. Highly to extremely weathered, weak conglomerate consist of mm to 20cm sized, polygenetic, rounded / sub-rounded gravels and forms the most of the unit. Dark brown sandstones are highly weathered, weak and have 10cm to 30cm bedding thickness. Oxidation is observed on the sandstone layers		
10	D-L Devonian – Light grey, grey limestone	This unit is consist of brownish light grey coloured, moderately strong, highly weathered, brecciated limestone and overlain by D-C with an angular unconformity. Rocks are very blocky to disturbed and slightly folded due to faulting. Regular and irregular discontinuity surfaces are mostly coated with Fe ₂ O ₃		

ID	GEOLOGICAL UNIT	DESCRIPTION	FIGURES	
11	Cr-L Lower Cretaceous – Greenish grey, dark grey limestone	This unit is observed only at the NW corner of the plot. It consists of moderately hard to hard and moderately weathered limestone. Unit is blocky, brecciated and tectonically deformed. Its hardness and faulting between the O-L, morphology around this unit is very steep		
12	Cr-C1 Cretaceous – Yellow brown conglomerates, sandstones and mudstones	This unit can be observed both in the eastern & western plot. Description of this unit can be reviewed in Table 8-2 above.		
13	Cr-C2 Cretaceous – Reddish yellowish brown sandstones	This clastic sequence can be observed on top of Cr-CB2 in this plot. This sedimentary sequence mainly consists of reddish / yellowish brown sandstones with fossils and yellowish green sandstone/mudstone alternation. The unit is highly to extremely weathered and very weak to weak		

ID	GEOLOGICAL UNIT	DESCRIPTION	FIGURES	
14	Cr-CB1 Cretaceous – Reddish dark brown altered sandstones and basaltic sill and lava flow	This unit can be observed both in the eastern & western plot. Description of this unit can be reviewed in Table 8-2 above.		
15	Cr-CB2 Cretaceous – Altered clastic sedimentary units and basaltic intrusive	This unit can be observed both in the eastern & western plot. Description of this unit can be reviewed in Table 8-2 above.		
16	Cr-C3 Upper Cretaceous – Yellowish green sandstones, mudstones and reddish yellow conglomerates	This unit consists of yellowish green sandstone, mudstone and reddish yellow conglomerate sequence. This sequence includes highly to extremely weathered, weak to moderately hard rocks. The unit is slightly deformed due to faulting and offset layers are observed on the outcrops		

ID	GEOLOGICAL UNIT	DESCRIPTION	FIGURES	
17	PE-CB Paleocene–Eocene – Altered sedimentary units and basaltic intrusive	This unit includes different clastic sedimentary rocks such as sandstones and mudstones, altered due to basaltic intrusions. Rocks are extremely to completely weathered and very weak. At some locations it is observed that the weathering is extreme and the unit is behaving like residual soil.		
18	Qa Quaternary – Alluvium	Recent river-bed deposits, alluvial fans, in-situ and talus deposits are observed within the Quaternary alluvial units. These units are mapped together as Quaternary Alluvium and not divided into sub-units in the geology map above. The main structural feature in plot is the E-W trending fault zone consist of dextral strike-slip faults with reverse fault components. Along this fault zone older units are uplifted, sheared and thrust on each other and formed a steep, scarped ridge through the entire plot.		

10.1.1.2 Topography

The site condition is undeveloped and in its vast majority is greenfield. The topography of the Project site consist of a mixture of flat areas with stones/rocks and mountains & small hills/cliffs that are formed from stones in other areas. Based on observations from site visits, the flat areas are noted to have vegetation particularly shrubs and the stones/rocks were noted to vary in sizes; from small stones/rocks in some areas to large stones/rocks in other areas.

Plate 10-1 Evidence of Shrubs in Areas without Mountains or Cliffs



Plate 10-2 Evidence of Mountain Plains within the Eastern Plot of the Project Site



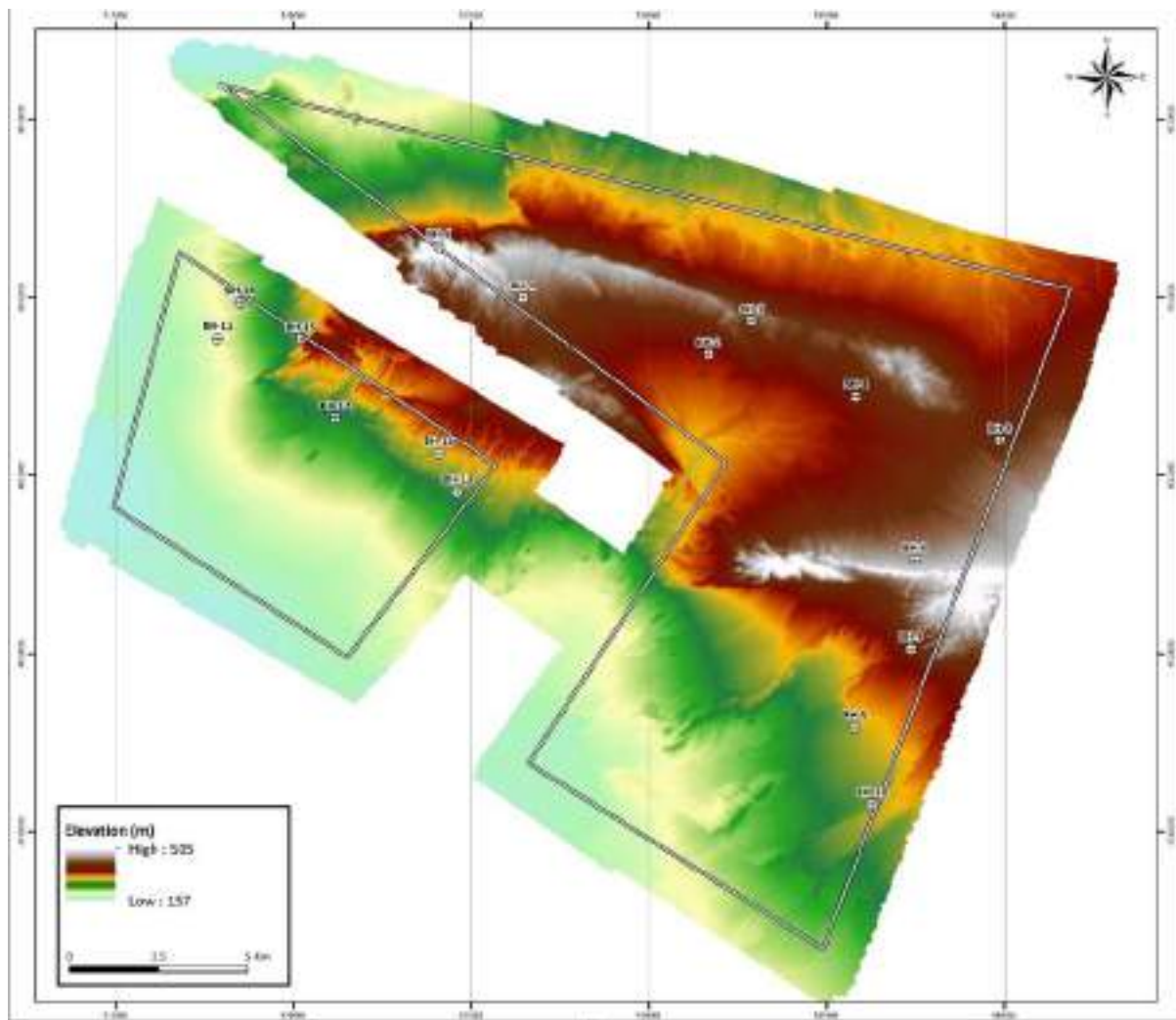
WESTERN PLOT

According to the geotechnical site investigation (UzAssystem, 2021b) & topographical survey report (UzAssystem, 2021c) prepared by UzAssystem, the elevation of the western plot vary from approximately 300m asl in the northern extent to 150m asl in the southern extent. Besides the hills at the northern extent, the general topography at this plot is mainly flat with shallow drainage channels

EASTERN PLOT

The elevation at the eastern plot ranges from 150m asl to approximately 500m asl. A northwest to south east trending mountain ridge with gentle slope covers the northern extent of the plot. Elevation increases up to 400m asl in this area. At the middle of the site there is an east-west trending mountain ridge with very steep slopes. This mountain ridge forms the highest areas within the plot. At the southern part of this plot, elevation decreases gently to 150m asl again towards the flat area.

Figure 10-3 Digital Elevation Model of the Project Site (UzAssystem, 2021c)



Note: The layout of the eastern & western plot in the figure above is different from the final project layout as shown across different Chapters of this report. This is because of the change made to the layout in March 2021 (after geotechnical site investigation) in order to minimise potential environmental & social impacts and minimise interferences with existing houses and settlements. See the Project Alternatives Sub- section for more details.

10.1.1.3 Soil

During the site visit undertaken in 12th March 2021, it was observed that there are two (2) soil types at the Project site. The soils at the flat area with shrubs was observed to be predominantly desert-sandy while the soils within the mountainous terrain of the site was observed to be gray brown soils with different reliefs & anticlines. During project specific soil survey undertaken on 5th April 2021, it was observed that the surface of the light desert sandy soils at the flat area of the site is covered with vegetation; mainly grass & shrubs.

With the exception of local access roads that runs through the eastern & western plots, the site is a greenfield site.

EXISTING INFLUENCES ON SOIL QUALITY

The presence of the access road within both plots and the use of vehicles on this road provides the potential for the presence of vehicle residues (e.g. oils & greases, hydrocarbons and heavy metals) on the surface soils/topsoils causing soil contamination.

Review of historic satellite imagery of the Project site from 2006 – 2019 indicates that besides the presence of the local access road which was evident from 2013 to present day, the site has not been developed as no previous development (industrial or commercial) was identified within the site.

10.1.1.4 Surface Water

There are no permanent, or perennial surface water features at the eastern or western plots of the Project. However, during heavy rainfall, water ponds do appear as was seen during the site visit on 12th March 2021.

It is likely that these water ponds will be used by livestock and other fauna in the project area as a source of water whenever it appears during heavy rainfall.

Plate 10-3 Water Flow After Rainfall – 12th March 2021



10.1.1.5 Groundwater

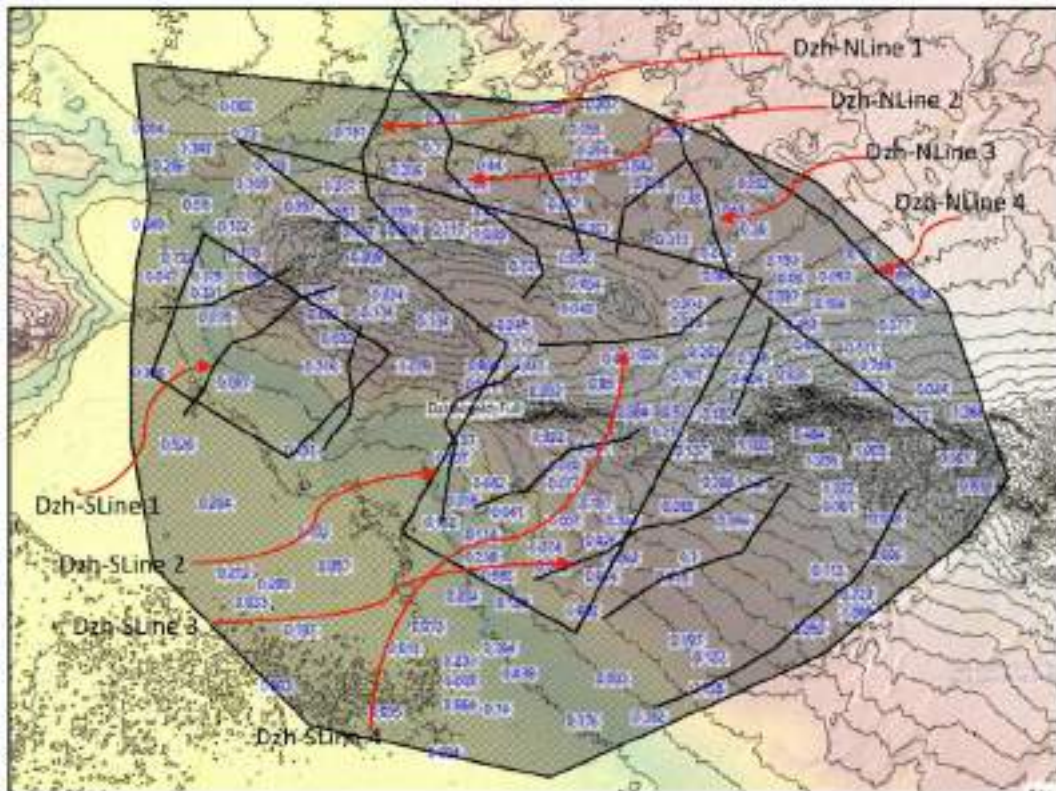
During the site visit on 12th March 2021, groundwater sources was not seen at the Project site. According to the geotechnical site investigation report, groundwater table was not observed at the Project site (both eastern & western plots) during the drilling investigations having depths down to 50 m.

10.1.1.6 Flood Risk Assessment

Hydraulic modelling was undertaken by UzAssystem (2021b) to identify the potential for flood at the Project site. Daily precipitation data for Dzhankeldy 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 Dzhankeldy Site.

Figure 10-4 Pathways of Surface Runoff Indicated in the Hydraulic Model at Dzhankeldy Project Area (UzAssystem, 2021b)



As can be seen from the figure above, the water runoff is mainly South East to North West and North East to South West.

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.

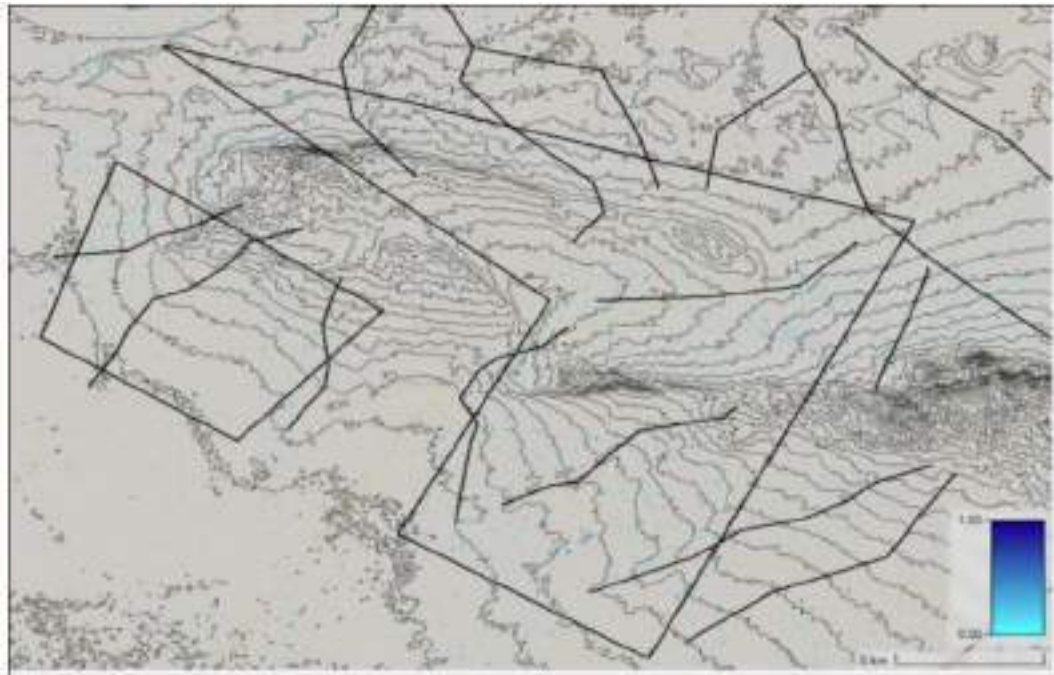
Table 10-4 Flood Hazard Rating at the Project Site

PERIODS	FLOOD HAZARD RATING FOR DZHANKELDY SITE				
	FLOW PATHS	S-LINE 1	S-LINE 2	N-LINE 1	N-LINE 2
T=50 Years	24-Hour Precipitation	0.42	0.25	0.16	0.13
	6-Hour Precipitation	0.41	0.55	0.18	0.11
T=100 Years	24-Hour Precipitation	0.49	0.26	0.55	0.19
	6-Hour Precipitation	0.55	0.27	0.56	0.25

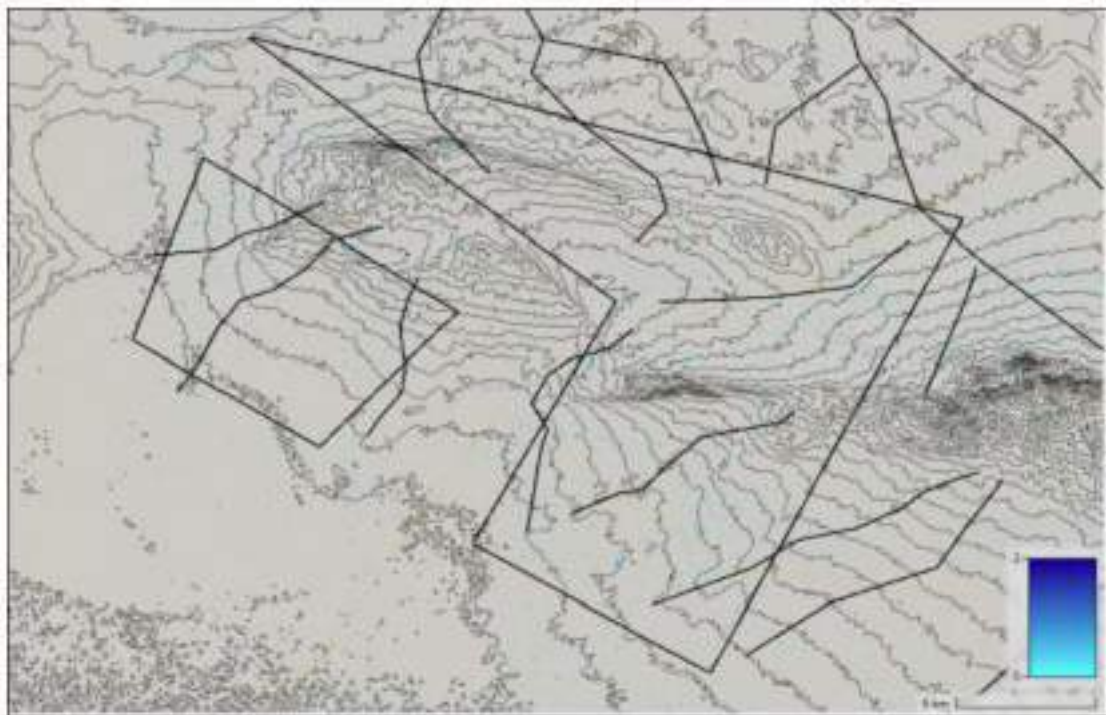
The results of the Flood Hazard Rating show that there is a very low hazard risk at the western & eastern Dzhankeldy sites.

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)

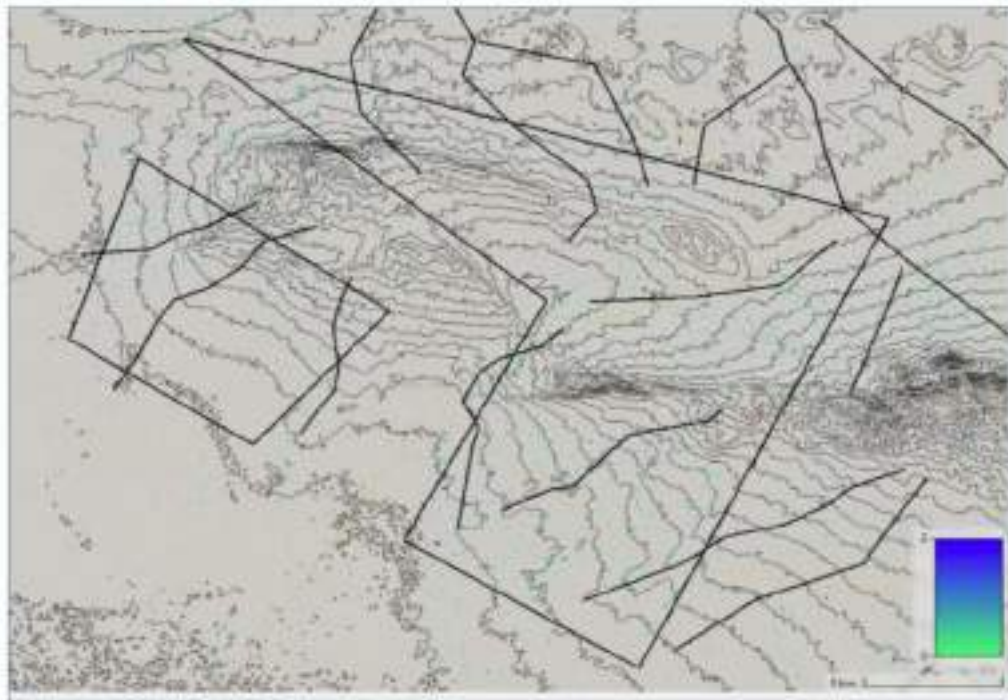


6-Hour

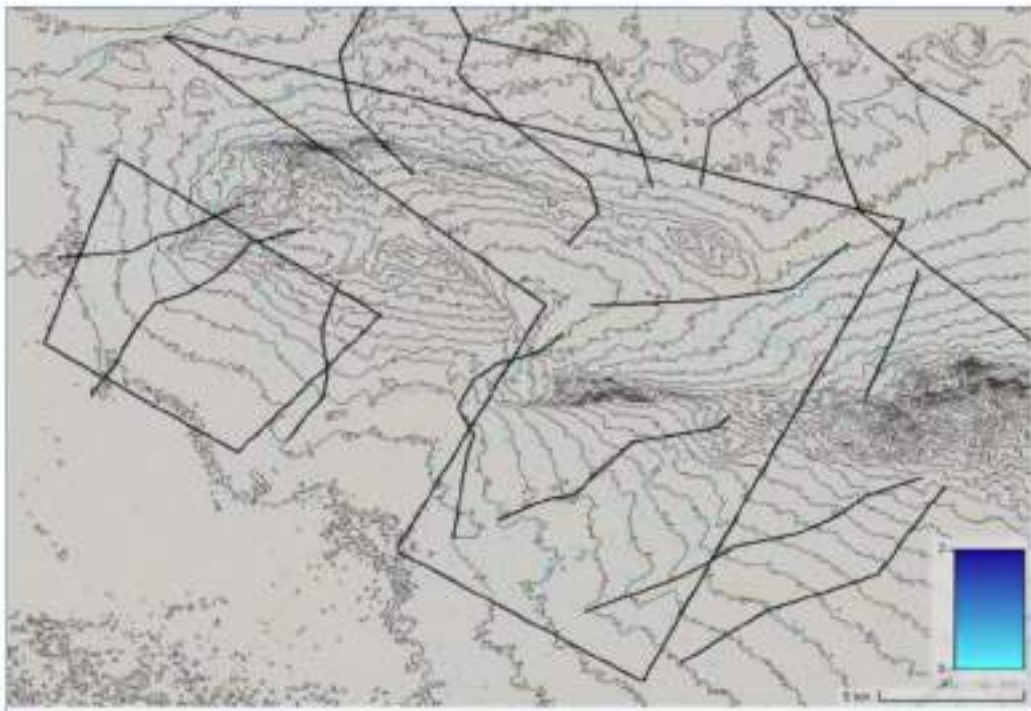


24-hour

Figure 10-6 Flood Risk Map at the Project Site for 100-Year; 6-hour & 24-hour (UzAssystem, 2021b)



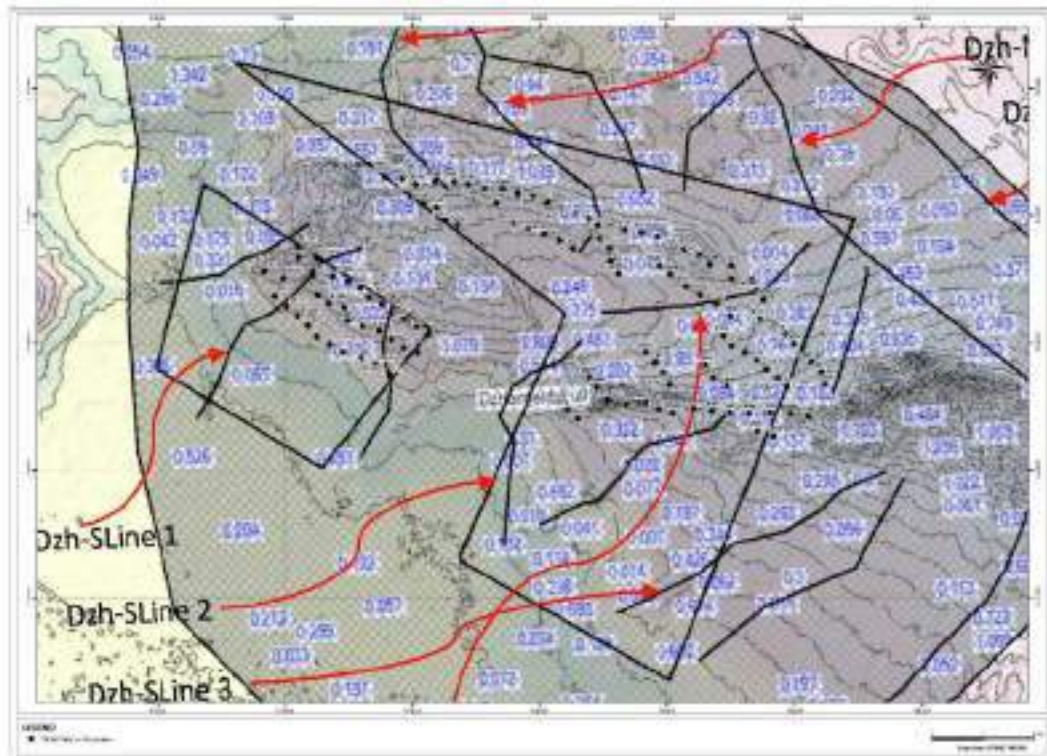
6-Hour



24-hour

Few WTG at the Project site is located in proximity to main drainage pathways (S-Line 1 & 2 and N-Line 1& 2) as shown in the figure below. At the eastern plot, these WTGs include D04, D16, D28 and D49 and at the western plot the WTG in proximity to the drainage pathway include D95, D101, D104, D114, and D121. As stated above, the degree of flood hazard is designated as “very low” for all pathways.

Figure 10-7 WTG Location in Relation to Drainage Pathway at the Project Site (UzAssystem, 2021b)



10.1.2 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.

10.1.2.1 Methodology

Soil investigation at the Project site was conducted on 5th 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 seven (7) 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 10-5 Soil Sampling Location

ID	COORDINATES	
	NORTHING	EASTING
SQ1	40.813813°	63.425894°
SQ2	40.871759°	63.282831°
SQ3	40.881642°	63.455134°
SQ4	40.932494°	63.330276°
SQ5	40.889645°	63.282222°
SQ6	40.909721°	63.226733°
SQ7	40.899651°	63.183279°

Figure 10-8 Soil Sampling Locations



Table 10-6 Evidence of Soil Sampling at the Site





10.1.2.2 Results

The results of the soil laboratory analysis are presented in the table below and have been compared with the Dutch Soil Quality Standards.

Table 10-7 Soil Analysis Results

PARAMETERS	SAMPLE							DETECTABLE LIMITS IN MG/L	SANPiN № 0191-05 MPC	DUTCH STANDARDS (INTERVENTION VALUE)
	SQ1	SQ2	SQ3	SQ4	SQ5	SQ6	SQ7			
pH	7.75	7.80	7.82	7.63	7.14	7.80	7.74	1-14	-	-
Chloride (as Cl), %	0.014	0.014	0.014	0.014	0.021	0.042	0.035	N/A	-	-
Chloride (as Cl) mg/l	7	7	7	7	11	21	18		-	
Nitrate (NO ₃), mg/dm ³	1	1	1	2	48	6	1	10 ⁻⁶ -100* mg/kg	130 (gross content)	-
Sodium (Na), mg/kg	8600	11000	11000	12000	3600	11000	11000	40-110000mg/kg	-	-
Magnesium (Mg), mg/kg	10000	9400	10000	7700	9100	11000	11000	40-110000mg/kg	-	-
Potassium, mg/kg	18000	16000	18000	17000	5500	16000	17000	80-300000 mg/kg	-	-
Lead (Pb), mg/kg	16.0	14.0	15.0	13.0	6.40	16	16	0.1-4000 mg/kg	32	530
Manganese (Mn), mg/kg	300	380	350	310	160	520	420	20-100000 mg/kg	1,500 (gross content)	-
Copper (Cu), mg/kg	29.0	24.0	25.0	23.0	17.0	26.0	26.0	1,0-4000 mg/kg	3	190
Zinc (Zn), mg/kg	50.0	44.0	44.0	40.0	26.0	51	50	1,0-4000 mg/kg	23	720
Chromium (Cr), mg/kg	63.0	51.0	57.0	49.0	40.0	54.0	52.0	1,0-4000 mg/kg	6	380
Iron (Fe), mg/kg	24000	17000	18000	15000	8800	23000	17000	60-3000000 mg/kg	-	-
Mercury (Hg), mg/kg	0.26	0.07	0.06	<0.01	0.16	0.07	0.02	Not determined	2.1	36
Nickel (Ni), mg/kg	51.0	46.0	46.0	48.0	19.0	40.0	42.0	1.0-4000	4.0	210
Cadmium (Cd), mg/kg	0.073	0.059	0.046	0.046	0.028	0.055	0.059	0.005-4000 mg/kg	-	12
Aluminum (Al), mg/kg	61000	61000	66000	57000	24000	63000	64000	20-200000 mg/kg	-	-
Arsenic (As) mg/kg	65.0	18.0	34.0	28.0	45.0	43.0	21.0	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 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 7.14 - 7.82 which means the site has a slightly alkaline pH. The samples obtained from the mountainous area of the site (SQ4, SQ5 & SQ6) have high concentration of nitrates when compared to other sampling locations.

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 Kyzylum Desert naturally comprises of metals 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 and not as a result of anthropogenic or human influence.

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 10-8 Potential Soils, Geology & Groundwater Receptor -Wind Farm

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. 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.
Surface water Quality (Onsite water ponds)	High	Water is of high importance on a national due to water scarcity in the country. As such it is of limited potential for substitution. The water pond at the Project site which appears during period of heavy rainfall may be used by livestock and other fauna in the area as a source of water.

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

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 quantities.

As the wind turbines will likely require deep foundation works, soil quality can be susceptible to contamination from various construction sources, for example, storage and usage of fuels, chemicals and sanitary provision 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.

SURFACE WATER

Given the presence of water ponds at the wind farm during periods of heavy rainfall, surface water may also be susceptible to contamination from various sources during the construction phase. Improper methods of storing, transferring, and handling of chemicals, fuels and other liquid hazardous materials can result in contamination of runoff areas and therefore any water ponds within the Project site where a pathway for runoff is directed to water ponds. The water ponds serve as source of water for livestock and other fauna as such the potential contamination of these water sources can impact the health of livestock and other fauna that drink from the water ponds.

The above highlighted risk to surface water 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 to soil increases. Potential environmental impacts arising from the generation of hazardous wastes are covered in the Solid Waste & Wastewater Management Chapter in Part A of this ESIA.

Table 10-9 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
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 container and 25% of the total volume of the multiple containers. - Store all chemicals/materials according to manufacturer's instructions and MSDS; MSDSs for all chemicals to be readily available on-site in close proximity to storage areas. - All hazardous materials must be labelled according to manufacturer's instruction and Good International Industry Practice (GIIP) - The chemical storage area will have proper ventilation and cover from the elements (i.e. rain, sun) and different storage areas to allow for segregation of incompatible chemicals. - All equipment using oils will have drip trays underneath to capture any oil leaks or drips. - 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.	Negligible
	Negligible Negative	Groundwater Quality	High	Minor		Negligible
	Minor Negative	Surface water Quality (Onsite water ponds)	High	Minor to Moderate		Negligible to Minor

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					- 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. - 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 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.	

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					- 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. - First aid kits will be available at all hazardous and chemical storage areas - Provisions for the containment of the first flush of storm water will be considered to ensure that the initial runoff from rainfall events does not lead to contamination of the water ponds at the site. - No storage of hazardous chemicals, materials, excavated soil, oils or fuels or waste within 100m of water channels. - No wastewater will be disposed into water ponds in the Project site.	
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.	Negligible
	Minor Negative	Groundwater Quality	High	Minor to Moderate		Negligible to Minor

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					- Concrete washout will only be undertaken at designated and signed areas, with adequate protection to soils, to prevent leaks or spread of wastewater - 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 - Washing of equipment, machinery and vehicles will only be permitted in designated areas, with impermeable surfaces and dedicated drainage systems. - 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 used and present in small quantities, precaution must be paid to ensure proper storage, handling, transportation and adequate spill prevention. It is expected that the storage of any of these materials, chemicals and fuels will be within designated areas, which have specific management and mitigation measures in place to prevent exposure of these pollutants to unprotected soils and surface water (onsite water ponds).

Table 10-10 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
	Negligible Negative	Surface water Quality (Onsite water ponds)	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 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 C of this ESIA.

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 10-11 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

CONSULTATIONS WITH THE MINISTRY OF TRANSPORTATION

A consultation letter was sent to the Ministry of Transportation on 4th May 2021 informing them of the Project and enquiring on whether the Ministry of Transportation had any specific requirement relating to the transportation of wind farm Project component 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.

11.1.1 Project Logistics

11.1.1.1 Transportation Route from the China – Kazakhstan -Uzbekistan Border

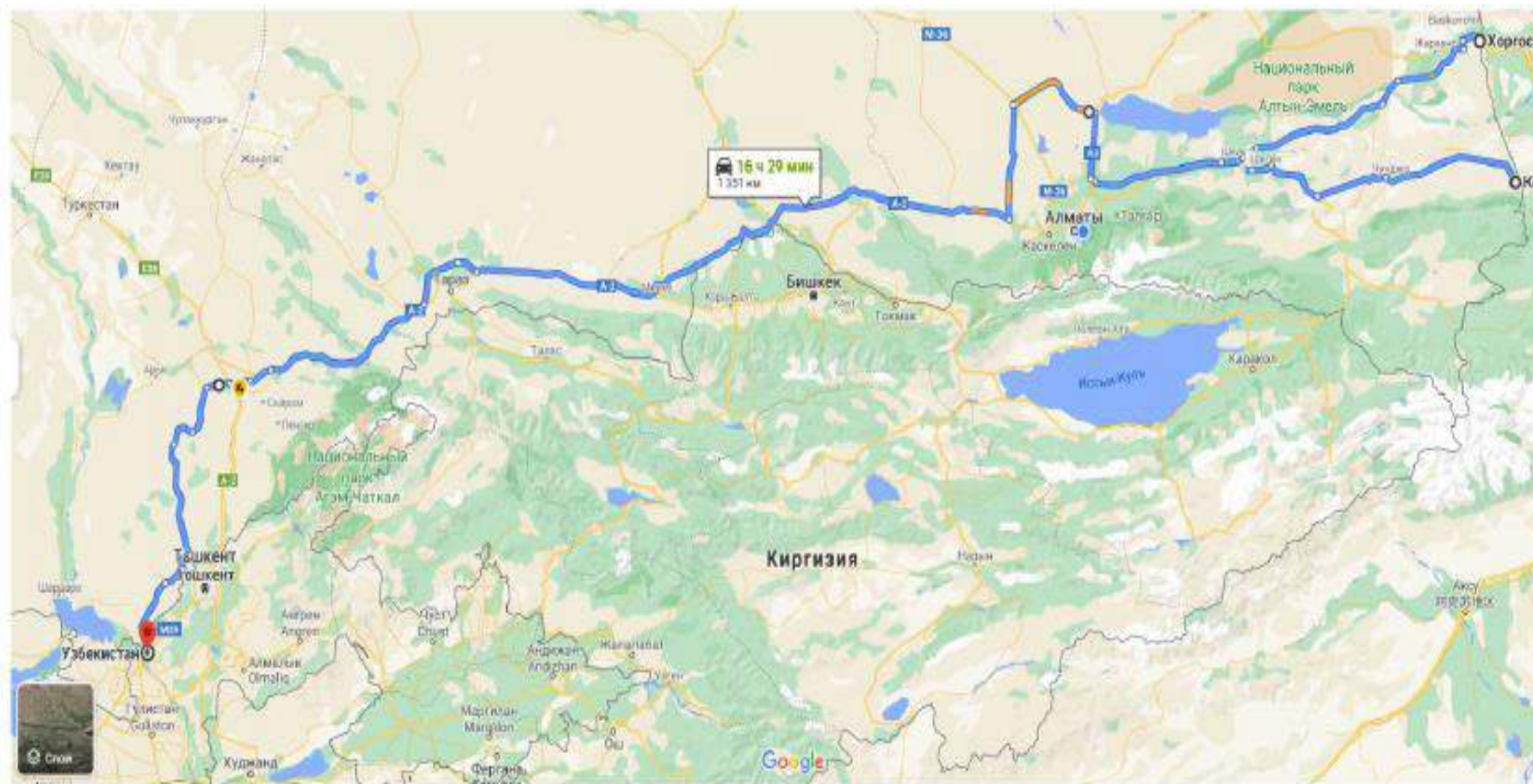
Transportation route surveys were undertaken by ACWA Power in August 2021 and by the EPC Contractor in May 2022 for the transportation of heavy project component. The table below provides a list of the most critical WTG components considered during the Route Survey.

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 Khorgos border in China to custom points at Kolzhat in Kazakhstan. From Kolzhat in Kazakhstan, project components will be transported to custom points at Yallama (KZ-UZ border) to route M-39 in Uzbekistan and from route M-39 to the Wind Farm project site

Figure 11-1 General Transportation Route Surveyed



Source: Route Survey Report for ACWA Power Wind PP Project



Based on the findings from the route survey & EPC report, the roads in Kazakhstan will be used to transport both heavy & oversized cargos from the Kolzhat border in Kazakhstan to custom points at Yallama (KZ-UZ border). From the KZ-UZ border, route M-39 will be used within Uzbekistan. The total distance from the Kazakhstan to route M-39 is approximately 1391km.

Based on the preliminary transportation report prepared by the EPC Contractor, modifications required along the route include but not limited to:

- Temporary removal of traffic signs, lamppost;
- Reconstruction of roundabout with drive through lanes;
- Construction of turning areas;
- Construction of storage, loading and access sites;
- Road widening, etc.

It should be noted that any modification works along the external road are not expected to impact receptors along the road as such, relocation of receptors along the access road is not anticipated.

At the border crossing in Kalzhat, permission will be obtained, there will be construction of storage, loading and access sites on the prc side and in the neutral zone. At the border crossing in Yallama, to pass the territory of the Republic of Kazakhstan, a platform is required for turning the blade truck by 90 degrees. Necessary permits will be obtained by the EPC Contractor.

11.1.1.2 Transportation Route from the Yallama (Kazakhstan – Uzbekistan Border) to the Project Site

The total distance from Yallama to the Project site is approximately 690km with a total number of 37 bridges and 15 overhead structures. The route from Yallama to the project site passes through Karmana place and continues from Karmana via route A-379.

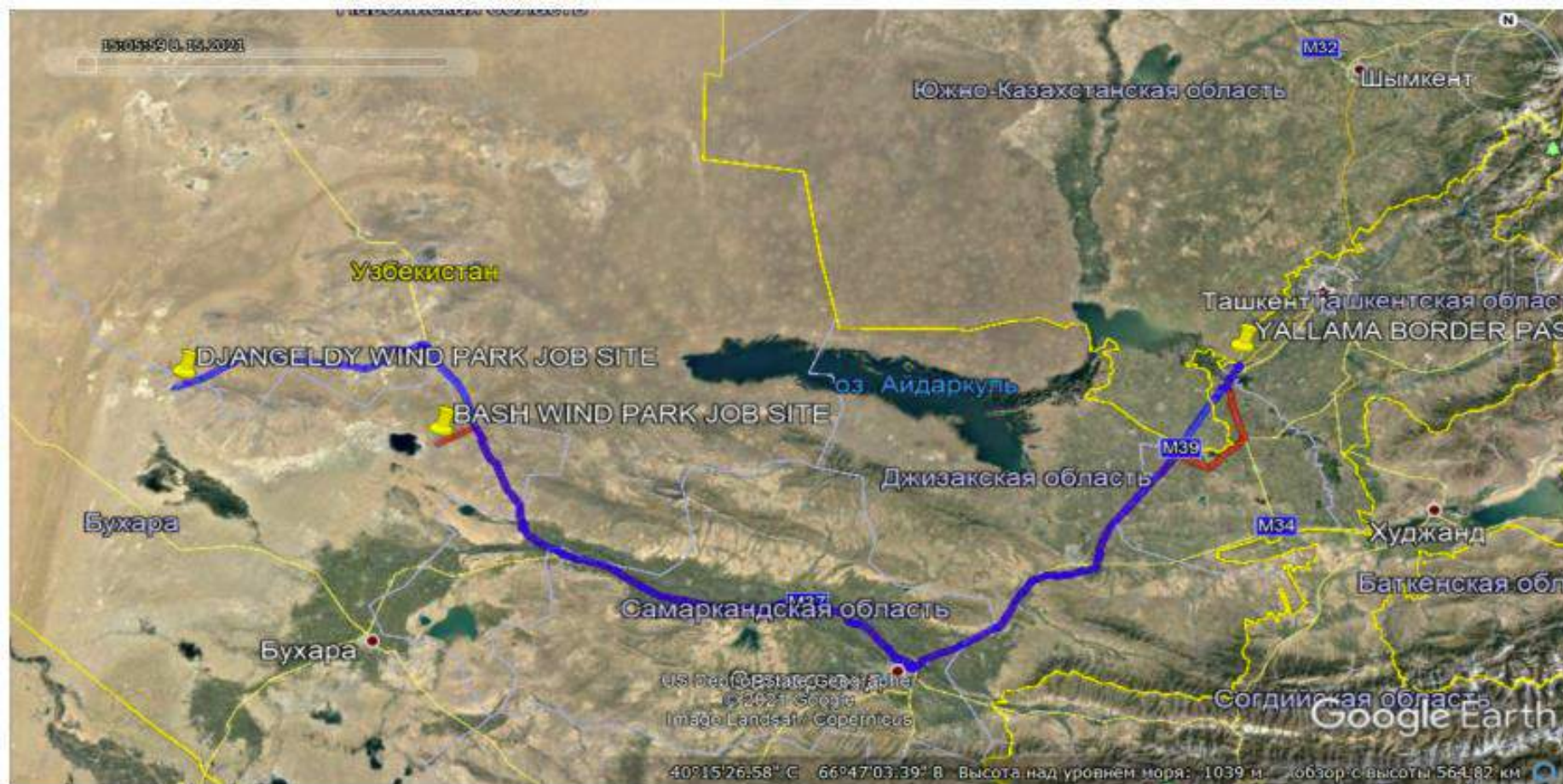
Based on the preliminary transportation report prepared by the EPC Contractor, the following modification work is required:

- Upgrading works of the roadway along the route;
- Arrangement of bypass;
- Dismantling of signs;
- Strengthening of Islet for passage;
- Pothole repair and levelling;
- Road construction (21km)
- Road widening, etc.

It should be noted that any modification works along the external road are not expected to impact receptors along the road as such, relocation of receptors along the access road is not anticipated.

The proposed route is as shown in the figure below.

Figure 11-2 General Transportation Route from KZ-UZ Border to the Project site



Source: Route Survey Report for ACWA Power Wind PP Project



Source: Planned Civil Works for Transportation of WTG Equipment from China to Uzbekistan. Kazakhstan & Uzbekistan (Preliminary Report)

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. The Route Survey report prepared in August 2021 and the Planned Civil Works for Transportation of WTG Equipment from China to Uzbekistan. Kazakhstan & Uzbekistan (Preliminary Report) is presented in Appendix O..

11.1.2 Project Site Observations

Based on review of satellite imagery and site visits conducted to date, the project site comprises of paved access roads that runs through the eastern & western plot. One (1) access road runs from the south east extent to the south west extent of the eastern plot. This same access roads connects to the western plots and runs from the eastern extent of this plot to the west.

Another access road runs from the west to the north east & northern extent of the eastern plot. Both access roads connect to A380 highway which is located approximately 47km south of the Project site (both eastern & western plots). This road also connects Uzbekistan to Turkmenistan. The access road that runs from the west to the north east & northern extent of the eastern plot also connects to A379 highway (also called Navoi-Uchkuduk) which is located approximately 94km north east of the eastern plot.

The local access roads to the Project site & within the project site have low traffic flows (i.e. about one(1) vehicle passing by every 10 minutes (based on site observations). These roads are used by residents of Churruq village located 2.63km from the access road, residents of Dzhankeldy & Kalaata villages as well as herders that use the site for grazing. It is anticipated that these roads will be used by the mining companies of the nine(9) mining areas once mining activities commences.

In addition to the paved access road within the site, few unpaved/dirt roads are also present within the project site. These roads are used by herders to reach grazing areas within the site and the traffic flows on these unpaved/dirt roads is very low.

Transport to and from the Project site will be via the local access road that runs from the west to the northern extent of the eastern plot (see figure below). This road links with the highways A380 and A379. These highways are single carriage ways with dual lanes.

Figure 11-3 Location of Access Road Connecting the Project Site to Highway A379 (ref. Red Line) and Highway A380 (ref. Purple Line)



Figure 11-4 View of the Access Road Connecting the Project Site to Highway A380



Figure 11-5 View of the Access Road Connecting the Project Site to Highway A379



11.2 Receptors

Table 11-2 Potential Traffic & Transportation Receptor -Wind Farm

RECEPTOR	SENSITIVITY	JUSTIFICATION
Highway A379 & A380 and Users of Highway A379 & A380	Medium	As observed from site visit, traffic flow on this highway is low at present. Although the highway has large spare carrying capacity, the transportation of abnormal wide loads and any road improvement works may increase stress in the underlying system and present challenges to highway users.
Residents of nearby villages (Dzhankeldy and Kalaata village) including children and vulnerable groups	High	Given that residents including children, vulnerable groups, herders together with livestock will cross the access roads when moving back & forth, they are particularly vulnerable to an increase in vehicular flow on the access road south of the Project site.
Local Access Road and other users of local access roads (including children, vulnerable groups and mining areas)	High	The majority of roads near the Project site are narrow and transportation of wide loads may present a challenge to local road users

11.3 Potential Impacts, Mitigation, Management & Residual Impact

1.1.1 Construction Phase

11.3.1.1 Impact on Road Infrastructure

IMPACT ON HIGHWAY INFRASTRUCTURE

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. As such, there is a potential for infrastructure improvement along some sections of the highway and some bridges. This will increase the pressure on the highway infrastructure when conducting the improvements works.

The EPC Contractor will be required to apply for the relevant permits to transport project components, equipment and machinery across borders and with local roads authorities.

IMPACT ON LOCAL ROAD INFRASTRUCTURE

From Highway A379 & A380, it is expected that all vehicles will eventually need to use the local access road to the immediate north & south of the Project site respectively.

The carrying capacity of the local access roads mentioned above is based on the use of standard vehicles such as pickup trucks, vans, etc. and not on vehicles with abnormal loads. Given that vehicles with abnormal loads are not known to frequent the project area, there is a potential for oversized & abnormal load vehicles to damage road surfacing leading to structural faults such as potholes. The movement of oversized & abnormal load vehicles along the road may exacerbate the already existing potholes and elevation difference.

As such, improvements works such as backfilling of potholes and compaction & levelling of elevation differences will be undertaken to enable the adequate and suitable transportation of project components thereby reducing the potential for further damage. Such improvement works will however increase the pressure on the local road infrastructure.

11.3.1.2 Increased Vehicular Flow and Traffic Congestion

Construction activities will likely result in an increase in 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 well 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 local road infrastructure & highway infrastructure have 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 that the local road infrastructure is narrow, there is also the potential for the transportation of overside loads to likely move slowly and occupy the entire road resulting in limited passing opportunity for other road users and ultimately traffic congestion and delay.

11.3.1.3 Safety of Residents & Other Road Users

The existing paved access roads south of the eastern & western plots are already used by herders & local communities to access Churruq, Dzhankeldy & Kalaata village respectively. These roads are also used by mobile van vendors who sell food at Dzhankeldy & Kalaata village. Based on site observations, one(1) vehicle drives through the local roads every 15 minute. As such, these roads have sufficient capacity to handle additional traffic. The existing paved access road north of the eastern plot is used by herders to access the former Chontabay village and possibly other villages such as Chengeldy, Balakarak, etc.

The development of the Project will require the use of vehicles carrying normal loads & abnormal loads. As such, this will result in an increase in the number of vehicles (both LDVs & HGVs) along these local access roads as a result of the Project's development and this has the potential to result in road traffic accidents affecting humans and livestock.

11.3.1.4 Loss of Access Route/Tracks through the Project site

As earlier mentioned, the existing local access road south of the eastern & western plots are already used by herders, local communities and vendors to access Dzhankeldy & Kalaata village and the road north of the western plot is used by herders, local communities to access the former Chontaby village. Due to the movement of machinery and equipment access to the local access road may be disrupted temporarily 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 and/temporary disruptions, 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 from Kalaata to Dzhankeldy village via the project site. The use of these alternative unpaved routes will potentially increase the travel time of the herders between the different grazing areas and settlements and the travel time of local communities & vendors from and to Dzhankeldy & Kalaata village by approximately 1 hour. The figure below shows the alternative routes that can be used by local road users.

Figure 11-6 Alternative Unpaved Access Route

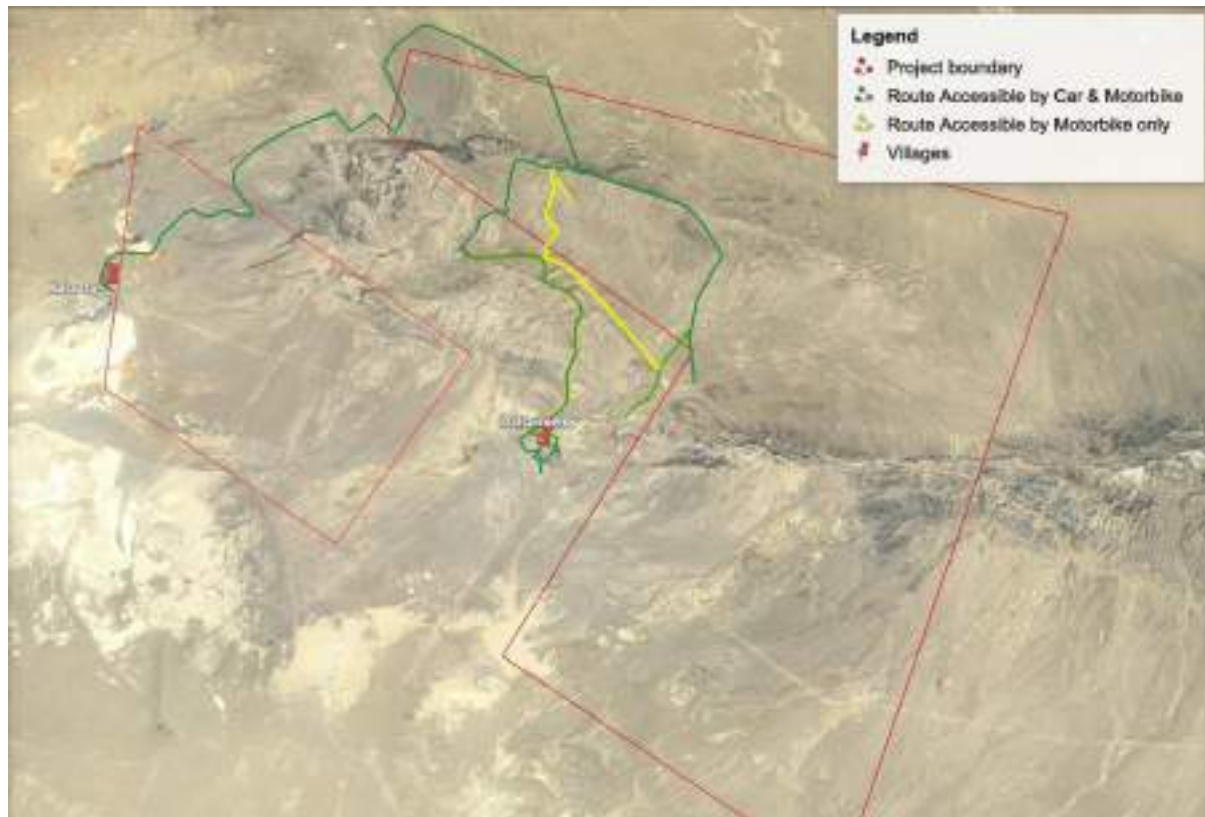


Table 11-3 Traffic & Transportation Impact Significance, Mitigation & Management Measures and Residual Impacts – Construction

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
Impact on Road Infrastructure	Moderate Negative	Highways A379 & A380	Medium	Moderate	- 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.	Minor
	Moderate Negative	Local access road	High	Moderate to Major	- 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. - Where transportation of equipment/materials is to be undertaken during the winter season or on wet or windy periods, additional safety and precaution measures will be implemented in order to ensure the safety of other road users and integrity of the road infrastructure and materials being transported.	Minor to Moderate

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					- 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	Minor Negative	Users of 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 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 consultations with schools, kindergartens and within the communities to create awareness on potential risks associated with movement of vehicles and machinery and basic safety precautions they can take. - The Project Company will ensure that the EPC Contractor has undertaken road safety campaigns especially targeting vulnerable groups in impacted communities including	Negligible
	Minor Negative	Residents of nearby villages (Dzhankeldy and Kalaata village)	High	Minor to Moderate		Minor
	Minor Negative	Other users of local access roads (including mining areas)	High	Minor to Moderate		Minor

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
Safety of Residents of nearby villages & herders	Minor Negative	Residents of nearby villages & herders (Dzhankeldy and Kalaata village) including children	High	Minor to Moderate	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. • The EPC Contractor will provide awareness training on traffic safety to the local people in collaboration with local police office.	Minor

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					- 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 local access routes/tracks through the Project site	Moderate Negative	Residents of nearby villages and herders (Dzhankeldy and Kalaata village)	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 vehicles like pick-ups, 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, 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'.

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.

There are no specific monitoring requirements proposed for operations

12 ARCHAEOLOGY AND CULTURAL HERITAGE

12.1 Observation and Baseline Environment

According to the National Archaeological Center of the Academy of Sciences of the Republic of Uzbekistan, archaeological excavations of the Kyzylkum Desert have been carried out since the late 1940s, and although hundreds of monuments and major cultures have been found and put into scientific circulation, new material and cultural sites continue to be found in the region. Researcher of the Kyzylkum archeology - A.V. Vinogradov informed the Academy of Science about the findings of Tashbulak and Tashkazgan, about 20-25km south-east of the village of Jonkeldi (also Dzhankeldy village). However, no monuments have been found around the village of Jonkeldi in the Peshku district of Bukhara region (in the Wind Farm Project area).

Extensive consultations have been undertaken with the Ministry of Culture of Republic of Uzbekistan, National Centre of Archaeology 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 neolithic sites were identified during the expedition.

The summary of these consultations is provided below.

12.1.1.1 Consultation with Tourism Development Committee

The Tourism Development Committee or the State Committee of Tourism Development was merged with the Ministry of Sports and is now called the Ministry of Tourism and Cultural Heritage (Presidential Decree, April 6 2021). This Ministry is responsible for the identification, registration, protection, promotion, maintenance of the state register, state cadastre of cultural heritage objects, implementation of state control, implementation of the norms of documents and recommendations to UNESCO and other international organizations.

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 Peshku district. However, the Committee advised that the Project should obtain conclusions from the Department of Cultural Heritage under the Ministry of Culture on the presence or absence of cultural monuments on the Project site.

12.1.1.2 Consultation with Ministry of Culture

The Ministry of Culture is responsible for the protection of cultural heritage items and for the protection and preservation of cultural values within the Country and abroad. This Ministry organizes cultural events aimed at meeting the growing intellectual, aesthetic and cultural needs of the society. The Ministry is also responsible for expansion and strengthening of interstate and international cultural ties, wide promotion of the country's cultural heritage and promotion of works of domestic creative teams and authors abroad.

On 29th March 2021, a consultation letter was sent to Bukhara Department of Culture; 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 (statues, monuments, etc.) 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.

12.1.1.3 Institute of Archaeology

The Institute of Archaeology also known as the National Centre of Archaeology of Academy of Sciences of the Republic of Uzbekistan is the scientific and methodological orientation of archaeological research in the country. This institute organises complex archaeological expeditions using innovative technologies in connection with educational practice. This Institute is also responsible for establishing international cooperation in the field of archaeological research, systematic organization of joint archaeological expeditions with foreign researchers working in the field of archaeology.

A consultation letter was 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; and
- If they would be willing to share survey locations, timelines and any other relevant information about such ongoing archaeological/cultural surveys (if present).

A response letter was received on 6th April 2021 from the Institute of Archaeology stating that the Project site was being studied by Uzbek-French joint expedition of 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). This expedition team studies the Ancient Stone Age

The studies conducted identified samples of ceramics from the ancient and medieval periods in and around the Project area. 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.

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:

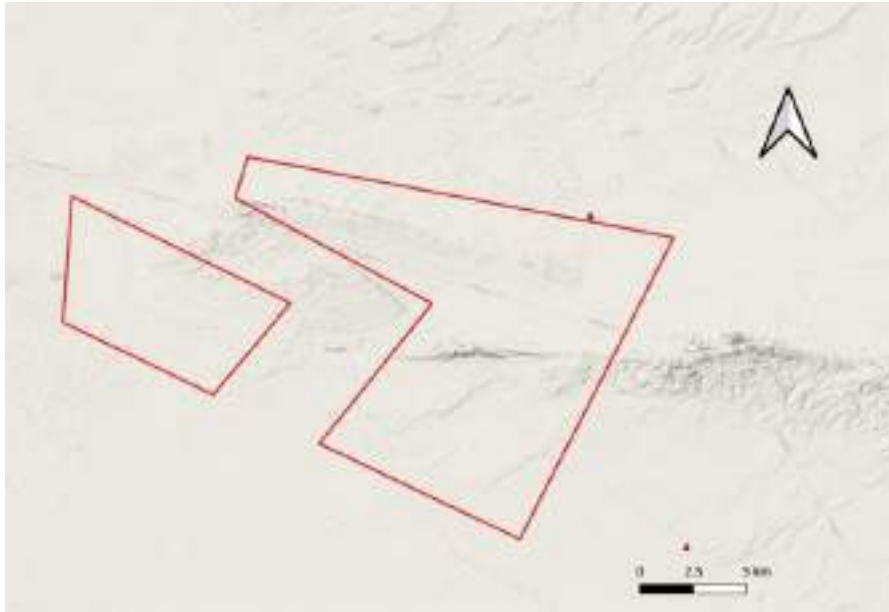
- Exact coordinates of the archaeological findings in Dzhanakeldy including the details of the required buffer zone between this site and construction works;
- Confirmations on whether the Uzbek-French expedition was still conducting active research work within the site or 5km radius of the site;
- Information 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 are provided below.

DATE OF CONSULTATION	19 th April 2021
TIME	15:30 -16:30
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 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 OUTCOME	
• 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 1980 and a monument named "<i>Tasqazgan monument</i>" was identified and the preliminary location of this monument was provided by the Institute of Archaeology • 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.

Figure 12-1 Preliminary Location of the Area Surveyed in Dzhankeldy in 1980 (ref. red dot at the northern extent of eastern plot)



DATE OF CONSULTATION	27 th 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	Business Development (ACWA Power) Acting Head of E&S Group (Juru Energy)
MATERIALS USED	N/A
COVID-19 PRECAUTION IMPLEMENTED	N/A
MAIN OUTCOMES	
- 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 identified, 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	30 th 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	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 OUTCOMES	
• 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 requirements 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.	

Consultation letters, MOMs and power point presentation to Institute of Archaeology can be found in Appendix P.

12.1.2 Project Site Archaeological Survey

The National Archaeological Centre of the Academy of the Republic of Uzbekistan was engaged by ACWA Power to undertake survey at the Project site. An agreement was signed on 4th May 2021 and this agreement outlined the terms of engagement between the two parties and required the immediate mobilisation of the Archaeology Team to site.

On 5th July 2021 a research team of nine (9) experts from the Institute of Archaeology mobilised to the Project site in order to conduct the archaeological surveys. The survey works at the site was conducted between 5th to 26th July 2021 and a summary of their conclusions was received on 28th July 2021.

12.1.2.1 Outcome of the Archaeological Survey

During the surveys conducted one (1) Neolithic site (7th millennium B.C.) stone processing workshop, eight (8) medieval (V-X centuries) tombs, 21 stones (11 points, VI millennium BC) and classical (10 points, V-XII centuries) were identified. The findings were divided into two (2) groups according to their characteristics:

- Group 1: This group comprised of two (2) points; a stonework workshop and medieval burial mounds. Archaeological artifacts here were scattered within a 200m radius and therefore a protection zone of 200m was established. The protection area was determined on the basis of Chapter 4 of the Resolution of the Cabinet of Ministers No. 265 dated 2019.
- Group 2: This includes 21 small finds which do not have cultural layer and a buffer zone of 25m was established.

NEOLITHIC SITE (7TH MILLENNIUM B.C.) STONE PROCESSING WORKSHOP

The Neolithic site (7th millennium B.C.) stone processing workshop was found north of an unnamed sinkhole within the eastern plot and approximately 10km north east of Dzhankeldy village. The unnamed sink hole is about 10X3km in size and the Neolithic workshop is located at an altitude of 383 m above sea level, above the now eroded silicon deposits. The area is 70x30m and cut by cliffs on both sides. White, brown, and gray shades of silicon are found here with the majority being white silicon. Excavations at the monument have shown that the cultural layer here is unique and up to 40cm thick. After this depth, the finds end and limestone rocks begin.

A number of processed stone items were collected from the workshop and this included nuclei, splinters and plates as shown in the figure below.

Plate 12-1 Jonkeldi Workshop – Stone Nucleus



Plate 12-2 Jonkeldi Workshop – Flakes and Plates



The items found in this workshop indicate that primary stone processing was undertaken at this workshop. The workshop is located near silicon deposits where Neolithic people collect quality raw materials and perform primary stone processing.

According to the National Archaeological Center the discovery of this Neolithic Stone Workshop is an invaluable contribution to the ancient history of Uzbekistan.

MEDIEVAL (V-X CENTURIES) TOMBS

While surveying the unnamed sinkhole, a group of eight (8) circular tombs from the Middle Ages (V-X centuries) were found. The upper part of the mounds was observed to be a circle of stones with dolomites of different sizes (20-50cm). The distance between the forts was recorded as 3m. Numerous fragments of pottery believed to be graves were collected. Pottery is believed to be the first medieval pottery

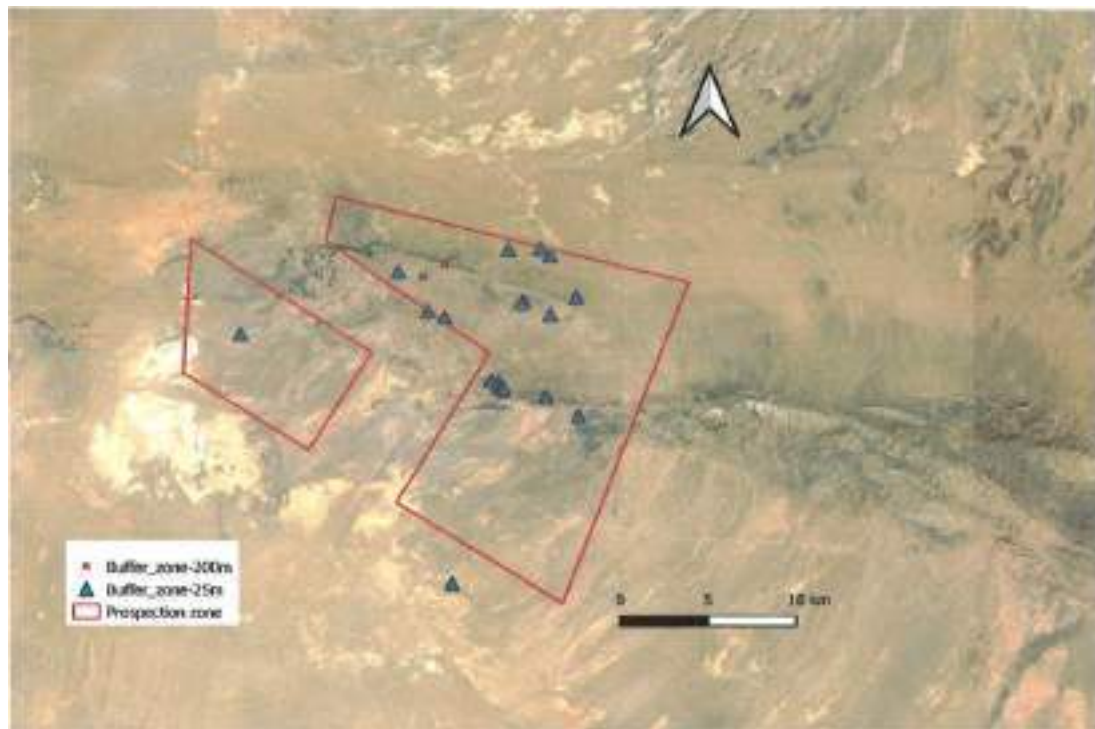
Plate 12-3 Graveyards – South North View



Plate 12-4 Evidence of Pottery Collected from the Tombs



Figure 12-2 Identified Finds with 200m & 25m Buffer Zone within the Project Site



Source: Institute of Archaeology

The table below shows the database of archaeological finds found within the Project site

Table 12-1 Archaeological Finds at the Project Site

ID	COORDINATES			STONE	CERAMIC	BONE	BUFFER ZONE (M)
	X	Y	Z				
1	533076	4523216	405	10	0	-	25
2	534225	4528548	389	6	0	-	25
3	532824.66	4523453.57	252	1	0	-	25
4	528558	4529984	383	53	0	-	200
5	537360	4521637	382	0	1	-	25
6	534098.00	4528456.00	387	5	0	-	25
7	535143.61	4531727.13	302	1	0	-	25
8	527287	45300626	399	4	0	-	25
9	527144	4530296	391	0	9	-	25
10	529777	4530688	432	0	66	-	200
11	529762	4527571	320	4	7	-	25
12	532418	4523790	319	0	1	-	25
13	532796	4523619	347	0	1	-	25
14	528806	4527929	344	0	23	-	25

ID	COORDINATES			STONE	CERAMIC	BONE	BUFFER ZONE (M)
	X	Y	Z				
15	533371.98	4531624.53	312	0	7	-	25
16	537208	4528769	372	4	0	-	25
17	535513.42	4522820.32	378	1	5	-	25
18	535754.94	4527765.13	333	2	0	-	25
19	535737.87	4531284.10	284	1	0	-	25
20	530200	4511602	254	1	0	-	25
21	532994	4523434	357	1	0	-	25
22	533096	4523336	361	9	0	-	25
23	518211	4526501	260	0	7	-	25

Plate 12-5 Evidence of Group 2 Findings (25m Buffer) from the Archaeological Survey



Identified at Location 1 within the Eastern Plot



Identified at Location 5 within the Eastern Plot



Identified at Location 17 within Eastern Plot



Identified at Location 23 within the Western Plot

In the conclusions provided by the Institute of Archaeology it is stated that if construction and excavation works will be carried out on the territory of the finds belonging to the two (2) groups above, the works should be carried out directly under 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.

During a meeting 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 (subject of a separate ESIA), 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 change 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 translated summary of this is presented in Appendix Q.

12.1.2.2 Consultation with the Agency of Conservation of Cultural Heritage

The Agency of Conservation of Cultural Heritage is responsible for the identification, registration, protection, promotion, maintenance of the state register, electronic catalogue, passports and state cadastres and the determination of the protective boundaries of items of cultural importance. They are also responsible for the preservation and protecting of items of historical and cultural values across the different territories in the country.

Following the meeting with the National Centre of Archaeology, ACWA Power sent an application to the Agency of Conservation of Cultural Heritage under the Ministry of Tourism and Sports on 16th July 2021 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 buffer zones.

The application requested the Agency to provide the Project with a final conclusion on the proposed protection/buffer zones and any comments about the Project. 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 suggested by the National Centre of Archaeology.

Follow up consultation has been undertaken with the Agency of Conservation of Cultural Heritage requesting their assistance in assigning the newly established buffer zone for each archaeological finding (see table of archaeological finds 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.

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.

12.1.2.3 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 stated 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 12-2 Information on Coordinates of the Finds at Dzhankeldy Site

ID	X	Y	Z	STONE	CERAMIC	BONE	INITIAL BUFFER ZONE BY NAC	FINAL BUFFER ZONE BY ACCH	COMMENTS
1	533076	4523216	405	10	0	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
2	534225	4528548	389	6	0	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
3	532824.66	4523453.57	252	1	0	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
4	528558	4529984	383	53	0	0	200	167	Initial buffer zone established by archaeologists was 200 m. Cultural Agency established 117 +50m buffer zone. So, the final buffer zone is 167 m
5	537360	4521637	382	0	1	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
6	534098.00	4528456.00	387	5	0	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
7	535143.61	4531727.13	302	1	0	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
8	527287	45300626	399	4	0	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
9	527144	4530296	391	0	9	0	25	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 BY NAC	FINAL BUFFER ZONE BY ACCH	COMMENTS
10	529777	4530688	432	0	66	0	200	50	Initial buffer zone established by archaeologists was 200 m. Agency have established non-standard buffer zone of 50m from the most extreme point of the clustered archaeological zone.
11	529762	4527571	320	4	7	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
12	532418	4523790	319	0	1	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
13	532796	4523619	347	0	1	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
14	528806	4527929	344	0	23	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
15	533371.98	4531624.53	312	0	7	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
16	537208	4528769	372	4	0	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
17	535513.42	4522820.32	378	1	5	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
18	535754.94	4527765.13	333	2	0	0	25	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 BY NAC	FINAL BUFFER ZONE BY ACCH	COMMENTS
19	535737.87	4531284.10	284	1	0	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
20	530200	4511602	254	1	0	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
21	532994	4523434	357	1	0	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
22	533096	4523336	361	9	0	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m
23	518211	4526501	260	0	7	0	25	75	Initial buffer zone established by archaeologists was 25 m, Cultural Agency added + 50 m. So, the final buffer zone is 75 m

Note: A kmz file was also made available to ACWA Power showing the location of applicable buffer zones.

NCA: National Centre National Archaeological Center

ACCH: Agency of Conservation of Cultural Heritage

12.2 Intangible and Tangible Cultural Heritage

12.2.1 Intangible Cultural Heritage

As discussed in section 6.4 there are 4 elements of intangible cultural heritage occurring across Uzbekistan. Consultations with the Dzhankeldy and Kalaata Community leader on 11th May 2022 confirmed that Palov culture and Nawrouz are practiced in their communities. The consultations also revealed that the practices and celebrations are mostly among families and friends.

12.2.2 Tangible Cultural Heritage

During the public disclosure of the ESIA, community members from Dzhankeldy and Kalaata village were asked about the tangible cultural heritage and some of the participants of the disclosure meeting stated that the main tangible cultural heritage item in the project area is “Qanorbay ata” pilgrimage located 35km from Dzhankeldy village and 40km from Kalaata village.

12.3 Receptors

Table 12-3 Potential Archaeology & Cultural Heritage Receptors – Wind Farm

RECEPTOR	SENSITIVITY	JUSTIFICATION
Tasqazgan Monument (R32)	High	The proposed project site or local area is of importance archaeologically or culturally due to the presence of ancient stone age settlements & other items of the medieval periods. As such, it is of high importance and rarity on a national scale with limited potential for substitution
Unknown Memorial (R33)	High	Given the location of the project in an area of archaeological & cultural importance, this unknown memorial is of high importance
Known items of cultural or archaeological significance (R34)	High	Archaeological finds from Neolithic, medieval and classical periods (V-XII centuries) have been found within the Project site during the archaeological survey that was undertaken at the site and some are under Category 1. Archaeological finds in Category I are of high importance and rarity with limited potential for substitution. In addition, the Neolithic Stone Workshop has been identified as an invaluable contribution to the ancient history of Uzbekistan.
Unknown items of cultural or archaeological significance	High	Given the location of the Project in an area of known archaeological & cultural importance, 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 and Nawrouz. These are

RECEPTOR	SENSITIVITY	JUSTIFICATION
		important elements and part of a national identity that has also been recognised by UNESCO.

12.4 Potential Impacts, Mitigation, Management and Residual Impacts

12.4.1 Construction Phase

12.4.1.1 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, Medieval and classical periods (V-XII centuries). Although the exact location of the WTGs and other project facilities such as the switchyard, access roads and cable routes etc has not been finalised at this stage, there is a potential for construction activities at the Project site to damage or impact these archaeological finds. As such, all these facilities and associated infrastructure will require careful consideration in terms of siting taking into account the following:

- Archaeological sites identified during the surveys.
- The buffer zone/distance requirements that will be set by the Cultural Heritage Agency.
- On-going consultations and engagement with the Institute of Archaeology in Uzbekistan

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 should be available on site during the construction phase to monitor the work being undertaken. The archaeologist on site should also be included in conducting induction sessions and tool box talks for the workers.

In addition to the above, construction activities undertaken beyond the site boundary have the potential to impact archaeological or cultural items in proximity to project site. Particularly the Tasqazgan monument located at the boundary of the eastern plot and the unknown memorial in between both plots. With regards to the Tasqazgan monument, there is the potential for an interface between project works and this monument during construction works at the fence line.

12.4.1.2 Direct Impact to Unknown Buried Archaeology

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 & cultural 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 Finds 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 managed by archaeological experts and identified, recovered and preserved in coordination with the relevant government authorities.

12.4.1.3 Impact on Intangible cultural heritage

Elements of intangible cultural heritage in Uzbekistan are identified in section 6.4 two 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 29 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 these elements within their communities.

Table 12-4 Archaeology and Intangible Cultural Heritage Impact Significance, Mitigation & Management Measures and Residual Impacts - Construction

POTENTIAL IMPACTS	MAGNITUDE OF IMPACTS	RECEPTOR	SENSITIVITY	IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
Impact to existing archaeology and/cultural items	Minor Negative	Tasqazgan Monument (R32)	High	Minor to Moderate	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. - 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 Finds 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.	Negligible to Minor
	Minor Negative	Unknown Memorial (R33)	High	Minor to Moderate		Negligible Minor
	Moderate Negative	Known items of cultural or archaeological significance (R34)	High	Moderate to Major		Minor to Moderate

POTENTIAL 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.	

POTENTIAL IMPACTS	MAGNITUDE OF IMPACTS	RECEPTOR	SENSITIVITY	IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
Accidental destruction of unknown archaeological resources buried within the Project site	Minor Negative	Unknown Buried archaeological artefacts or remains	High	Minor to Moderate	- An archaeological 'Chance Finds 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. - 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 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.	Minor

POTENTIAL IMPACTS	MAGNITUDE OF IMPACTS	RECEPTOR	SENSITIVITY	IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
Impact on intangible and tangible cultural heritage	Minor Negative	Communities who practice the elements of Palov & Nawrouz and visit the "Qanorbay ata" pilgrimage	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

12.4.2 Operational Phase

The operational phase of the Wind Farm 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 procedures to be implemented in ensuring protection of the archaeological sites.

Table 12-5 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

12.4.3 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.

12.5 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 12-6 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		Visual Inspections of the area near the project fence line to ensure that no damage is being caused by Project workers.
	Undiscovered archaeological remains within the Project site		Archaeological buffer zones to ensure compliance The Project area requiring excavations, earthworks or grading during construction.
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.

13 LANDSCAPE AND VISUAL AMENITY

This chapter 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, several 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 also identified. 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 24 in Part B of this ESIA.

13.1 Observation and Baseline Environment

13.1.1 Methodology

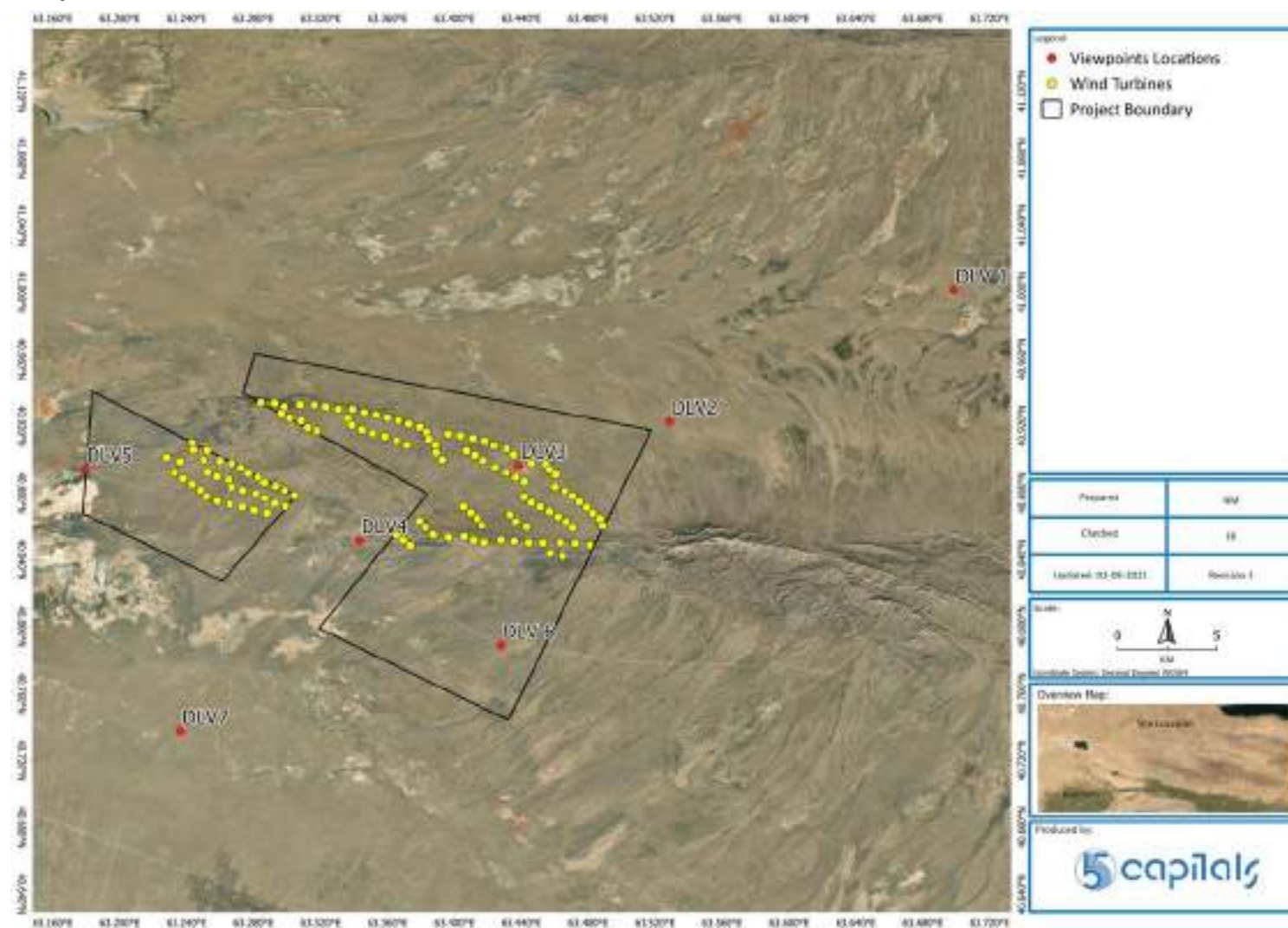
During desktop study of the Project area, a Geographic Information System (GIS) was used to conduct a Viewshed or Zone of Theoretical Visibility (ZTV) Assessment of the project site. The assessment provides an accurate geographical representation of the project site and the surrounding areas where visibility 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, seven (7) 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 (DLV1 to DLV7) 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 13-1 Viewpoint Locations

VIEWPOINT ID	COORDINATES		DESCRIPTION
	LONGITUDE	LATITUDE	
DLV1	63.69854	41.00132	Located on the road from Chontabay to Dzhankeldy and has one of the first views of the site as you travel down this road.
DLV2	63.52861	40.92269	Located on the same road from Chontabay to Dzhankeldy but much closer, at the boundary of the site.
DLV3	63.43842	40.89616	Located in the middle of the project eastern plot, this represents the view as seen from the herder's accommodation.
DLV4	63.34314	40.85149	Located in the middle of the project two plots, this viewpoint represents the view as seen from the outskirts of Dzhankeldy village.
DLV5	63.17892	40.89405	This represents the view as seen from Kalaata village.
DLV6	63.42776	40.78867	This represents the view as seen from one of the proposed access roads between the A380 highway and Dzhankeldy.
DLV7	63.23631	40.73758	This represents the view as seen from another of the proposed access roads between the A380 highway and Dzhankeldy.
Notes: DLV = Dzhankeldy Landscape and Visual Viewpoint Locations Coordinate System = WGS 1984, Decimal Degrees			

Figure 13-1 Viewpoint Locations



The field survey was undertaken on 29th July 2021 and involved the following:

- Taking a photographic record of the landscape character of the Project area,
- Visiting locations determined through the desktop study i.e. viewpoints DLV1 to DLV7 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.

13.1.2 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 forms the basis for the identification and description of the changes that may occur to the landscape character as a result of the construction and operation of the wind farm.

The different elements that contribute to the landscape character at the study area as identified during the survey are discussed below.

PROJECT SITE LAND USE AND COVER

Land use at the site and the surrounding areas consist of an undeveloped natural desert with mountains/hills crossing the project site from east to west and significant anthropogenic influences. The anthropogenic influences include existing low voltage overhead transmission lines (OHTL) which runs through the eastern and western project plots, temporary weather masts and herders' settlement & structure all of which are present within the Project boundary. The existing OHTL, the temporary weather masts and herders' settlement & structure create a vertical anthropogenic intrusion into the existing project site landscape.

Residential building of two (2) nearby villages; Kalaata and Dzhankeldy also contribute to the anthropogenic intrusion to the landscape character at the project area.

SETTLEMENTS

The two villages located outside the project boundary primarily consists of one storey buildings. These settlements are small and typically focused on agriculture and livestock grazing. There are very few well paved roads within the villages and many homes are distributed in a random pattern and only accessible by dirt tracks.

Dzhankeldy village is located west of the eastern plot and the Kalaata village is located west of the western plot.

Plate 13-1 View of Dzhankeldy Village



Plate 13-2 Kalaata Village



LANDFORM AND TOPOGRAPHY

The topography in the study area is typical of the region and consists of rolling desert shrub-covered hills, with more mountainous areas crossing through the middle of the site. The elevation of the western plot ranges from around 150m above sea level in the southern region to over 520m above sea level on the mountain peaks.

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 site but identified in and around the villages, Kalaata and Dzhankeldy outside the Project boundary.

Plate 13-3 Typical Shrub Vegetation at Project Site



TRANSPORT ROUTE & SITE ACCESS ROADS/TRACKS

Based on the desktop study using google earth and observations made during numerous site visits including the landscape survey, there are currently four (4) access roads in the study area. The main access road is the R-61 road located south of eastern plot and runs through the Project site from the west to the northern extent of the eastern plot. This road separates into two (2) arterial roads one of which enables the connection of the A380 highway with the A379 highway located approximately 94km east of the eastern plot and the other road enables connection to other areas north of the Project site such as Uchkuduk.

A small road; the R-218 road runs from the western extent of the western plot to the east and connects to the eastern plot running from the south west to the south east enabling connection to the A380 highway via the Churruq village.

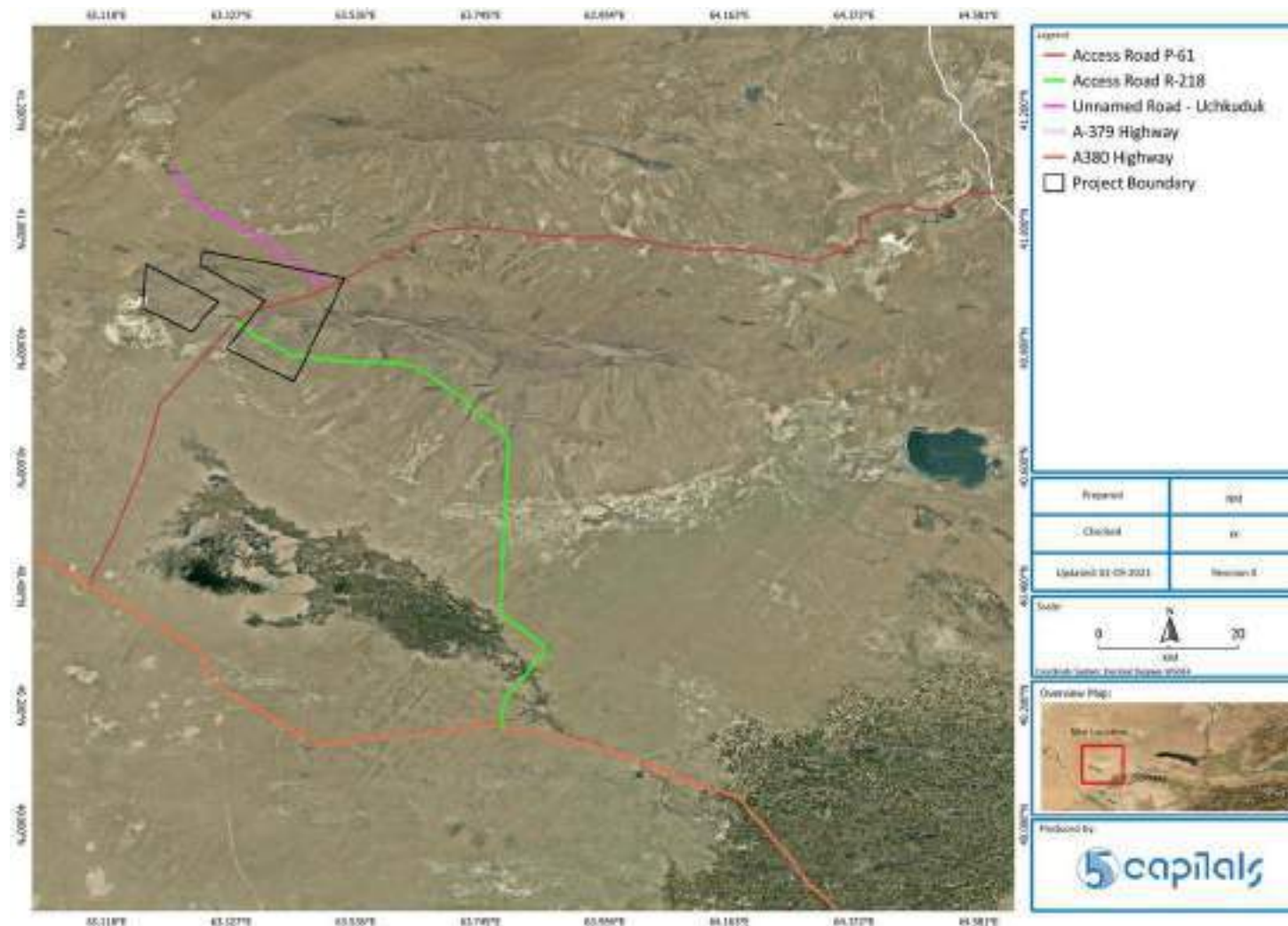
Plate 13-4 The Proposed Access Road, R-218



Plate 13-5 The Proposed Access Road, R-61



Figure 13-2 Transport Route & Site Access Roads/Tracks



LANDSCAPE CHARACTER AREAS

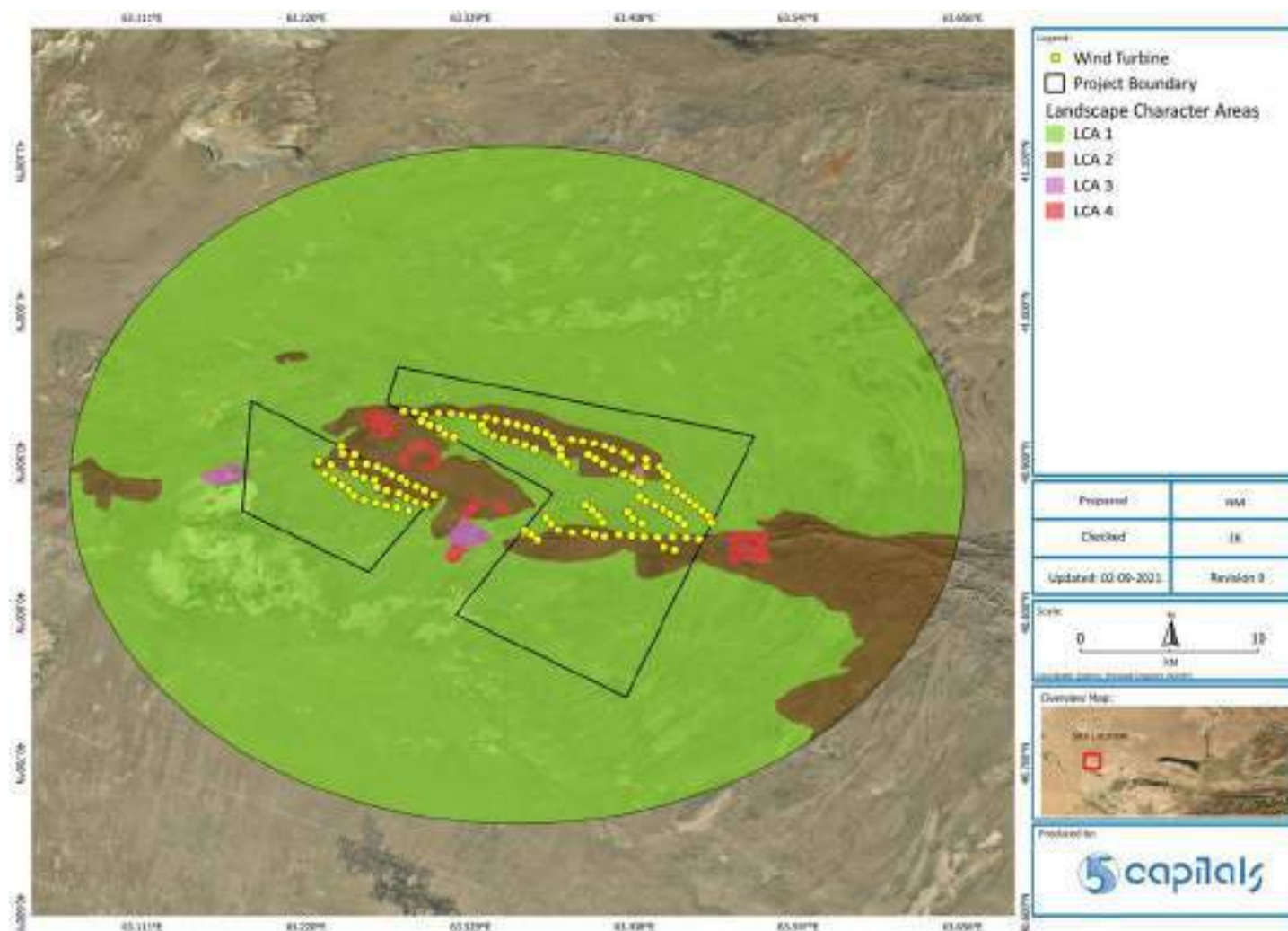
Through a combination of desktop study and fieldwork surveys, the landscape is classified into units of distinct and broadly homogenous characteristics referred to as Landscape Character Areas (LCAs). Within the study area, there are four (4) distinct LCAs and these are shown in the table and figure below.

Table 13-2 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	Undeveloped Mountains / Hills	The surrounding mountainous areas and hills of the study area are mostly undeveloped and untouched.	There are no valued features in this LCA except for the landform itself. It is entirely undeveloped and in good condition. However, there is limited potential for substitution	Medium
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 & existing OHTL)	Existing agricultural & residential uses and busy roads are notable detracting features in this area. In addition, the area lacks any recognised features of local or national value and as such it is considered to be of low value.	Low
LCA 4	Mining Areas	Interspersed in-between the project eastern & western plot are several mining areas that are currently inactive	Mining areas are known to cause significant damage to the natural enjoyment and as such, the landscape value of the mining areas is considered very low.	Very Low

Note: The sensitivity of each Landscape Character has been assigned using the criteria described in "Table 4-5 Environmental Value of Receptor or Resource"

Figure 13-3 Landscape Character Areas



13.1.3 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.

13.1.3.1 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. Receptor types include individual properties and settlements; main transport routes; and the range of landscape character types within the study area.

RESULTS

Besides views of the low voltage OHTLs within the Project site, herders' settlement & structures and residential buildings 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.

Plate 13-6 Transmission Lines Within the Project Site



Plate 13-7 Herders Animal Shelter Within the Project Site



A photographic record of each of the viewpoints 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 13-3 Views from Viewpoint Locations

VISUAL RECEPTORS AND SENSITIVITY	DESCRIPTION OF VIEW														
DLV 1															
Motorists travelling west on the R-61 Sensitivity: Low	While driving west from Chontabay village this will likely be the first view of the wind farm. At this distance, it's likely that only the tips of the wind turbines will be visible and such visibility of the wind turbines will only be on clear sky days. As shown in the photograph below, there are no structures, trees or hills obstructing the view of the mountains in the distance where the turbines will be located.														
	 <table border="1"> <tr> <td>Distance from Nearest Turbine</td><td>Approximately 23.3 Km</td></tr> <tr> <td>Survey Date</td><td>29th July 2021</td></tr> <tr> <td>Camera and Lens</td><td>NIKON D780 with 50mm lens</td></tr> <tr> <td>Orientation</td><td>330 Degree West</td></tr> <tr> <td>Prepared</td><td>NM</td></tr> <tr> <td>Checked</td><td>EC</td></tr> <tr> <td>14-09-2021</td><td>Revision 2</td></tr> </table> 	Distance from Nearest Turbine	Approximately 23.3 Km	Survey Date	29th July 2021	Camera and Lens	NIKON D780 with 50mm lens	Orientation	330 Degree West	Prepared	NM	Checked	EC	14-09-2021	Revision 2
Distance from Nearest Turbine	Approximately 23.3 Km														
Survey Date	29th July 2021														
Camera and Lens	NIKON D780 with 50mm lens														
Orientation	330 Degree West														
Prepared	NM														
Checked	EC														
14-09-2021	Revision 2														

VISUAL RECEPTORS AND SENSITIVITY	DESCRIPTION OF VIEW														
DLV 2 Motorists travelling west on the R-61 Sensitivity: Low	While driving west from Chontabay this will likely be the first close up view of the wind farm. At this distance, the wind turbines will be clearly visible on most days. As shown in the photograph below, there are no structures, trees or hills obstructing the view of the mountains in the distance where the turbines will be located.														
	<table border="1"> <tr> <td>Distance from Nearest Turbine</td><td>Approximately 6.7 km</td></tr> <tr> <td>Survey Date</td><td>29th July 2021</td></tr> <tr> <td>Camera and Lens</td><td>NIKON D750 with 50mm lens</td></tr> <tr> <td>Orientation</td><td>230 Degrees West</td></tr> <tr> <td>Prepared</td><td>NM</td></tr> <tr> <td>Checked</td><td>EK</td></tr> <tr> <td>16-08-2021</td><td>Revision 0</td></tr> </table>	Distance from Nearest Turbine	Approximately 6.7 km	Survey Date	29th July 2021	Camera and Lens	NIKON D750 with 50mm lens	Orientation	230 Degrees West	Prepared	NM	Checked	EK	16-08-2021	Revision 0
Distance from Nearest Turbine	Approximately 6.7 km														
Survey Date	29th July 2021														
Camera and Lens	NIKON D750 with 50mm lens														
Orientation	230 Degrees West														
Prepared	NM														
Checked	EK														
16-08-2021	Revision 0														

VISUAL RECEPTORS AND SENSITIVITY	DESCRIPTION OF VIEW														
DLV 3 -South Active settlement used by herders. Sensitivity: High	This is the south-facing viewpoint from the active settlement currently in use by herders. From this point, wind turbines will be all around the settlement, with few turbines located within 1km of the settlement. The nearest wind turbines are located approximately 500m north & 650m south of the settlement. There are no trees or structures that will obstruct the view.														
	<table border="1"> <tr> <td>Distance from Nearest Turbine</td><td>Approximately 0.65 Km</td></tr> <tr> <td>Survey Date</td><td>29th July 2021</td></tr> <tr> <td>Camera and Lens</td><td>NIKON D750 with 50mm lens</td></tr> <tr> <td>Orientation</td><td>180 Degrees South</td></tr> <tr> <td>Prepared</td><td>NM</td></tr> <tr> <td>Checked</td><td>EK</td></tr> <tr> <td>16-08-2021</td><td>Revision 0</td></tr> </table>	Distance from Nearest Turbine	Approximately 0.65 Km	Survey Date	29th July 2021	Camera and Lens	NIKON D750 with 50mm lens	Orientation	180 Degrees South	Prepared	NM	Checked	EK	16-08-2021	Revision 0
Distance from Nearest Turbine	Approximately 0.65 Km														
Survey Date	29th July 2021														
Camera and Lens	NIKON D750 with 50mm lens														
Orientation	180 Degrees South														
Prepared	NM														
Checked	EK														
16-08-2021	Revision 0														

VISUAL RECEPTORS AND SENSITIVITY	DESCRIPTION OF VIEW														
DLV 3 - West Active settlement used by herders. Sensitivity: High	This is the west-facing viewpoint from the active settlement currently in use by herders. From this point, wind turbines will be all around the settlement, with several turbines within 1km. There are no trees or structures that will obstruct the view.														
	<table border="1"> <tr> <td>Distance from Nearest Turbine</td><td>Approximately 0.65 Km</td></tr> <tr> <td>Survey Date</td><td>29th July 2021</td></tr> <tr> <td>Camera and Lens</td><td>NIKON D750 with 50mm lens</td></tr> <tr> <td>Orientation</td><td>280 Degrees West</td></tr> <tr> <td>Prepared</td><td>NM</td></tr> <tr> <td>Checked</td><td>EE</td></tr> <tr> <td>16-08-2021</td><td>Revision 0</td></tr> </table> 5 capitals	Distance from Nearest Turbine	Approximately 0.65 Km	Survey Date	29th July 2021	Camera and Lens	NIKON D750 with 50mm lens	Orientation	280 Degrees West	Prepared	NM	Checked	EE	16-08-2021	Revision 0
Distance from Nearest Turbine	Approximately 0.65 Km														
Survey Date	29th July 2021														
Camera and Lens	NIKON D750 with 50mm lens														
Orientation	280 Degrees West														
Prepared	NM														
Checked	EE														
16-08-2021	Revision 0														

VISUAL RECEPTORS AND SENSITIVITY	DESCRIPTION OF VIEW														
DLV 4 - East Residents of Dzhankeldy village and motorists on R-61 Sensitivity: High	This viewpoint is from the outskirts of Dzhankeldy village facing towards the east. Turbines will be fully visible and within 2km from the viewpoint. At this distance, there are no structures likely to obstruct the view of the turbines. The hills are also unlikely to obstruct the view of the turbines.														
	 <table border="1"> <tr> <td>Distance from Nearest Turbine</td><td>Approximately 1.92 km</td></tr> <tr> <td>Survey Date</td><td>29th July 2021</td></tr> <tr> <td>Camera and Lens</td><td>NIKON D750 with 50mm lens</td></tr> <tr> <td>Orientation</td><td>80 Degrees East</td></tr> <tr> <td>Prepared</td><td>NM</td></tr> <tr> <td>Checked</td><td>ER</td></tr> <tr> <td>22-08-2021</td><td>Revision 0</td></tr> </table>  capitals	Distance from Nearest Turbine	Approximately 1.92 km	Survey Date	29th July 2021	Camera and Lens	NIKON D750 with 50mm lens	Orientation	80 Degrees East	Prepared	NM	Checked	ER	22-08-2021	Revision 0
Distance from Nearest Turbine	Approximately 1.92 km														
Survey Date	29th July 2021														
Camera and Lens	NIKON D750 with 50mm lens														
Orientation	80 Degrees East														
Prepared	NM														
Checked	ER														
22-08-2021	Revision 0														

VISUAL RECEPTORS AND SENSITIVITY	DESCRIPTION OF VIEW														
DLV 4 - North Residents of Dzhankeldy village and motorists on R-61 Sensitivity: High	This viewpoint is from the outskirts of Dzhankeldy village facing northwest. Turbines are located further away and the views of the turbines will be slightly obstructed by the nearby hills.														
	 <table border="1"> <tr> <td>Distance from Nearest Turbine</td><td>Approximately 4.3 Km</td></tr> <tr> <td>Survey Date</td><td>29th July 2021</td></tr> <tr> <td>Camera and Lens</td><td>NIKON D750 with 50mm lens</td></tr> <tr> <td>Orientation</td><td>350 Degrees North</td></tr> <tr> <td>Prepared</td><td>NM</td></tr> <tr> <td>Checked</td><td>ER</td></tr> <tr> <td>22-08-2021</td><td>Revision 0</td></tr> </table>  	Distance from Nearest Turbine	Approximately 4.3 Km	Survey Date	29th July 2021	Camera and Lens	NIKON D750 with 50mm lens	Orientation	350 Degrees North	Prepared	NM	Checked	ER	22-08-2021	Revision 0
Distance from Nearest Turbine	Approximately 4.3 Km														
Survey Date	29th July 2021														
Camera and Lens	NIKON D750 with 50mm lens														
Orientation	350 Degrees North														
Prepared	NM														
Checked	ER														
22-08-2021	Revision 0														

VISUAL RECEPTORS AND SENSITIVITY	DESCRIPTION OF VIEW														
DLV 5															
Residents of Kalaata village	This viewpoint is from the outskirts of Kalaata village facing east.														
Sensitivity: High	Turbines are located over 4km away, but without any structure or trees to obstruct the view, turbines will be clearly visible.														
	 <table border="1"> <tr> <td>Distance from Nearest Turbine</td><td>Approximately 4.2 km</td></tr> <tr> <td>Survey Date</td><td>29th July 2021</td></tr> <tr> <td>Camera and Lens</td><td>NIKON D750 with 50mm lens</td></tr> <tr> <td>Orientation</td><td>80 Degrees East</td></tr> <tr> <td>Prepared</td><td>NM</td></tr> <tr> <td>Checked</td><td>EC</td></tr> <tr> <td>22-08-2021</td><td>Revision 0</td></tr> </table>  5 capitals	Distance from Nearest Turbine	Approximately 4.2 km	Survey Date	29th July 2021	Camera and Lens	NIKON D750 with 50mm lens	Orientation	80 Degrees East	Prepared	NM	Checked	EC	22-08-2021	Revision 0
Distance from Nearest Turbine	Approximately 4.2 km														
Survey Date	29th July 2021														
Camera and Lens	NIKON D750 with 50mm lens														
Orientation	80 Degrees East														
Prepared	NM														
Checked	EC														
22-08-2021	Revision 0														

VISUAL RECEPTORS AND SENSITIVITY	DESCRIPTION OF VIEW														
DLV 6 Motorists travelling on the unnamed road between the A380 and Dzhankeldy Sensitivity: Low	This viewpoint is from the proposed access road between the A380 highway and Dzhankeldy via Churruq village. Turbines are located over 6km away however there are no structure or trees to obstruct the visibility.														
	 <table border="1"> <tr> <td>Distance from Nearest Turbine</td><td>Approximately 6.6 Km</td></tr> <tr> <td>Survey Date</td><td>29th July 2021</td></tr> <tr> <td>Camera and Lens</td><td>NIKON D750 with 50mm lens</td></tr> <tr> <td>Orientation</td><td>350 Degrees North</td></tr> <tr> <td>Prepared</td><td>HA</td></tr> <tr> <td>Checked</td><td>EK</td></tr> <tr> <td>22-08-2021</td><td>Revision 0</td></tr> </table>  	Distance from Nearest Turbine	Approximately 6.6 Km	Survey Date	29th July 2021	Camera and Lens	NIKON D750 with 50mm lens	Orientation	350 Degrees North	Prepared	HA	Checked	EK	22-08-2021	Revision 0
Distance from Nearest Turbine	Approximately 6.6 Km														
Survey Date	29th July 2021														
Camera and Lens	NIKON D750 with 50mm lens														
Orientation	350 Degrees North														
Prepared	HA														
Checked	EK														
22-08-2021	Revision 0														

VISUAL RECEPTORS AND SENSITIVITY	DESCRIPTION OF VIEW														
DLV 7 Motorists travelling on the R-61 road between the A380 and Dzhankeldy Sensitivity: Low	This viewpoint is from the R-61 access road between the A380 highway and Dzhankeldy. This is likely to be the first view of the project site when coming from the south, with turbines are over 15km away.														
	 <table border="1"> <tr> <td>Distance from nearest turbine</td><td>Approximately 15.1 km</td></tr> <tr> <td>Survey Date</td><td>29th July 2021</td></tr> <tr> <td>Camera and Lens</td><td>NIKON D750 with 50mm lens</td></tr> <tr> <td>Orientation</td><td>40 Degrees North</td></tr> <tr> <td>Prepared</td><td>RM</td></tr> <tr> <td>Checked</td><td>BC</td></tr> <tr> <td>22-08-2021</td><td>Revision 0</td></tr> </table>  capitals	Distance from nearest turbine	Approximately 15.1 km	Survey Date	29th July 2021	Camera and Lens	NIKON D750 with 50mm lens	Orientation	40 Degrees North	Prepared	RM	Checked	BC	22-08-2021	Revision 0
Distance from nearest turbine	Approximately 15.1 km														
Survey Date	29th July 2021														
Camera and Lens	NIKON D750 with 50mm lens														
Orientation	40 Degrees North														
Prepared	RM														
Checked	BC														
22-08-2021	Revision 0														

13.1.4 Lighting Survey

METHODOLOGY

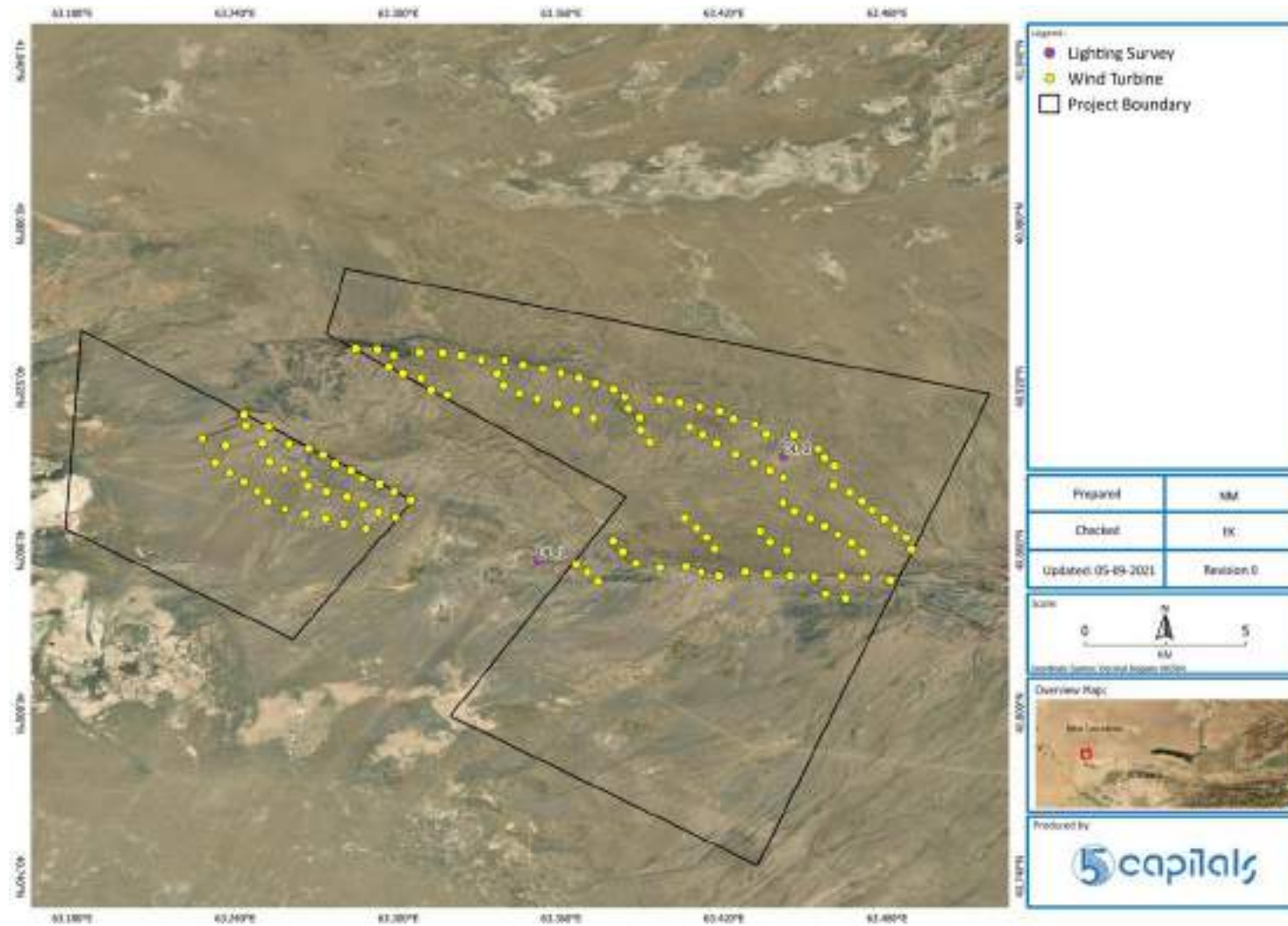
A baseline lighting survey was conducted in August 2021 to understand local sky brightness and existing light sources at the Project site and surrounding areas. Due to the rural nature of the site and the dangers involved with driving off-road at night, the survey was only conducted along the tarmac access road, P-61.

A Nikon D750 camera was set up on a tripod to a mid-lens height of 1.5m outside of Dzhankeldy village. The camera settings used to capture images are shown in the table below and survey location are shown in the figure below.

Table 13-4 Lighting Survey Camera Settings and Location

SURVEY LOCATION		CAMERA SETTINGS	COORDINATES	
ID	DESCRIPTION		LONGITUDE	LATITUDE
DL 1	Outside Dzhankeldy Village	Exposure: 5 Seconds F16 Iso 5000	63.3452671	40.8526117
DL 2	Settlement used by herder's	Exposure: 5 Seconds F16 Iso 5000	63.4417290	40.8943290

Figure 13-4 Location of Dzhankeldy 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 13-5 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 13-5 Bortle Scale



RESULTS

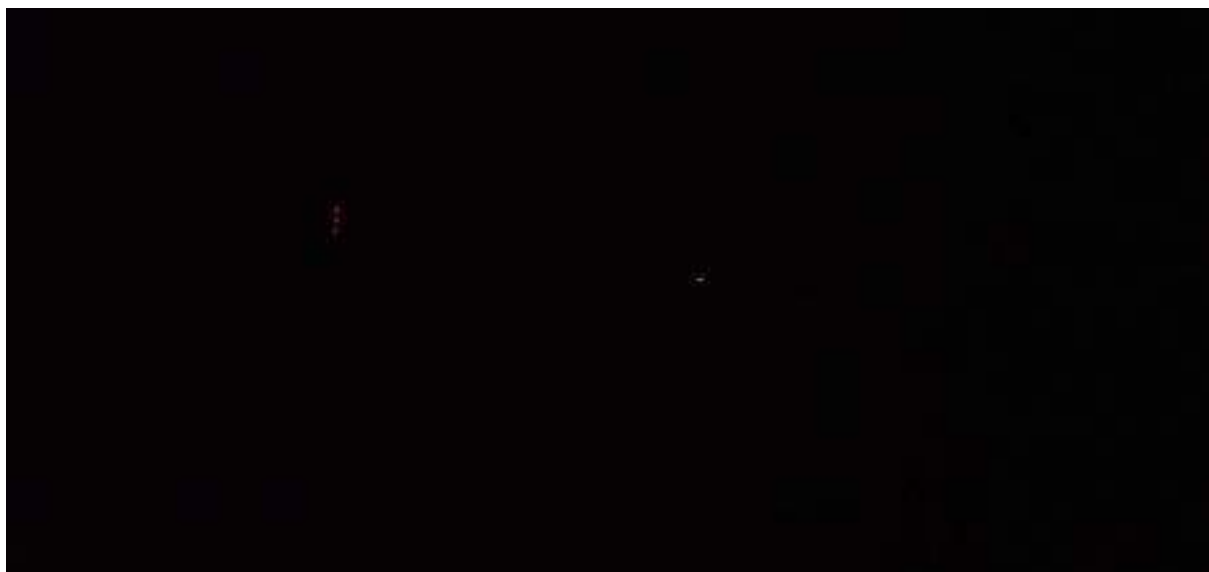
The project site is located in a very rural part of Uzbekistan and as such intrinsically dark. The biggest source of light was from Dzhankeldy village. The majority of residents in Dzhankeldy only have internal lights inside their residences, with only a few street lights along the main road in the village. The image below shows the view of Dzhankeldy as seen from the R-61 road just outside the village.

Plate 13-8 Dzhankeldy Village - Main Light Source in the Area



Further away from Dzhankeldy it quickly becomes extremely dark. At the active settlement used by herder's, the lights from Dzhankeldy was barely visible. The only other light source observed during the August 2021 survey was the lights from the various Met masts located on the site and the occasional vehicle driving on the R-61 road.

Plate 13-9 Light from Dzhankeldy and Met Mast as observed from Active Herder's Settlement.



During the survey, an SQM reading was taken from the outskirts of Dzhankeldy at 21:00 hours. To minimise the influence of celestial lighting (sun and moon) and ensure an accurate reading, the SQM was taken more than an hour after sunset but before the moonrise. As shown in the table below, despite the proximity to the light spill from Dzhankeldy village, the SQM reading was very high as expected from an extremely dark rural sky.

Due to the rising moon and a brighter night sky, no SQM reading was taken at DL 2.

Table 13-6 Lighting Survey SQM and Bortle Scale Results

LOCATION	SQM	BORTLE SCALE
Dzhankeldy Village	21.93	Dark Sky site (Class 2)

During the survey, no light was observed from Kalaata village located near the western Boundary of the Project Site. However, considering its smaller size, the lights from Kalaata is expected to be less intense than observed at Dzhankeldy.

13.2 Receptors

The potential landscape and visual receptors are presented in the table below.

Table 13-7 Potential Landscape and Visual Impacts Receptors – Wind Farm

ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
LCA 1	Landscape Character	Undeveloped Desert Landscape	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.
LCA 2		Undeveloped Mountains / Hills	Medium	The landscape is that of the typical mountain/hills landscape present across Uzbekistan with no features of local or national importance. It is therefore of medium importance and rarity on a local scale.
LCA 3		Developed Areas	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
LCA 4		Mining Areas	Low	The landscape value of the mining areas is of very low importance.
R6	Active settlement within the eastern plot	Seasonal Residential	High	If present at the Project site, the herders using the settlement will have direct visibility of the WTGs within the eastern plot and as such will be particularly vulnerable to changes on landscape character.

ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
R7	Newly constructed settlement within the eastern plot	Seasonal Residential	High	If present at the Project site, the herders using the settlement will have direct visibility of the WTGs within the eastern plot and as such will be particularly vulnerable to changes on landscape character.
R12	Dzhankeldy Village	Residential	High	Residents of this village have direct visibility of the eastern plot and as such will be particularly vulnerable to changes on landscape character as project activities, the Project WTGs and some project buildings will be visible to residents.
R13	Kalaata Village	Residential	High	Residents of this village have direct visibility of eastern plot and as such will be particularly vulnerable to changes on landscape character as project activities, the Project WTGs and some project buildings will be visible to residents.
R16 – R24	Mining Areas (Mining Areas 1 to 9 including mine workers)	Industrial	Low	If mining activities commences before the installation of the WTGs, workers at the mine will have direct visibility of the WTGs within the eastern & western plots and as such will be relatively vulnerable to changes on landscape character.

13.3 Potential Impacts, Mitigation, Management and Residual Impacts

13.3.1 Construction Phase

13.3.1.1 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.

13.3.1.2 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.

13.3.1.3 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 surrounding receptors will at night where the addition of lighting during night time activities 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 night time environment is a "Dark Sky site: Class 2" 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. However, this impact will be temporary and it is not anticipated to significantly impact receptors at the Dzhankeldy & Kalaata villages in proximity to the site due to the existing lighting.

Any night time 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 13-8 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	Undeveloped Desert Landscape (LCA 1)	Low	Negligible to Minor	- Site clearance, levelling & grading to be limited to the size necessary for works at the WTG pads - Construction works to be limited within the boundaries of the Project site. - All temporary construction facilities will be removed once this phase is complete.	Negligible
	Minor Negative	Undeveloped Mountains / Hills (LCA 2)	Medium	Minor		Negligible to Minor
	Minor Negative	Developed Areas (LCA 3)	Low	Negligible to Minor		Negligible
	Minor Negative	Mining Areas (LCA 4)	Very Low	Negligible to Minor		Negligible
Disturbance to Visual Envelope of Receptors	Moderate Negative	Dzhankeldy Village (R12)	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) 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.	Minor to Moderate
	Moderate Negative	Kalaata Village (R13)	High	Moderate to Major		Minor to Moderate
	Moderate Negative	Mining Areas- (Mining Areas 1 to 9 including mine workers))- Only when active	Low	Minor		Minor

POTENTIAL IMPACT	MAGNITUDE OF IMPACTS	RECEPTOR	SENSITIVITY	IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
Addition of Lighting	Minor Negative	Dzhankeldy Village (R12)	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 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 to Moderate
	Minor Negative	Kalaata Village (R13)	High	Moderate to Major		Minor to Moderate
	Minor Negative	Mining Areas- (Mining Areas 1 to 9 including mine workers))	Low	Negligible to Minor		Negligible

13.3.2 Operational Phase

13.3.2.1 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 sub-stations, 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 multiple 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 proximity of permanent receptors (particularly the villages) from 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.

13.3.2.2 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; particularly residents of the settlements within the site and residents of Kalaata & Dzhankeldy village.

13.3.2.3 Addition of Lighting

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 13-9 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	Undeveloped Desert Landscape (LCA 1)	Low	Minor	Efforts will be made to soften the landscape character impacts by planting native trees and vegetation in appropriate areas such as the Project boundary, Health Protection Zone in order to soften the impacts.	Minor
	Moderate Negative	Undeveloped Mountains / Hills (LCA 2)	Medium	Moderate		Moderate
	Moderate Negative	Developed Areas (LCA 3)	Low	Minor		Minor
	Moderate Negative	Mining Areas (LCA 4)	Very Low	Minor		Minor
Disturbance to Visual Envelope of Receptors and Addition of Lighting	Minor Negative	Dzhankeldy Village (R12)	High	Moderate to Major	- Lighting provisions will need to comply with Health & Safety, but not be excessive or unnecessary and not result in sky glow, light spill and glare effects. - Light fittings will be directional as deemed appropriate for their use and intended areas of illumination. - Lighting column and lighting head design will be chosen to limit back spill and any unwanted light spill to other site areas or areas off the site.	Moderate to Major
	Minor Negative	Kalaata Village (R13)	High	Moderate to Major		Moderate to Major
	Minor Negative	Mining Areas- (Mining Areas 1 to 9 including mine workers)) – Only when active	Low	Negligible to Minor		Negligible to Minor

14 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.

14.1 Observation and Baseline Environment

There is no baseline information for shadow flicker.

14.2 Receptors

The assessment of receptors potentially susceptible to shadow flicker (e.g. human settlements) within a distance of ten rotor diameters from proposed turbine locations is internationally considered to be an acceptable distance limit for the shadow flicker studies. 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, for a robust approach, all identified human settlements within 2500m radius of any given turbine location have been included for analysis

The sensitive receptors considered for the Shadow Flicker Assessment are shown in the table below.

Table 14-1 Potential Shadow Flicker Receptors – Wind Farm

RECEPTOR ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
R6	Active settlement within the eastern plot	Seasonal Residential	High	Users of the active settlement will be particularly vulnerable to shadow flicker effect
R12	Dzhankeldy Village	Mixed Use (residential, educational, agricultural)	High	Residents of Dzhankeldy village will be particularly vulnerable to shadow flicker effect

14.3 Potential Impacts, Mitigation and Management Measures and Residual Impacts

14.3.1.1 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 14-2 Turbine Details

TURBINE MODEL	ROTOR DIAMETER (M)	HUB HEIGHT (M)	ROTOR TIP HEIGHT (M)	ROTOR SWEEP 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 (please see residential receptor in the Receptors Section above), the modelling study considered two (2) scenarios; a conservative worst-case approach based on the requirements outlined in IFC EHS Guideline for Wind Energy and a more realistic approach to consider actual site conditions.

The conservative worst-case scenario assumed the following:

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

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

The more realistic approach used long term weather conditions obtained from Tashkent meteorological station (391km away) 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 14-3 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

14.3.1.2 Results

The modelling predicted that under worst-case scenario & realistic scenario the active settlement within the Project site (R6) will experience shadow flicker for 66 hours 16 minutes and for 45 hours 19 minutes in a year respectively. This exceeds the IFC recommended limit of 30 hours per year. 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. Also, the realistic scenario has not considered screening.

The receptor R12 will not experience shadow flicker that exceed the limit of 30 hours per year established by IFC EHS Guideline for Wind Energy both in the worst case & real case scenarios. The calculated shadow flicker at all identified residential receptor location is presented in the table below.

Table 14-4 Shadow Flicker Occurrence at Each Receptor

ID	DESCRIPTION	LOCATION WGS84 (ZONE 41N) UTM	NEAREST WTG	DISTANCE TO NEAREST WTG (M)	GROUND HEIGHT AT RECEPTOR (M)	IFC WORST-CASE SHADOW HOURS PER YEAR	REALISTIC SHADOW HOURS PER YEAR	IFC MAX SHADOW HOURS PER DAY
						(H/YEAR)	(H/YEAR)	(H/DAY)
R6	Active settlement within the eastern plot	537207 E, 4527104 N	DZH36	533	416	66:16	45:19	00:54
R12	Dzhankeldy Village	528463 E, 4522463 N	DZH70	2264	214	05:06	03:29	00:18

The figures below show the extent of shadow flicker effect on receptors from nearest WTG locations.

Figure 14-1 IFC Worst Case Maximum Hours/Minutes per Shadow Day

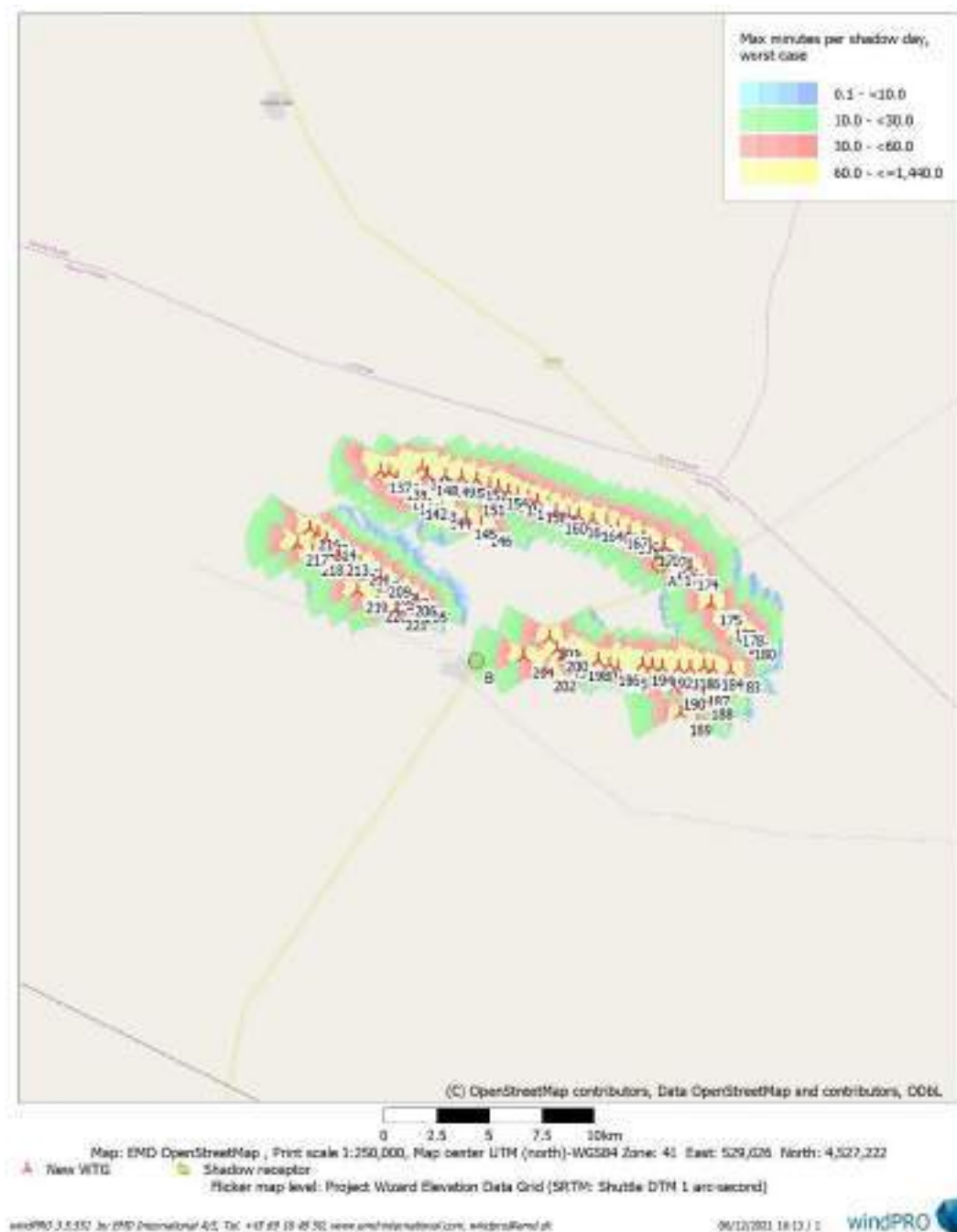


Figure 14-2 IFC Worst Case Shadow Hours Per Year



The detailed shadow flicker assessment report is presented in Appendix R.

Table 14-5 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	Minor Negative	Active settlement within the eastern plot (R6)	High	Minor to Moderate	The active settlement (R6) 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
	No Change	Dzhankeldy Village (R12)	High	Neutral	No Mitigation Required	Neutral

14.4 Monitoring Requirements

No monitoring requirement proposed as the active settlement will be relocated

15 SOCIO-ECONOMICS

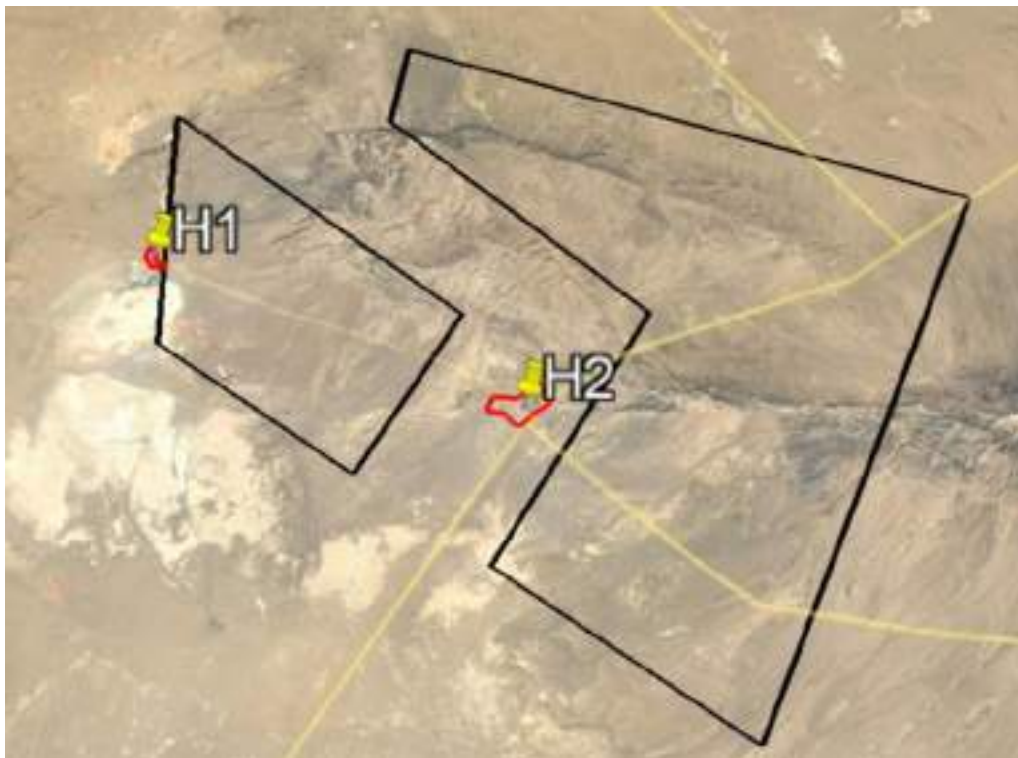
15.1 Observation and Baseline Condition

15.1.1 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 23rd to 24th April 2021 at Dzhankeldy and Kalaata villages which are the closest communities to the Project site and the only communities within 5km of the Project site.

Figure 15-1 Location of Target Communities for Socio-economic Survey



Note:

- **H1:** Kalaata village which is located approximately 200m west of the western plot of the Project site
- **H2:** Dzhankeldy village located approximately 2km west of the eastern plot of the Project site.

The number of households surveyed per village is as shown in the table below:

Table 15-1 Number of Surveyed Households Per Village

ID	OVERALL NO. OF HOUSEHOLDS IN THE VILLAGE	NUMBER OF SURVEYED HOUSEHOLDS	DATE OF HOUSEHOLD SURVEY
Kalaata Village	30	19	24 th April 2021
Dzhankeldy Village	98	79	23 rd April 2021

Plate 15-1 Evidence of Socio-Economic Survey at Kalaata & Dzhankeldy Village



Dzhankeldy Village



15.1.2 Demographic Characteristics

According to the socio-economic survey, a total of 469 people were living in the 98 households that were surveyed. Of these, 55% are male and 45% are female. The majority of the households in both villages are male led households at 91% and 9% are led by women. Female led households were only identified at Dzhankeldy village and none were identified at Kalaata village.

In addition, only 8% of the surveyed household have disabled persons i.e. about 8 households of the 98 surveyed 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 allowance from the government.

MARITAL STATUS

According to the survey, 77% of men in the households surveyed were recorded to be married. 17% were recorded to be single while 6% were either divorced or widowers. In the female led households, 79.4% of those surveyed were married while 6% were widowed or 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 93.5% of the heads of households at both villages are Kazakhs while the rest are Uzbek, Tajiks, Turkoman and Kirgiz. It is worth noting that the Kazakhs make up to 2.5% of the Uzbekistan population.

The survey showed that all the respondents are fluent in both Kazakh and Uzbek languages. According to majority of the respondents (87%), 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", "Bet ashar", and "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 bride & 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:

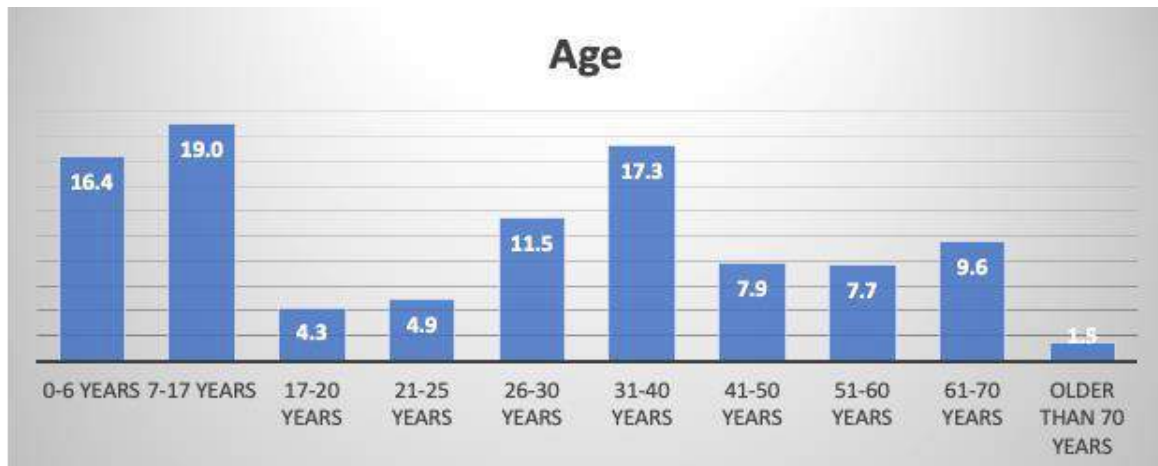
- *Tusau Keser*: When a child takes their first steps, their legs are tied with a thread and that thread is cut by someone they would want their child to emulate (like a role model). Various items such as money, books, whip are placed in front of the child and their choice is believed to determine their 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

Majority of the surveyed households' heads at both village were aged between 7 to 17 years as shown in the figure below.

Figure 15-2 Age of Surveyed Households Members



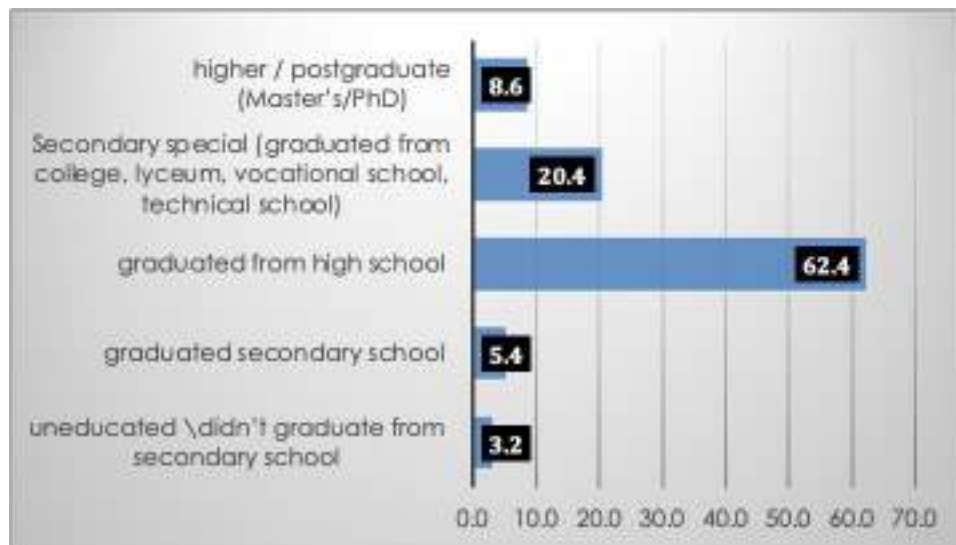
15.1.3 Social Economic Characteristics

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 96.8 % of the respondents stated that they have some form of education whereas 3.2% were either uneducated or had not gone beyond secondary school. Among female led households, about 50% reported to have vocational education.

Figure 15-3 Education Level of Respondents



SOURCES OF LIVELIHOOD

According to the survey, approximately 48% of the respondents (both men and women) are employed at government or private sector while 21.1% are registered as unemployed. 20.8% of the respondents are of retirement age.

Besides employment at government or private sector, other sources of incomes include livestock rearing/cattle grazing, working in the quarry, temporary jobs etc.

Approximately 19.9% of female respondents are unemployed. This is lower when compared to male respondents.

When asked about the main challenges faced by female members of their households in workplaces 87.5% reported that women's rights are implemented at the proper level in society and there is no discrimination against women. However, 11.4% stated that women lack employment opportunities. Limited employment opportunities for women are typical for the labour market in Uzbekistan as employers generally give preference to male workers due to higher level of professional education obtained by men. Of all the female respondents, about 1% stated that they had limited access to obtain vocational education and continue education after secondary school.

Table 15-2 Occupation of Respondents

OCCUPATION	PERCENTAGE (%)
Student of higher educational institution	0.7
College student	0.3
State enterprise, organization, employee in a private firm, including military	48.2
Worker on someone else's farm, contractor	0.3

OCCUPATION	PERCENTAGE (%)
Labourer working in temporary and one-time jobs	2.0
Entrepreneur (registered or unregistered)	0.7
Grazing livestock for pay	2.3
Unemployed but willing to work (but not registered with the labour exchange)	21.1
Not working and not looking for a job	1.3
Disabled (registered)	1.0
Retirement by age or length of service	20.8
Officially registered in the labour exchange as unemployed	1.3

Approximately 2.2% of the respondents stated that their family members work in other regions of Uzbekistan or abroad. This only included men and no 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.

DIVISION OF LABOUR

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, 50% stated that their children perform chores such as cleaning, cooking and fetching water, taking care of younger siblings. 22.7% stated their children are involved in grazing the family livestock while 36.4% 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, 40% stated that their children help out for more than 20 hours per week. 23.1% stated it was more than 30 hours while 36.9% did 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.

Based on the socio-economic survey, 6.7% of the respondent are registered in the system for social support. 25% of the female led households are registered in the system This is primarily

due to the fact that, as a rule, the share of poor and socially vulnerable households among such households is higher than among households headed by men.

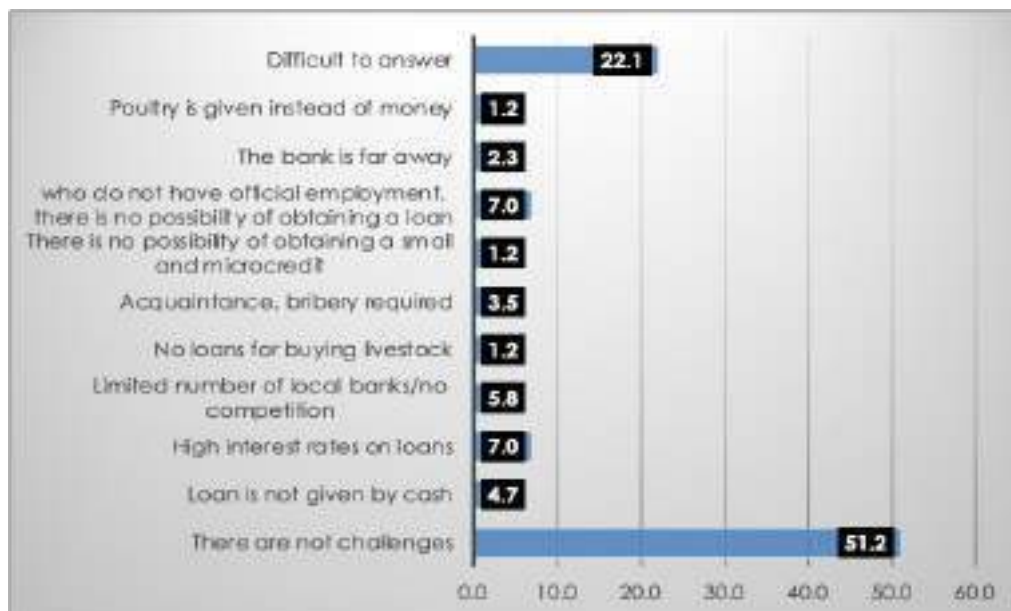
In addition, approximately 15% of the families receive child benefits or poverty allowances and 10% of the respondents believe they should be receiving allowances but do not. The main reason for this is that some families do not meet the criteria set by the government due to their income level, ownership of assets such as a car and failure to register as unemployed¹⁵ with the mahalla.

FINANCIAL ACCESS

According to the survey, only 12% of the respondent have taken a loan in the past 5 years of which 10.8% used the loan for the purchase of household goods. 72.7% of those that received loans were men while the remaining 27.3% were women. 62.4% of respondents stated that they do not think the availability of loans is dependent on the loan applicant gender and female respondents agreed to this as they do not think it is more difficult for women to obtain loans as 1.9% of male respondents indicated.

When asked about the challenges experienced in accessing loans, 51.2% stated that they did not experience any challenges, 7% stated that loans have high interest and those unemployed are not given loans while 22.1% found it difficult to respond.

Figure 15-4 Challenges Faced by Households in Obtaining Loans



¹⁵ 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.

It is noted that there are no financial services in the villages and respondents complained that they have to travel to Peshku to apply for loans or pay back loans.

EXPENDITURE

The main source of expenditure in the surveyed households is food at 42.7%, clothing (15.4%), transportation (10.1%) and agricultural, livestock breeding & other agricultural needs (8.5%). Average household expenditure is provided in the table below.

Table 15-3 Average Household Expenditure

OCCUPATION	PERCENTAGE (%)
Purchase of household food (except drinking water) and meals from the catering establishments (at the expense of money)	42.7
Shopping for clothes and shoes for children and adults	15.4
Detergents, sanitary and hygiene products	3.4
Costs of purchase and delivery of water for drinking and household needs	1.5
Other utility bills and housing taxes (electricity, land tax, etc.), except for drinking water	3.1
Cell phone bills	4.7
Bottled Gas costs	0.9
Public transport, taxis and minibuses, petrol	10.1
Purchase of stationery and educational materials, school fund contributions, higher education and college expenses, payments for courses, tutors, etc.	2.6
Payments for medications, medical services	5.2
Costs for agricultural, horticultural needs, including cattle breeding, purchase of poultry, costs for breeding and feed	8.5
Other expenses (durable goods, construction and renovation of house, purchase of building materials, weddings, dishes, holidays, parks, travel and other expenses.)	1.9

IMPACTS OF COVID-19 ON HOUSEHOLDS

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% 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 clothing, utility, educational expenses (kindergarten, tutoring, books), food, medical and travelling. Even

households whose income was not impacted also reduced their expenses in order to save funds due to uncertainty about the future.

In addition, about 40% 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 8% 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.

HOUSEHOLD AMENITIES

The villages do not have any centralised gas supply, heating or sewage system in place and only few families have access to water supply. Electricity is supplied to all the houses and interruptions are rare.

Due to the lack of centralised water supply, about 95% of the respondents have to buy water from water trucks, 4.3% use water from irrigation canals as the main source of drinking water while 1.1% get water from a pump station. 29% of the households stated that they were not satisfied with the quality of the water due to its high salt content and contamination.

For heating, 93.5% of the households use saxauls for heating up their houses, while 15.1% use electricity and 2.2% use coal. For cooking, 97.8% use gas cylinders, while 3.2% use saxaul wood and 1.1% use coal, branches, boughs & electric oven. 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.

The saxaul tree is listed in the Uzbekistan Red List and is a protected tree. Based on the survey, 85.2% 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.

There are no garbage/waste collection services in the villages and 33% of the respondents stated that they have garbage pits in their gardens while 25% dump the waste in public garbage pit and 42% dump the waste in undefined places in the desert.

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 story houses. Approximately 97.8% own their own homes, while 1.1% rent and the remaining 1.1% use service housing. About 92% of the houses are registered (owned) under the men in the household and the remaining 8% are under the female. The reason why most houses are registered under men is due to the fact that the

houses are usually registered in the name of the head of the family, because in most cases, the house belongs to the husband's parents. Therefore, more often men automatically become homeowners.

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 15-5 House Ownership

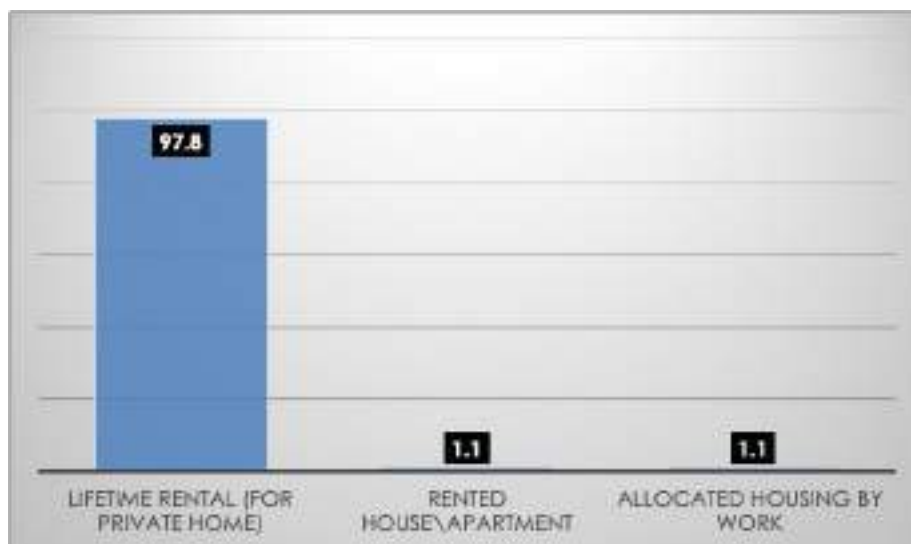
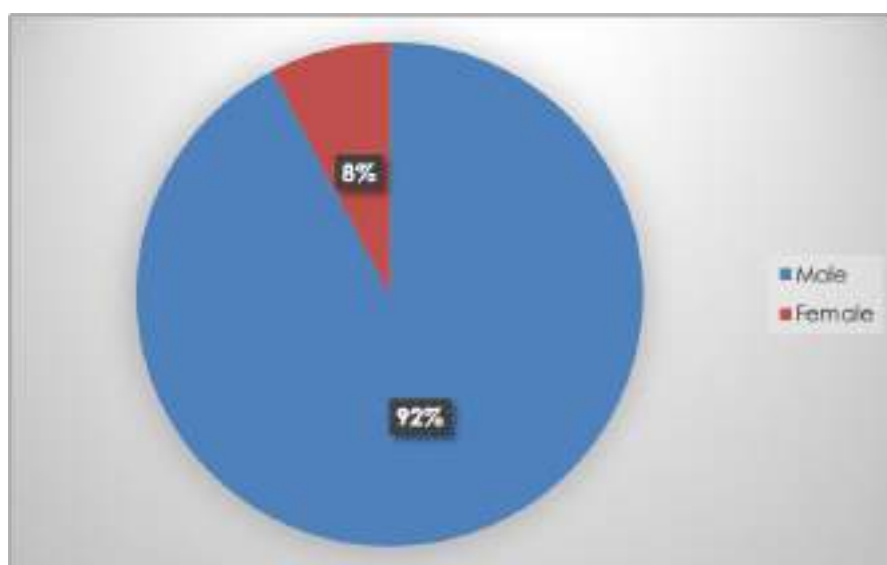


Figure 15-6 House Ownership by Gender



OWNERSHIP OF LIVESTOCK & POULTRY

According to the survey, 79% of all the households keep livestock which mainly consist of cows, and sheep. 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.

The main challenges associated with keeping livestock include:

- Lack of pastures for grazing cattle
- High cost of cattle feed
- Lack of land for growing fodder crops
- Lack of water resources to water the cattle
- Limited opportunities to sell livestock product.

FARMING

The villages are located in a desert area which is not suitable for farming. All the surveyed households stated that they have their own vegetable gardens (tomorka) but 80% 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 discussed with PAPs including with female participants only in public meetings held in February 2022. During these meetings, information on potential 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, 71.6% reported that crime in their villages is very low while 21.6% said the prevalence of crime is low and 5.7% reported crime to be medium. The main source of crime in the villages was reported as robbery which 3.5% 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.

15.1.4 Access to Social Services

ACCESS TO HEALTH SERVICES

There are no private medical facilities in the Project area or in proximity to the Dzhankeldy & Kalaata village. However, a rural family polyclinic is located in Dzhankeldy village. According to the outcome of the survey, 72% of the respondents stated that the family polyclinic is well equipped, 16.1% stated the polyclinic is not well equipped and 8.6% stated that the clinic was well equipped but lacked qualified specialists particularly dentists, gynaecologists and paediatrician.

One of the main challenges faced by the respondent is the lack of maternity hospitals in proximity to the villages. It is noted that the nearest maternity hospital is located more than 100km from both Kalaata & Dzhankeldy village. 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 15-4 Common Illnesses in the Village

COMMON ILLNESSES	
Cardiovascular disease	Genitourinary Diseases
Respiratory Diseases (Influenza, cold)	Gynaecological Diseases
Anaemia	Jaundice

Majority of the respondents stated that they do not have health insurance while 9.7% of the respondents chose not to answer the question about health insurance availability. 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 17.2% of the respondents have already received their COVID-19 vaccination, 22.6% do not plan to be vaccinated because they believe the vaccine is potentially harmful or they do not need it, 33.3% plan to get vaccinated if it is free and 9.7% 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 both Dzhankeldy & Kalaata Village but none of the villages have professional college. Based on the survey, 50% of the respondent with children of pre-school age attend kindergarten while 15% 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 established more kindergarten networks in Uzbekistan and the law now allows creation of private kindergartens.

44.1% of the respondents stated that the schools in the village are well equipped while 31.2% mentioned that the schools are not well equipped with qualified teachers and learning materials such as books, desks. 18.3% stated that the schools are equipped and only meet the basic requirements for learning. The rest (6.4%) found it hard to answer.

TRANSPORTATION SERVICES

In general, public transportation network in the villages is underdeveloped 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 can be used to access services and goods.

Based on the survey, 18.3% of the respondents stated that they own a vehicle, 65.6% use private taxis and 12.9% use route taxis (which can transport several people at once). Other means of transport available to the locals include motorcycles and train depending on their destination and distance of travel.

MARKET PLACE

There are 1-2 shops located in each village and in some instances, mini buses called "mobile shops" visit the villages to sell food & non-food items. From the survey, about 40% of the households surveyed rely on these mobile shops to buy food. These minibuses do not visit the villages on a defined schedule and hence they are not entirely reliable. As such villagers sometimes have to travel to Peshku district (which is over 100km – 120km away) to purchase some essential goods.

Figure 15-7 Mobile Shop As Seen During the Survey



About 78.9% of the respondents buy building materials, 63.3% buy clothing, 61.1% buy household goods and 56.7% buy 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 15-5 Current Price of Commodities in the Project Area

ITEM	UNIT	AVERAGE PRICE IN THOUSAND SOUMS	AVERAGE PRICE IN USD
Bakery products	1 pc	3,250	0.3
Bread	1 pc	2,250	0.2
Meat/beef	1 kg	52,500	5.0
Potato	1 kg	4,000	0.4
Onion	1 kg	3,000	0.3
Carrot	1 kg	3,000	0.3
Tomato	1 kg	17,800	1.7
Milk (l)	L	4,850	0.5
Dairy product (l)	L	3,200	0.3
Egg (pcs)	1	1,500	0.1
Rice	1 kg	11,000	1.0
Oil (l)	L	15,500	1.5
Flour	1 kg	3,200	0.3
Sugar	1 kg	9 000	0.9

NGOs OPERATING IN THE PROJECT AREA

Approximately 70% of the respondents stated that they were not aware of any NGOs working in their villages while 2.2% stated that they are familiar with the International Committee of the Red Cross (ICRC) and 28% are not aware of NGO operating in the project area. ICRC is involved in working with humanitarian work.

15.1.5 Use of the Project Site

15.1.5.1 Livestock Grazing at 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 current land users, there are 13 herders that use the project site for livestock grazing activities. Eight (8) are from Dzhankeldy village, three (3) are from Kalaata village and the remaining two (2) herders are from Bukhara city. Out of the 13 herders, only 3 have a written contract with Dzhankeldy LLC. The total number of livestock owned by Dzhankeldy LLC and the herders and is grazed within the project boundary is 4,068.

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.

In addition to livestock grazing, the Project site also contains a network of paved access roads which are used to connect the neighbouring villages to grazing areas, Highway A380, Peshku District & Shofirkon District. The location of these access roads and connectivity to other areas is shown in the figure below.

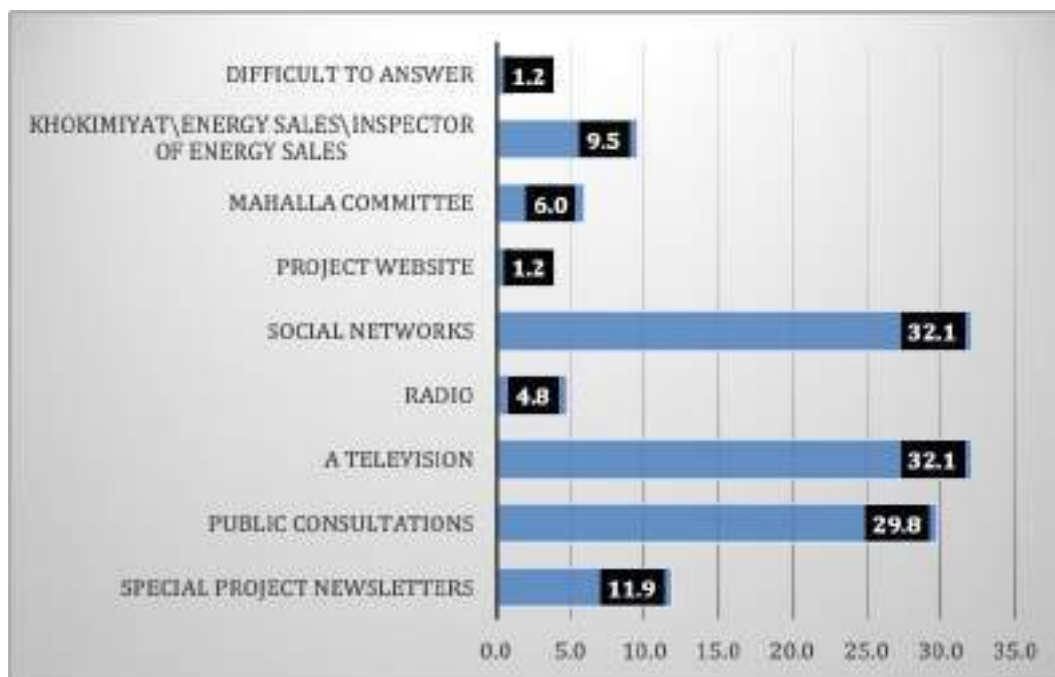
During the public disclosure of the ESIA, community members of Dzhankeldy and Kalaata village were informed that access through the project site maybe limited and, in some cases, restricted and the participants indicated that they have no concerns in relation to the existing access roads as there are other roads in the project area that can be used.

15.1.6 Knowledge About the Project

Approximately 22% of the households surveyed reported to have previous knowledge of the Project while 43% did not have any prior information about the Project. Approximately 27% 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, friends or social media.

When asked about how they would like to receive Project information moving forward, 29.8% would like to receive information from Project representatives, 32.1% from TV adverts and social networks and 11.9% from project newsletters.

Figure 15-9 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;
- 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:

- Reduction of grazing land;
- Damage to gardens/farms;
- Damage to roads, irrigation canals and utility systems such as water pipes, gas supply network etc.; and
- Environmental and ecological impacts.

15.2 Receptors

Table 15-6 Potential Socio-Economic Receptors – Wind Farm

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.

15.3 Potential Impacts, Mitigation, Management and Residual Impacts

15.3.1 Construction Phase

15.3.1.1 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.

15.3.1.2 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.

15.3.1.3 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.

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

Potable water will be supplied to the Project site via water tanker trucks to cover the potable water demand of the project however, it has not been confirmed where the water will be sourced from.

Based on the socio-economic survey undertaken, about 95% of respondents from surrounding village indicated that they buy water from water trucks as such If the supply of potable 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 local communities or an increase in the price of water particularly if water is obtained from the same supply network that provides water to the surrounding local communities/villages.

15.3.1.5 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 27 Community Health, Safety and Security, Chapter 28 Labour & Working Conditions).

Children may also be 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.

15.3.1.6 Land Use Change

Refer to the project specific RAP for impacts relating to land use change.

15.3.1.7 Disruption of Local Custom

The influx of workers and migrants (refer to the Influx Impact Assessment Chapter 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.

15.3.1.8 Expectations from Local Communities

During ESIA public disclosure meeting with the local communities surrounding the project site, members of Dzhankeidy and Kalaata 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 sport facilities such as a mini stadium with sport equipment at the local school
- Provision of mini bus to provide transportation services from the village to Peskhu district centre
- Provision of water pipeline to connect each household to the central drinking water source
- Provision of a small wedding hall for the women of the community

The Project Developer will assess the suggestions provided and provide social services in the communities in coordination with local government authorities.

15.3.1.9 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 an international consultancy, SGS to undertake the assessment.

SGS has mapped 22 suppliers for the Project which include Envision (Tier 1 – turbine OEM Manufacturer)) and the rest as Tier 2 – component manufacture & Tier 3 (key material provider such as steel rod & plate, cast iron, fibreglass, aluminium and copper). The scope of the on-going assessment includes the following:

INITIAL SCREENING

A review of all labour & working conditions relevant documentation available in the public domain on Envision and Envision's core suppliers including but not limited to union complaints, recent legal cases/appeals, public allegations including NGO claims, etc.

DESKTOP SCREENING/ONLINE ASSESSMENT

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 was undertaken and completed for 16 out of the 21 suppliers. This online screening involved the use of worker questionnaire that comprised of question relating to:
 - Recruitment;
 - Discipline process;
 - Forces and Child Labour;
 - Overtime work;
 - Freedom of association/role of the trade union
 - Worker's well-being;
 - Anti-discrimination, sexual harassment and equal opportunity;
 - Health & safety concerns; etc.

SITE BASED ASSESSMENTS

- Site based assessment was undertaken for 5 suppliers that were not able to participate in the desktop/online screening and involved visit to supplier offices, accommodation and other facilities and the review of supplier's policies, plans, procedures, internal reports to assess working conditions and workforce management.

The result of the desktop screening and site assessment is outlined below:

- All suppliers meet the requirements of National laws & regulations;
- There is no evidence of "Zero Tolerance" such as child labour and forced labour for all suppliers
- The management and executive levels of the suppliers have an adequate understanding of the basic requirements of labour and working conditions according to national legislations.

- Majority of the suppliers have established related rules and policies, which defined some of the requirements of protecting employees and providing safe working conditions.
- The suppliers have carried out various training activities, to improve the awareness and ability of relevant personnel on protecting workers.

In addition to the above, Envision implements a Supplier Code of Conduct that is a total-chain initiative, as such applicable to all suppliers and their subsidiaries, affiliated parties, sub-contractors, and third-party intermediaries. The Supplier Code of Conduct has comprehensive provisions covering strict zero-tolerance policies for forced labour and child labour, as well as wage standards, health and safety standards, among other provisions in line with the UNGPs, the Universal Declaration on Human Rights and ILO Core Standards, in addition to requiring adherence to local/national laws. Envision also publishes a statement on Modern Slavery & Human Trafficking; this entails commitments to ensure that there is no modern slavery or human trafficking in their supply chains or business activities. Review of documents proved that Envision's policies are generally in line with the Bank requirements for supply chains.

Although, the result of the desktop screening and site assessment identified Zero Tolerance to forced and child labour issues in Envision and its supply chain, a number of major non-compliance points were identified. These non-compliance points largely relate to inconsistencies in policies against the requirements and implementation practices, overtime issues, gaps in HSE processes, disciplinary and grievance mechanism or employee record-keeping systems. Given the number of major non-compliances, the social risk risk related to supply chain is anticipated to be Moderate.

The outcome of the assessment for each supplier is provided in the Supply Chain Labour & Working Condition Assessment Report in Appendix S.

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.

During the assessment, it was discovered that Envision had established and implemented the supplier management system based on the "Envision Energy Code of Conduct for Suppliers", all suppliers will be required to sign the agreement as it plays an important role in strengthening supplier management at Envision.

Table 15-7 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., Kalaata and Dzhankeldy 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 for unskilled and semi-skilled labour positions.	Minor Positive
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.	Minor to Moderate Positive

POTENTIAL IMPACT	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					Cultural awareness training for all foreign workers and those coming from other regions in Uzbekistan.	
Purchase of construction materials and food resources locally	Minor Positive	Local/Regional Economy	High	Minor 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. - Water supply to the Project site will not be sourced from the wells used by residents of Kalaata and Dzhankeldy village	Minor to Moderate Positive
Consumption of water	Moderate Negative	Water resources	Medium	Moderate Negative	- A water supply assessment will be undertaken by the EPC Contractor to assess availability of water prior to establishing boreholes and abstracting water from the site. - The EPC Contractor will obtain water abstraction permits before drilling any wells/boreholes at the project site. - EPC Contractor will obtain relevant permits and engage licensed water tanker trucks for the supply of potable water. - Prior to engaging a licensed potable water supply company, the EPC Contractor will determine the source of the water to be used for the project. - Where water is sourced from the same water supply system that surrounding communities use, the EPC Contractor will undertake water sustainability assessment to ensure that the projects water demand does not create a shortage to local communities or drive up the price of water.	Minor Negative

POTENTIAL IMPACT	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					- The Project workers will be trained on ways to minimise water consumption and to ensure they have an understanding of water resources and resource efficiency. - The EPC Contractor will have a grievance mechanism in place that will allow villagers to lodge their complaints or concerns regarding any water issues related to the Project. - Water storage tanks, pipes, taps etc. will be inspected for leakage and repaired immediately once identified. - Where feasible, wastewater generated at the batching plant will be recycled and reused to reduce water requirements for concrete works and hence reduce pressure on existing water sources.	
Disproportionate impacts on 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 27 Community Health, Safety & Security and Chapter 28 Labour & Working Conditions. - Implementation of the Project specific RAP to ensure that herders livelihoods are not impacted.	Minor Negative
Disruption of Local Custom	Moderate Negative	Welfare of Local Communities	High	Moderate to Major 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	Minor to Moderate Negative

POTENTIAL IMPACT	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					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	
Social risks related to supply chain	Moderate Negative	Workers working within the supply chain	High	Moderate to Major Negative	- ACWA Power & the Project Company will develop a Supply chain Management Plan and 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 and supply chain risk assessment in relation to Envision'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. - Envision must provide a Letter of Commitment to the Project Company which states that the suppliers involved in production/assembly of turbines will be locked contractually and any new or replacement supplier will go through a separate due	Moderate Negative

POTENTIAL IMPACT	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					diligence process to confirm no association with child and forced labour risks. • A Corrective Action Plan (CAP) will be developed and implemented to address the gaps identified during the supply chain assessment and to address any non-compliances that that will be identified in future audits. • ACWA Power & the Project Company will notify the lenders when labour risks such as forced/child labour or allegations are raised in relation to their core suppliers. • A dis-engagement clause will be added to the loan agreement in case of material non-compliance with the measures listed above. • ACWA Power and the Project Company will ensure that Envision and its core suppliers keep all records, rules and policies in relation to workers protection and the provision of safe working conditions.	

15.3.2 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 (about 15-20 local workforce) 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 27 Community Health, Safety & Security and Chapter 28 Labour & Working Conditions.

Table 15-8 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

15.4 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 15-9 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 from outside the Project site 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 (Aol), 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.

16 TERRESTRIAL ECOLOGY

16.1 Observation and Baseline Environment

The following subsections provide an overview summary of the OHTL ecology surveying results.

16.1.1 Ecosystems, Habitats and Plant Communities

16.1.1.1 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 100m buffer in width along the planned electric lines.

Refer to the detailed habitat and flora reports in Appendix B-1 in Volume 4 for methodology, location coordinates, maps, and full datasets of results.

16.1.1.2 Results

HABITATS

The following habitat types were recorded along the proposed Segment 1 OHTL corridor:

- Sandy and sandy-loamy desert plain
- Fixed and semi-fixed sands
- Complex of fixed and semi-fixed sands, saline depressions and takyr
- Weakly inclined piedmont plain of relic low mountains
- Foothills of relic low mountains
- Outcrops of variegated beds
- Saline lands

The following figure provides an estimation of the habitat distribution along the OHTL corridor.

Figure 16-1 Habitat Map for Dzhankeldy to Bash OHTL Corridor



FLORA

The following table provides the species types considered nationally threatened which were registered during the surveys of the corridor. The two endemic species, *Acanthophyllum cyrtostegium* and *Calligonum zakirovii*, satisfy the EBRD range restricted species requirement and qualify as PBFs.

Table 16-1 Threatened Flora Registered During OHTL Survey

OHTL SEGMENT 1 ("BASH WF – DZHANKELDY WF")			
SPECIES	ABUNDANCE ON SITE (RARE/OCCASIONAL/FREQUENT/DOMINANT)	RANGE (ENDEMIC / REGIONAL / TRANSCONTINENTAL)	IUCN /RDB STATUS
<i>Acanthophyllum cyrtostegium</i> Vved.	Rare	Endemic	Not Evaluated (NE) / UzbRDB 3 (vulnerable, declining species)
<i>Calligonum zakirovii</i> (Khalk.) Czerep.	Rare	Endemic	Not Evaluated (NE) / UzbRDB 1 (endangered species)
<i>Tulipa lehmanniana</i> Merckl.	Occasional to Rare	Regional	Not Evaluated (NE) / UzbRDB 3 (vulnerable, declining species)

16.1.2 Terrestrial Mammals

16.1.2.1 Survey Methodology

Mammal surveying was undertaken during June 2021 along proposed Segment 1 alignment corridor including nocturnal surveying and ground transects.

Refer to the detailed mammal survey reports in Appendix B-1 in Volume 4 for methodology, location coordinates, maps, and full datasets of results.

16.1.2.2 Results

The following table provides a summary of species registered during the surveys of OHTL. Of the species recorded during the OHTL mammal survey, the Goitered gazelle is classified as a priority biodiversity feature as per the EBRD PR6 requirements.

Table 16-2 Registered Mammals During OHTL Surveys

ID	NAME OF SPECIES		IUCN /RDB STATUS	TOTAL NO. OBSERVED
	LATIN	ENGLISH		
1	<i>Paraechinus hypomelas</i>	Brandt's hedgehog	LC/3NT	2 individuals**
2	<i>Lepus totai</i>	Tolai hare	-/game sp	3 individuals
3	<i>Spermophilus fulvus</i>	Yellow ground squirrel	LC/-	5 individuals
4	<i>Spermophilopsis leptodactylus</i>	Long-clawed ground squirrel	LC/-	4 individuals
5	<i>Ellobius tancrei</i>	Zaisan Mole Vole	LC/-	17 inhabited colonies
6	<i>Phombomys opimus</i>	Great gerbil	LC/-	4 inhabited colonies
7	<i>Meriones libycus</i>	Libyan jird	LC/-	5 inhabited colonies
8	<i>Meriones meridianus</i>	Midday jird	LC/-	3 inhabited colonies
9	<i>Allactaga elater</i>	Small five-toed jerboa	-	3 individuals + 2 individuals**
10	<i>Allactaga severtzovi</i>	Severtzov's jerboa	LC/-	2 individuals**
11	<i>Mustela sp.</i>	-	-	1 individual (species unidentified)
12	<i>Vulpes vulpes</i>	Red fox	LC/-	4 individuals
13	<i>Gazella subgutturosa</i>	Goitered Gazelle	VU/3(VU)	4 individuals**

Plate 16-1 Zaisan Mole Caught on a Camera Trap at Dzhankeldy

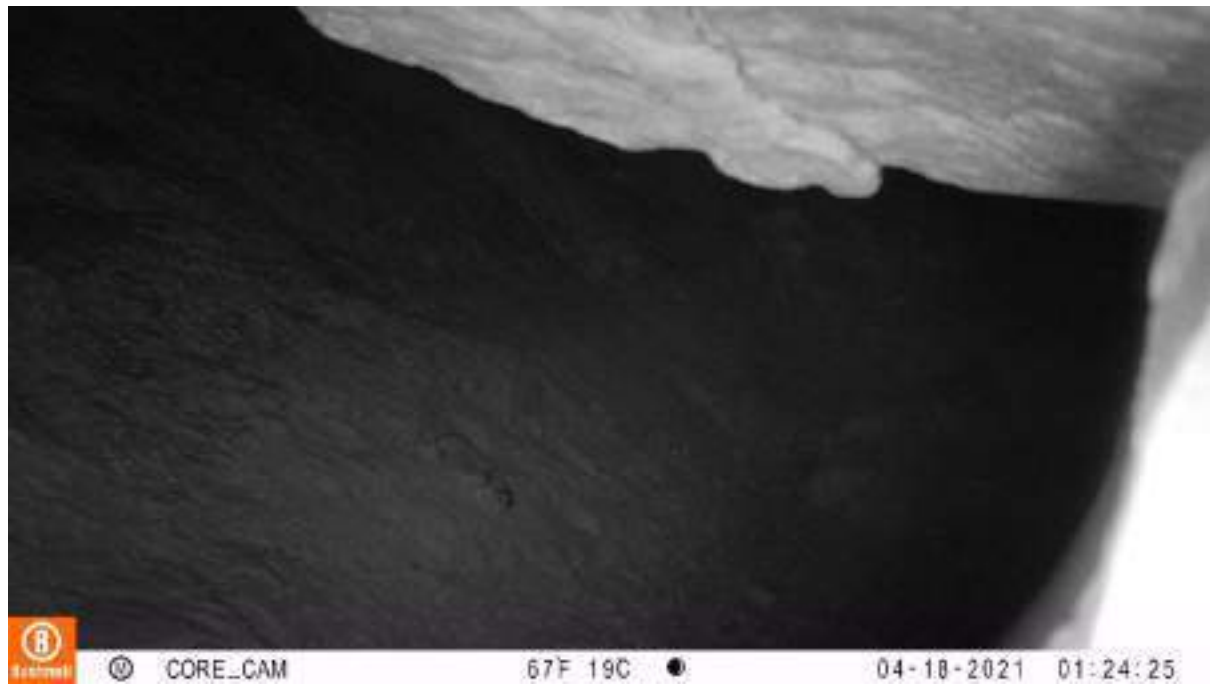


Plate 16-2 Zaisan Mole Colony on Dzhankeldy-Bash OHTL Route



16.1.3 Bat Roosts

Roost searches were undertaken to identify if any colonies of significant importance exist within the corridor.

Refer to the detailed bat survey reports in Appendix B-1 in Volume 4 for methodology, location coordinates, maps, and full datasets of results.

Two species were identified, Ognev's serotine bat (*Eptesicus bottae*) and Common Pipistrelle Bat (*Pipistrellus pipistrellus*), both of which are classed as Least Concern (LC) globally and nationally. The following figure indicates the areas where roosts were located. The two species are of the order Microchiroptera which is listed under Annex IV of the EU Habitat Directive.

Figure 16-2 Bat Roosts Along the Alignment

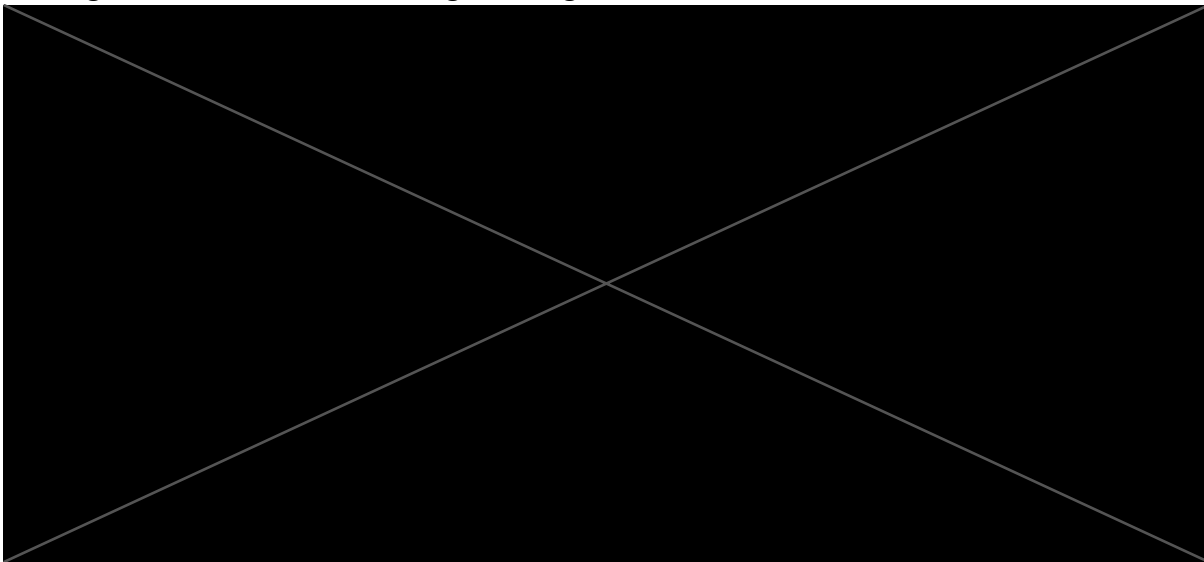
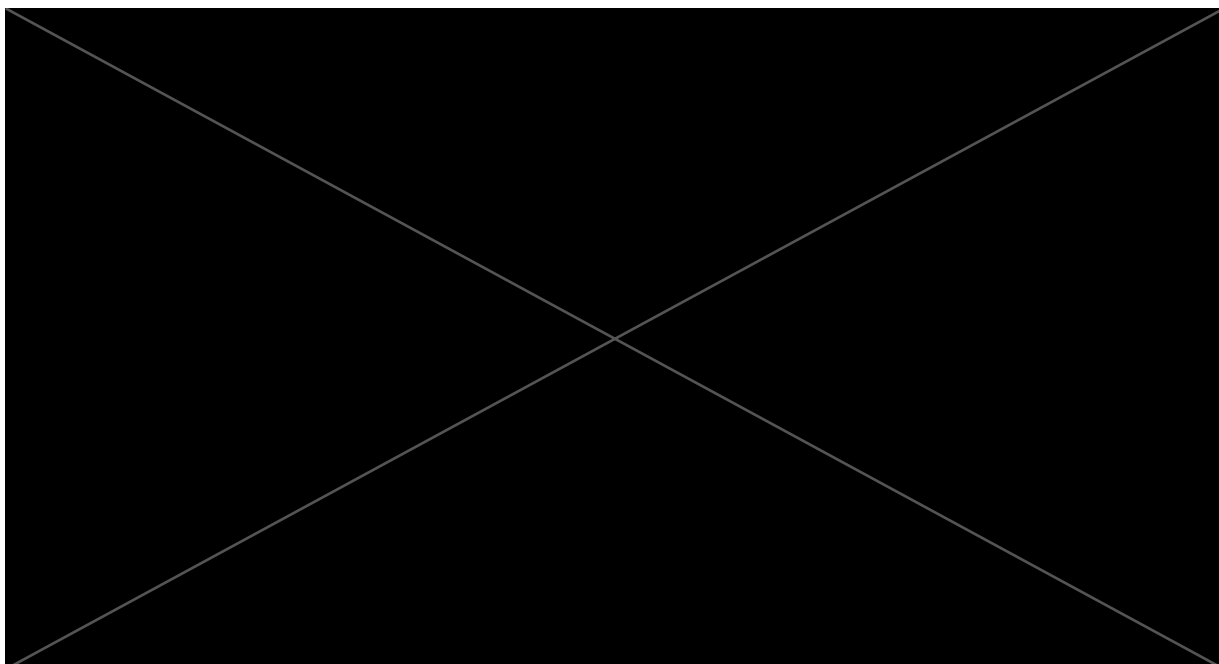


Plate 16-3 Male *Eptesicus bottae* Recorded in a Drainage Tunnel Along the Alignment



16.1.4 Reptiles

16.1.4.1 Survey Methodology

The field trip to the survey points in the area along planned Dzhankeldy-Bash OHTL was carried out from 19th to 25th June 2021.

Refer to the detailed herpetology survey reports in Appendix B-1 in Volume 4 for methodology, location coordinates, maps, and full datasets of results.

16.1.4.2 Results

The following table summarizes the herptile species registered during transects carried out along the OHTL corridor.

Table 16-3 Reptiles Recorded along Dzhankeldy to Bash OHTL Corridor

№	NAME OF SPECIES	THE PRESENCE ACC. TO LITERARY SOURCES	AUTHOR'S EARLIER PERSONAL DATA	JUNE 2021 FIELD EXPEDITIO N DATA	ENDEMISM	STATUS		
						UzRDB	IUCN	CITES
Family Bufeniode (toads)								
1	Turan Toad <i>Bufotes turanensis</i>	+	+		UZ, TJ, TM			
Family Testudinidae (tortoises)								
2	Russian tortoise <i>Testudo horsfieldii</i>	+	+	+		2 (VU)	VU	II
Family Gekkonidae (geckoes)								
3	Southern Even-fingered Gecko <i>Alsophylax laevis</i>	+		+	UZ, TM	VU:D	CR	
4	Comb-toed Gecko <i>Crossobamon eversmanni</i>	+			UZ, TJ, TM, KZ, IR, AF			
5	Caspian Bent-Toed Gecko <i>Tenuidactylus caspius</i>	+	+	+			LC	
6	Turkestan thin-toed gecko <i>Tenuidactylus fedtschenkoi</i>	+	+		UZ, TJ, TM, KZ			
7	Common Wonder Gecko <i>Teratoscincus scincus</i>	+	+	+	UZ, TJ, TM, KG, IR,CN			
Family Agamidae (agamas)								
8	Steppe agama <i>Trapelus sanguinolentus</i>	+	+	+				

№	NAME OF SPECIES	THE PRESENCE ACC. TO LITERARY SOURCES	AUTHOR'S EARLIER PERSONAL DATA	JUNE 2021 FIELD EXPEDITION DATA	ENDEMISM	STATUS		
						UZRDB	IUCN	CITES
9	Sunwatcher toad-headed agama <i>Phrynocephalus helioscopus</i>	+	+					
10	Lichtenstein's Toadhead Agama <i>Phrynocephalus interscapularis</i>	+	+		UZ, TM, KZ			
Family Varanidae (monitor lizards)								
11	Rapid Lizard <i>Eremias velox</i>	+	+	+				
12	Sand Racerunner <i>Eremias scripta</i>	+						
Family Varanidae (monitor lizards)								
13	Caspian Monitor <i>Varanus griseus caspius</i>	+	+	+		2 (VU:D)		I
Family Boidae (Boas)								
14	Desert sand boa <i>Eryx miliaris</i>	+				3 (NT)		II
Family Colubridae (colubrid snakes)								
15	Sand racer <i>Psammophis lineolatus</i>	+	+					
16	Spotted whip snake <i>Hemorrhois ravergieri</i>	+						
17	Spotted desert racer <i>Platyceps karelinii</i>	+	+					

With the exception of the Russian Tortoise (VU) and the Southern Even-fingered Gecko (CR), all species recorded during the OHTL reptile survey are classified as LC on the Global IUCN Red List. Although there are no global estimates for the Southern Even-fingered Gecko, the available literature and stakeholder engagement indicates that any viable population would be considered as more than 0.5% of the global population. Adding to the fact that the Uzbekistan population may be a genetically unique endemic species, it is considered that Criticality is triggered for the Southern Even-fingered Gecko along the OHTL corridor route.

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.

Plate 16-4 Southern Even-fingered Gecko Recorded Along the Alignment



16.1.5 Invertebrates

16.1.5.1 Survey Methodology

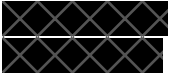
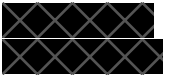
Invertebrate surveying was undertaken by visual and netting surveys covering various transects throughout the OHTL corridor; the surveys were undertaken in May 2021.

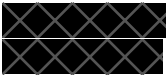
Refer to the detailed entomology survey reports in Appendix B-1 in Volume 4 for methodology, location coordinates, maps, and full datasets of results.

16.1.5.2 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.

Table 16-4 Invertebrates Recorded in Dzhankeldy to Bash OHTL Corridor

NO. OF MONITORING LOCATION	COORDINATES	BIOTOPE	RECORDED SPECIES
Location 1		Dunes, loose sands	<i>Cataglyphis pallidula</i> <i>Sarcophaga</i> sp.
Location 2		Fixed sands	<i>Theone costipennis</i> <i>Lycosa</i> sp. <i>Nabis ferus</i> <i>Messor aralocaspicus</i> <i>Cataglyphis oxiana</i> <i>Cataglyphis cinnamomea</i> <i>Megamecus variegatus</i> <i>Anthaxia anatolica</i> <i>Anacanthotermes turkestanicus</i>
Location 3		Sands	<i>Cataglyphis pallidula</i> <i>Plagiolepis pallescens</i> <i>Messor variabilis</i> <i>Cucullia boryphora</i> <i>Tentyria</i> sp. <i>Halictus</i> sp. <i>Bembex</i> sp. <i>Theone costipennis</i> <i>Lycosa</i> sp. <i>Nabis ferus</i> <i>Anacanthotermes turkestanicus</i>
Location 4		Fixed sands	<i>Anthaxia anatolica</i> <i>Neoplocaederus scapularis</i> <i>Zophosis punctate</i> <i>Machozetus lehmanni</i>
Location 5		Fixed sands	<i>Lycosa</i> sp. <i>Sarcophaga</i> sp. <i>Anacanthotermes turkestanicus</i>
Location 6		Fixed sands	<i>Chioneosoma Porosum</i> <i>Tricomymex</i> sp. <i>Cataglyphis oxiana</i> <i>Tetramorium schneideri</i> <i>Neuroleon</i> sp. <i>Lycosa</i> sp.
Location 7		Fixed sands	<i>Julodis variolaris</i> <i>Clytra</i> sp. <i>Messor variabilis</i> <i>Cataglyphis cinnamomea</i> <i>Lycosa</i> sp.
Location 8		Fixed sands	<i>Bombyliidae</i> (3 species) <i>Cataglyphis oxiana</i> <i>Anacanthotermes turkestanicus</i>
Location 9		Fixed sands	<i>Sarathropus depressus</i> <i>Anacanthotermes turkestanicus</i>

NO. OF MONITORING LOCATION	COORDINATES	BIOTOPE	RECORDED SPECIES
			<i>Lycosa sp.</i> <i>Menecleon sp.</i>
Location 10		Fixed sands	<i>Menecleon sp.</i> <i>Lycosa sp.</i> <i>Zophosis punctate</i>
Location 11		Sands	<i>Trichomyrmex sp.</i> <i>Cataglyphis pallidula</i> <i>Anthaxia anatolica</i> <i>Neoplocaederus scapularis</i> <i>Lixus hirticollis</i> <i>Anacanthotermes turkestanicus</i> <i>Adesmia sp.</i> <i>Zophosis punctate</i>

16.1.6 Birds

Bird Surveys were undertaken along the OHTL alignment at a series of Vantage Points, as shown in the following figures.

Refer to the detailed OHTL bird survey reports in Appendix B-1 in Volume 4 for methodology, location coordinates, maps, and full datasets of results.

Figure 16-3 Vantage Points When Surveying the Route of the Planned OHTL in May 2021

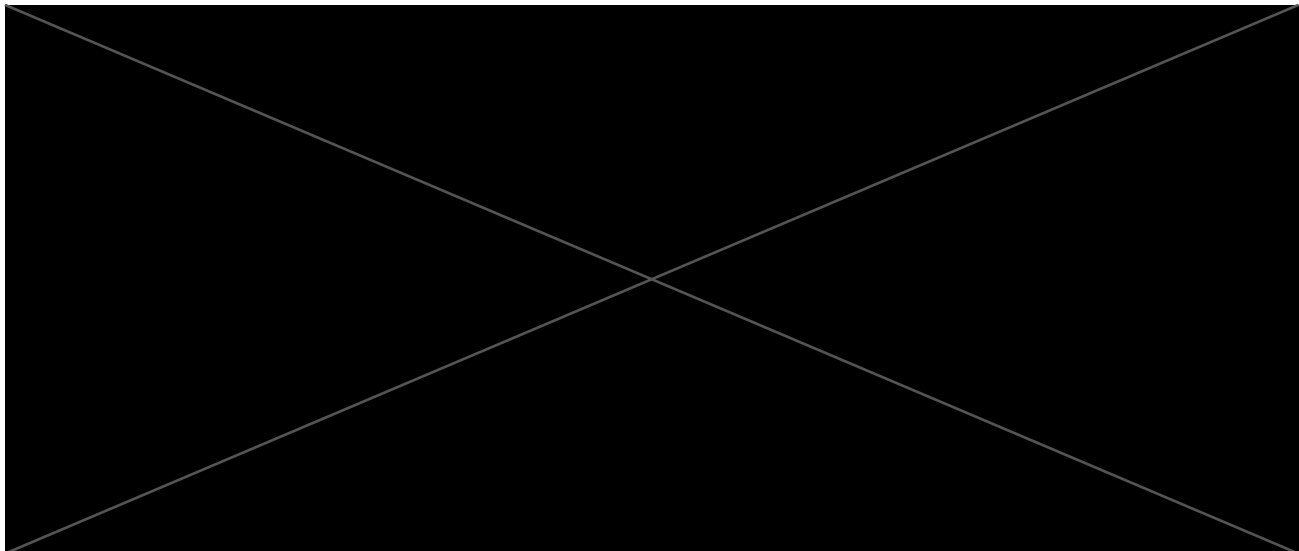
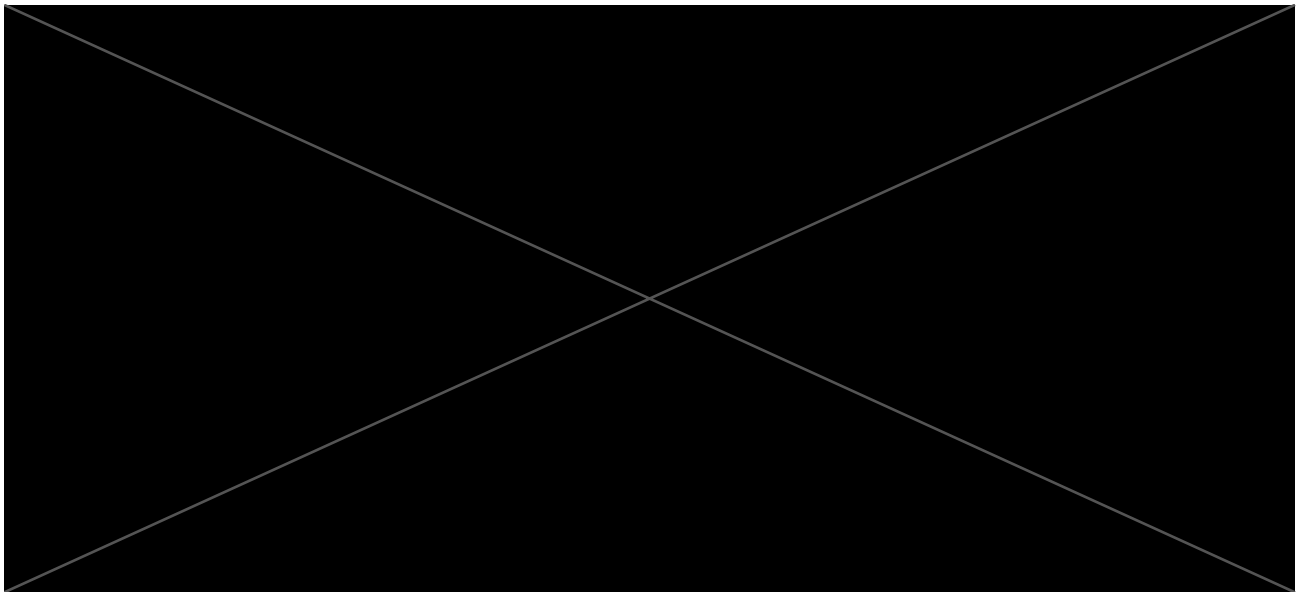


Figure 16-4 Vantage Points When Surveying the Route of the Planned OHTL in June –



Due to the route change in June, the number of vantage points was reduced to 10.

Familiarization with the route of Project OHTL showed that the area of the line is represented by open habitats. Due to the fact that the survey of the route took place at the very end of the spring migration, the data presented indicates the possible impact of OHTL on nesting birds and the need for monitoring surveys during the migration period to identify places of migrating birds' concentration.

During the survey along the Project route, we found nests of Common Kestrel on the poles of an existing power line (presumably 220kV) running parallel to OHTL route along VPs 9,10 and 11. Nesting of the *Acridotheres tristis* and *Passer domesticus* were observed in non-residential nests of this species. None of these species has a high conservation status. In the course of familiarization with the line route, no potential high-risk areas were identified.

Table 16-5 The summary list of threatened bird species

ID	NAME OF SPECIES		IUCN /RDB STATUS	TOTAL NO. OBSERVED					
	LATIN	ENGLISH		MAY	JUNE	JULY	AUG	SEPT	OCT
1	<i>Neophron percnopterus</i>	Egyptian Vulture	IUCN-EN, UzRD B-VU	2	2	1	2	-	-
2	<i>Circus gallicus</i>	Short-toed Eagle	UzRD B -VU	1	-	-	-	-	-
3	<i>Chlamydotis macqueenii</i>	Houbara bustard	IUCN – VU UzRD B-VU,	3	1	-	-	-	-
5	<i>Aquila nipalensis</i>	Steppe Eagle	IUCN-EN,	-	-	-	-	1	-

ID	NAME OF SPECIES		IUCN /RDB STATUS	TOTAL NO. OBSERVED					
	LATIN	ENGLISH		MAY	JUNE	JULY	AUG	SEPT	OCT
			UzRD B- NT						

Table 16-6 Threatened species recorded outside of the VPs

SPECIES	NUMBER	NOTES
May		
Houbara bustard <i>Chlamydotis macqueenii</i>	3	Near the Ayakagitma lake
Short-toed Eagle <i>Circus gallicus</i>	1	Near the Ayakagitma lake
June		
Egyptian Vulture <i>Neophron percnopterus</i>	1	Near the village of Kalaata
Houbara bustard <i>Chlamydotis macqueenii</i>	1	On the project territory of Dzhankeldy
July		
Egyptian Vulture <i>Neophron percnopterus</i>	1	Between VP 1 and 2

Survey results show that distribution of species across the surveyed sections is quite uniform.

The number of observed birds was much higher in June, which could be explained by the end of the nesting period in small passerines, appearance of juveniles and reduction in brooding behaviors.

Eurasian roller and Egyptian vulture usually nest on cliffs, no nesting sites of these species were identified in the project area. Egyptian vultures observed in May and June can be both nesting individuals in the Kuldjukttau massif and flying (migrating) individuals.

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 $\geq 0.5\%$ of the global population were not recorded in the OHTL area. Surveys of the OHTL segments recorded a total of 7 individuals. However, it remains a priority biodiversity feature (PBF) for which mitigation will be addressed in the ecological impact assessment.

Among the mentioned species, Houbara Bustard is the most vulnerable, as there are nesting sites for this species in the immediate vicinity of the proposed OHTL. During the stakeholder consultation exercises, Dr. John Burnside, based on years of field study estimated the density of Asian Houbara in the project area to be 0.284 – 0.416 birds /km². The extent of suitable habitat within the EAAA covers 2125.98 km². Therefore, the total population within the EAAA is actually considered to be 671.08-982.99 birds. As per the CHA, this number of potential birds

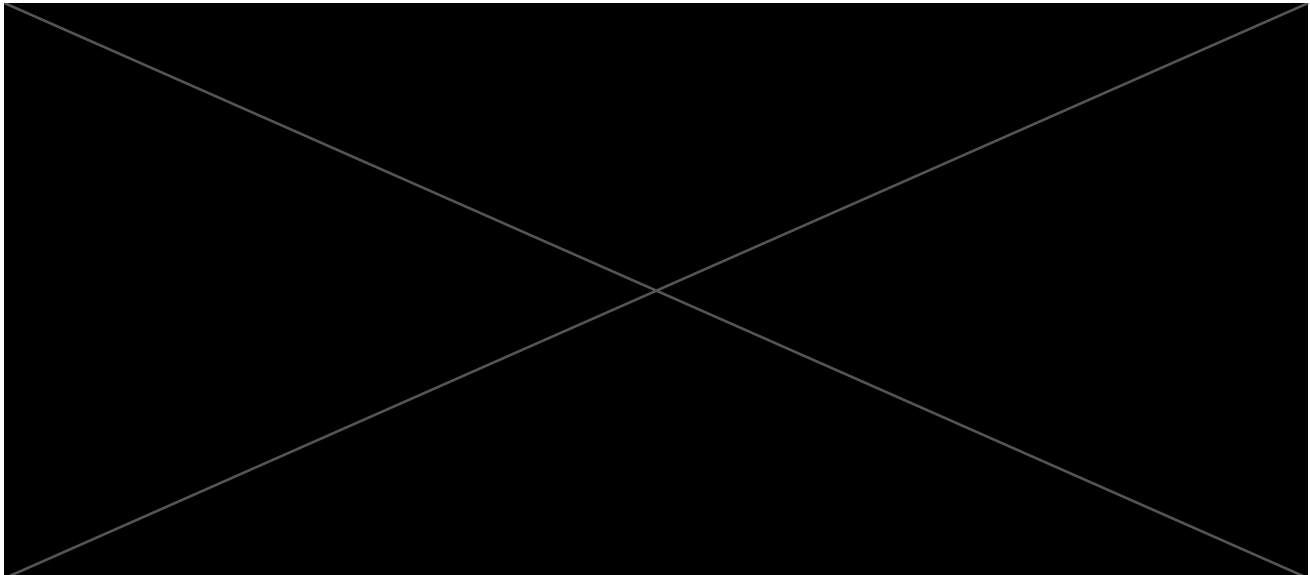
within the EAAA triggers criticality and Houbara Bustard is therefore reflected as an important Sensitive Receptor in the ecological impact assessment.

Though the Steppe Eagle, a species listed as EN on the IUCN Red List, regularly occurs in the project area, CHA found that this species does not trigger criticality since it did not meet the criteria threshold for endangered species. However, as per EBRD PR6 GN6, this species satisfies Criterion ii for Priority Biodiversity Feature Area.

Short-toed eagle is a trophic migrating species and is not directly associated with the area.

The locations where the endangered bird species were observed are presented in the following figure.

Figure 16-5 Locations of Egyptian Vulture (NP), Houbara Bustard (ChU), Short-toed Eagle (CG) and Eurasian Roller (CG) in May and June 2021.



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 aim was to collect dead birds and their remains under OHTL wires and towers to assess bird mortality from operating OHTLs.

Sections of existing OHTL located in the immediate vicinity of the project line route were surveyed to find remains of dead birds under them. The total length of the routes surveyed under OHTLs was 99 km.

The carcass of Long -legged Buzzard *Buteo rufinus* was found near VP 9 under an existing power line during the July survey of the OHTL segment.

Table 16-7 Schedule for Surveying Sections of Existing OHTLs in the Project Area.

DATE	ROUTE LENGTH (KM)	SECTION AND LENGTH OF THE ROUTE	COORDINATES OF ROUTE BEGINNING	COORDINATES OF ROUTE END
28.03.2021	26	D1-D3	[REDACTED]	[REDACTED]
18.04.2021	26	D1-D3	[REDACTED]	[REDACTED]
04.05.2021	7	D1-D2	[REDACTED]	[REDACTED]
14.05.2021	14	D1-D2	[REDACTED]	[REDACTED]
21.05.2021	14	D1-D2	[REDACTED]	[REDACTED]
20.06.2021	12	D1-D2	[REDACTED]	[REDACTED]

During the surveys conducted in 2021 the remains of 7 dead birds belonging to 6 species were found.

Table 16-8 List of dead birds found under operating OHTLs

LATIN NAME	ENGLISH NAME	NUMBER OF BIRDS	COORDINATES	DATE
<i>Upupa epops</i>	Hoopoe	1	[REDACTED]	28.03.2021
<i>Galerida cristata</i>	Crested lark	1	[REDACTED]	21.05.2021
<i>Galerida cristata</i>	Crested lark	1	[REDACTED]	28.03.2021
<i>Sylvia curruca</i>	Lesser Whitethroat	1	[REDACTED]	14.05.2021
<i>Sturnus vulgaris</i>	Common Starling	1	[REDACTED]	28.03.2021
<i>Buteo rufinus</i>	Long-legged Buzzard	1	[REDACTED]	22.07.2021
<i>Coturnix coturnix</i>	Common Quail	1	Near VP1	11.10.2021

Figure 16-6 Locations of Dead Birds.



The species found dead are widespread in the Kyzylkum desert and do not have any conservation status. The presumed cause of death was collision with OHTL wire.

16.2 Receptors

16.2.1 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 Aol varies considerably. The below provide the Aol 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 (1) potential major invasive spread and (2) secondary impacts caused by displacement of less competitive fauna into adjacent areas.

16.2.2 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 surveys as well as sensitive species that are anticipated to possibly occur within the area of influence.

Table 16-9 Potential Terrestrial Ecology Receptors – OHTL

GROUP	RECEPTOR(S)	JUSTIFICATION	VALUE
Natural Habitats	Sandy and sandy-loamy desert plain	Sandy and sandy-loamy desert plain with flat or flat-wavy terrain is covered with native ephemeroid-sagebrush and saltwort-ephemeroid-sagebrush vegetation. The canopy cover is 20 to 40%, plant communities are characterized with low species diversity and low to medium level of anthropogenic disturbance. A total of 16 plant species and 1 moss were recorded for this habitat.	Medium
	Fixed and semi-fixed sands	Fixed and semi-fixed sands with hilly, ridge-hilly, ridge and wavy terrain are covered with psammophilous shrublands. The grass cover of the sandy desert is formed by desert sedge which plays a key role in sands fixation through its densely branched root system. 36 plant species and one moss were recorded for this habitat type including one nationally red-listed species, <i>Tulipa lehmanniana</i> .	High
	Complex of fixed and semi-fixed sands, saline depressions and takys	This habitat is located in surroundings of the village Shengeldy (2–6 km to the south), on the edge of the saline depression Karakata. Sandy areas are covered with psammophytic shrubs and ephemeroid-sagebrush vegetation. Small saline depressions and takys have very sparse vegetation (canopy cover less than 10%) represented with the same species that on the sands, with participation of <i>Tamarix</i> sp. and <i>Lycium ruthenicum</i> ; 35 plant species and one moss were recorded.	Very High
	Weakly inclined piedmont plain of relic low mountains	Weakly inclined piedmonts of relic low mountains Kuldzhuktau with flat, wavy or gently sloping terrain are covered with native ephemeroid-sagebrush and saltwort-sagebrush vegetation. Canopy cover is 20–40%. 31 plant species and one moss were recorded for this habitat type, including 3 species listed in the Red Data Book of Uzbekistan.	High
	Foothills of relic low mountains	The terrain is more or less rugged, and the vegetation is represented with native saltwort-sagebrush communities on gypsiferous grey-brown desert soil and outcrops of variegated beds, sometimes with tamarisk along dry riverbeds. Canopy cover is 10–30%. 27 plant species and one moss were recorded for this habitat type.	High
	Outcrops of variegated beds	This habitat type is found on rather small plots along the previous variant of the power line (red line) running across the northern foothills of the relic ridge Kuldzhuktau. The terrain is more or less rugged; the vegetation is very	Medium

GROUP		RECEPTOR(S)	JUSTIFICATION	VALUE
			sparse (canopy cover is 1–10%) and composed by saltworts and gypsophytes.	
		Saline lands	Several rather small saline depressions with very sparse saltworts or with takyr and without any vegetation are situated along the road P-61, between the village Shengeldy and the eastern edge of "Dzhankeldy" project site, among the weakly inclined northern piedmonts of the relic mountains Kuldzhuktau. Canopy cover is 0–5%. 22 plant species were recorded for this habitat type (table 53), including one red-listed species, <i>Tulipa lehmanniana</i> . "Takyrs" is a peculiar type of landscape occurring in the deserts of Central Asia, which is formed on periodically inundated depressions with loamy soil, forming a cracked crust at the dry season. This habitat is prime habitat for the Southern Even-fingered Gecko.	Very High
Endangered Flora		<i>Calligonum zakirovii</i> (PBF)	Listed as Endangered on the Uzbekistan Red Book.	Very High
Threatened Flora		<i>Acanthophyllum cyrtostegium</i> <i>Tulipa lehmanniana</i>	Listed as Vulnerable on the Uzbekistan Red Book.	High
Protected Flora		Protected Flora (Black Saxaul, White Saxaul)	Nationally Protected	High
All other Flora		All other Flora	Listed as Least Concern, not considered to be of national importance .	Low
Endangered Birds	Raptors	Egyptian Vulture (PBF) Steppe Eagle (PBF) Saker Falcon (not confirmed) Pallas's Fish-Eagle (not confirmed)	Listed as critically endangered or endangered on IUCN Red List.	Very High
	Waterbirds	Sociable Lapwing (not confirmed) White-headed Duck (not confirmed)	Listed as critically endangered or endangered on IUCN Red List.	Very High
Threatened Birds	Raptors	Greater Spotted Eagle (not confirmed) Eastern Imperial Eagle (not confirmed) Cinereous Vulture (not confirmed) Eurasian Griffon (not confirmed)	Listed as vulnerable or near threatened on the IUCN Red List.	High
	Waterbirds	Marbled Teal(not confirmed)	Listed as vulnerable or near threatened on IUCN Red List.	High

GROUP		RECEPTOR(S)	JUSTIFICATION	VALUE
		Lesser White-fronted Goose (not confirmed) Common Pochard (not confirmed)		
	Groundbirds	Great Bustard (not confirmed) Asian Houbara (critical)	Listed as vulnerable or near threatened on IUCN Red List.	High
	Songbirds/ Allies	European Turtle Dove(not confirmed) Yellow-eyed Pigeon (not confirmed)	Listed as vulnerable or near threatened on IUCN Red List.	High
Nationally-threatened Birds	Raptors	Short-toed Snake Eagle (PBF) Golden Eagle (not confirmed) White-tailed Sea Eagle (not confirmed) Lesser Kestrel (not confirmed)	Classified as Least Concern on the global IUCN Red List, but listed as vulnerable or near-threatened under Uzbekistan Red Data Book.	Medium
	Waterbirds	Dalmatian Pelican (not confirmed) Great White Pelican (not confirmed)		
All other Birds		All other Bird species	Listed as Least Concern on the IUCN Red List, not of national importance.	Low / Lower
Bats		<i>Eptesicus bottae</i> <i>Pipistrellus pipistrellus</i>	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 as per EBRD PR6 for key ecological function in top-down control of insect populations	Medium
Threatened Mammals		Goitered Gazelle <i>Gazella subgutturosa</i> (PBF)	This species is listed as vulnerable on the IUCN Red List.	High
Nationally Threatened Mammals		Brandt's hedgehog <i>Paraechinus hypomelas</i>	These species are listed as vulnerable or near threatened in the Uzbekistan Red Data Book.	Medium

GROUP		RECEPTOR(S)	JUSTIFICATION	VALUE
Non-threatened Mammals	Carnivores	Red fox <i>Vulpes vulpes</i>	This carnivore acts as top-down control on prey populations and help control disease. However, these species are not threatened or endemic and are common and widespread.	Low / Lower
	Hare	Tolai hare <i>Lepus totai</i>	Hares are an important prey species, however this species is not threatened or endemic and are common and widespread.	Low / Lower
	Rodents	Long-clawed ground squirrel <i>Spermophilopsis leptodactylus</i> Yellow ground squirrel <i>Spermophilus fulvus</i> Small five-toed jerboa <i>Allactaga elater</i> Severtzov's jerboa <i>Allactaga severtzovi</i> Great gerbil <i>Phomomys opimus</i> Libyan jird <i>Meriones libycus</i> Midday jird <i>Meriones meridianus</i> Zaisan Mole Vole <i>Ellobius tancrei</i>	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 <i>Alsophylax laevis</i> (Critical)	This species is listed as critically endangered on the IUCN Red List and is considered regionally endemic. 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 <i>Testudo horsfieldii</i> (PBF)	This tortoise is listed as Vulnerable on the IUCN Red List.	High
Nationally important Herptiles		Caspian Monitor <i>Varanus griseus caspius</i>	This species is listed as vulnerable in the Uzbekistan Red Data Book.	Medium
		Desert sand boa <i>Eryx miliaris</i>	This species is listed as near threatened in the Uzbekistan Red Data Book.	Medium
Non-threatened Herptiles	Amphibians	Turan Toad <i>Bufo turanensis</i>	These species are not threatened and are common and widespread.	Low / Lower

GROUP		RECEPTOR(S)	JUSTIFICATION	VALUE
	Geckos and Lizards	Comb-toed Gecko <i>Crossobamon eversmanni</i> Caspian Bent-Toed Gecko <i>Tenuidactylus caspius</i> Turkestan thin-toed gecko <i>Tenuidactylus fedtschenkoi</i> Common Wonder Gecko <i>Teratoscincus scincus</i> Steppe agama <i>Trapelus sanguinolentus</i> Sunwatcher toad-headed agama <i>Phrynocephalus helioscopus</i> Lichtenstein's Toadhead Agama <i>Phrynocephalus interscapularis</i> Rapid Lizard <i>Eremias velox</i> Sand Racerunner <i>Eremias scripta</i>		
	Snakes	Sand racer <i>Psammophis lineolatus</i> Spotted whip snake <i>Hemorrhois ravergeri</i> Spotted desert racer <i>Platycephalus karelinii</i>		
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

16.3 Potential Impacts, Mitigation, Management and Residual Impacts

16.3.1 Construction Phase

16.3.1.1 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 from along the planned alignment.

Habitat loss is certain to occur, however, overall magnitude of habitat loss is anticipated to be relatively minimal compared to the overall extent of the available habitats.

Table 16-10 Significance of Habitat Loss

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Natural Habitats (Sandy and sandy-loamy desert plains)	Medium	Minor	Minor
Natural Habitats (Fixed and semi-fixed sands)	High	Minor	Minor to moderate
Natural Habitats (Complexes of fixed and semi-fixed sands, and saline sands)	Very High	Minor	Moderate to Major
Natural Habitats (Weakly inclined piedmont plain of relic low mountains)	High	Minor	Minor to moderate
Natural Habitats (Foothills of relic low mountains)	High	Minor	Minor to moderate
Natural Habitats (Settlements and Wasteland)	Very Low	Negligible	Negligible
Natural Habitats (Saline lands)	Very High	Minor	Moderate to Major

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 16-11 Residual Significance of Habitat Loss

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Natural Habitats (Sandy and sandy-loamy desert plains)	Medium	Negligible	Negligible to minor
Natural Habitats (Fixed and semi-fixed sands)	High	Negligible	Minor
Natural Habitats (Complexes of fixed and semi-fixed sands, and saline sands)	Very High	Negligible	Minor
Natural Habitats (Weakly inclined piedmont plain of relic low mountains)	High	Negligible	Minor
Natural Habitats (Foothills of relic low mountains)	High	Negligible	Minor
Natural Habitats (Settlements and Wasteland)	Very Low	Negligible	Negligible
Natural Habitats (Saline lands)	Very High	Negligible	Minor

16.3.1.2 Biodiversity Loss

EARTHWORKS (CLEARING, EXCAVATION)

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 (PBFs) respectively. Active only during a few 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. Therefore, 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 16-12 Significance of Direct Loss and Mortality

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Moderate	Major
Threatened & Protected Flora	High	Moderate	Moderate to Major
Non-threatened Flora	Low / Lower	Moderate	Minor
Non-threatened Mammals	Low / Lower	Moderate	Minor

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Threatened Herptiles	High	Major	Major
Nationally Important Herptiles	Medium	Major	Moderate to Major
Non-threatened Herptiles & Invertebrates	Low / Lower	Moderate	Minor
Southern Even-fingered Gecko	Very High	Moderate	Major

However, the following mitigation measures will be introduced to reduce the impacts on floral species:

- As part of the Biodiversity Management Program (BMP), a Flora Conservation Action Plan has been prepared, which outlines the locations, timings and methodology of pre-construction flora surveys undertaken for the purposes of seed collection, seed storage, demarcation of areas to be protected, and translocation of whole specimens if deemed feasible for endangered and threatened flora during appropriate season.
- The EPC contractor will commit to the restoration of habitat post-construction in unused land areas that are not required for O&M maintenance. The Restoration Action Plan will provide the restoration measures that will be undertaken for natural habitats, post-construction restoration via seeding, re-planting, and landscaping with native, high-value species, monitoring and reporting requirements of the plan.

The following mitigation measures will be implemented to reduce the impacts on fauna species and provide a basis for the mechanisms for achieving NNL:

- Minimization of the built footprint in design and construction buffer zone outside of the prime suitable habitat for Southern Even-fingered Gecko as much as possible **(see below for further details);**
- A Reptile Relocation Plan has been prepared for the Southern Even-fingered Gecko and the Russian Tortoise which outlines the methodology and results of the identification of release sites, erection of fencing to exclude relocated tortoises in the construction footprint, designation and erection of livestock exclusion fencing in gecko release sites, monitoring and reporting requirements as well as assigned roles and responsibilities.
- As part of the CSEMP, a 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 has been included within the CSEMP to provide general guidance on potential ecological triggers for work stoppage and will be implemented by the Ecologist and EPC contractor team. For non-threatened species such as other herptiles, rodents, and invertebrates, chance-find procedures with individual relocations as deemed necessary may be sufficient
- The Biodiversity Action Plan (BAP) provides the strategy designed to achieve to Net Gains (NG) for the Southern Even-fingered Gecko and No Net Loss (NNL) for the Russian Tortoise

For non-threatened species such as other herptiles, rodents, and invertebrates, chance-find procedures with individual relocations as deemed necessary will 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.

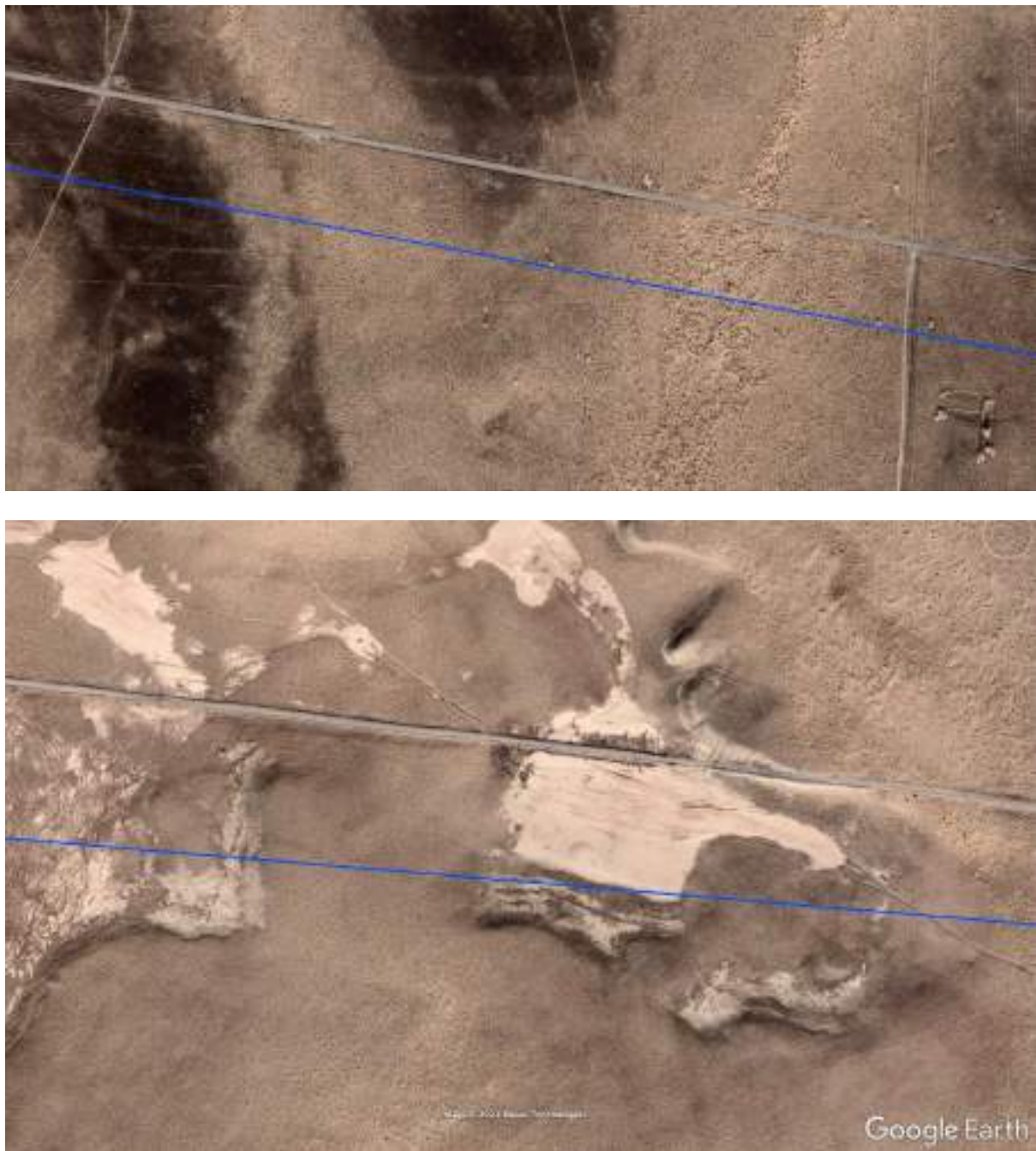
The design team and engineers have worked with 5 Capitals and local environmental experts to minimize project footprint on critical habitat as much as possible. The final layout of the OHTL within critical habitat for the Southern Even-fingered Gecko is shown below.

Figure 16-7 Extent of OHTL Alignment within Gecko Habitat



Care was taken to relocate the OHTL to as close to the existing road and other existing infrastructure, including adjacent to other existing OHTL alignments, as much as possible.

Figure 16-8 OHTL Close to Existing Road Throughout Critical Habitat



In order to ensure no net loss and to additionally provide beneficial net gain for the gecko population, two areas south of the existing roads have been suggested to be identified as release sites for geckos relocated as per the Reptile Relocation Plan. No activities will be allowed within these areas, they will be signposted, and livestock exclusion fencing will be erected around these release sites. Fencing of these core areas will allow the geckos to move freely within the reserve while obstructing grazing livestock. The measure was recommended by regional experts following consultations with relevant stakeholders. These areas will not be designated as local/regional/national protected areas but will be maintained and monitored long -term during the lifetime of the project.

The BAP outlines the strategy to achieve NG for this species in the project site which includes the protocols outlines in the Reptile Relocation Plan and Compensation Offset Plan, monitoring and reporting requirements as well as roles and responsibilities of entities involved.

With the above measures, the residual significance is presented in the following table.

Table 16-13 Residual Significance of Direct Loss and Mortality

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
Non-threatened Mammals	Low / Lower	Minor	Negligible to minor
Threatened Herptiles	High	Minor	Minor to moderate
Nationally Important Herptiles	Medium	Minor	Minor
Non-threatened Herptiles & Invertebrates	Low / Lower	Minor	Negligible to minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major

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 Fox which are more likely to disperse in time to avoid collision (as the vehicles will not be traveling at freeway speeds).

Small to medium sized wildlife such as 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 16-14 Significance of Vehicular Collision

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Raptors	Very High	Moderate	Major
Threatened Raptors and Ground birds	High	Moderate	Moderate to Major
Nationally Threatened Raptors	Medium	Moderate	Moderate
Non-threatened Ground birds	Low / Lower	Moderate	Minor
Non-threatened Mammals	Low / Lower	Minor	Negligible to minor
Threatened Herptiles	High	Major	Major
Nationally Important Herptiles	Medium	Moderate	Moderate

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Non-threatened Herptiles	Low / Lower	Moderate	Minor
Southern Even-fingered Gecko	Very High	Major	Major

However, the following mitigation measures will be implemented to reduce the impacts:

- Strict speed controls which will be enforced by EPC HSE and Security teams; especially during the active period for the Russian Tortoise;
- Ban against driving outside of delineated access roads and restricting driving and machinery operation to daylight hours;
- The CESMP will include protocol for removal of any road-kill carcasses immediately upon observation to at least 10 meters away from the access roads during the construction phase by the EPC contractor. With the above measures, the residual significance is presented in the following table.

With the above measures, the residual significance is presented in the following table.

Table 16-15 Residual Significance of Vehicular Collision

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Raptors	Very High	Negligible	Minor
Threatened Raptors and Ground birds	High	Negligible	Minor
Nationally Threatened Raptors	Medium	Negligible	Negligible to minor
Non-threatened Ground birds	Low / Lower	Negligible	Negligible to minor
Non-threatened Mammals	Low / Lower	Negligible	Negligible to minor
Threatened Herptiles	High	Negligible	Minor
Nationally Important Herptiles	Medium	Negligible	Negligible to minor
Non-threatened Herptiles (	Low / Lower	Negligible	Negligible to minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major

“TAKE” (POACHING, HUNTING, FISHING, 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 16-16 Significance of “Take”

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Moderate	Major
Threatened & Protected Flora	High	Moderate	Moderate to Major

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
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	Low / Lower	Moderate	Minor
Non-threatened Mammals	Low / Lower	Minor	Negligible to minor
Threatened Herptiles	High	Moderate	Moderate to Major
Nationally Important Herptiles	Medium	Minor	Minor
Non-threatened Herptiles	Low / Lower	Minor	Negligible to minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major

However, the following mitigation measures will be implemented to reduce the impacts:

- Strict controls forbidding the gathering, poaching or otherwise disturbance of any flora or fauna on site, included in induction training
- 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 16-17 Residual Significance of “Take”

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	Low / Lower	Negligible	Negligible to minor
Non-threatened Mammals	Low / Lower	Negligible	Negligible to minor
Non-threatened Mammals	Low / Lower	Negligible	Negligible to minor
Threatened Herptiles	High	Negligible	Minor
Nationally Important Herptiles	Medium	Negligible	Negligible to minor
Nationally Important Herptiles	Medium	Negligible	Negligible to minor
Non-threatened Herptiles	Low / Lower	Negligible	Negligible to minor
Southern Even-fingered Gecko	Very High	Negligible	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 16-18 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	Low / Lower	Minor	Negligible to minor
Non-threatened Mammals	Low / Lower	Minor	Negligible to minor
Threatened Herptiles	High	Minor	Minor to moderate
Nationally Important Herptiles	Medium	Minor	Minor
Non-threatened Herptiles	Low / Lower	Minor	Negligible to minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major

However, the following mitigation measures will be implemented to reduce the impacts:

- Preparation of a Waste Management Plan as one of the supplementary plans to the CESMP;
- Training will be provided to staff such as tool box meetings which in waste management measures
- 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 16-19 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
Non-threatened Mammals	Low / Lower	Negligible	Negligible to minor
Threatened Herptiles	High	Negligible	Minor

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Nationally Important Herptiles	Medium	Negligible	Negligible to minor
Non-threatened Herptiles	Low / Lower	Negligible	Negligible to minor
Southern Even-fingered Gecko	Very High	Negligible	Minor

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 16-20 Significance of General Disturbance

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered	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
Non-threatened Mammals	Low / Lower	Major	Minor to moderate
Threatened Herptiles	High	Major	Major
Nationally Important Herptiles	Medium	Major	Moderate to Major
Non-threatened Herptiles	Low / Lower	Major	Minor to moderate
Southern Even-fingered Gecko	Very High	Major	Major

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.
- A Breeding Bird Protection Plan has been prepared which provides the protection measures and protocols i.e., micro-siting of turbines within close proximity to raptor nests and buffers to be implemented at known nest locations based on species sensitivity. The plan also outlines the monitoring and reporting requirements of the construction phase as well as the assigned roles and responsibilities of the involved entities
- The Restoration Action Plan will provide the restoration measures that will be undertaken for natural habitats, post-construction restoration of temporary laydown areas and buffer zones via seeding, re-planting, and landscaping with

native, high-value species, monitoring and reporting requirements of the plan as well assigned roles and responsibilities.

With the above measures, the residual significance is presented in the following table.

Table 16-21 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	Low / Lower	Negligible	Negligible to minor
Non-threatened Mammals	Low / Lower	Negligible	Negligible to minor
Threatened Herptiles	High	Negligible	Minor
Nationally Important Herptiles	Medium	Negligible	Negligible to minor
Non-threatened Herptiles	Low / Lower	Negligible	Negligible to minor
Southern Even-fingered Gecko	Very High	Negligible	Minor

16.3.1.3 Biodiversity Displacement

DISPERSAL AND COMPETITION

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 16-9 Available Habitat Outside OHTL Area for Potentially Dispersed Species



PROLIFERATION OF GENERALIST SPECIES

The dispersal of shy 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 16-22 Significance of Proliferation

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Major	Major
Threatened & 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	Low / Lower	Moderate	Minor

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Non-threatened Mammals	Low / Lower	Minor	Negligible to minor
Threatened Herptiles	High	Major	Major
Nationally Important Herptiles	Medium	Moderate	Moderate
Non-threatened Herptiles & Invertebrates	Low / Lower	Moderate	Minor
Southern Even-fingered Gecko	Very High	Moderate	Major

However, the following mitigation measures will be implemented to reduce the impacts:

- Preparation of a Waste Management Plan as one of the supplementary plans to the CESMP;
- Training will be provided to staff such as tool box meetings related to waste management;
- 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 16-23 Residual Significance of Proliferation

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	Low / Lower	Negligible	Negligible to minor
Non-threatened Mammals	Low / Lower	Negligible	Negligible to minor
Threatened Herptiles	High	Negligible	Minor
Nationally Important Herptiles (Caspian Monitor)	Medium	Negligible	Negligible to minor
Non-threatened Herptiles & Invertebrates	Low / Lower	Negligible	Negligible to minor
Southern Even-fingered Gecko	Very High	Negligible	Minor

16.3.1.4 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 16-24 Significance of Introduced Species

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Major	Major
Threatened & 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	Low / Lower	Moderate	Minor
Non-threatened Mammals	Low / Lower	Moderate	Minor
Threatened Herptiles	High	Moderate	Moderate to Major
Nationally Important Herptiles	Medium	Moderate	Moderate
Non-threatened Herptiles & Invertebrates	Low / Lower	Moderate	Minor
Southern Even-fingered Gecko	Very High	Moderate	Major
	Low / Lower	Moderate	Minor

However, the following mitigation measures will be implemented to reduce the 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 16-25 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	Low / Lower	Negligible	Negligible to minor

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Non-threatened Mammals	Low / Lower	Negligible	Negligible to minor
Threatened Herptiles	High	Negligible	Minor
Nationally Important Herptiles	Medium	Negligible	Negligible to minor
Non-threatened Herptiles & Invertebrates	Low / Lower	Negligible	Negligible to minor
Southern Even-fingered Gecko	Very High	Negligible	Minor
Non-threatened Invertebrates	Low / Lower	Negligible	Negligible to minor

16.3.1.5 Environmental Quality

AIR QUALITY

Dust can coat vegetation, reducing photosynthesis and respiration ability, causing desiccation. Emissions of pollutants such as NO_x, SO_x, 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 16-26 Significance of Air Pollution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Minor	Moderate to Major
Threatened & 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	Low / Lower	Minor	Negligible to minor
Non-threatened Mammals	Low / Lower	Minor	Negligible to minor
Threatened Herptiles	High	Minor	Minor to moderate
Nationally Important Herptiles	Medium	Minor	Minor
Non-threatened Herptiles & Invertebrates	Low / Lower	Minor	Negligible to minor
Southern Even-fingered Gecko	Very High	Minor	Moderate to Major

However, the following mitigation measures will be implemented to reduce the 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 16-27 Residual Significance of Air Pollution

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	Low / Lower	Negligible	Negligible to minor
Non-threatened Mammals	Low / Lower	Negligible	Negligible to minor
Threatened Herptiles	High	Negligible	Minor
Nationally Important Herptiles	Medium	Negligible	Negligible to minor
Non-threatened Herptiles & Invertebrates	Low / Lower	Negligible	Negligible to minor
Southern Even-fingered Gecko	Very High	Negligible	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 16-28 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	Low / Lower	Major	Minor to moderate
Non-threatened Mammals	Low / Lower	Minor	Negligible to minor
Threatened Herptiles	High	Moderate	Moderate to Major
Nationally Important Herptiles	Medium	Moderate	Moderate
Non-threatened Herptiles & Invertebrates	Low / Lower	Moderate	Minor
Southern Even-fingered Gecko	Very High	Moderate	Major

However, the following mitigation measures will be implemented to minimize the magnitude of these potential impacts:

- Refer to noise control measures.
- A Breeding Bird Protection Plan has been prepared which provides the protection measures and protocols such as buffers to be implemented at known nest

locations based on species sensitivity. The plan also outlines the monitoring and reporting requirements of the construction phase as well as the assigned roles and responsibilities of the involved entities

- Install temporary acoustic barriers around large generators, dampening, use of best available technology to reduce noise 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 16-29 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	Low / Lower	Minor	Negligible to minor
Non-threatened Mammals)	Low / Lower	Negligible	Negligible to minor
Threatened Herptiles (Russian Tortoise)	High	Negligible	Minor
Nationally Important Herptiles (Caspian Monitor)	Medium	Negligible	Negligible to minor
Non-threatened Herptiles & Invertebrates	Low / Lower	Negligible	Negligible to minor
Endangered Herptiles (Southern Even-fingered Gecko)	Very High	Negligible	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. This will cover a total area of <0.25km² within the 17.6km WF boundary (equivalent to 1.4% of the WF area).

The magnitude and unmitigated significance calculations are presented in the table below.

Table 16-30 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	Low / Lower	Moderate	Minor
Non-threatened Mammals	Low / Lower	Minor	Negligible to minor

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Threatened Herptiles	High	Moderate	Moderate to Major
Nationally Important Herptiles	Medium	Moderate	Moderate
Non-threatened Herptiles	Low / Lower	Moderate	Minor
Southern Even-fingered Gecko	Very High	Moderate	Major
Non-threatened Invertebrates	Low / Lower	Moderate	Minor

However, the following mitigation measures will be implemented to reduce the minor impacts:

- 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 16-31 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	Low / Lower	Negligible	Negligible to minor
Non-threatened Mammals	Low / Lower	Negligible	Negligible to minor
Threatened Herptiles	High	Negligible	Minor
Nationally Important Herptiles	Medium	Negligible	Negligible to minor
Non-threatened Herptiles	Low / Lower	Negligible	Negligible to minor
Southern Even-fingered Gecko	Very 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 16-32 Significance of Contamination

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Moderate	Major
Threatened & Protected Flora	High	Moderate	Moderate to Major
Non-threatened Flora	Low / Lower	Moderate	Minor

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	Low / Lower	Moderate	Minor
Non-threatened Mammals	Low / Lower	Moderate	Minor
Threatened Herptiles	High	Moderate	Moderate to Major
Nationally Important Herptiles	Medium	Moderate	Moderate
Non-threatened Herptiles)	Low / Lower	Moderate	Minor
Southern Even-fingered Gecko	Very High	Moderate	Major
Non-threatened Invertebrates	Low / Lower	Moderate	Minor

However, the following mitigation measures will be implemented to reduce the 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 16-33 Residual Significance of Contamination

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	Low / Lower	Negligible	Negligible to minor
Non-threatened Mammals	Low / Lower	Negligible	Negligible to minor
Threatened Herptiles	High	Negligible	Minor
Nationally Important Herptiles	Medium	Negligible	Negligible to minor
Non-threatened Herptiles	Low / Lower	Negligible	Negligible to minor
Southern Even-fingered Gecko	Very 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 16-34 Significance of Soil Impacts

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Moderate	Major
Threatened & Protected Flora	High	Moderate	Moderate to Major
Protected Flora (Black Saxaul, White Saxaul)	High	Moderate	Moderate to Major
Non-threatened Flora	Low / Lower	Moderate	Minor

However, the following mitigation measures will be implemented to reduce the magnitude of the impacts:

- Minimize construction footprint and strict controls to prevent driving out of designated corridors
- Restoration Action Plan will provide the restoration measures that will be undertaken where appropriate, post-construction restoration of temporary laydown areas and buffer zones via seeding, re-planting, and landscaping with native, high-value species, monitoring and reporting requirements of the plan as well assigned roles and responsibilities.

With the above measures, the residual significance is presented in the following table.

Table 16-35 Residual Significance of Soil Impacts

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

16.3.2 Operation Phase

The OHTL will be designed and constructed under ACWA Power's supervision hence the biodiversity mitigation and monitoring requirements outlined herein is considered final. Operation and Maintenance of the OHTL will fall under the purview of NEGU.

ACWA Power commits to offset impacts to species of conservation concern should the project off taker, NEGU, fail to do so during OHTL operations.

16.3.2.1 Ecosystem Function

HABITAT FRAGMENTATION (BARRIER EFFECT)

Development and operation of large-scale and linear alignment projects will fragment the landscape's existing habitats, reducing overall ecosystem connectivity and function. This in turn reduces the ability for vegetation recruitment and wildlife movement between habitat patches. Species with large home range requirements and migratory species in particular may be affected by fragmented habitat. Long-term fragmentation caused by physical barriers

may also lead to a reduction in genetic exchange which is a concern for r-selected species with rapid generation turnover.

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 significant habitat fragmentation.

16.3.2.2 Biodiversity Loss

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.

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 16-36 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	Egyptian Vulture	Large-bodied	III
	Steppe Eagle		
Threatened Birds - Groundbirds	Houbara Bustard	Poor Manoeuvrability Low Visual Detectability Low Altitude	III
Nationally Threatened Birds - Raptors	Short-toed Snake-eagle	Migratory	II

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 16-37 Significance of OHTL Collision

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds (Raptors) - Egyptian Vulture	Very High	Moderate	Major
Threatened Birds (Groundbirds) - Houbara Bustard	High	Major	Major
Nationally Threatened Birds (Raptors) - Short-toed Snake Eagle	Medium	Moderate	Moderate

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
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 risk:

- 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 visual markers/ 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.
- Any markers must be robust to allow long-term durability for the environmental conditions of exposure; maintenance plans for the OHTL should include inspections of marker devices and replacements as needed.
- A Post Construction Fatality Monitoring Plan (PCFM) 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;
- A Potential Biological Removal (PBR) Analysis was undertaken to determine the thresholds for acceptable levels of annual losses due to the project.
- The Biodiversity Action Plan (BAP) provides the strategy for No Net Loss (NNL) for PBF species and Net Gain (NG) for the CH species, Asian Houbara.
- The Compensation Offset Plan details the offset measures that will be implemented for the Asian Houbara if the PCFM exceeds the PBR thresholds. The plan includes the preferred option for the project to sponsor a Project-generated addition to an existing Asian Houbara captive breeding and wild release program located within Uzbekistan. This collaboration leverages the pre-existing facility, resources, knowledge and experience of the program to generate the required conservation gains for the HB through their production and release to the wild.

With the above measures, the **residual** significance is presented in the following table.

Table 16-38 Residual Significance of OHTL Collision

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds (Raptors) - Egyptian Vulture	Very High	Negligible	Minor
Threatened Birds (Ground birds) - Houbara Bustard	High	Negligible	Minor
Nationally Threatened Birds (Raptors) - Short-toed Snake Eagle	Medium	Negligible	Negligible to 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 16-39 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	Egyptian Vulture	Large	Yes	III
	Steppe Eagle			
Threatened Birds – Ground birds	Houbara Bustard	Medium	No	I
Nationally Threatened Birds - Raptors	Short-toed Snake-eagle	Large	Yes	III

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 16-40 Significance of OHTL Electrocution

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds (Raptors) - Egyptian Vulture	Very High	Major	Major
Threatened Birds (Ground birds) - Houbara Bustard	High	Minor	Minor to moderate

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Nationally Threatened Birds (Raptors) - Short-toed Snake Eagle	Medium	Major	Moderate to Major
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.

The following mitigation measures will be applied to reduce electrocution risk:

- 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 should 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 should be the highest elements of the structure to attract birds away from perching on potentially dangerous components.
- A Post Construction Fatality Monitoring Plan (PCFM) will be in place to include carcass searches for the OHTL 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 or until the risk to birds is considered 'negligible' in consultation with the lenders;
- The Compensation Offset Plan details the offset measures that will be implemented for the Asian Houbara if the PCFM exceeds the PBR thresholds.
 - The plan includes the preferred option for the project to sponsor a Project-generated addition to an existing Asian Houbara captive breeding and wild release program located within Uzbekistan. This collaboration leverages the pre-existing facility, resources, knowledge and experience of the program to generate the required conservation gains for the HB through their production and release to the wild.

With the above measures, the **residual** significance is presented in the following table.

Table 16-41 Residual Significance of OHTL Electrocuting

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds (Raptors) - Egyptian Vulture	Very High	Negligible	Minor
Threatened Birds (Ground birds) - Houbara Bustard	High	Negligible	Minor
Nationally Threatened Birds (Raptors) - Short-toed Snake Eagle	Medium	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).

16.3.3 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.

16.4 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 and measure performance. A Biodiversity Management Plan has been prepared which details the management plan to be implemented during each phase of the project, monitoring and reporting requirements i.e., the Biodiversity Monitoring and Evaluation Plan (BMEP) as well the entity responsible for the implementation of each plan.

16.4.1 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.

16.4.2 Pre-construction

Refer to the BMP for implementation of management plans for the pre-construction phase and BMEP for ongoing monitoring and reporting requirements for each plan. The following outline the mitigation requirements pre-construction:

- Review of Construction Methodology and Schedule by environmental consultant, especially in regards to:
 - New or upgraded access routes
 - Site Clearance and Layout
 - Timing and method of works
 - Lighting Strategy
 - Solid Waste Management Strategy
- Preparation of Biodiversity Action Plan which illustrates the pathway to NG for CH species and NNL for PBF species.
 - Preparation of Reptile Relocation Methodology
 - Preparation of Flora Conservation Action Plan
 - Preparation of Breeding Bird Protection Plan
- Carry out preconstruction survey, implementation of actions as per above plans
- Preparation of Restoration Action Plan
- 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

16.4.3 Construction

Refer to the BMP for implementation of management plans for the post-construction phase and BMEP for ongoing monitoring and reporting requirements for each plan. 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 the Chance Find Procedure
- Implementation of CEMP
 - Daily Checklist
 - Weekly Inspection
 - Monthly Reporting
 - Quarterly Auditing

16.4.4 Post-Construction

Refer to the BMP for implementation of management plans for the post-construction phase and BMEP for ongoing monitoring and reporting requirements for each plan. The following outline the mitigation requirements post-construction:

- Implementation of Restoration Action Plan
- Carrying out restoration works
- Post-restoration survey
- Compensation Offset Plan
- Habitat restoration offset works
- Biodiversity Monitoring and Evaluation Programme BMEP

16.4.5 Operation

Refer to the BMP for implementation of management plans for the operation phase and BMEP for ongoing monitoring and reporting requirements for each plan. The following outline the mitigation requirements during operation:

- Fatality Monitoring Plan
- Compensation Offset Plan

17 AIR QUALITY

17.1 Observation and Baseline Environment

The air quality in the OHTL area is monitored by the meteorological station/observation post of Bukhara station located at Dzhankeldy village. 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 Dzhankeldy – Bash OHTL alignment, the OHTL is located in a remote area that is not very populated and have little or no anthropogenic sources of emissions. The only source of emission will be mobile emissions from vehicles moving along the local asphalt road that run along/parallel to the OHTL route. This road is located north of the OHTL alignment and connects the village of Dzhankeldy to the former Chontabay village, the village of Chengeldy, Karakata and Baloakarak.

Mobile source emissions from vehicles have the potential to contribute to ambient concentrations of Nitric Oxide, NO₂, SO₂, VOC's, CO and Particulate Matter (i.e. PM_{2.5} & PM₁₀) in the local air shed. Given the remote nature of the Project area and the anticipated low vehicle flows on the local roads, any mobile emissions are unlikely to be distinguishable from background concentrations in the airshed.

17.1.1 Ambient Air Quality Monitoring

Given the remote location of the OHTL and the very limited local influences of either point, diffuse and mobile sources in the OHTL area, the ambient air quality monitoring survey undertaken at the Wind Farm site from 13th to 15th March 2021 is considered representative of the ambient air quality for the Dzhankeldy to Bash OHTL alignment airshed.

The use of this data is considered representative due to the location of the Wind Farm and OHTL within a similar environment/terrain. In addition, the ambient air quality monitoring locations are within relative proximity that regional influences on air quality are likely to be similar. Kindly see the sub-section 8.1.3 on Ambient Air Quality Monitoring for the air quality monitoring survey undertaken at the Wind Farm site as well as the result of this survey.

17.2 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 will not have operational 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 17-1 Potential Air Quality Receptors - OHTL

RECEPTOR ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
R37	Herders at Former Chontabay village	Temporary Residential	High	Local herder and his workers using the structure suitable for living will be vulnerable to changes in ambient air quality
R38	Inactive Herders settlement 1	Temporary Residential	High	Users of this settlements will be vulnerable to changes in ambient air quality.
R39	Herders settlement 2	Permanent Residential	High	Residents at these settlements will be vulnerable to changes in ambient air quality.
R40	Herders settlement 3		High	
R41	Herders settlement 4		High	
R42	Herders settlement 5		High	
R43	Herders settlement 6		High	
R47	Herders settlement 7		High	

Figure 17-1 Receptors within 1km of the Dzhankeldy to Bash OHTL Route



17.3 Potential Impacts, Mitigation, Management and Residual Impacts

17.3.1 Construction Phase

During the construction of the OHTL, ambient air quality may potentially be affected by increased (i.e. increased particulate matter) particularly during clearance at tower construction area, vehicle movement, earthworks for installation of transmission towers, and by exhaust fumes from construction vehicles & machinery.

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

- Land clearance for the OHTL corridor/ROW and tower installation ;
- Excavations and earthworks for foundations & transmission tower installation;
- 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, CO₂, VOCs, particulates and BTEX) and particulates from vehicles, generators and other mechanical equipment.

17.3.1.1 Dust Generation

The principle sources of dust and particulate emissions during construction will be:

- Land clearance for the OHTL corridor/ROW and tower installation
- 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 alignment, the herders at Chontabay village, herders settlement 2, and herders settlement 7 are within 350m of the OHTL route. 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 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 such as site to the tower installation area.

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' or 'ecological' 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 OHTL, the receptors within 50m of the route to be used by OHTL construction vehicles include some residents of Chulobod village. The herders settlements and the livable structure at former Chontabay village are located over 50m from the route to be used. Likewise, there is potential for dust generation or particulate emission impacts as a result of vehicle movement on the existing road.

17.3.1.2 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 to excavators, graders, pavers, cranes, vibratory rollers, concrete pump truck, generators, etc. The quantity of gaseous emissions from this equipment will depend on the numbers deployed on site and the hours of operations.

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 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 within 50m from the site access road. With regard to the Project, receptors within 50m of local access road are some residents of Chulobod village located in proximity to the local access road that runs parallel to the OHTL route.

Considering that the ambient air quality in the Project area is representative of a remote location without key influences and is well below established Uzbekistan Maximum Permissible concentration of NO₂, SO₂ & CO (see sub-section 8.1.3 on Ambient Air Quality Monitoring in Part A of this ESIA), 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. In addition, neither is it expected to result in distinguishable change in local ambient air quality at these receptor locations.

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

17.3.1.3 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 of the OHTL. Where 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 Volatile Organic Compounds (VOCs) is likely to be within 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.

17.3.1.4 Odour

The construction phase of the project will require 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 likely to be limited to the immediate surrounding area as such, impacts to receptor over 100m from the OHTL route is not anticipated .

Table 17-2 Air Quality Impact Significance, Mitigation & Management Measures and Residual Impacts – OHTL 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	Herders at Former Chontabay village (R37)	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 or from the OHTL construction area, trucks will not be overloaded and will be appropriately covered / sheeted to avoid losses 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 to access OHTL construction areas will be undertaken in order to reduce dust generation.	Negligible to Minor
	Minor Negative	Herders Settlement 2 (R39)	High	Minor to Moderate		Negligible to Minor
	Minor Negative	Herders Settlement 7 (R47)	High	Minor to Moderate		Negligible to Minor

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					OHTL workers will be provided with full PPE kit including dust masks where dust is identified as a risk to workers.	
Gaseous emissions – From vehicle exhaust	Negligible Negative	Herders at Former Chontabay village (R37)	High	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 to minimize gaseous emissions.. - There will be pre-requisite requirements of all 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

17.3.2 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 B 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 17-3 Air Quality – Impact Significance, Mitigation & Management Measures and Residual Impacts – OHTL Operation

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACT
Gaseous Emissions from Vehicles	Negligible Negative	Herders at Former Chontabay village (R37)	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. • 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

17.3.3 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 as well, but will be re-assessed at the time to best inform a Decommissioning Management Plan, with specific relevance to working methods and any regulations that may be applicable at this time.

17.4 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 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 17-4 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/grievances are received.	Access Road to the OHTL construction area, 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
Operations			
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.

18 NOISE AND VIBRATION

18.1 Observation and Baseline Environment

18.1.1 Noise

Based on review of satellite imagery and various site reconnaissance visits undertaken along the 128.5km OHTL route, the area is remote and away from permanent anthropogenic noise generating activities.

The only notable anthropogenic noise source along the OHTL route will be the noise emanating from the local road & the railway that runs parallel to the OHTL route. Due to the remote location of the OHTL, it is expected that only herders at Chontabay village, Chengeldy village, Chulobod village and herders maybe using the local roads. As this road connects to the local road within the Project's eastern plot (from the northern boundary), resident of Dzhangeldy & Kalaata village may also use this road.

18.1.1.1 Noise Monitoring Survey

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.

18.1.2 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.

18.2 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 18-1 Potential Noise and Vibration Receptors - OHTL

RECEPTOR ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
R35	Users of the local road that is parallel to OHTL route	Commercial (temporary)	Medium	Users of the local road are relatively vulnerable to changes in ambient noise levels as a result of development of the Project.

RECEPTOR ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
R37	Herders at Chontabay village	Residential	High	Herders using liveable structure at Chontabay village within 1km of the OHTL route will be sensitive to changes in noise.
R38	Inactive Herders settlement 1	Temporary Residential	High	Users of this settlements will be vulnerable to changes in ambient air quality.
R39	Herders settlement 2	Permanent Residential	High	Residents at these settlements will be vulnerable to changes in ambient air quality
R40	Herders settlement 3		High	
R41	Herders settlement 4		High	
R42	Herders settlement 5		High	
R43	Herders settlement 6		High	
R47	Herders settlement 7		High	
R48	Existing railway that runs parallel to the proposed OHTL	Infrastructure	Low	Passengers on the trains will be of low vulnerability to changes in noise level as trains are anthropogenic noise sources when in operation

Figure 18-1 Receptors within 1km of the Dzhankeldy to Bash OHTL Route



18.3 Potential Impacts, Mitigation, Management and Residual Impacts

18.3.1 Construction Phase

18.3.1.1 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 stringing of conductors);
- Vehicle movements for transportation of equipment, machinery & OHTL components.

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 site. 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 128.5km 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 -18-2 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

The methodology for assessing noise impacts at receptor location (per construction phase) is discussed in Part A: Noise and Vibration chapter.

Where all equipment is operating at the same location for 50% of the working day, the continued cumulative noise level would be 79.6 dB(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.

Receptor	Distance from Source	Predicted Noise Level
Source Noise: 79.6dB(A) (at 10m)		
R35	250	46.6
R37	331	43.6
R38	65	61.3
R39	95	57.2
R40	750	34.7
R41	551	38.1
R42	593	37.3
R43	356	42.8
R47	163	51.3
R48	210	48.5

The ABC assessment method cannot be used to calculate the changes in noise levels from the baseline at residential receptors (Chontabay Village, Inactive Herders settlement 1, Herders settlement 2, Herders settlement 3, Herders settlement 4, Herders settlement 5, Herders

settlement 6, Herders settlement 7) because no noise surveys were undertaken at these locations. 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 Herders settlement R38 & R39 and at night time at majority of the receptor location except at Herders settlement R37, R40, R41, R42, & R43. 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 18-4 OHTL Building and Foundation Works Noise Attenuation by Distance

RECEPTOR	DISTANCE FROM SOURCE	PREDICTED NOISE LEVEL
Source Noise: 87.6dB(A) (at 10m)		
R35	250	54.7
R37	331	51.6
R38	65	69.3
R39	95	65.2
R40	750	42.7
R41	551	46.1
R42	593	45.3
R43	356	50.8
R47	163	59.3
R48	210	56.6

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 R38, R39, R47, and R48 and at night time at all receptor locations except at R40.

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 18-5 OHTL Mechanical and Installation Works Noise Attenuation by Distance

RECEPTOR	DISTANCE FROM SOURCE	PREDICTED NOISE LEVEL
Source Noise: 85.2dB(A) (at 10m)		
R35	250	52.2
R37	331	49.2
R38	65	66.8
R39	95	62.7
R40	750	40.3
R41	551	43.6
R42	593	42.8
R43	356	48.4
R47	163	56.8
R48	210	54.1

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 R38, R39 and R47 and at night time at all receptor location with the exception of R40 & R42.

18.3.1.2 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 existing roads and tracks, that have limited existing vehicular movements and related noise impacts. In such areas, the addition of vehicles will result in slight additional noise generation for receptors (i.e., Chulobod village), 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.

18.3.1.3 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 at some of the herders settlements may be negligible while impacts at receptor location over 500m are not expected to be discernible due to the attenuation of vibration over distance.

18.3.1.4 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 result in health impacts, for example hearing damage.

Table 18-6 Noise and Vibration- Impact Significance, Mitigation & Management Measures and Residual Impacts – OHTL 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 Vehicular Noise- Noise from movement of construction vehicles	Negligible Negative	Users of local road (R35)	Medium	Negligible to 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	Negligible
	Negligible Negative	Herders at Former Chontabay village (R37)	High	Minor		Negligible
	Minor Negative	Inactive Herders settlement 1 (R38)	High	Minor to Moderate		Negligible to Minor
	Minor Negative	Herders settlement 2 (R39)	High	Minor to Moderate		Negligible to Minor
	Minor Negative	Herders settlement 3 (R40)	High	Minor to Moderate		Negligible to Minor
	Minor Negative	Herders settlement 4 (R41)	High	Minor to Moderate		Negligible to Minor
	Minor Negative	Herders settlement 5 (R42)	High	Minor to Moderate		Negligible to Minor
	Minor Negative	Herders settlement 6 (R43)	High	Minor to Moderate		Negligible to Minor

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
	Minor Negative	Herders settlement 7 (R47)	High	Minor to Moderate	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.	Negligible to Minor
	Minor Negative	Users of local road (R35)	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. - Speed limits established in the Traffic & Transportation Management Plan will be adhered to.	Negligible
	Minor Negative	Herders at Former Chontabay village (R37)	High	Minor to Moderate		Negligible to Minor
Construction vibration	Negligible Negative	Inactive Herders	High	Minor		Negligible

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
impacts (including vehicle vibration)		settlement 1 (R38)			- 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 Negative	Herders settlement 2 (R39)	High	Minor		Negligible
	Negligible Negative	Herders Settlement 6 (R43)	Medium	Minor		Negligible
	Negligible Negative	Herders Settlement 7 (R47)	High	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	Minor to Moderate

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					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	

18.3.2 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 effect. Such noise is in the form of buzzing and humming and reaches higher 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 lines do not pose any known health risks. However, corona discharge can cause interference with radio waves and television signal.

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 lines (400-800kV) and even greater with ultra-high voltage lines (100kV and higher) (Gerasimov, 2003). When it is 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 anticipated 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 liveable structure to the OHTL route to be approximately 331m (Herder at Chontabay village), 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 impacts to fauna species are addressed in Chapter 16: Terrestrial Ecology of Part B of this ESIA.

Table 18-7 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	Herders at Former Chontabay village (R37)	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

18.3.3 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.

19 SOILS, GEOLOGY AND GROUNDWATER

19.1 Observation and Baseline Environment

19.1.1 OHTL Alignment Conditions

During the reconnaissance survey undertaken along the Dzhankeldy -Bash OHTL route in April, June & August 2021, it was observed that the OHTL route runs through different topographies and surface conditions consisting of desert landscape and mountain plains with moderate vegetation. The soil surface was also observed to be covered by barchan with gentle slopes facing towards the wind.

The land along the OHTL is primarily used for grazing and this was also evidenced through observation of animal tracks.

Besides the presence of local access road that runs parallel to the OHTL route & grazing activities, 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.

19.1.2 Soil Quality Analysis

19.1.2.1 Methodology

As a precautionary approach, soil quality analysis was undertaken along the OHTL route from the Dzhankeldy to Bash WF. 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 or smelt.

The samples were collected on 20th August 2021 at seven (7) 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 19-1 Soil Sampling Location

ID	COORDINATES	
	NORTHING	EASTING
SQ1	40°59'45.46"	63°40'26.54"
SQ2	40°59'7.06"	63°56'3.74"
SQ3	40°55'17.47"	64°21'52.33"
SQ4	40°49'2.61"	64°28'14.48"

ID	COORDINATES	
	NORTHING	EASTING
SQ5	40°58'38.31"	64° 1'19.83"
SQ6	40°59'15.98"	63°50'17.51"
SQ7	40°45'58.68"	64°32'37.73"

Figure 19-1 Soil Sampling Locations Along the Dzhankeldy -Bash OHTL Route



Plate 19-1 Evidence of Soil Sampling Along the Dzhankeldy-Bash OHTL Route



19.1.2.2 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 permissible concentrations (MPC) and approximate permissible concentrations of exogenous harmful substances in soil" and the Dutch Soil Quality Standards.

Table 19-2 Soil Analysis Results for Samples Collected Along Dzhankeldy-Bash OHTL Route

PARAMETERS	SAMPLE							DETECTABLE LIMITS IN MG/L	SANPiN № 0191-05 MPC	DUTCH STANDARDS (INTERVENTION VALUE)
	SQ1	SQ2	SQ3	SQ4	SQ5	SQ6	SQ7			
pH	8.35	8.30	8.00	8.30	8.10	8.25	8.26	1-14	-	-
Chloride (as Cl), %	535	11.00	7.00	11.00	6.00	11.00	7.00	N/A	-	-
Nitrate (NO ₃), mg/dm ³	249	9.40	10.00	15.00	17.00	11.00	8.00	10 ⁻⁶ -100* mg/kg	130 (gross content)	-
Sodium (Na), mg/kg	12,000	13,000	20,000	12,000	14,000	14,000	11000	40-110000mg/kg	-	-
Magnesium (Mg), mg/kg	12,000	6,900	10,000	9,700	12,000	9,100	9100	40-110000mg/kg	-	-
Potassium, mg/kg	19,000	24,000	35,000	23,000	23,000	22,000	18000	80-300000 mg/kg	-	-
Lead (Pb), mg/kg	17.0	13.0	20.0	15.00	17.0	13.0	13.0	0.1-4000 mg/kg	32	530
Manganese (Mn), mg/kg	560	290	530	430	520	410	390	20-100000 mg/kg	1,500 (gross content)	-
Copper (Cu), mg/kg	46.0	40.0	79.0	56.0	61.0	54.0	45.0	1.0-4000 mg/kg	3	190
Zinc (Zn), mg/kg	57.0	46.0	81.0	57.0	67.0	50.0	43.0	1.0-4000 mg/kg	23	720
Chromium (Cr), mg/kg	54.0	59.0	110	65.0	81.0	68.0	47.0	1.0-4000 mg/kg	6	380
Iron (Fe), mg/kg	26,000	17,000	28,000	22,000	28,000	20,000	19000	60-3000000 mg/kg	-	-
Mercury (Hg), mg/kg	0.056	0.024	0.016	0.032	<0.01	0.024	0.016	Not determined	2.1	36
Nickel (Ni), mg/kg	39.0	44.0	57.0	40.0	48.0	43.0	29.0	1.0 -4000	4.0	210
Cadmium (Cd), mg/kg	0.082	0.066	0.170	0.066	0.100	0.100	0.066	0.005-4000 mg/kg	-	12
Aluminum (Al), mg/kg	61,000	56,000	74,000	48,000	59,000	57,000	62000	20-200000 mg/kg	-	-
Arsenic (As) mg/kg	24.0	21.0	49.0	27.0	38.0	27.0	20.0	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 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 8.00 – 8.35 which means the soil along the OHTL route is alkaline in nature. The sample obtained near Chontabay village (SQ1) is characterized by a high content of nitrates and chloride compared to the other samples.

All samples exceed the Maximum Permissible Values established in SanPiN № 0191-05 for Cu, Zn, Cr & Ni. However, these are well below the benchmarked Dutch intervention standards. The soil chemistry of the Kyzylum Desert naturally comprises of metals 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 Kyzylum Desert where the OHTL is located and not as a result of anthropogenic or human influence.

The full sets of the soil analysis results from the laboratory and the laboratory certificate are presented in Appendix U.

19.2 Receptors

Table 19-3 Potential Soils, Geology & Groundwater Receptor – OHTL

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.

19.3 Potential Impacts, Mitigation, Management and Residual Impacts

19.3.1 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.

19.3.1.1 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, soil characteristics will be impacted directly through backfilling and soil compaction activities to provide structural stability for the structures.

19.3.1.2 Spills and Leaks Associated with Construction

As the tower construction & installation will require deep foundation works, 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.

19.3.1.3 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 to soil 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 19-4 Soils, Geology, and Groundwater Impact Significance, Mitigation & Management Measures and Residual Impacts – OHTL Construction

POTENTIAL IMPACTS	MAGNITUDE OF IMPACTS	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 temporary OHTL construction 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/or in proximity to secondary containment bund and fully stocked with appropriate absorbent materials. • Refuelling and maintenance of vehicles/equipment will be within a dedicated area along the OHTL corridor, on impermeable surface.	Negligible to Minor

POTENTIAL IMPACTS	MAGNITUDE OF IMPACTS	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					- Availability of suitable containment and spill clean-up materials/equipment at specific 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	Negligible to Minor

POTENTIAL IMPACTS	MAGNITUDE OF IMPACTS	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
					handling, storage, and transport of hazardous materials and waste.	

19.3.2 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 impact 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 19-5 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. - 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

19.3.3 Decommissioning Phase

Potential impacts relating to decommissioning of the OHTL will be similar to those encountered during the construction and operational phase. As such, it is assumed that the risk of accidental spills and waste management associated with the construction phase will be expected for the decommissioning 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.

19.4 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 19-6 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.

20 ELECTRIC MAGNETIC FIELD

20.1 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.

20.1.1 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).

20.2 Baseline Conditions

According to the OHTL prefeasibility study report there are 2 transmission line crossings along the proposed 128.1km Dzhankeldy – Bash OHTL. The proposed OHTL will run parallel to two existing 220kV existing OHTLs for approximately 20km from the Bash sub-station.

The closest residential receptor to the proposed OHTL is Chontabay village used by herders at approximately 331m north of the OHTL. As such, no residential receptors are within the 30m buffer zone required by Uzbek law.

20.3 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 20-1 Potential EMF Receptor - OHTL

RECEPTOR	SENSITIVITY	JUSTIFICATION
Herders and other land users along the OHTL alignment	Medium	Herders and other land users along the OHTLs will be relatively vulnerable to exposure to electric magnetic field especially when they are within the ROW.
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.

20.4 Potential Impacts, Mitigation, Management and Residual Impacts

20.4.1 Construction Phase

EMF is associated with cables that are transmitting electricity and therefore no impacts are anticipated during the construction phase of the Project.

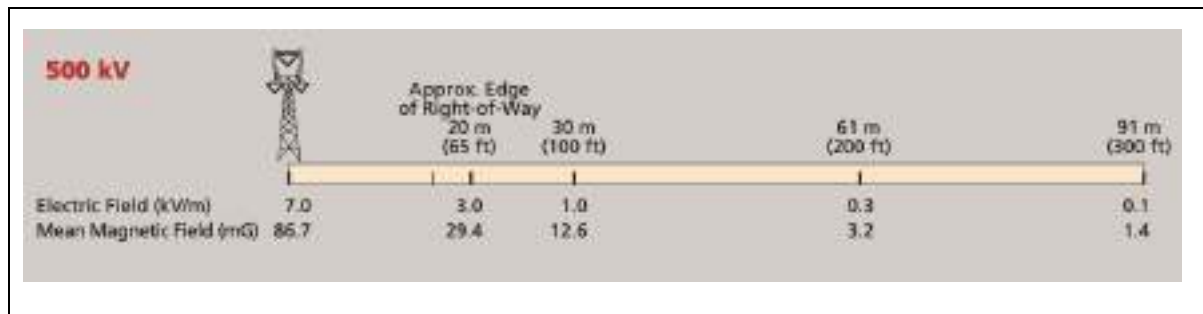
20.4.2 Operational Phase

20.4.2.1 EMF

The majority of the OHTL route from Dzhankeldy substation to Bash substation is located within desert area with few villages over 100m away from the route. As such, potential impacts relating to EMF will potentially be in areas near human settlements. As the OHTLs are 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 main magnetic field around a typical 500kV transmission line up to a distance of 91m (NIEHS, 2002). This figure shows that the application of a 30m buffer zone is sufficient as EMF outside this area are below the requirements set in the SanPin 0236-07 which states 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 20-1 Typical EMF levels for Power Transmission Lines

Source: National Institute of Environmental Health Sciences, 2002

The closest residential property along the OHTL is the liveable structure at former Chontabay village used by herders approximately 331m north of the OHTL. The EMF levels at this location will be below 0.1kV/m for electric fields and $0.14 \mu\text{T}$ (1.4mG) magnetic fields. This represents a negligible impact to these receptors.

It is expected that grazing activities will continue under the OHTL's where the EMF may exceed the national and lenders requirements. However, grazing activities under the OHTL are expected to be spaced out (especially because the OHTL alignment is mostly in a modified habitat parallel to an existing access road), thus limiting the period of exposure to herders.

20.4.2.2 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. It is noted that there are no radio or TV broadcast stations located near the OHTLs.

20.4.2.3 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 should be prevented and/or minimised through the preparation and implementation of an EMF safety program.

Table 20-2 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 other land users along the OHTL alignment	Medium	Negligible to Minor	- Installation of cables at increased height above ground to allow for movement of herders and other land users under the OHTL to continue. This will also reduce EMF exposure. - 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
	Negligible 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. - Utilization of personal monitors during work activities in high EMF zones.	Negligible

20.4.3 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.

21 TRAFFIC AND TRANSPORTATION

21.1 Observation and Baseline Environment

The OHTL route runs parallel to an existing access road and crosses an existing railway line that connecting Navoi city to Zarafshan city. The two-lane asphalt access road (locally referred to as the Zarafshan-Navoi road) connects several villages which include Dzhankeldy, former Chontabay, Chengeldy, Karakata and Baloakarak. A few local roads within the eastern plot of the wind farm also connect to the access road before connecting to the A380 & A379 highway (also called Navoi-Uchkuduk).

Based on the site visits conducted along the OHTL route in April, June and July 2021, the local access roads have very low traffic flows with about one (1) vehicle passing every 10-15 minutes and, in some cases, only 2 vehicles pass the road in a day. Transport to the OHTL route is expected to be through these local roads.

21.2 Receptors

Table 21-1 Potential Traffic & Transportation Receptors - OHTL

RECEPTOR	SENSITIVITY	JUSTIFICATION
Local Access Road and users of local access roads	Medium	The local access road is narrow and transportation of OHTL components may present a challenge to other road users during the
Railway Line	High	The railway line will be particularly vulnerable to the movement of machinery, equipment and construction works along the OHTL route particularly at the area where the OHTL crosses the railway line and this could disrupt the movement of passenger and cargo trains.
Residents of villages nearby the local access roads including children	High	Given that residents of villages, herders together with livestock will cross the Highways & access roads when moving back & forth, they are particularly vulnerable to an increase in vehicular flow on the local access roads.

21.3 Potential Impacts, Mitigation, Management and Residual Impacts

21.3.1 Construction Phase

21.3.1.1 Transportation of OHTL Materials and Equipment

IMPACT ON ROAD INFRASTRUCTURE

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 OHTL area via the national/international highway network. At this stage, it is understood that the construction vehicles for the Wind Farm & OHTL will use the existing local asphalt road (Zarafshan-Navoi road) to reach the site as such, all vehicles will eventually need to use the local access roads to 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 within local roads authorities.

POTENTIAL DISRUPTION OF TRAIN SERVICES

Movement of vehicles, machinery, equipment and the transportation of OHTL components may lead to disruption of passenger and/or freight train movement along the railway line particularly at the area where the OHTL crosses the railway line. In addition, this could result in accidents and loss of life & property of those using the trains. As such the EPC will be required to conduct a risk assessment prior to commencement of construction work and obtain the necessary permits from Uzbek Railway Authority before movement of machinery/equipment over the railway line.

21.3.1.2 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 limited existing vehicular movements. The addition of vehicles along other existing routes will likely result in very minor temporary increases in traffic along the local roads.

21.3.1.3 Safety of Residents

The existing local asphalt road (Zarafshan-Navoi road) are used by local communities to access Chengeldy, Karakata, Baloakarak, Dzhankeldy and Kalaata village. The development of the OHTL will require the use of vehicles carrying normal loads & abnormal loads. As such, this will result in a temporary increase in the number of vehicles (both LDVs & HGVs) along this local road as a result of the OHTL's development and this has the potential to result in road traffic accidents affecting road users including vulnerable groups such as children, disabled and elderly.

Table 21-2 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	Local asphalt road (Zarafshan-Navoi road)	Medium	Moderate	- A Traffic & Transportation Study will be conducted along the Zarafshan-Navoi route that runs parallel to the OHTL before the transportation of OHTL related equipment and machinery. - The study will assess the requirements for upgrades to be made to the local road infrastructure to enable safe transportation of oversized and/or heavy specialised transportation vehicle.	Minor
Disruption of Train Services	Minor Negative	Railway Line	High	Minor to Moderate	- The design of the OHTL and its construction will ensure that a 12m buffer zone is maintained between OHTL facilities and the railway line. - The EPC Contractor will get a written permission from the Railway Authority of Uzbekistan if heavy equipment is required to cross the railway line. The application for permission will be submitted five (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 will not be permitted.	Negligible to Minor
Increased vehicle flow on highway and local roads	Minor Negative	Users of local access roads	Medium	Minor	The Traffic & Transportation Management Plan that will be prepared for the Wind Farm will also outline how OHTL components will be delivered to the site and outline how construction traffic will be managed along the Zarafshan-	Negligible

POTENTIAL IMPACTS	MAGNITUDE OF IMPACT	RECEPTOR	SENSITIVITY	POTENTIAL IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
	Minor Negative	Residents of villages nearby the local access roads including children	High	Minor to Moderate	Navoi local road to limit impacts upon local communities, 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. - 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 local access roads & highways areas leading to OHTL. - Deliveries of OHTL construction materials will be coordinated to reduce congestion on local roads and to reduce the waiting time for the drivers.	Negligible to Minor
Safety of Residents of nearby villages & herders	Minor Negative	Residents of villages local access road including children	High	Minor to Moderate	- Where applicable, the EPC Contractor will notify the local communities on delivery of OHTL materials and how it could potentially impact road use. - Children will be informed about the project at local schools 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. - 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.	Negligible to Minor

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 that use the Zarafshan-Navoi road 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.	

21.3.2 Operational Phase

21.3.2.1 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 21-3 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	Local Access roads	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

21.3.3 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 and increased risk of road traffic accidents will be applicable to the decommissioning phase as well.

21.4 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 21-4 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.	Daily	Local access road (Zarafshan-Navoi road) and any other roads used by project vehicles

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
Grievances received	Record of grievances received, response period, close-outs	On-going	Local access road (Zarafshan-Navoi road) and any other roads used by project vehicles
Disruption of Train Services	Records of correspondence with Railway Authority of Uzbekistan notifying them of transportation of OHTL components & movement of equipment or machinery across the railway line.	On-going	Railway line that runs parallel to the OHTL and crosses the OHTL
	Records showing application and permission obtained from Railway Authority of Uzbekistan where buffer zones are not adhered to or machinery, vehicles or equipment crosses over the railway line		
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

22 INFRASTRUCTURE AND UTILITIES

22.1 Observation and Baseline Environment

As part of the OHTL prefeasibility study commissioned by ACWA Power, Juru Energy's Technical Team undertook site visit along the planned OHTL route from 26th to 27th June 2021. During the site visit, exiting access road, existing transmission lines and an existing railway were identified along the OHTL route and these are described in the table below.

Table 22-1 Details of Existing Infrastructure & Utilities Along the OHTL

INFRASTRUCTURE AND/OR UTILITIES	DESCRIPTION	PHOTO
Two (2) 220kV high voltage transmission lines	These transmission lines are located at the eastern extent of the Dzhankeldy-Bash OHTL; approximately 5km from the substation within Bash site. The proposed Dzhankeldy to Bash OHTL crosses these transmission lines	 2 X 220kV Transmission Lines
Navoi - Uchkuduk Railway	The Navoi – Uchkuduk Railway is located towards the eastern extent of the Dzhankeldy – Bash OHTL; approximately 11km from the substation within Bash site. The proposed Dzhankeldy to Bash OHTL also crosses this railway	 Navoi – Uchkuduk Railway
Existing Access Road	The Dzhankeldy to Bash OHTL runs parallel to the existing access road	No Photo

22.2 Potential Impact

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., existing OHTL, railway, access roads could potentially result to disruption of services to many customers within Uzbekistan.

As such, on-going consultations will be undertaken and the conclusions of the OHTL prefeasibility study implemented as provided below.

22.3 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 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.
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 PUE¹⁶-2011.2.5.138 - 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	When crossing highways, the supports of OHTL that limit the span of the crossing must have an anchor of a normal structure.

¹⁶ PUE – 2011. 2.5.117, for 500kV overhead line crossings, the supports of the crossing overhead line must be of normal anchoring design.

ASPECT	CONCLUSIONS
	- 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.
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.

22.3.1 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.

22.3.2 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.

22.3.3 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.

22.3.4 Small Road Crossing

Crossings over small roads will not require any special type of towers.

Table 22-2 Summary of the Infrastructure & Utilities between Dzhankeldy - Bash

ELEMENT	DESCRIPTION	SPECIAL TOWER REQUIREMENT
Number of transmission line crossings	2	Yes
Number of railway line crossings	1	Yes
Number of highway crossings	0	Yes
Number of small road crossings	1	No

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

23 ARCHAEOLOGY AND CULTURAL HERITAGE

23.1 Observation and Baseline Environment

Based on the consultation 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 a potential for archaeological finds or items of cultural importance to be within the vicinity of the OHTL.

23.1.1.1 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 are any recognized archaeological sites along the planned Dzhankeldy-Bash OHTL route. A response letter was received on 12th October 2021 stating that no archaeological research have been undertaken along the planned Dzhankeldy- Bash route therefore there is no information regarding the presence/absence of archaeological sites/finds along the route. However, given the location of the OHTL route in the Kyzylkum desert area where ancient stone age settlements, workshops, tombs or burial grounds of ancient nomadic herders have been found, there is a potential for ancient items of cultural importance to be present along the route. As such, the Institute of Archaeology suggests that preliminary archaeological researches and supervision should be carried out along the planned OHTL route.

23.1.1.2 Consultation with the Cultural Heritage Agency

A consultation letter was sent to the Cultural Heritage Agency on 27th September 2021 requesting if there are any cultural and archaeological sites along the planned OHTL route. The request was forwarded to the Bukhara Regional Department of Cultural Heritage Agency and a response was received from the Navoi Regional Cultural Heritage Agency Department on 2nd November 2021 indicating that there are no cultural objects/items located in the Navoi region where the OHTL runs through. They however advised that all OHTL related works should be undertaken under the supervision of archaeologists.

23.1.2 Archaeological Survey Along OHTL Route

Given that the Navoi Regional 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 to supervise construction works.

23.2 Intangible and Tangible Cultural Heritage

During the public disclosure of the ESIA, representatives of Municipalities along the OHTL route were asked about the intangible and tangible cultural heritage and the responses provided are presented in the table below.

MUNICIPALITIES	INTANGIBLE CULTURAL HERITAGE	TANGIBLE CULTURAL HERITAGE
Peshku Municipality	Nawrouz, wedding ceremonies was identified as the main intangible cultural heritage practiced by communities in these Municipalities	No tangible cultural heritage item or object is located along the OHTL route
Gijduvon Municipality		The main tangible cultural heritage item is Khoja Abdulkholik Gijduvoniy mausoleum located in Gijduvan district and other tangible cultural heritages including Khoja Bakhoudin Nakshband Bukhoriy, Khoja Sayyid Amir Kulol mausoleums which is the "7 Pilgrims" in Bukhara region.
Konimekh Municipality		No tangible cultural heritage item or object is located along the OHTL route

In addition to the above, it is highly likely that the Palov culture is practiced within communities along the OHTL as it is common across Uzbekistan. The nearest community to the OHTL is Chontabay village which is located approximately 331m north of the Dzhanakeldy – Bash OHTL and community members of this village will practice the above-mentioned intangible & tangible cultural heritage. However, it is noted that there are land users (herders) along the OHTL who may potentially also practice the same elements.

23.3 Receptors

Table 23-1 Potential Archaeology & Cultural Heritage Receptors - OHTL

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. These are important elements and part of a national identity that has also been recognised by UNESCO.

23.4 Potential Impacts, Mitigation, Management and Residual Impacts

23.4.1 Construction Phase

23.4.1.1 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.

23.4.1.2 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 be disassembled and moved to another area of construction. The relatively low number of workers at each construction area (where pylons are to be constructed) would therefore not cause any significant cultural influence/social change or prevent any of the communities from practicing these elements.

Table 23-2 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 archaeologist will be present to supervise construction works along the OHTL. - 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 12.4.1 (Table 12-4) of this ESIA.	Negligible

23.4.2 Operational Phase

The operational phase will not result in further impacts to archaeology, as the area will be static and excavations will not be required.

23.4.3 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.

23.5 Monitoring

Table 23-3 Archaeology and Cultural Heritage - Monitoring Requirements

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
Construction			
Archaeological Resources & Artefacts	Undiscovered archaeological remains along OHTL route	Daily continued visual observations by site staff involved in excavations.	The OHTL construction area requiring excavations, earthworks or grading during construction.

24 LANDSCAPE AND VISUAL AMENITY

This chapter identifies aspects of the landscape character and visual receptors along the OHTL route.

Based on numerous site visits undertaken to date and review of satellite imagery, the OHTL corridor consists of different landscape character; desert land and mountain plains and a number of infrastructures such as the railway line, existing OHTL etc. As such, a landscape & visual impact survey was undertaken along the proposed OHTL route between the Dzhangeldy substation which will be located at the Project site and the Bash Substation located at the Bash Project site (subject of a separate ESIA).

24.1 Observation and Baseline Environment

24.1.1 Landscape Baseline

24.1.1.1 Landscape Survey

METHODOLOGY

The landscape survey was undertaken in July 2021 at a total of five (5) 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 location of the viewpoints are shown in the table and figure below.

Table 24-1 OHTL Cardinal Point Locations

VIEWPOINT ID	COORDINATES		DESCRIPTION
	LONGITUDE	LATITUDE	
OHTL CP 1	64.593535	40.715336	Located on the existing OHTL and near the train tracks.
OHTL CP 2	64.510582	40.779586	Located next to the train tracks, this represents the view from the small settlement next to the train tracks.
OHTL CP 3	64.369415	40.923743	Located on the railway crossing and P&G Line.
OHTL CP 4	64.357427	40.952152	Located on the outskirts of Chengeldy village.
OHTL CP 5	63.67749	40.998327	This represents the view as seen from the small, mostly abandoned village including views of the distant mountains.
Notes: OHTL = Overhead Transmission Line CP = Cardinal Points Coordinate System = WGS 1984, Decimal Degrees			

Figure 24-1 OHTL Cardinal Point Locations



RESULTS

The proposed OHTL will be constructed on a predominantly undeveloped, open desert landscape with the landscape typology characterised by sparse shrub vegetation, gravel or coarse soils with the occasional minor elevations. The OHTL route consists of existing local asphalt road that runs parallel to the OHTL route, an area with hills/cliff, existing transmission line, railway and other roads.

Significant anthropogenic contributions to the landscape are from existing overhead transmission line and residential buildings in nearby villages (former Chontabay, Chengeldy and Chulobod). The existing OHTL is located towards the end of the OHTL route and results in a linear feature across the generally open landscape of the OHTL route whilst the residential buildings of nearby villages create a vertical anthropogenic intrusion into the existing project site landscape.

The different elements that contribute to the landscape character at the study area as identified during the survey are discussed below.

LAND USE AND COVER

Land use along the OHTL route consist of an undeveloped natural desert with some undulating hills. This undeveloped desert area is commonly used by herders (for cow, camel, and goat). There are three villages along the route, former Chontabay, Chengeldy and a small settlement next to the railway in Bash called Chulobod village.

Plate 24-1 Cows Outside Chontabay Village



SETTLEMENTS

There are three (3) villages along the OHTL route, former Chontabay, Chengeldy and a small settlement next to the railway in Bash called Chulobod village. These settlements are very small and focused on agriculture and livestock grazing. Chontabay is mostly abandoned with only a few families still living there. Most roads are dirt tracks servicing the sporadically distributed homes. Most buildings are limited to one story in height.

Plate 24-2 View of Chulobod Village and Railway Tracks Along Proposed OHTL



Plate 24-3 View of Abandoned Buildings in Chontabay Village



Plate 24-4 View of Chengeldy 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 400m above sea level in Dzhankeldy to around 250m above sea level at the northern boundary of the Bash Project Site.

VEGETATION

The dominant vegetation within the OHTL study area is small desert shrubs, with little variation in flora diversity. Larger shrubs and trees were observed in and around the villages.

Plate 24-5 Typical Shrub Vegetation along OHTL Route



LANDSCAPE CHARACTER AREAS

Through a combination of desktop study and fieldwork surveys along a 3km buffer of the OHTL route, the landscape was classified into four (4) distinct LCA's as shown in the following table and figure.

Table 24-2 Landscape Character Areas

ID	NAME	DESCRIPTION	VALUE	SENSITIVITY
OHTL 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
OHTL LCA 2	Undeveloped Mountains / Hills	The mountainous areas and hills at Dzhanakely are mostly undeveloped and untouched.	There are no valued features in this LCA except for the landform itself. It is entirely undeveloped and in good, natural condition. However, there is limited potential for substitution	Medium
OHTL LCA 3	Developed Areas	The flatter, lower elevation plains have several small, developed areas that include agriculture (goat herders) and residential areas.	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 4	Transport and OHTL routes	Along the proposed OHTL route there are an existing OHTL as well as multiple parallel and branching roads, including small gravel tracks.	The road 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 5	Mining Areas	Within 10km from the Project site, there is some mining activity along the proposed OHTL route.	Mining areas cause significant damage to the natural environment and as such any change to the mining landscape is likely to have little effect on its value.	Very Low
OHTL LCA 6	Saltmarsh Landscape	There is a slight depression where a Saltmarsh is located south of Chengeldy village, next to the proposed OHTL	There are no valued features in this LCA except for the landform itself. It is undeveloped with no anthropogenic features. It is in good, natural condition. However, there is limited potential for substitution	Medium

Note: The sensitivity of each Landscape Character was assigned using the criteria described in "Table 4-5 Environmental Value of Receptor or Resource."

Figure 24-2 OHTL Landscape Character



24.1.2 Visual Quality

24.1.2.1 Visual Quality Survey

METHODOLOGY

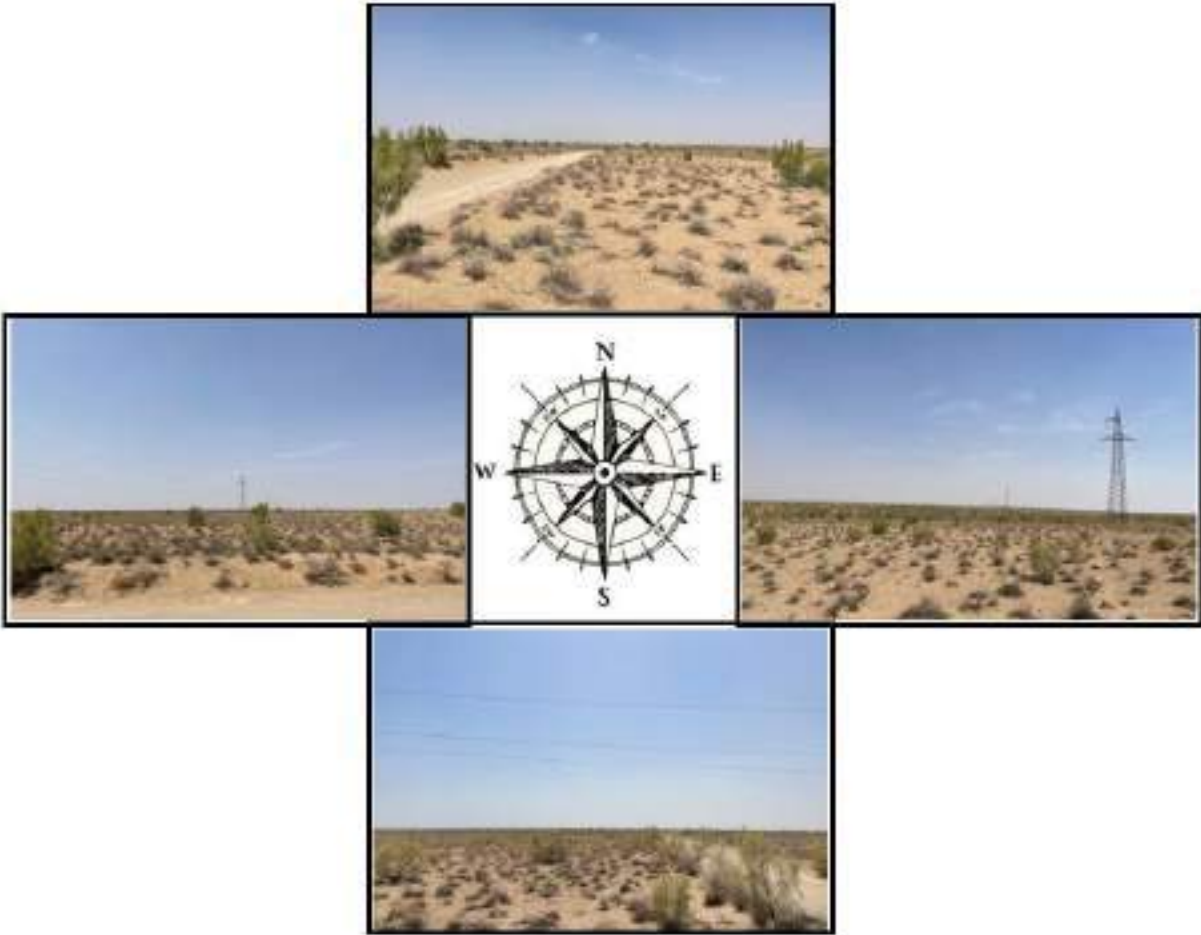
The visual amenity of the study area was surveyed from the selected locations. Views from a variety of distances, aspects, elevations and extents were considered.

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 desert typology found in Uzbekistan.

The following table outlines the views that may potentially be impacted at each of the cardinal point locations.

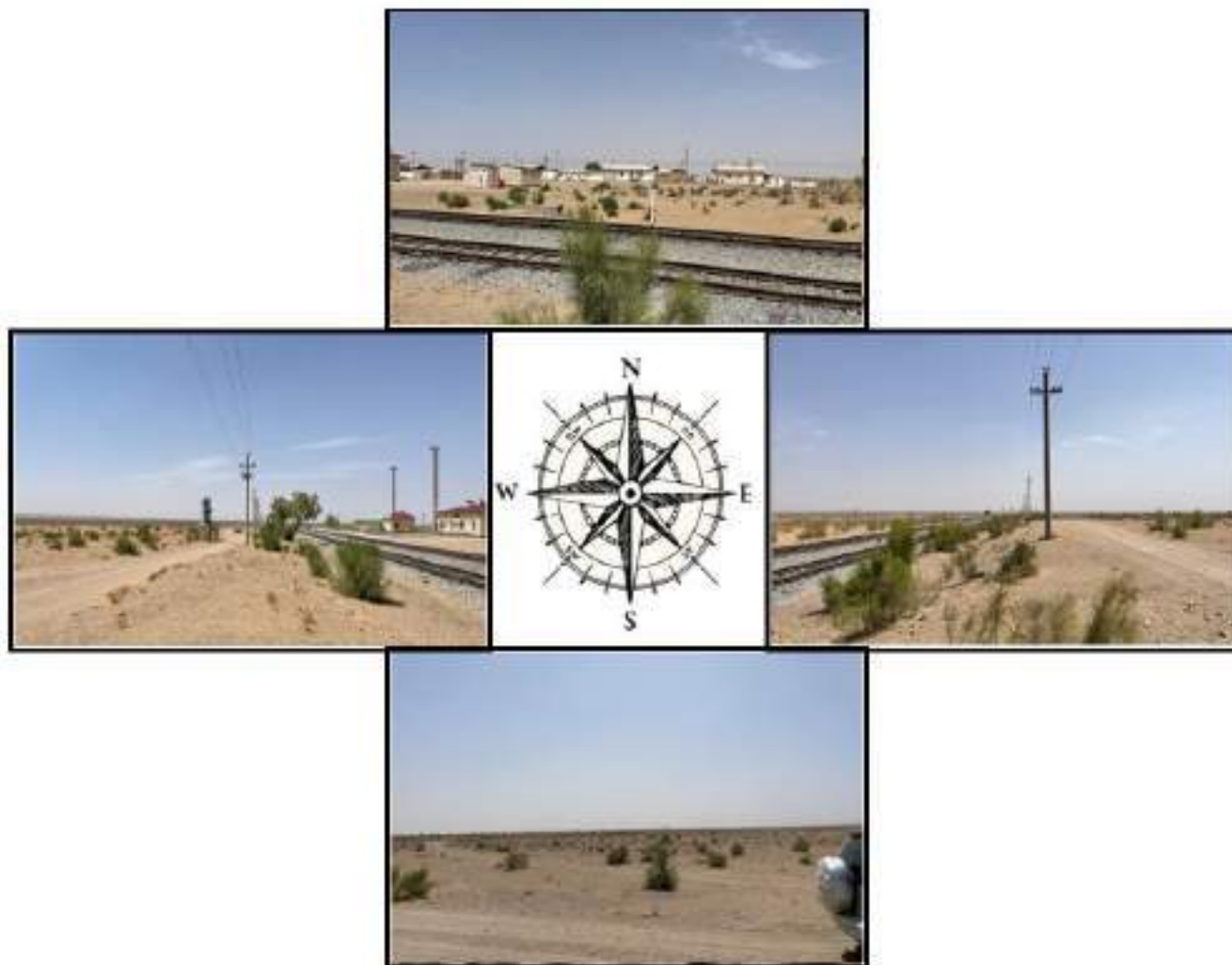
Table 24-3 Views from Cardinal Points Locations Along OHTL

DESCRIPTION OF VIEW
OHTL CP 1
Views captured along the existing OHTL that run parallel to the Railway tracks. Other than the OHTL and dirt tracks used by herders, the area is mostly untouched.


DESCRIPTION OF VIEW

OHTL CP 2

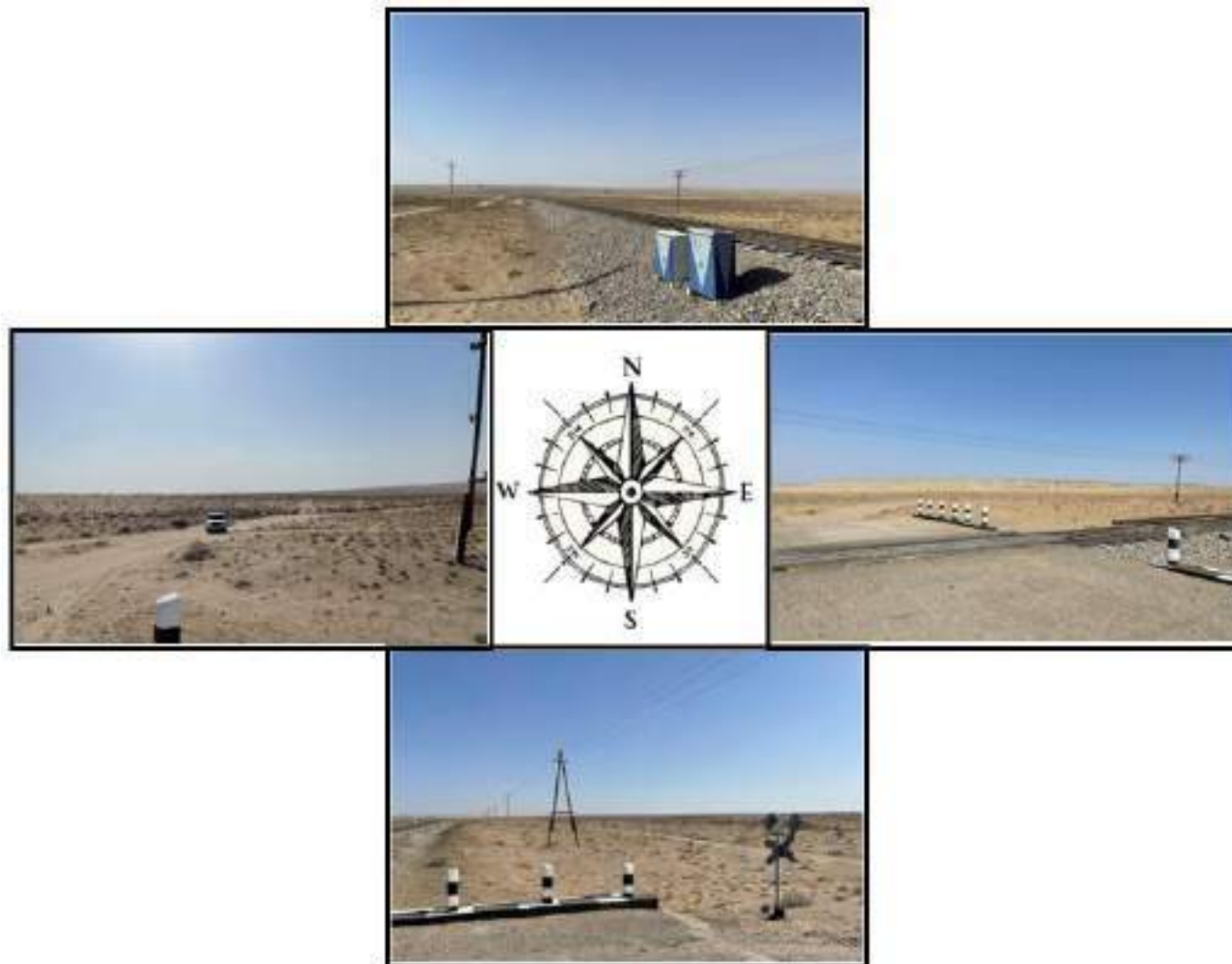
Located next to the train tracks, this represents the views from the small settlement next to the train tracks.



DESCRIPTION OF VIEW

OHTL CP 3

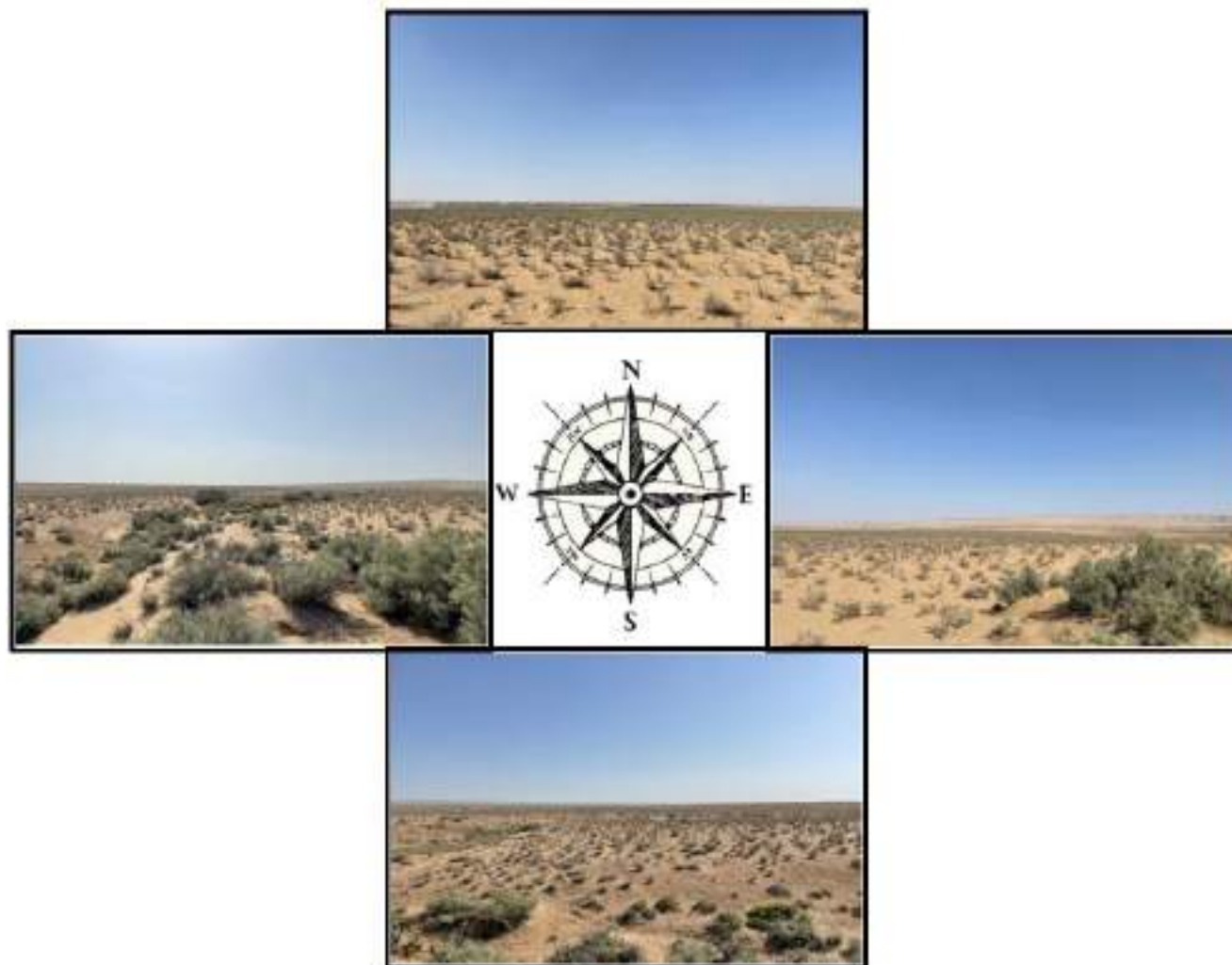
Represent the view as seen from the railway crossing. Existing OHTL run parallel to the railway tracks



DESCRIPTION OF VIEW

OHTL CP 4

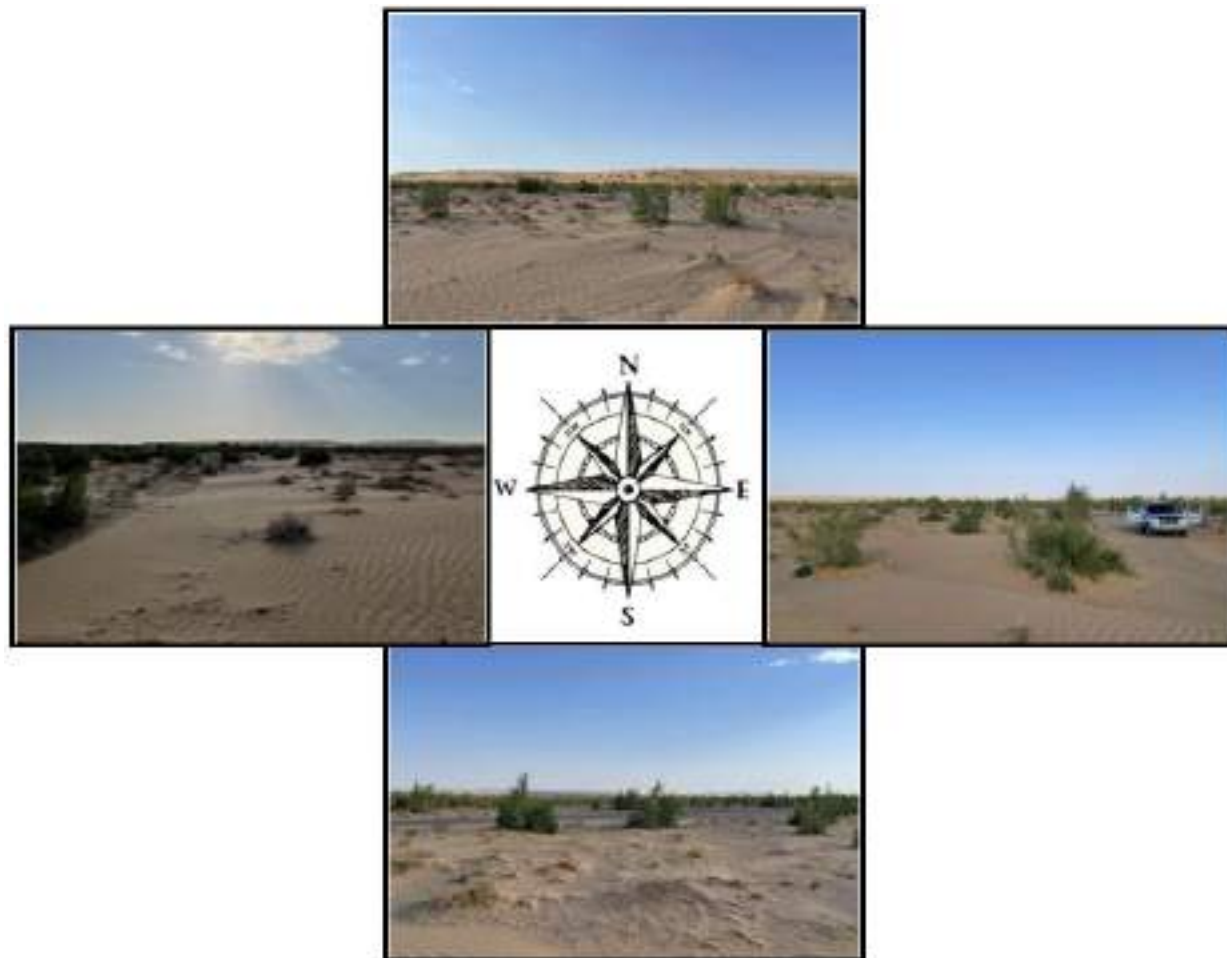
Located on the outskirts of Chengeldy village. Other than the village to the north of the location, the area is untouched and represents a typical Uzbekistan desert landscape.



DESCRIPTION OF VIEW

OHTL CP 5

This represents the view as seen from the small, mostly abandoned Chontobay village with views of the mountains of the distance.



24.2 Receptors

The potential landscape and visual receptors as a result of the OHTL 's development are presented in the table below.

Table 24-4 Potential Landscape and Visual Impacts Receptors - OHTL

ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
OHTL LCA 1	Landscape Character	Undeveloped Desert Landscape	Low	The landscape along the OHTL route 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.
OHTL LCA 2		Undeveloped Mountains / Hills	Medium	The landscape along the OHTL route is that of the typical mountain/hills landscape present across Uzbekistan with no features of local or national importance. It is therefore of medium importance and rarity on a local scale.
OHTL LCA 3		Developed Areas	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
OHTL LCA 4		Transport and OHTL routes	Low	The road network causes fragmentation of the natural environment as such the landscape value is low importance
OHTL LCA 5		Mining Areas	Very Low	The landscape value of the mining areas is of very low importance.
OHTL LCA 6		Saltmarsh Landscape	Medium	This landscape is a typical saltmarsh landscape in Uzbekistan. However, there is limited potential for substitution.
R37	Former Chontabay village	Mixed Use (residential, commercial)	High	While most of the village has been abandoned, there are still several families remaining. These residents will have direct visibility of the proposed OHTL route and as such will be particularly vulnerable to changes in landscape character as the OHTL will be visible to residents.
-	Chengeldy village	Mixed Use (residential, commercial)	High	While further away from the proposed OHTL than Chontabay village, residents will still have direct line of sight

ID	RECEPTOR	RECEPTOR TYPE	SENSITIVITY	JUSTIFICATION
				visibility of the proposed OHTL route. As such, residents will be vulnerable to changes in the landscape character and visual amenity of the area.
-	Chulobod Village	Mixed Use (residential, commercial)	High	These residents will have direct visibility of the proposed OHTL route and as such will be particularly vulnerable to changes in landscape character as the OHTL will be visible to residents.

24.3 Potential Impacts, Mitigation, Management and Residual Impacts

24.3.1 Construction Phase

24.3.1.1 Change in Landscape Character

Similar to the construction of the wind farm, 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 majority of the OHTL route is flat in nature, excavation, levelling, grading and other site preparation activities may result in limited land use changes.

The subsequent erection of pylons/ towers will transform the landscape of the OHTL route. Such transformation will primarily relate to large scale vertical structures and this will embed with the existing landscape as there are a number of other OHTLs in the area. Hence, the large-scale vertical structures will unlikely result in any noticeable landscape character impacts. This will also divide areas of existing landscape character with long linear and vertical infrastructure features.

24.3.1.2 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 to 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 Chengeldy village.

Any impacts from lighting are anticipated to be minimised by the implementation of specific controls detailed in the CESMP on-site.

Table 24-5 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	Minor Negative	Undeveloped Desert Landscape (OHTL LCA 1)	Low	Negligible to Minor	- Site clearance, levelling & grading to be limited within the boundaries of the designated OHTL corridor. - Construction works to be limited within the designated OHTL corridor. - Where appropriate, construction work areas will be screened 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
	Minor Negative	Undeveloped Mountains / Hills (OHTL LCA 2)	Medium	Minor		Negligible to Minor
	Minor Negative	Developed Areas (OHTL LCA 3)	Low	Negligible to Minor		Negligible
	Minor Negative	Transport and OHTL routes (OHTL LCA 4)	Low	Negligible to Minor		Negligible
	Minor Negative	Mining Areas (OHTL LCA 5)	Very Low	Negligible to Minor		Negligible
	Minor Negative	Saltmarsh Landscape (OHTL LCA 6)	Medium	Minor		Negligible to Minor
	Minor Negative	Herders at former Chontabay village (R37)	High	Minor to Moderate		Minor
	Minor Negative	Chengeldy village	High	Minor to Moderate		Minor
	Minor Negative	Chulobod village	High	Minor to Moderate		Minor

POTENTIAL IMPACT	MAGNITUDE OF IMPACTS	RECEPTOR	SENSITIVITY	IMPACT SIGNIFICANCE	MITIGATION AND MANAGEMENT MEASURES	RESIDUAL IMPACTS
Disturbance to Visual Envelope of Receptors	Minor Negative	Herders at former Chontabay village (R37)	High	Minor to Moderate	- 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 plant 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. - 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 issuance of night permits. - Any flood lights required during night time construction activities will be directed onto the working areas, with a maximum position angle of 30° from vertical, and back spill shields, therefore minimising any unwanted light spill. - No lights will be installed facing any of the receptor locations including the access roads in the project area.	Minor
	Minor Negative	Chengeldy village	High	Minor to Moderate		Minor
	Minor Negative	Chulobod Village	High	Minor to Moderate		Minor

24.3.2 Operational Phase

24.3.2.1 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 or visual envelope of receptors overlooking the Project site, as it is generally expected that receptors will become accustomed to the presence of OHTL (i.e., the towers & cables).

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 which requires a 30m health protection zone for single circuit OHTL with rated voltage of 500kV. 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 “

24.3.2.2 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 cease. 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 24-6 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	Undeveloped Desert Landscape (OHTL LCA 1)	Low	Negligible to Minor	-	Negligible to Minor
	Minor Negative	Undeveloped Mountains / Hills (OHTL LCA 2)	Medium	Minor		Minor
	Negligible	Developed Areas (OHTL LCA 3)	Low	Negligible to minor		Negligible to minor
	Negligible	Transport and OHTL routes (OHTL LCA 4)	Low	Negligible to minor		Negligible to minor
	Negligible	Mining Areas (OHTL LCA 5)	Very Low	Negligible		Negligible
	Minor Negative	Saltmarsh Landscape (OHTL LCA 6)	Medium	Minor		Minor
Disturbance to Visual Envelope of Receptors	Minor Negative	Herders at former Chontabay village (R37)	High	Minor to moderate	-	Minor to moderate
	Minor Negative	Chengeldy village	High	Minor to moderate		Minor to moderate
	Minor Negative	Chulobod Village	High	Minor to moderate		Minor to moderate

25 SOCIO-ECONOMICS

25.1 Observation and Baseline Condition

25.1.1 Socio Economic Survey

Socio-economic surveys targeting the PAPs along the OHTL was conducted between 28th February 2022 and 1st March 2022 using survey questionnaires targeting directly impacted land 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 2 herders. Institutional lease holders such as LLC clusters under SWID were not included in the socio-economic surveys.

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.

25.2 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 impacts to land users and this has been assessed in the Project specific RAP.

Table 25-1 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.
Herders/PAPs that graze livestock along the OHTL route	High	Herders identified to graze livestock within the OHTL area of influence will face access restrictions during the construction phase of the OHTL as such, they are particularly vulnerable.

25.3 Potential Impacts, Mitigation, Management and Residual Impacts

25.3.1 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 15).

Impacts relating to land use by the herders have been assessed and will be mitigated and managed through the implementation of the Project Specific RAP.

25.3.2 Operational Phase

Refer to Chapter 15 Socio-Economic for operational phase impacts and mitigation measures in relation to employment.

25.4 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.

26 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 Soils, Geology and Groundwater Chapter in Part A 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

26.1 Observation and Baseline Environment

26.1.1 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 landfills¹⁷.

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-

¹⁷ https://unece.org/DAM/env/epr/epr_studies/ECE.CEP.188/ECE.CEP.188.RUS.03.part_II.pdf

compliance with requirements of sanitary and environmental standards ¹⁸. The Project site is 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 Kalaata & Dzhankeldy 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.

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 26-1 Location of Bukhara City Wastewater Treatment Plant in Relation to the Project Site



¹⁸ 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

26.2 Potential Impacts

26.2.1 Construction Phase

The construction phase of a Project can often be the most environmentally damaging phase of a project, particularly in regard to the volumes of waste that are generated, if not properly managed.

26.2.1.1 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-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.

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 area 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 26-1 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)

26.2.1.2 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 0.1m³/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 70m³ - 100m³ 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.

26.2.2 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).

26.2.2.1 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.

26.2.2.2 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 be collected in a sump and will be treated in an oil separator for settlement of solids. The residual oil and solids will be collected for recycling and/or disposal by a licensed contractor.

The improper handling, transport and disposal of hazardous wastes could lead to potential localised contamination of soil and groundwater resources, which have been assessed for significance in the Soils, Geology, Groundwater & Surface Water in Part A & B of this report.

26.2.3 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.

26.3 Mitigation and Management Measures

26.3.1 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 26-2 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, 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.

26.3.2 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 26-2 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

26.3.3 Construction Phase

Table 26-3 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 Peshku district or Bukhara region in order to promote the recycling of waste especially packaging materials, wood and metal waste etc.
Inappropriate/uncontrolled handling, storage, transport and/or disposal of solid hazardous waste	• Develop and maintain a hazardous waste inventory to document and track hazardous wastes generated, segregated, reused and consignments. • Segregate and identify hazardous waste from the other waste streams into separate signed and 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. • First aid kit and fire extinguishers will be available at hazardous waste storage areas • 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.

IMPACT/SOURCE	MITIGATION AND MANAGEMENT MEASURES
	The removal of any sludge residues as solid hazardous waste will be undertaken by a licensed waste contractor and handled as a hazardous waste.
Medical Waste	- Any generated medical waste (i.e. from 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.

26.3.4 Operation Phase

Table 26-4 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. - A licensed waste contractor will be engaged for the periodic removal of tank.

SOURCE	MITIGATION AND MANAGEMENT MEASURES
Inappropriate/un controlled handling, storage, transport and/or disposal of solid hazardous waste	- Develop and maintain a hazardous waste inventory to document and track hazardous wastes generated, segregated, reused and consignments. - Segregate and identify hazardous waste from the other waste streams into separate waste containers/skips clearly signed and labelled. - Store hazardous waste in allocated impervious hard standing areas in sealed containers stored with impermeable bases, sufficient containment and separation capacity, sun/rain shelter, separate drainage system, good ventilation and equipped with spill kits & spill response procedures. This area must be placed away from any sources of ignition. - Waste containers will be clearly marked with appropriate warning labels to accurately describe their contents and detailed safety precautions. Labels will be waterproof, securely attached, and written in English and other languages as required by the workforce such as 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.

26.3.5 Decommissioning Phase

Potential impacts relating to decommissioning of the wind farm are expected to be similar to those encountered during the construction phase and as such, no additional measures are proposed. All wastes generated during decommission will be managed in accordance with the waste management hierarchy

It is anticipated that a large quantity of materials will be segregated and recycled with minimal waste going to landfill. The methods for recycling or disposing the wind turbine components will be determined in compliance with future national legal requirements and applicable international best practices.

A Decommissioning Plan will be developed prior to decommissioning and this will include detailed methods for disposal of decommissioning wastes.

26.4 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 26-5 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

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATION
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.

27 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.

27.1 Observation and Baseline Condition

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. There might also be potential risks to public facilities/infrastructure in the vicinity of the Project area such as airports, flight paths, telecommunication systems, etc.

27.1.1 Wind Farm

The closest residential receptors to the Project site is the Kalaata village located west of the western plot boundary and this plot is approximately 35m to the nearest residential compound of this village. However, Kalaata village is over 4km from the nearest WTG location. The Dzhankeldy village is located approximately 2.5km east of the western plot boundary, approximately 1.4km west of the eastern plot and approximately 2km from the nearest WTG. There are also other residential and commercial receptors within close proximity of the site as identified in Land Use and Site Condition Section in Chapter 2 of this ESIA

As a result, Project activities may pose health, safety and security risks to these receptors.

27.1.2 OHTL

The closest residential receptors to the OHTL route is the Chontabay village located approximately 270m north of the OHTL. The Chengeldy village is located approximately 3.7km north of OHTL. 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 this ESIA.

27.1.3 Health Protection Zone

In order to fulfil the requirements, set out in SanPiN No 0350-17 of establishing a health protection zone (HPZ), consultation letters were sent out to the Agency for Sanitary and Epidemiology Welfare under the Ministry of Health of the Republic of Uzbekistan on 3rd April 2021 requesting the requirement for the Health Protection Zone of the Wind Farm Project as it is a Renewable Project and there are no specific emission sources from the Project.

Response from the Agency of Sanitary and Epidemiological Wellbeing (under the Ministry of Health) was received on 12th April 2020 stating 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 "at least 500 meters"
- Based on sanitary norms, rules and hygienic standards, SanPiN № 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 Dzhankeldy 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, "Health Protection Zone for modern wind power plants is justified as 700m from the outermost wind turbines in terms of noise criteria"
 - "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".
 - Based on 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 again 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. 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 V.

27.1.4 Existing Public Facilities/Infrastructure

AIRPORTS

There is one (1) airport within 100km of the Project site; the Zarafshan airport located approximately 98km north of the Project site. Other airports within the region but over 100km away include the Uchkuduk airport (125km north), Bukhara International Airport (140km south east), Kagan South Air Base (Military Airport – 150km south east) and Navoi International Airport (163km south east). In addition, there may be few flight paths present in the project area¹⁹.

Consultation with Civil Aviation Agency (CAA)

In a letter dated 19th July 2021 from Civil Aviation Agency 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.

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.

¹⁹ 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>

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 done before the start of construction.

TELECOMMUNICATION SYSTEMS

Based on review of satellite imagery and the numerous site visits undertaken till date, no telecommunication systems were observed at the project area.

Consultation with Ministry for Information & Communication Technology Development

A letter from the Ministry for Information & Communication Technology Development to Ministry of Energy dated 11th August 2021 stated that they do not have any telecommunication networks or communication facilities at the Dzhankeldy Project site in Peshku district

Reference Appendix W for letters provided by MoE as proof of consultations with CAA and Ministry of ICT.

27.2 Potential Impacts, Mitigation, Management and Residual Impacts

27.2.1 Construction Phase

27.2.1.1 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 and surrounding community during construction. Detail assessment of these impacts is provided in Chapter 29 Influx Impact Assessment.

27.2.1.2 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.

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.

It is also understood from consultation with Civil Aviation Agency that where project facilities are higher than 50m relative permits will need to be obtained from the Ministry of Defence to prevent any interference with aircraft, aircraft radar & flight routes.

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 29 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 is in a direction perpendicular to the OHTL to ensure safety of the population living near the OHTL.

Additional hazards to the communities found near the OHTLs will include electrocution from direct contact with high-voltage electricity or contact with tools, 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.

27.2.1.3 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.

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 29.1.1.7). Based on the socio-economic survey undertaken 71.6% of respondents reported that crime in their villages is extremely low (reference section 15.1.3). Increase in crime poses safety risks to the local communities thereby interfering with the quality of life and sense of security.

DISRUPTION OF LOCAL ACCESS ROADS

As described in the Wind Farm Traffic and Transportation chapter (Chapter 11), the local access road in the vicinity of the Project will be used for the transportation of project components between the two project plots. The use of this local access road can result in temporary disruptions and access restrictions which have the potential to impact the freedom of movement of villagers between the two communities in the project area (Kalaata village & Dzhangeldy village). This is because travel time will increase and access restriction particularly during the transportation of abnormal/wide loads will not encourage free movement.

ECONOMIC AND PHYSICAL DISPLACEMENT OF HERDERS

The Project will lead to physical and economic displacement of herders with settlements & other structures (livestock stable, storage room, etc.) within the Project site and temporally disrupt grazing activities. It is understood from consultation with land users that some of these herders take turns living at the settlements within the project site throughout the year while others use the settlements at the site for short periods (mainly between March and December). 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.

27.2.1.4 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 TO 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.

27.2.2 Operational Phase

27.2.2.1 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 20);
- Impacts to aircraft & aircraft radar;
- 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.

Impact to Aircraft and Aircraft Radar

During operation of the wind farm, there is a potential for wind turbines particularly the rotating blades to interfere with aircraft and aircraft radar (if any) which is assumed to track incoming and outgoing aircraft. The rotation of the rotor blades makes it possible for wind turbines to reflect signals with a Doppler signature (depending on the wind direction and relative alignment of the wind turbine versus the radar) thereby creating interference on the radar display/screen such as erroneous signals, echoes and other clutters and these could further create flight safety issues. There is also the potential for WTGs to present an obstacle on flight routes particularly when aircrafts are flying close to the ground i.e. during take-off and landing or where flights are flying low as with military activities.

Upon review of satellite imagery, there are no airports or helipads in the vicinity of the Project area. The nearest airport to the Project site is the Zarafshan Airport; a civil airport approximately 98km north of the Project site. However, as the Civil Aviation Agency of Uzbekistan has indicated that the *"installation of objects (Project facilities) is located within the surface of the obstacles accounting circle and does not exceed the limiting surfaces"*, there is a potential for interference with aircraft along flight routes. Given that the exact location of such obstacles accounting circles has not been provided by CAA and the final project layout & WTG details have not been selected, further assessment of potential impact from the wind farm on such obstacles has not been undertaken.

As such, it is expected that 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. In addition, consultations with CAA should continue in order to obtain exact location of obstacles accounting circles and establish any additional requirements by CAA.

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.

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. The nearest airport is the Zarafshan airport; a civil airport approximately 65km north of the OHTL route. As such, the likelihood of aircraft collision with tower to occur is 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.

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.

27.2.2.2 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.

27.2.2.3 Human Rights Risk

The risk to human rights abuses during the operational phase will be limited due to the reduced workforce and interaction with local communities. However, the risks will not be entirely eliminated and mitigation measures will need to be put in place just as in the construction phase.

In addition, the O&M Company will be required to implement the grievance mechanism, conduct consultations and provide information to local communities in line with the SEP.

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.

27.2.3 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.

27.3 Mitigation and Management Measures

Table 27-1 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 29.2.
Public/Community Safety	Impact to Aviation - 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 - The final NOC will be obtained from CAA and Ministry of Defense before the start of construction. - If required by CAA, red aircraft lighting will be installed on the hub and/or blade tips of the WTG (to be agreed before the WTGs are erected). - Consultations with CAA will continue in order to obtain exact location of obstacles accounting circles and establish any additional requirements by CAA. - The employees during the construction phase will undergo a Code of Conduct training to ensure smooth coordination with the neighbouring community. Other 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 during the construction phase will undergo a Code of Conduct training to ensure smooth coordination with the neighbouring community.

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	- Risks to public safety will be appropriately addressed and prepared for in the construction phase 'Emergency Preparedness and Response Plan' and training. - The plan will include the appropriate procedure to respond to any such incidents, as well as site specific contact details and details of external agencies who may be required. - Project induction training will include a section on code of conduct when engaging with local community members. This will include an overview of culturally appropriate measures and etiquette to bear in mind. - Vulnerable groups particularly children will be specifically trained/informed about the dangers in active construction areas or climbing of poles so that they understand the risks of trespassing to the project site, OHTL construction areas and/or fenced off areas. Such training or engagement can be undertaken at local schools. - All high-risk areas including fuel storage areas will be secured with internal fencing and will be patrolled by security throughout the day. - Smoking will be prohibited at chemical and fuel storage areas. - Appropriate mechanisms for emergency control (e.g. well-equipped firefighting equipment) will be placed at suitable positions around the site.
Public/Community Security	- The Project will employ its own security staff who will provide 24/7 security control across the Project site and dedicated security staff at gatehouses. - The EPC will prepare a Security Plan consistent with its Security Risk Assessment. - Security arrangements will be guided by UN Code of conducts for law enforcement officials and UN basic principles on the use of Force and Firearms by law enforcement officials (where firearms are in use). Security personnel will follow a strict code of conduct and will be trained in weapons handling, human rights and receipt of grievances. - Any use of firearms will be in accordance with the Uzbekistan legal requirements. - The Project will be fenced during enabling works stage. - All vehicles entering the site will require pre-approved clearance and will need to be registered. Project security will record all instances of incoming vehicles. - CCTV will be installed at key locations around the site and at gatehouses. - Appropriate lighting will be provided at gatehouses for security personnel to prevent unauthorized access. - Project personnel will only be provided access to the construction site with valid ID cards and permits to work in line with HSE requirements. - People trying to gain unauthorized access to the site without appropriate permits and PPE will not be permitted, or will be removed from site if identified and an investigation carried out on how they were able to access the site and corrective action taken. - 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	- 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

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
Displacement of PAPs	- 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.
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

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	how to report and deal with any GBV/SEA/SH related cases and the services that will be made available to offer support to any of the victims • The Project Company and the EPC Contractor will conduct a GBV/SEA/SH risk assessment in consultation with relevant stakeholders including women leaders and those working with young adolescent girls and boys. This will also include the identification of potential interventions and risk mitigation measures. • The EPC Contractor will develop and implement a Project specific GBVH Policy detailing the list of unacceptable behaviour among workers, provisions for reporting, sanctions for perpetrators and available resources & support systems for the victims in accordance with lenders and Uzbek requirements including ACWA Power's Environmental & Social Management System Implementation Manual. • Awareness training will be mandatory for all Project workers regarding the GBV/SE/SH risks and the workers responsibilities and the legal consequences of being a perpetrator. • • Approach towards GBV/SEA/SH prevention, mitigation and response will be survivor centered and ensure confidentiality, dignity and respect to them. • The Project staff will be trained on how to preserve the safety of the women, girls, boys when interviewing them and collecting information about their experiences on GBV/SEA/SH. • The project will provide essential services for survivors such as access to counselling services, support groups, legal support etc. at no cost to them. • All determined cases of GBV/SEA/SH will be referred to relevant legal entities in the Project area for further investigation and prosecution. • The Project grievance mechanism will be made available to project workers and community members and will ensure that survivors' information is confidential and kept anonymous. • All cases relating to GBV/SEA/SH will be documented and closed. • The EPC Contractor will prepare and implement a GBV/SEA & SH Prevention and Response Action Plan which will put necessary protocols and mechanisms to address the risks of GBV/SEA/SH and how to address any allegations that may arise in accordance with the World Bank Good Practice Note on Addressing SEA/SH in Investment Project Financing involving Major Civil Works.
Grievance Mechanism	• The project will implement an appropriate system to allow external parties to raise grievances in regard to the Project. • The Grievance Mechanism will be clearly defined, transparent and accessible to identified stakeholders. • EPC Contractor will appoint a community liaison officer preferably from the local community who will maintain communication with the local leaders and community members. • The grievance mechanism will be confidential and provide referral and support system for any workers reporting cases of GBVH.
Human Rights 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;

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	- Stipulate the EPC's human rights expectations of personnel, local communities, sub-contractors and other suppliers directly linked to the construction of the project; - Be publicly available and communicated internally and to the relevant stakeholders; - Be reflected in the other policies and procedures to embed it throughout their construction phase activities.

Table 27-2 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 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.

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	- The plan will include the appropriate procedure to respond to any such incidents, as well as site specific contact details and details of external agencies who may be required. - The employees during the operational phase will undergo a Code of Conduct training to ensure smooth coordination with the neighboring community. - Appropriate mechanisms for emergency control (e.g. firefighting equipment) will be placed at suitable positions around the site. - Grievance Redressal Mechanism will be made accessible to the community to ensure that community members raise grievances to the Project leadership. - Sexual harassment or violence in and out of the Project site will not be tolerated and the O&M Company will work with local community leaders and government officials to ensure that any complaints are addressed in accordance with the law. - The Health and Safety teams on site will provide advice during training/inductions on exposure to disease including preventative measures e.g. TB, STDs and HIV/AIDS. - The Project Company and O&M Company will conduct on-going awareness campaigns targeted to children and young adults about the risks and dangers of trying to access, play or vandalize 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.
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.

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	- Awareness training will be mandatory for all Project workers regarding the GBV/SEA/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. - 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;

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	Be reflected in the other policies and procedures to embed it throughout the operational phase activities.

27.4 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 27-3 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
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
Application and securing relevant permit from CAA	N/A	As required by law

28 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.

28.1 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. 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.

28.2 Potential Impacts, Mitigation, Management & Residual Impact

28.2.1 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 unions;
- 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.

28.2.1.1 Occupational Health and Safety

Common activities undertaken during construction such as the movement of heavy machinery, excavation, handling of chemicals, works undertaken at height etc. can 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 consideration of health and safety risks as part of their chosen construction methods and that these risks are appropriately mitigated.

As occupational health and safety is a risk rather than a potentially defined impact, its significance has not been assessed further in this ESIA. Health and safety risks to the site force will be managed through effective risk assessment, development and implementation of an Occupational Health & Safety Plan and an Emergency Preparedness and Response Plan.

28.2.1.2 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 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 15.3.1.9 on Supply Chain Risks and proposed mitigation & management measures).

28.2.1.3 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.

28.2.1.4 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.

28.2.1.5 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.

28.2.1.6 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.

28.2.1.7 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 of 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.

28.2.1.8 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 29 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 Remuneration 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.

28.2.2 Operational Phase

28.2.2.1 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 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 order 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.

28.2.2.2 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.

28.2.2.3 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.

28.3 Mitigation and Management Measures

Table 28-1 Labour & Working Condition 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 Contractor will only engage recruitment agencies that are registered in their country of operations and have a good track record i.e., no court cases etc.
Child Labour	- The EPC contractor will comply with all relevant national laws, lenders requirements and ILO provisions related to the employment of minors. - 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.
Lack of Worker Representation &	HR Policies will include the ability of workers to form or join all types of associations.

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
Restrictions on Trade Unions	- 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. - 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.

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. - Ensure inclusion of a balanced representation of women on the HSE team who will be easily relatable and approachable to female workers. - Project personnel in charge of receiving GBVH/SEA/SH grievances will be provided with appropriate training on how to handle such complaints. It is recommended that the personnel are trained in coordination with any GBVH organisations working in the Project area where available. - Female workers will be included in the grievance redress committee to help female workers and host community female members raise their grievances. - Regular consultations will be undertaken with women on their concerns about the project - The EPC Contractor will work to identify a suitable labour pool locally in order to minimize the need for bringing large number of workers from other regions or countries. This could also help the EPC Contractor in cutting cost associated with provision of accommodation facilities if the majority of the workers are sourced locally. - Provision of opportunities for the workers to regularly return to their families who may be located far from the Project site. - The EPC Contractor will provide opportunities for workers to have access to entertainment opportunities away from the host communities. - EPC Contractor will allow submission and investigation of anonymous sexual harassment complaints by workers and host community members and protect the confidentiality of the complainants. - The EPC Contractor will work in close coordination with the local authorities in investigating any complaints relating to gender violence and harassment in the host communities where it relates to Project workers. - The EPC Contractor will provide targeted training (including in life skills such as leadership and decision-making) and awareness raising to vulnerable workers such as women. - The EPC Contractor will prepare a Gender Equality and GBVH/SEA/SH Policy in line with Uzbek and lenders requirements. This will include provision of training to workers, subcontractors and suppliers on GBVH associated risks.
Gender Risk - GBVH/SEA/SH in Accommodation Facilities	- The EPC will provide safe, secure and separate accommodation facilities and sanitary facilities for the male and female workers (lockable sanitary facilities will be mandatory for women). - The EPC Contractor will provide separate social facilities for the men and women. - Worker accommodation areas will be managed in accordance with the EBRD and IFC Workers' Accommodation: Processes and Standards.
Gender Risk - Wage discrimination based on Gender	- EPC Contractor to provide access to recruitment opportunities for women based on their qualifications. - EPC Contractor will develop a Local Recruitment Plan that ensures equal opportunities are provided to women in the employment process, training and promotions

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	- 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	- Workers will be provided with access to the grievance mechanism in accordance with the SEP. - 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 28-2 Labour & Working Condition 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 - Labour Management Plan - 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

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	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 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. <i>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.</i>
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.

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	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. - 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

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	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	Workers will be provided with access to the grievance mechanism in line with the project specific SEP.
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.

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 28-3 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 remuneration compared	On-going	For all female Project personnel including those employed by the sub-contractors.

MONITORING	PARAMETER	FREQUENCY & DURATIONS	MONITORING LOCATIONS
	to men occupying the same positions.		
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 workers hired through third-parties or in the supply chain	Grievances received	On-going	As defined in the Stakeholder Engagement Plan (SEP)
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.

29 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.

Note

Consultation with community members in proximity to the wind farm and communities & Municipalities along the OHTL were undertaken during the ESIA public disclosure stage and following provision of a summary of the potential impacts of influx and associated mitigation measures to participants (see sub-sections below), no concerns or questions were raised in relation to workers influx.

29.1 Potential Impacts, Mitigation, Management & Residual Impact

29.1.1 Social Risks

29.1.1.1 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.

29.1.1.2 Impact on Local Accommodation Facilities

Based on the socio-economic study (reference section 15.1.3) 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.

29.1.1.3 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 community's ability to access these services and compromise their right to a decent life.

29.1.1.4 Increased Risk of Communicable Diseases & Burden on Local Health Services

The interaction of workers from other regions of Uzbekistan's and abroad and even with local communities may result in the transfer of communicable diseases 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.

The socio-economic baseline studies described in Chapter 15 of this ESIA identified that there is a rural family polyclinic in Dzhankeldy village. It is understood that residents of Kalaata village also use this polyclinic. The influx of workers and migrants to the project area will potentially result in additional pressure on the polyclinic especially in case of an emergency if no alternative health facilities (i.e., site clinic) are provided for the workers. Although this family polyclinic is well equipped, it lacks qualified specialists particularly dentists, gynaecologists and paediatrician and so increase in pressure on the polyclinic will result in restriction of use by both Kalaata and Dzhankeldy residents thereby impacting their right to health.

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.

29.1.1.5 Gender Based Violence & Harassment

Reference section 28.2.1.4 for potential gender risks associated with the Project and section 28.3 on mitigation measures to be implemented.

29.1.1.6 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.

29.1.1.7 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 facilities and the local law enforcement authorities may not be sufficiently equipped to deal with such challenges.

29.1.1.8 Intangible Cultural Heritage

Reference section 12.4.1 and 23.4.1 for the worker impacts on intangible cultural heritage and the mitigation and management measures to be implemented.

29.1.1.9 Increase in Traffic & Related Accidents

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.

29.1.2 Local Economy

29.1.2.1 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.

29.2 Mitigation and Management Measures

Table 29-1 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.

POTENTIAL IMPACT	MITIGATION AND MANAGEMENT MEASURES
	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 - 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 regularly in line with the evolving national and WHO requirements and guidance. - Regular and sporadic site checks with regards to substance abuse will be conducted at accommodation camps whilst respecting workers' freedom of movement rights.
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.

29.3 Monitoring

Monitoring of influx of non-locals will be undertaken as required via the management measures outlined above.

Table 29-2 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 sensitization and awareness campaigns undertaken.	Daily during construction

INDICATOR	SOURCE OF INFORMATION	FREQUENCY CONSTRUCTION / OPERATION
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
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 from the foreign workforce	Daily during recruitment

30 CLIMATE AFFAIRS

30.1 Potential Project Impacts upon Climate Change

30.1.1 Construction Phase

At this stage, the expected quantity of fuel to be consumed during construction by the appointed EPC & subcontractor is unknown. This will depend on the type and number of mobile equipment and diesel generators used at the Wind Farm and along the OHTL, the hours of machinery/equipment operation during construction and the efficiency of the equipment and machinery. 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.

30.1.1.1 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 30-1 GHG Emissions from the Use of Diesel During Project Construction

FUEL TYPE	VOLUME OF FUEL (LT)	CO ₂	CH ₄	N ₂ O	ALL GHGs (TONNES CO ₂ e)
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 30-2 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.

30.1.1.2 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.

30.1.2 Operational Phase

30.1.2.1 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 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.

30.1.2.2 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 CO₂eq/year.

The mitigation and management measures for all potential emissions are as provided in the Air Quality Chapter in Part A of this ESIA.

30.2 Vulnerability of the Project to Climate Change

30.2.1 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.

30.2.1.1 Increase 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.

30.2.1.2 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 very low risk 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

30.2.2 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 Dzhankeldy 500MW Wind Farm Project is a zero-carbon operation project, there are not anticipated to be any specific transition risks of concern.

31 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 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 events such as prolonged drought or other 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.

31.1 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), construction noise impacts etc. have considered the measured baseline conditions in combination with the predicted project contributions. As a result, this has provided an assessment of cumulative impacts, as a result of the Project itself.

31.2 Identification of Other Activities and Environmental Drivers

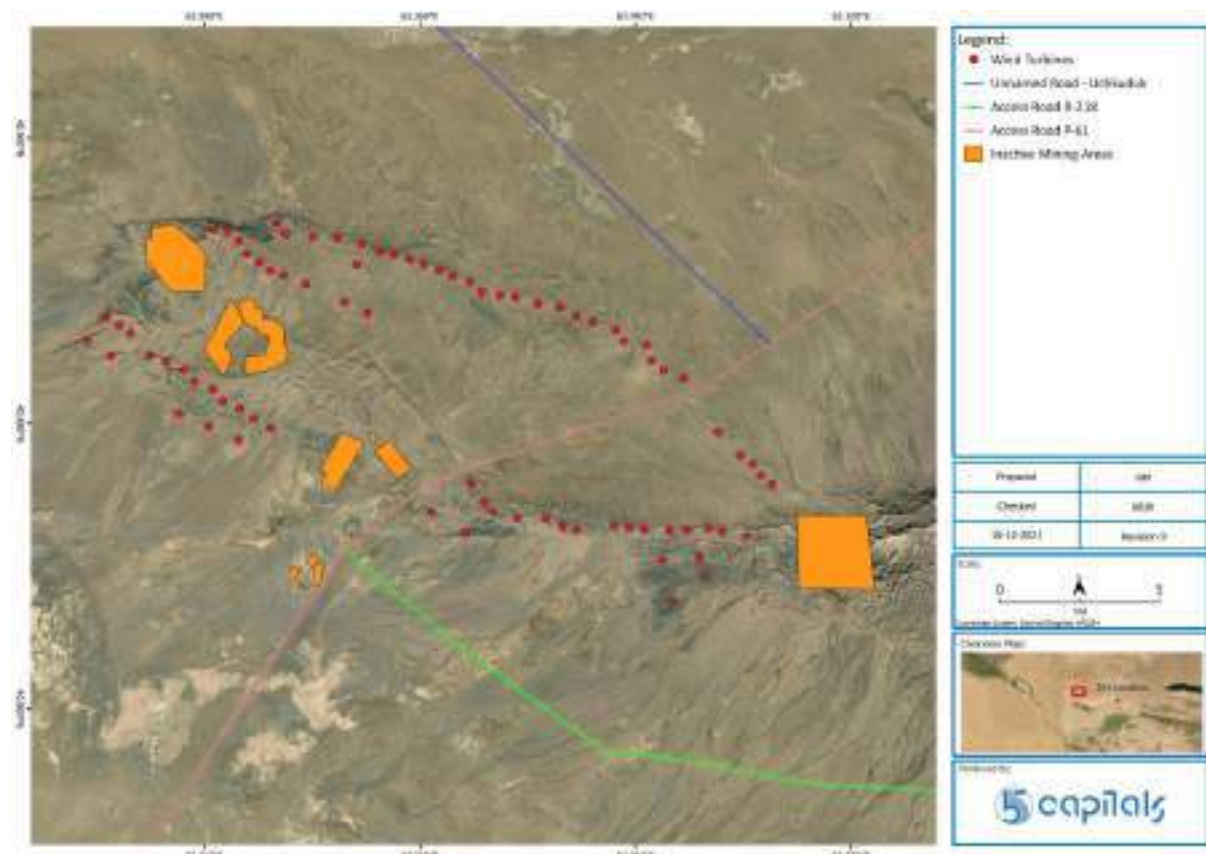
For the purpose of this ESIA and in light of the future mining activities, the CIA will be undertaken to establish whether there are barriers to both current and future development within the project's area of influence, such as:

- 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 Dzhankeldy 500MW Wind Farm Project?

Table 31-1 Known and/ Future Projects in the Project's Area of Influence

PROJECT	DESCRIPTION	DISTANCE TO PROJECT
Mining	Mining area 1 Geological survey is currently ongoing at this mine. Extraction of crushed stone will commence once permit is issued.	2.5km east of the western plot
	Mining area 2 – This mine is currently inactive but there is a potential for mining works to commence anytime in the nearest future	1.9km west of the eastern plot and 3.5km east of the western plot
	Mining area 3 – This mine is currently inactive but there is a potential for mining works to commence anytime in the nearest future	1.1km east of the eastern plot
	Mining area 4– This mine is currently inactive but there is a potential for mining works to commence anytime in the nearest future	1.8km north east of the western plot and 2.8km west of the eastern plot
	Mining area 5– This mine is currently inactive but there is a potential for mining works to commence anytime in the nearest future	2.8km west of the eastern plot and 3km north east of the western plot
	Mining area 6 – This mine is currently inactive but there is a potential for mining works to commence anytime in the nearest future	1.3km west of the eastern plot and 3.3km north east of the western plot
	Mining area 7 – This mine is currently inactive but there is a potential for mining works to commence anytime in the nearest future	500m south of the eastern plot and 1.8km north of the western plot
	Mining area 8 – This mine is currently inactive but there is a potential for mining works to commence anytime in the nearest future	570 meters north of the western plot and 1.4km south of the eastern plot
	Mining area 9 – This mine is currently inactive but there is a potential for mining works to commence anytime in the nearest future	930m north of the western plot and 950m south of the eastern plot
Bash Wind Farm & OHTL	A wind farm project that will be developed by ACWA Power alongside the Dzhankeldy Project	94km east of the eastern plot

Figure 31-1 Cumulative Impact Developments (future)



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 31-2 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 Dzhankeldy wind farm & OHTL is undertaken simultaneously with mining works at the mining areas and the Bash 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 Dzhankeldy 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 impact at receptor locations particularly any activities that will be undertaken at the boundary is only anticipated when extraction processes are being undertaken at mining facilities at the same time as the Dzhankeldy wind farm construction activities
Soils Geology, Groundwater and Surface water	Yes	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 areas 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. Cumulative soil impacts in relation to soil erosion is only anticipated when overburden and topsoil from the excavation/extraction process at the mining facilities are being piled up in proximity to the project site at the same time as the installation of turbine foundation, underground cables, access roads, and other ancillary infrastructure at the Dzhankeldy wind farm.
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

ENVIRONMENTAL AND SOCIAL COMPONENTS	CONSIDERED VEC TO BE INCLUDED IN CIA?	JUSTIFICATION FOR INCLUSION OR EXCLUSION
		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, 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.

31.3 Assessment of Cumulative Impacts on VECs

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 31-3 Summary of Cumulative Impacts (Qualitative Assessment)

	CONSTRUCTION	OPERATION
Terrestrial Ecology		
Impacts from Dzhankeldy 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 Bash Wind Farm & OHTL		
Cumulative Impacts		
Air Quality		
Impacts from Dzhankeldy 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 Bash Wind Farm & OHTL	Expected to be similar to the impacts identified for Dzhankeldy Wind Farm & OHTL	None
Cumulative Impacts	At this point, the start-up dates for the extraction activities at the mines are unknown. No cumulative impact will occur if the Project construction period do not coincide with mining activities If the project construction period coincides 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.	None

	CONSTRUCTION	OPERATION
	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 Dzhankeldy Wind Farm & Bash Wind Farm, cumulative impact on air quality is not anticipated due to the distance of the Bash site to the Dzhankeldy Wind Farm. Any impact 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 Dzhankeldy 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 and Vibration 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 limits at the majority of receptor locations.
Impacts from future mining areas	Increases in ambient noise due to construction machinery, equipment and vehicles.	The noise levels from mining activities will generally be the same as construction as such, it will not increase the existing noise levels.
Impact from Bash Wind Farm & OHTL	Expected to be similar to the impacts identified for Dzhankeldy Project	Expected to be similar to the impacts identified for Dzhankeldy Project
Cumulative Impacts	No cumulative impact will occur if the Project construction period do not overlap with mining activities. If the project construction period coincides 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 Dzhankeldy Wind Farm & Bash Wind Farm, is	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 Bash Wind Farm, no cumulative noise impact is anticipated due to the distance between the Dzhankeldy Wind Farm and the Bash site .

	CONSTRUCTION	OPERATION
	not anticipated due to the distance of the Bash site to the Dzhankeldy Wind Farm. 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	
Soils Geology, Groundwater and Surface water		
Impacts from Dzhankeldy Wind Farm & OHTL	Impacts on soil and groundwater could arise from a number of activities including, excavation and soil compaction, accidental spills or leaks, inadequate waste & wastewater management etc. Residual impacts (with management & mitigation measures) have been assessed as Negligible to Minor.	Specific Project impacts to soil and groundwater during operation could potentially arise from uncontrolled releases of operational chemicals and hazardous wastes stored on site etc. With the implementation of management and mitigation measures the residual impacts are mostly expected to be Negligible.
Impacts from future mining areas	During the construction of mine site facilities impacts on soil and groundwater could arise during excavation, inadequate waste & wastewater management etc. There is also a potential for the storage of overburden to result in soil erosion.	The extraction of gypsum and other geological activities at the mines during operation will result in the storage of overburden which will result in soil erosion.
Impact from Bash Wind Farm & OHTL	Expected to be similar to the impacts identified for Dzhankeldy Project	Expected to be similar to the impacts identified for Dzhankeldy Project
Cumulative Impacts	Most likely the impacts will be localised and limited within each Project boundary, with very limited potential for cumulative effects. However, a major leak/spill could lead to contamination of soil and groundwater	None unless in the event of a major spillage of chemicals or hazardous materials which would pose potential contamination risk to soil and groundwater.
Socio-Economic		
Impacts from Dzhankeldy Wind Farm & OHTL	The Project will lead to land acquisition and resettlement which will impact herders who graze livestock & live at settlements within the Project site. This will be mitigated through the Project specific RAP. Positive impacts will include additional local employment and generation of electricity.	This project will reduce Uzbekistan dependency on fossil fuel generated power and will reduce atmospheric pollution; in 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 Bash Wind Farm & OHTL	Expected to be similar to the impacts identified for Dzhankeldy Project	Expected to be similar to the impacts identified for Dzhankeldy Project
Cumulative Impacts	If the project construction period coincides with mining activities this will also lead to increase in local employment	Positive impact in terms of increase in power generation and employment opportunities.

	CONSTRUCTION	OPERATION
	With regards to the Bash Wind Farm, positive cumulative impact is anticipated in terms of cumulative increase in local employment in the Region	With regards to the Bash 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 Dzhankeldy 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 Bash Wind Farm & OHTL	Expected to be similar to the impacts identified for Dzhankeldy Project	
Cumulative Impacts	If the project construction period coincides with mining activities & construction of the Bash Wind Farm & OHTL, the influx of workers during the construction phase may 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.	

Cumulative Impact on Biodiversity

POTENTIAL CONSTRUCTION PHASE 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 asset 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 OPERATIONAL PHASE

Ecosystem Function Degradation

Habitat Fragmentation

Development and operation of large-scale and linear alignment projects will potentially 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 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 that 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 31-4 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

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	CUMULATIVE SIGNIFICANCE
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 likely to be impacted by the Project. 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 that were made, 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 during the operation phase.

However, the anticipated collision risk for all identified target species indicates predicted cumulative collisions of less than 1 per year, across all species. It is therefore not anticipated that wind turbine collision would be significant considering both wind farms.

Table 31-5 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

To ensure that cumulative impacts were integrated into the mitigation and monitoring strategy, a Potential Biological Removal (PBR) Analysis was undertaken which considers the local population of sensitive bird species, population demographics, proposed and current wind farm developments in Uzbekistan. The analysis produced thresholds of the annual number of fatalities that could be sustained without compromising long-term viability of the population. Refer to the Collision Risk Management Plan for PBR findings.

Turbine Collision – Bats

Bats may be cumulatively affected by the presence of multiple regional wind farms operating simultaneously. 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 31-6 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 31-7 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
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 31-8 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 31-9 Summary of Potential Cumulative Effects on Biodiversity Receptors (Construction and Operation)

	CONSTRUCTION	OPERATION
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	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.

	CONSTRUCTION	OPERATION
Impacts from Dzhankeldy to Bash OHTL	which is being mitigated with minimization of footprint, pre-construction survey and relocation.	OHTL impacts likewise, given the proposed design, are predicted to be of negligible significance.
Impacts from Bash WF	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.	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 Bash to Karakul 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 anticipated 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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