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REPORT

Khorezm Solar Project

Non-Technical Summary – Environmental and Social Impact Assessment

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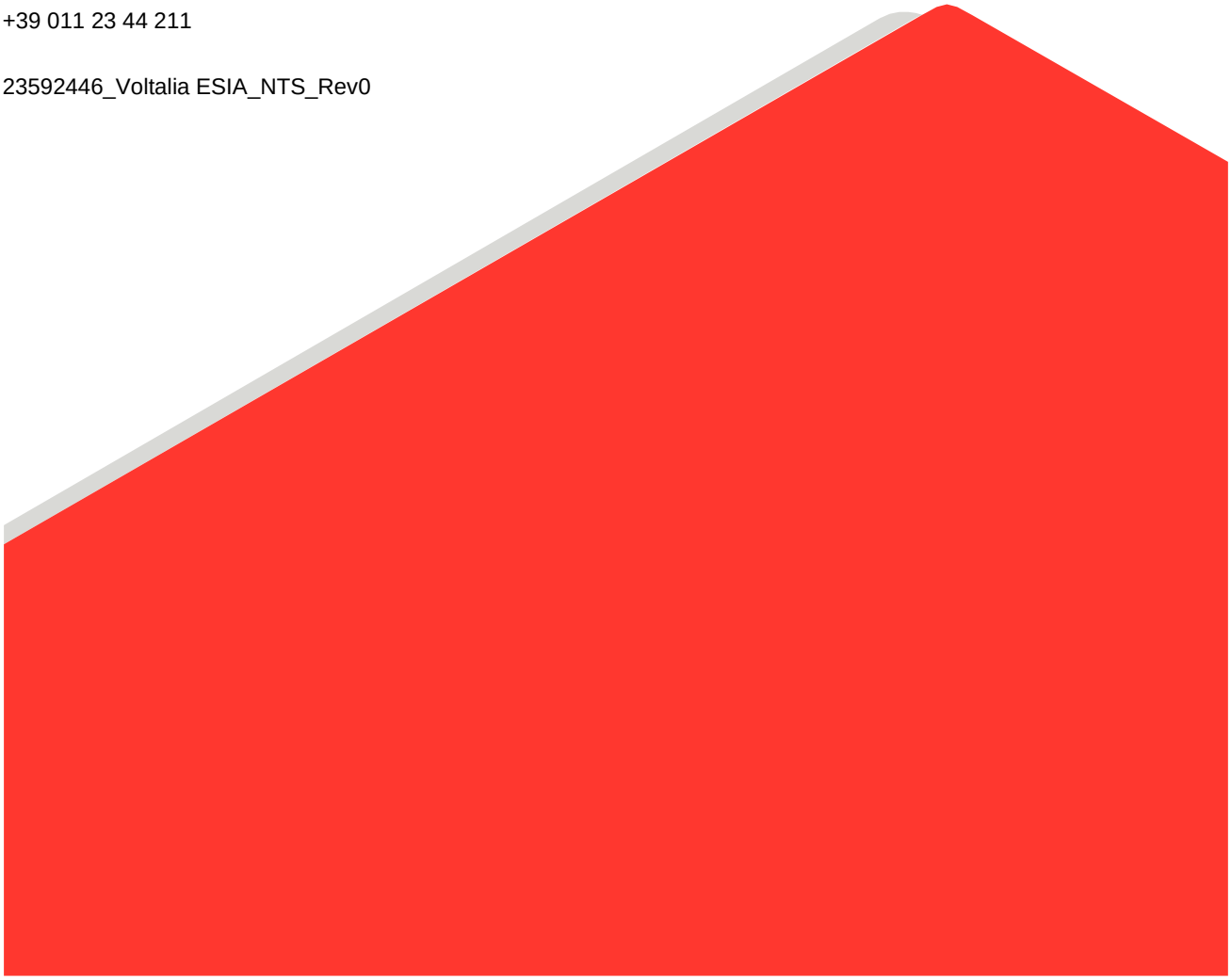

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List of Acronyms

AoI	Area of Interest
EBRD	European Bank for Reconstruction and Development
EHS	Environmental, Health and Safety
EPC	Engineering, Procurement and Construction
ESIA	Social Impact Assessment
IBA	Important Bird Area
IFC	International Finance Corporation
ILO	International Labour Organization
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
LSA	Local Study Area
NBT	Nazar Business and Technology LLC
NEGU	JSC National Electric Grid of Uzbekistan
NMMC	Navoi Mining and Metallurgical Combinat
NTS	Non-Technical Summary
Project	Khorezm Solar PV Project
PV	Photovoltaic
SPPP	Solar Photovoltaic Power Plant

1.0 INTRODUCTION

This document is the Non-Technical Summary (NTS) of the Environmental and Social Impact Assessment (ESIA) report prepared for the Voltalia Khorezm Solar Photovoltaic Project (the Project) consisting in the development of a 100 MW solar photovoltaic power plant, and associated 3.2 km overhead transmission line, in the Tuprokkala district in the Khorezm region of Uzbekistan. This project is being implemented as part of a Public-Private Partnership (PPP) between the Government of the Republic of Uzbekistan represented by the Ministry of Energy, and FE LLC Sarimay Solar, an entity created in Uzbekistan by Voltalia S.A. for the purpose of this Project.

1.1 Roles and Responsibilities

IFC Transaction Advisory mandated the Government of Uzbekistan to structure public-private partnerships and attract private partners to an open and competitive process for the development of a solar photovoltaic power plant (SPPP) with a total capacity of a capacity of 100 MW on a site in the Khorezm region. The Project Proponent and initiator is the Republic of Uzbekistan represented by the Ministry of Energy. The Ministry of Energy shall also be the main beneficiary of the Project. JSC National Electric Grid of Uzbekistan (NEGU) included in the structure of the Ministry of Energy will be the buyer of electrical energy.

The Ministry of Energy of the Republic of Uzbekistan conducted a bidding process in 2021 for the selection of the Project Developer, after which Voltalia, operating as FE LLC Sarimay Solar, was selected. Voltalia is a company incorporated and operating under the laws of France and an international energy producer that specializes in renewable energy solutions. The development and design of the final technical solution and selection of components will be completed by the successful Engineering, Procurement and Construction (EPC) bidder who will develop the project under a design, build, finance, operate, maintain and transfer model.

To identify and assess any potentially significant future adverse Environmental and Social impacts associated with the proposed Project, WSP Italy S.R.L. (WSP), with the support of Nazar Business and Technology LLC (NBT) acting as local partner, conducted an ESIA study according to national requirements and international standards and good practices (i.e., IFC Performance Standards, EBRD Performance Requirements, World Bank EHS Guidelines). Additionally, an Environmental and Social Management Framework and System was established upon completion of the ESIA.

2.0 THE KHOREZM SOLAR PV PROJECT DESCRIPTION

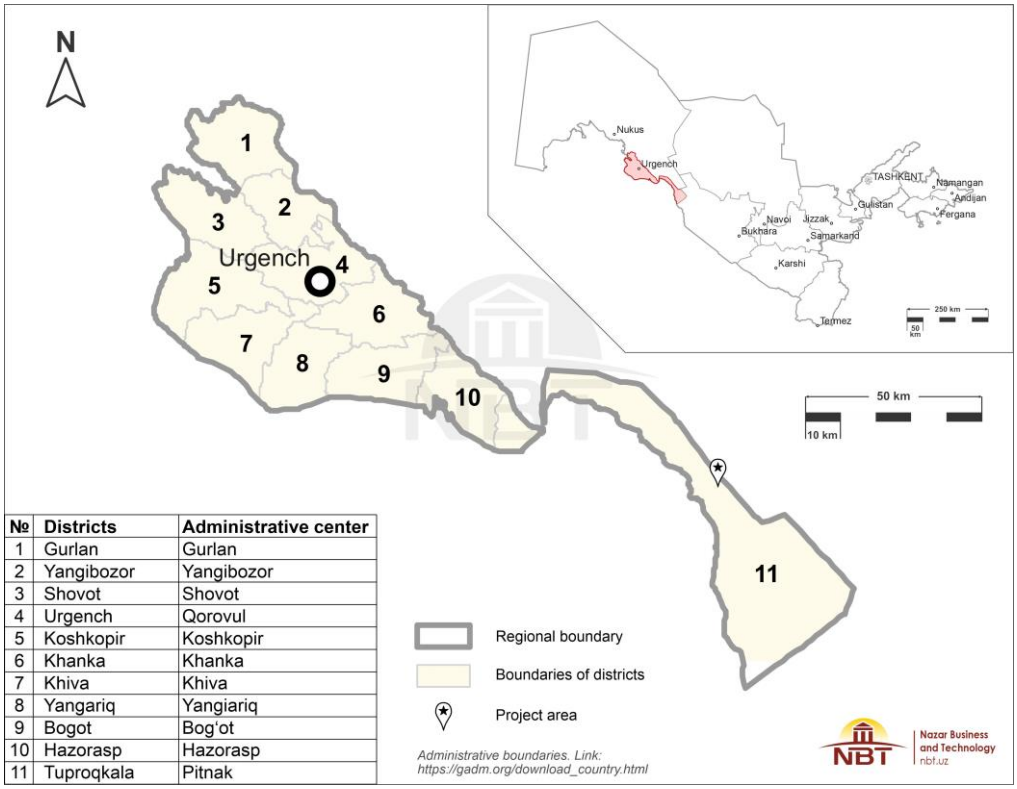
The Project is implemented under the Law No. ZRU-539 "On the use of renewable energy sources" dated May 22, 2019, and in alignment with the "Concept Note for ensuring electricity supply in Uzbekistan in 2020-2030" adopted by the Government of the Republic of Uzbekistan on April 30, 2020. This Concept Note, developed with the participation of international experts, aims at a significant reform of the power industry to meet the energy needs of the rapidly growing population and the developing economy of the country.

The Project aims to provide competitive electricity prices, promote a balanced energy sector with global best practices, and align with the Paris Agreement's climate change objectives by offering environmentally friendly and affordable energy to the Uzbekistan population and economy while minimizing greenhouse gas emissions.

The Khorezm Solar PV Project shall cover approximately 177 ha which will be utilized entirely for the construction and installation of a solar photovoltaic power plant. The PV plant area will stand at a height ranging between 158 masl and 185 masl on a gently sloping surface from North to South and from North-West to South-East and will be located along the main road A-380 of national significance connecting Bukhara province with Khorezm province, 120 km south-east of Urgench city, in the Khorezm Province (Tuprokkala District) close to the border with Turkmenistan and near the Amu-Darya River (Figure 1).

The two nearest settlements are the two villages of Sarimay and Nukus. The nearest residential buildings of the Sarimay village are located at a distance of 730 m from the Project site south of the A-380 motorway, while Nukus village is located northwest at a distance of 300 m. Between the Nukus village and the Project site runs the A-380 road, which increases the perceived distance from the site to the villages.

In order to conduct the ESIA study, the Area of Interest (AoI) has been defined as the area likely to be affected by direct impacts of the Project and associated activities managed by the client or contractors, foreseeable consequences arising unexpectedly, as well as indirect impacts on biodiversity or ecosystem services crucial for affected communities' livelihoods. The AoI encompasses the immediate project site and access roads where physical disturbances may occur, including neighboring communities. Additionally, it includes an area within a 5 km radius of the project site, potentially affected by various factors such as dust, noise, visual changes, glare, hindered access, and indirect socio-economic impacts.



№	Districts	Administrative center
1	Gurlan	Gurlan
2	Yangibozor	Yangibozor
3	Shovot	Shovot
4	Urgench	Qorovul
5	Koshkopir	Koshkopir
6	Khanka	Khanka
7	Khiva	Khiva
8	Yangariq	Yangiariq
9	Bogot	Bog'ot
10	Hazorasp	Hazorasp
11	Tuproqkala	Pitnak

Figure 1: Project Region. Source: NBT, 2023.

The Solar Photovoltaic Power Plant (SPPP) is expected to have capacity of around 122.9 MW (megawatts) in direct current (DC), which will be converted to 100 MW in alternating current (AC). It will involve the installation of approximately 200,000 solar panels built using the fixed slope technology (Figure 2), each with an average power output of 675 watts. It will generate electricity at 35 kV. The SPPP will be linked to a 35/220 kV substation, which in turn shall be connected to a 220 kV overhead power transmission line leading to an existing substation (the Sarimay Switching Station), connected to the national grid. To accommodate the Project, two extension bays will be added to the existing substation. The transmission line will cover a total length of 3.3 km.

It shall be noted that in close vicinity to the Project, there are six existing high-voltage transmission lines. The new transmission line for this Project will run parallel to one of these existing transmission lines throughout its entire trajectory in order to further minimize its impacts on soaring and migrating birds and habitat fragmentation.

Figure 2: Detail of a photovoltaic panel with fixed slope technology

2.1.1 Project construction

Initial activities, including site preparation, will entail the following activities, which can occur simultaneously in different areas:

- Mobilization of vehicles, workers and equipment, materials transportation;
- Installation of lifting cranes and warehouses for storage of delivered power equipment and building materials;
- Site works preparation and accommodation;
- Implementation of site security and fencing of the Project site;
- Site works supervision;
- Unloading/loading equipment;
- Vegetation clearing, land stripping and earthworks including excavations;
- Earthworks (excavations, landfill, surface levelling/grading);
- Adaptation of existing roads and implementation of temporary construction roads;
- Construction of the Project drainage system;
- Construction of the water supply network and hydraulic infrastructure;
- Construction/Installation of the panel foundations;
- Construction of electrical substation and its foundations;
- Construction of support facilities (Administrative and household building, warehouse, gatehouse);
- Construction of temporary housing (container-type construction trailers, campsites) for builders and maintenance services;
- Construction of lighting system (road, solar power plant);
- Concrete pouring under the foundation of buildings and structures;
- Installation of supporting structures;

- Installation of fasteners for solar modules installation;
- Installation of solar modules and inverters.
- Installation of electrical infrastructure and power supply;
- Construction/Installation of the transmission line tower foundations;
- Installation of the solar panels and electric equipment;
- Installation of the transmission line towers and facilities;
- Performance tests
- Building of sewage septic tank and firefighting water tank;
- Site clean-up and demobilization activities;

At the time of writing the ESIA report, further details on the construction activities were not available. Further integrations will be made at a later stage during the EPC stage.

2.1.2 Project operation

The operational phase of the proposed solar PV plant will last for 25 years. The direct current power of the photovoltaic plant will be about 122,892 MW (photovoltaic) and the alternating current will be 100 MW which determines the power of the SPPP. The main equipment of the photovoltaic plant is represented by 200,000 photovoltaic panels with an average power of 675 watts per panel. The estimated predicted volume of electrical energy generation at the capacity of 100 MW will be 280 - 310 million kWh per year. The newly built overhead transmission line will be designed for continued operability (24 hours per day, 7 days per week) depending on the regime and parameters of the national and regional power transmission grid. From the beginning of the operations, the transmission line will work without the continuous presence of personnel.

During the operational phase, the modules will be cleaned periodically depending on soiling and sand/silt accumulation and the SPPP will undergo maintenance activities such as PV panels cleaning, tower painting, future upgrading, etc. Additionally, vegetation growth under the solar panels will be kept in control. The transmission line will be periodically subject to maintenance as well.

3.0 LEGAL ASPECTS AND COMPLIANCE

The ESIA study prepared for the Khorezm Solar Project was prepared according to the following Lender E&S Standards:

- The latest version of the IFC Performance Standards (IFC PS, 2012);
- The EBRD Performance Requirements (2019); and
- The World Bank EHS Guidelines (Industry Sector and General 2007).

Also, the following were considered:

- A number of international substantive environmental Laws, standards and regulations including conventions and treaties adopted by Uzbekistan;
- Requirements of other Lenders, such as International Labour Organization (ILO) conventions covering core labour standards and the basic terms and conditions of employment; and

- Applicable local, national, and international environmental and social (including occupational health and safety) legislation and guidelines, including key environmental and social permits and approvals required under national legislation.

The assessment of the impacts on the physical, biological and social components has considered the most stringent Lenders and local/national requirements[1] applicable to the Project. The ESIA report presents a review of applicable requirements and identifies and adopts the most stringent in order to ensure an appropriate level of environmental protection and of workers and community health and safety. The Project is also expected to comply with the local/national applicable requirements.

4.0 ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

During the ESIA process, WSP and NBT collected both field data by performing site visits and secondary information (e.g., publicly available data or data provided by local Ministries) to acquire knowledge on the baseline conditions at regional and local levels for the physical, biodiversity and social components. The baseline conditions and a summary of the data collected are detailed in the following sections.

4.1 Baseline conditions – Physical Components

Geomorphology and Topography

The Project site extends on a predominantly flat or partially undulating surface (plateau). This territory belongs to the Kyzylkum desert, which is located between the Amu Darya River (West and South of the Project site) and the Syr Darya River (500 km North of the Project site in the territory of Kazakhstan). The Project site stands at a height ranging between 158 m asl and 185 m asl on a gently sloping surface from North to South and from North-West to South-East.

Geology and Seismicity

The geological setting of the Project site and surrounding area includes a pre-Quaternary bedrock (Cretaceous to the Paleogene period and Miocene and Pleistocene epoch) overlapped by a sequence of Quaternary age sediments. The pre-Quaternary bedrock consists of carbonate and carbonate-argillaceous deposits, multi-colored calcareous clays of Paleogene period, silts and sandstones of the Lower Miocene epoch and sands, siltstone and clays of the Pliocene epoch. Quaternary deposits include mainly alluvial sand deposits and aeolian sand deposits.

Most of Uzbekistan, as other Central Asian countries, is in a seismically active region since it is located in an area of transition between the mountain structures of the Tien Shan to the Turan platform. Earthquakes are not uncommon in the region. The possible earthquakes are with a magnitude (M) of up to 8 points on the Richter scale and more.

Soil

The soils in the Project area are characteristic of the desert zone subgrade which is a subzone of the subboreal temperate deserts of the large Kyzylkum massif. They are a combination of loose and semi-fixed sands (sand-stony composition) as well as desert sands with grey-brown soils and heavy-textured surface layers or crust occurring in arid conditions in periodically flooded soils (*takyrs*) in shallow depressed areas. there are also areas with heavier, crusty soil in depressions and patches of highly saline "solonchak" soil.

[1] *"The client will refer to the EHS Guidelines or other internationally recognized sources, as appropriate, when evaluating and selecting resource efficiency and pollution prevention and control techniques for the project. The EHS Guidelines contain the performance levels and measures that are normally acceptable and applicable to projects. When host country regulations differ from the levels and measures presented in the EHS Guidelines, clients will be required to achieve whichever is more stringent".* (IFC Performance Standard 3).

Land Use

The Project site is located within a 40,500 ha land plot categorized as a pastureland. This land plot was leased to the State Committee for Development of Silkworm and Karakul (SCDSK) by the decision of the governor of Tuprokkala district of Khorezm province on October 8, 2020. However, given the nature of the soils, within the Project site and its surroundings, no specific land use is assigned.

The Project site is planned on an area with no built structures except for the existing transmission lines and no agricultural activities. Moreover, no natural resources gathering activities are conducted on the Project site. Locals used to collect stones from the site for the construction of barns and walls, but this activity is no longer practiced as affordable construction materials are now available in the market. At least twice a year local shepherds use the existing paths through the Project site to move flocks of sheep from and to grazing areas located uphill. However, alternative paths surrounding the Project area can be easily utilized, as confirmed directly by the shepherds during stakeholder engagement sessions. Grazing activities are not developed in the Project site because of the very stony soils with scarce vegetation.

Hydrogeology and Groundwater

The Project site belongs to the Kyzylkum hydrogeological zone which extends along the desert with the same name (Figure 3). The area is located on the Turanian plain-platform hydrogeological region consisting of extended artesian aquifers of the Paleogene, Cretaceous and Jurassic bedrock.

The aquifer comprises Paleogene and Cretaceous to Paleocene deposits combined into one complex. Groundwater levels range from 40 to 100 meters below ground level, with regional flow generally from south to north. Surface-water leakage from the Amu Darya River contributes to natural groundwater recharge. In the Kyzylkum hydrogeological zone, groundwater quality is likely affected by salinization, ranging from slightly saline to saline waters.

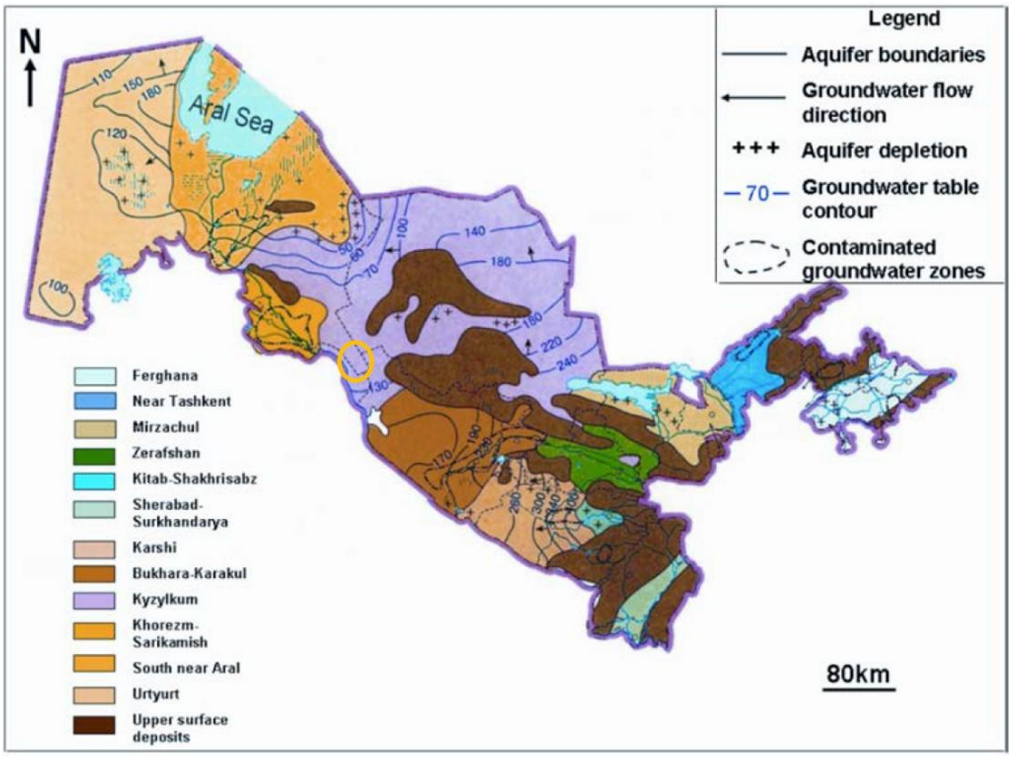


Figure 3: Hydrogeological map (orange circle represent the Project site)

Hydrology and Surface Water

The distribution of river runoff in Uzbekistan is closely tied to climatic factors, primarily atmospheric precipitation. Precipitation varies greatly across the region due to factors like geographical location and mountain slopes. High-mountain areas, like those in the Amudarya river basin, receive the highest annual precipitation, feeding rivers like Zeravshan, Kashkadarya, Sherabad, and Surkhandarya.

Uzbekistan's rivers are part of the Aral Sea basin and are primarily fed by melting snow, along with some rainwater and glacier melt. The Project area itself has no surface water bodies, but nearby there is a lake (1.3 km southwest) and the Amu Darya River. Water monitoring performed during the ESIA study in the lake showed high concentrations of chlorides and sulphates, indicating possible contamination. The Amu Darya River represents the largest watercourse close to the Project site and it mainly relies on snow and glacier melt. However, much of its water is lost due to evaporation, infiltration, and irrigation, with most of it being diverted for agricultural use. The river's condition depends on factors like annual precipitation, irrigation practices, and runoff from agricultural areas, which can introduce various pollutants into the water. Calcium salts, sulfates, chlorides, nitrates, nitrites, ammonium nitrogen, heavy metals, oil products and a number of other pollutants are introduced into the river with sewage from the collector-drainage system.

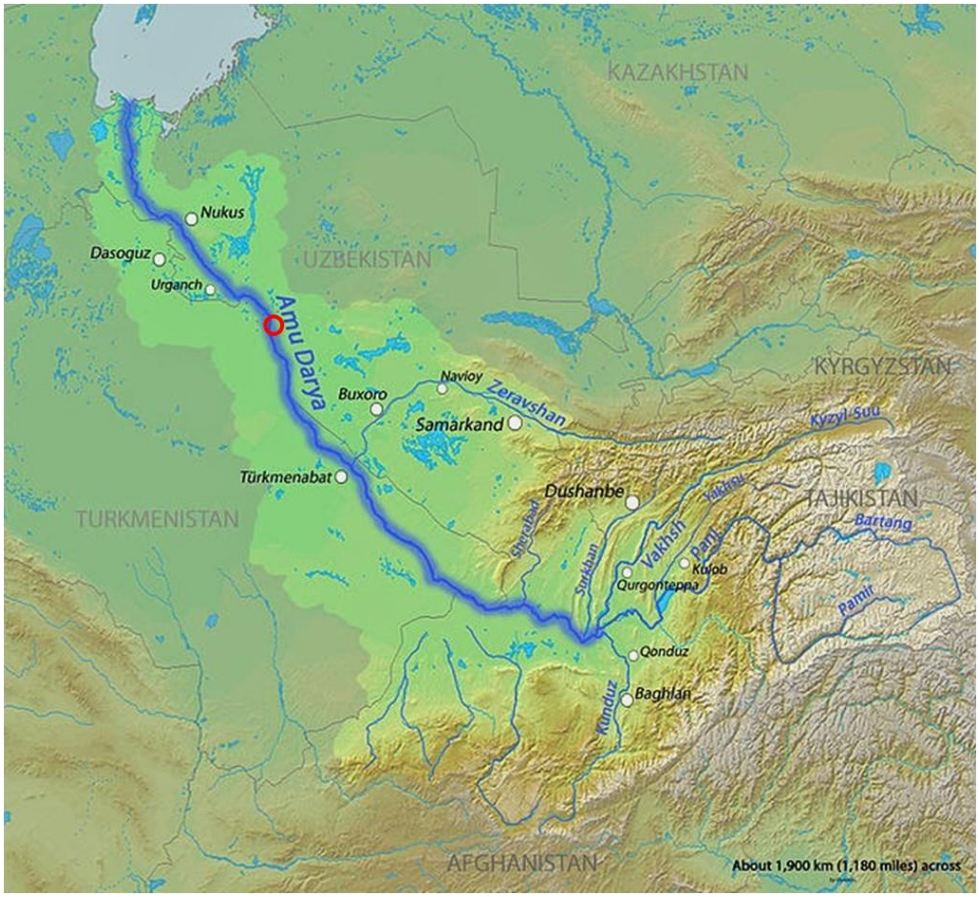


Figure 4: Amu Darya river basin (Red circle represent the Project site)

Climatology

Uzbekistan has an arid and continental climate characterized by large variations in temperature within days and between seasons. Summers are long, hot and dry, with an average monthly temperature of 27.2°C in the hottest month (July), and with an average daily maximum of 35°C in many of the major cities. Winters are cold, with average monthly temperatures of -1°C to -3°C between December and February. The most common characteristic features of such climate are its sharp continentality and aridity, as well as the abundance of heat

and light throughout the warm season, which will positively affect the generation of electrical energy due to accumulating solar panels. In the Project area, winter is not long-lasting and there are relatively few days with negative temperatures. The coldest month is January. Summer is hot and very dry, and July is the warmest month.

Ambient air quality

In the Tuprokkala district and Kyzylkum desert region, there are minimal anthropogenic air quality sources of impact due to the absence of industrial areas. Emissions primarily come from vehicle traffic along the A-380 highway, catering facilities along the highway, small agricultural enterprises, gas stations, and household heating sources like gas, firewood, electricity, and dung. A nearby gas pipeline and distribution station, located at about 400 to 600 meters south to the Project site and managed by Uztransgas, could be a potential emission source during maintenance.

Sandstorms are a natural factor affecting air quality, raising sand dust and particles. Ambient air monitoring during the ESIA study revealed PM_{10} levels exceeding local and international standards, likely influenced by desert conditions and high winds. Carbon monoxide levels exceeded national limits near Sarimay settlement, possibly due to proximity to the A-380 highway.

Noise and Vibrations

There are no major anthropogenic sources of noise and vibration in the Project site and its vicinity, apart from traffic on the A380 highway. Noise from nearby villages and facilities along the highway is not expected to be noticeable at the site. Noise monitoring during the ESIA study found that noise levels within the Project area were below national standards. However, near Nukus and Sarimay settlements, noise levels exceeded these standards, likely due to their proximity to the A380 highway.

Electric magnetic field

In proximity of the Khorezm Solar PV Project, there are several transmission lines and other are under development Figure 5. As part of other developments unrelated to Voltalia, seven transmission lines are, indeed, planned to be constructed in proximity of the Khorezm Solar PV Project. One of them, the Djankeldy line located between Sarimay and Djankeldy, is already under construction. The Djankeldy line is being built very close to the project at less than 2 km and will be connected to the existing Sarimay substation, just like the Project.

Transmission lines are sources of electromagnetic fields (EMF). According to the World Health Organization, EMF are types of electromagnetic radiation, spanning from static fields to X-rays. EMF are generated wherever electric current flows in power lines and cables. Magnetic fields result from moving electric charges and can penetrate most materials. These fields are strongest near their source and weaken with distance. The size and the frequency of the EMF within the Project area is however currently unknown.

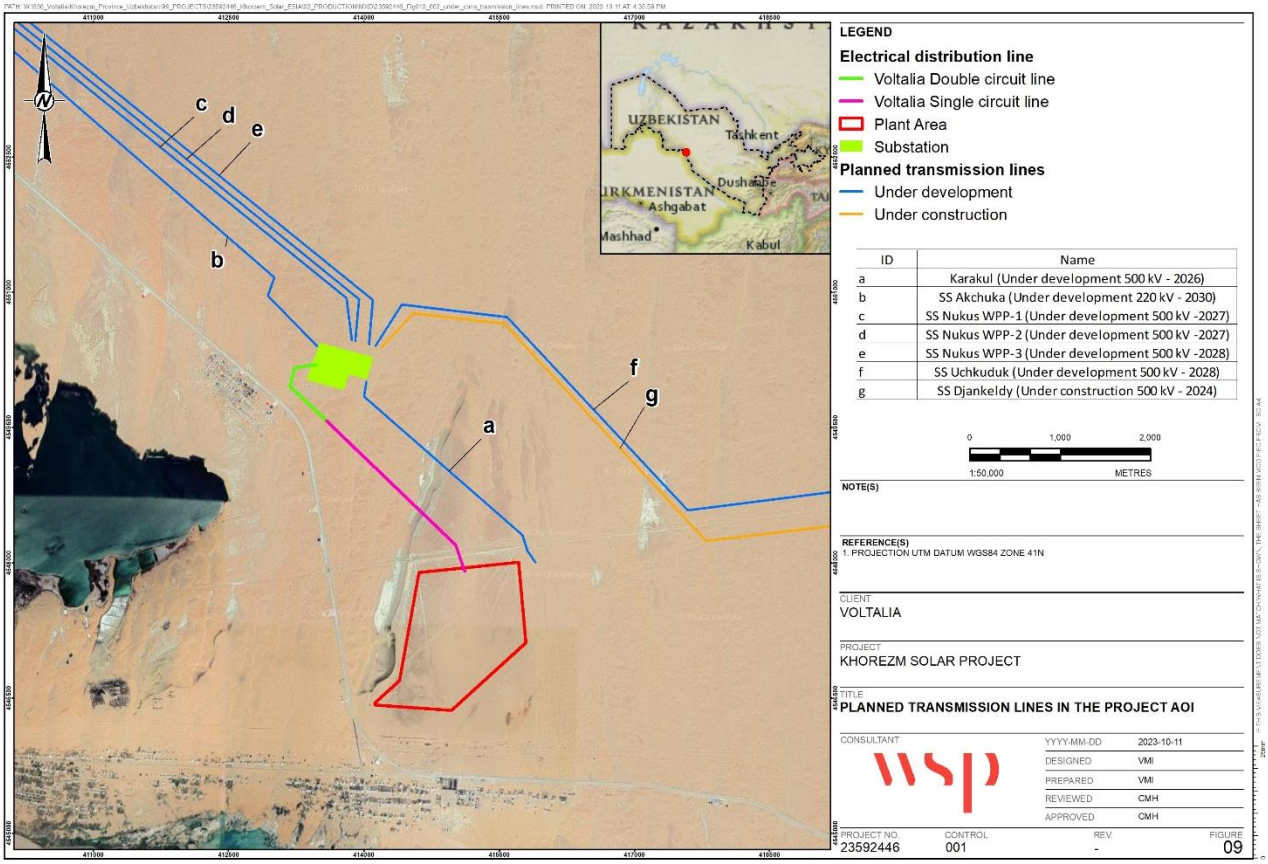


Figure 5: Planned transmission lines in close vicinity to the Project. Their expected completion years are shown in the legend. Line “g” represent the Djankeldy line already under construction.

4.2 Baseline conditions – Biological Components

The collection of data on the biological components has been performed through both desktop studies and field studies. The desktop studies were conducted by reviewing scientific and "grey" literature to identify potentially sensitive biodiversity elements in the area. Field studies were conducted within a so-called Local Study Area (LSA) which is defined as the area beyond which no detectable effects on biodiversity are expected. Thus, the LSA shall be considered equivalent to the ecological AoI of the Project. In light of this definition, since there are no clear physical boundaries, the LSA was designed as a 500 m buffer, around the Project Area and the related associated facilities. Field studies on habitat, flora, and fauna were carried out within the Project's LSA between April and September 2023, depending on biodiversity components. All data collection was overseen by NBT's experts under WSP's direction and supervision.

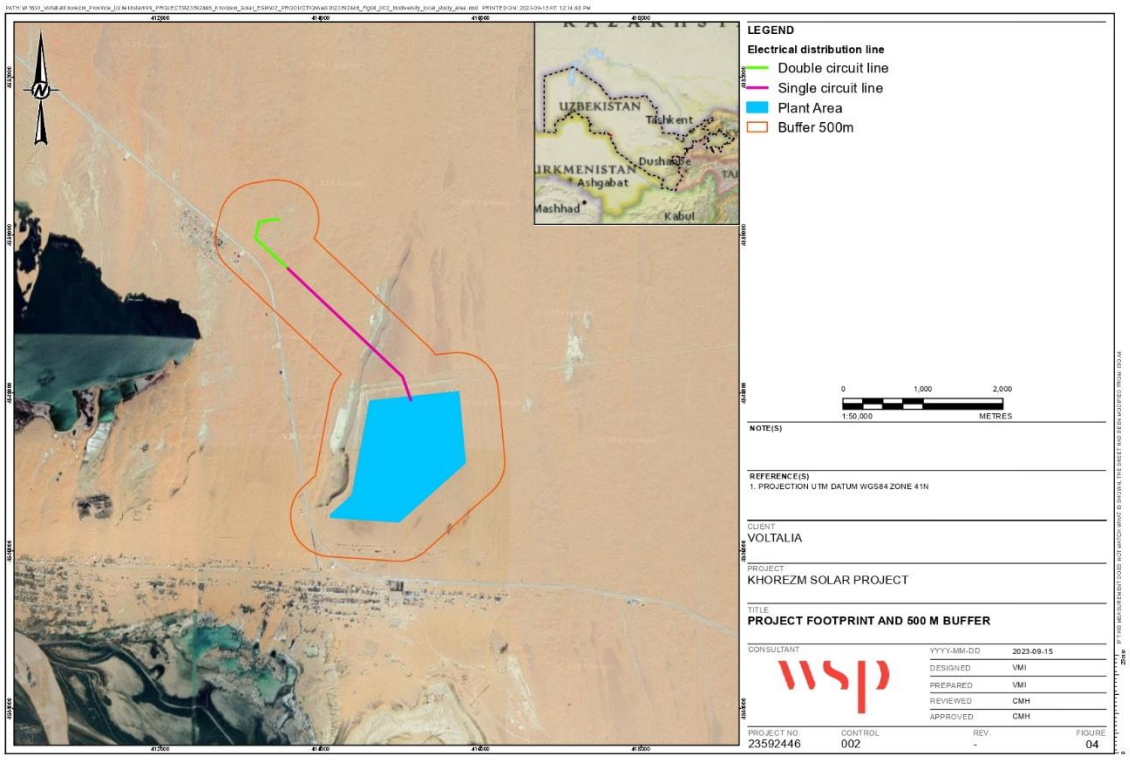


Figure 6: Local Study Area and Project Footprint

Protected Areas and areas recognized as of international importance for biodiversity

The Project is not located within any protected or internationally recognized areas. Within a 20 km buffer, there are the two following protected or internationally recognized areas: the Khorezm National Nature Park (located about 1,6 km south of the Project site) and the Gorelde Key Biodiversity Area (KBA) and Important Bird Area (IBA) (located about 7 km south of the Project site). Outside the 20 km buffer, at 39 km and 63 km respectively, the Kyzylkum State Reserve and the Buzaubay IBA can be found.

Natural and Modified Habitats

The Project's LSA sits at an average elevation of 170 meters within the "Central Asian Southern Desert (819)" Ecoregion, specifically in the subzone of the Southern Desert of the Kyzylkum Province. The terrain is a flat gravel-sandy uplift sloping gradually to the east, transitioning into a sandy plain. The landscape features ridge-cellular, cellular, and hummocky eolian sands, along with small remnant hills adorned with white scythes, *Calligonum*, and saltwort-sagebrush vegetation. Vegetation comprises desert flora, ephemera, and ephemeroids, well-adapted to extreme conditions with minimal foliage. Herbaceous and shrubby formations dominate the LSA. Natural habitats, particularly sandy-stony uplands, sandy deserts, and sandy-stony cliffs, constitute the majority of the landscape. These habitats face anthropic pressures, including grazing and vehicle traffic, due to the presence of power lines and nearby villages like Sarimay. Additionally, anthropogenically modified areas like paved and unpaved roads and village buildings are present within the LSA.

Flora species

According to literature review and field campaigns conducted during the ESIA study, a total of 51 flora species were identified in the LSA. The two principal flora formations in the LSA are the desert sedge-saltwort-sagebrush communities (*Artemisia diffusa, A.turanica, Oreosalsola arbusculiformis (Salsola arbusculiformis), Carex physodes)* and psammophilous desert sedge-saltwort-sagebrush-Calligonum communities with solitary white saxaul (*Calligonum sp., Xylosalsola arbuscula, Artemisia diffusa, Haloxylon persicum, Carex physodes*). During

the field surveys no threatened species red-listed at global or national level, alien species nor endemic species has been found. The scarce crown cover, phytomass, species diversity, and height and abundance of flora species, particularly ephemera and ephemeroids, are attributed to harsh winter conditions and a hot, dry spring with minimal precipitation.

Fauna species

Reptiles

According to literature review and fieldwork, 28 reptile species were identified as present or potentially present in the LSA, with only 6 species directly observed. Notably, threatened species like the Central Asian Tortoise (*Agrionemys horsfieldii)*, Desert Monitor (*Varanus griseus*), and Desert Sand Boa (*Eryx miliaris*), listed in Global and National Red Lists, were observed directly or through traces and footprints during field studies. The LSA intersects with the habitat of the Central Asian Cobra, classified as Near Threatened (NT) on the Global IUCN Red List. Sandy uplands and desert areas serve as suitable habitats for these reptiles, providing substrate for activities like hunting, sheltering, and oviposition. Species like the Central Asian Tortoise and Desert Sand Boa exhibit low mobility and limited dispersal abilities, with the tortoise using deep sand holes for hibernation to survive adverse environmental conditions in the Kyzylkum desert.

Birds

Due to its position in the Afro-Eurasian region, Uzbekistan is intersected by the Central Asian and West Asian-East African flyways, and partially by the Black Sea-Mediterranean flyway, which are crucial bird migration routes. Within the LSA and its vicinity, a total of 195 bird species have been identified as present or potentially present, with 41 species directly observed during field studies conducted between April and September 2023. Five of these observed species are threatened: Steppe eagle (*Aquila nipalensis*), Osprey (*Pandion haliaetus)*, White-tailed eagle (*Haliaeetus albicilla*), Golden eagle (*Aquila chrysaetos*) and Pallid Harrier (*Circus macrourus*). Seven nesting species were observed during field surveys, including Crested Lark (*Galerida cristata*), Desert Wheatear (*Oenanthe deserti)*, Asian Desert Warbler (*Curruca nana*), Blue-cheeked Bee-eater (*Merops persicus*), Ruddy Shelduck (*Tadorna ferruginea*), Brown-necked Raven (*Corvus ruficollis*), Golden Eagle (*Aquila chrysaetos*).

Mammals

Based on literature review and fieldwork, 41 mammal species were identified as present or potentially present in the terrestrial LSA, with no endemic species noted. Among these, 8 species were confirmed based on signs or direct observations, including the Marbled Polecat (*Vormela peregusna*), classified as Vulnerable on the Global IUCN Red List and in the Red Book of Uzbekistan. Although the presence of the Marbled Polecat was not confirmed during field surveys, there is data suggesting its potential presence in Khorezm National Park, located less than 2 km from the LSA. Other species of conservation concern potentially present in the Project area include *Mustela eversmanni, Gazella subgutturosa* and *Vulpes corsac.*

Ecosystem Services

The assessment of ecosystem services provided by natural habitats in the Project area aimed to understand their potential use by local communities. The ecosystem services analysis starts by identifying the potential ecosystem services provided by the natural habitat found in the LSA during the biodiversity studies and is confirmed during consultations with local communities in social field studies. Results showed that although no ecosystem service present in the LSA is actively utilized by local communities, sand fixation by vegetation offers valuable erosion prevention. Erosion prevention is highly relevant for the Project as it helps maintain solar panel performance by reducing dust accumulation caused by erosion.

Identification of Critical Habitat

According to the methodology suggested by the International Finance Corporation (IFC) Performance Standards 6 for the Critical Habitat Assessment, Critical Habitats are defined as crucial areas for the survival, reproduction, or recovery of threatened species, ecosystems, or ecological communities. The Critical Habitat Assessment evaluates how a project might affect these areas, taking into account their sensitivity and significance. By guiding project planning to avoid, minimize, or mitigate adverse impacts, this Assessment ensures the conservation and sustainable use of biodiversity. In this ESIA study, no species triggering nor potentially triggering Critical Habitat has been shown to be present during the Critical Habitat Assessment.

Identification of Priority Biodiversity Features

EBRD (European Bank for Reconstruction and Development) Performance Requirement 6 (2014) defines Priority Biodiversity Features as a subset of biodiversity that is irreplaceable or vulnerable, but at a lower priority level than critical habitats. They include threatened habitats and vulnerable species.

According to EBRD, threatened habitats refer to habitats under pressure according to national, regional, or international assessments, including those identified under Annex I of the EU Habitats Directive. No Priority Biodiversity Features are anticipated within the LSA based on this criterion.

Regarding Vulnerable species, identified by the IUCN or other national/regional lists, 7 Priority Biodiversity Features and 24 Potential Priority Biodiversity Features are expected in the LSA. However, significant biodiversity features identified by stakeholders or governments, such as Key Biodiversity Areas and Important Bird and Biodiversity Areas, are located outside the LSA borders, including the "Gorelde" KBA and IBA, and the "Khorezm" National Nature Park. Thus, no Priority Biodiversity Features are expected within the LSA according to this criterion.

Ecological structures vital for maintaining Priority Biodiversity Features' viability, such as riparian zones and rivers, are present near the LSA, notably the Amu Darya River channel and associated riparian zones and wetlands. However, these features lie approximately 2/3 km from the Project footprint and are not included within the LSA borders, resulting in no expected Priority Biodiversity Features in the LSA.

4.3 Baseline conditions – Social Components

Population and demography

Uzbekistan, a resource-rich, landlocked country in Central Asia, boasts a population of 36.2 million as of April 2023, with over half residing in urban areas. The population comprises primarily Uzbek individuals, with significant Tajik, Kazakh, Russian, Karakalpak, and Tater minorities. Women make up 49.7% of the population. The average age of the population of Uzbekistan is 29.1 years, 28.4 for men and 29.8 for women.

The Project is located in the Khorezm province which is divided into 11 administrative districts: Bogot, Gurlen, Khiva, Koshkopir, Shovot, Urganch, Khonqa, Hazorasp, Tuprokkala, Yaniariq, and Yangibozor (see Figure 1). The largest city is Urgench (pop. 146,700), which is the administrative center of the province and is located approx. 125 km west of the Project area. The province's economy revolves around agriculture, particularly cotton, melon, and rice cultivation, alongside industries such as vehicle production and electric power. More specifically, the Project sits in Tuprokkala district. With a population of approximately 58,000, spread across 18 makhalla[2] communities, Tuprokkala district experiences slower population growth compared to the national average. Within the district, Sarimay and Nukus Maskani are the primary settlements, sharing similar socio-demographic characteristics but differing in ethnic composition due to historical and migratory factors.

[2] Makhalla refers to urban and rural settlements.

Land use

Land use in households in the AoI can vary slightly depending on the socioeconomic status of the household. Common activities include residential development, warehouses, gardens, fences, and driveways are constructed. Additionally, many households cultivate kitchen gardens (known as Tomorka), growing fruits, vegetables, and herbs for consumption, despite challenges with irrigation near the river. Livestock and poultry farming are prevalent, with animals often housed on the same plot as the residence. Some households also maintain small orchards, producing fruits such as apples and apricots. Land around households may serve as outdoor spaces for recreation or gatherings, featuring patios, courtyards, or traditional sitting areas. In some households, waste disposal areas are designated for managing organic waste through composting or disposing of non-recyclable and hazardous materials.

Economy and employment

Uzbekistan is a resource-rich, landlocked country, strategically located in the heart of Central Asia. In terms of Gross Domestic Product, Uzbekistan has the second largest economy in Central Asia only after that of Kazakhstan. Although its economy has been growing at a rapid pace in recent years, Uzbekistan is still classified as a lower-middle-income economy. Major export items are oil/gas and energy products, cotton, and foodstuff while major import items are machinery, chemical products, and foodstuff. Major trade partners are the Russian Federation, Kazakhstan, and China for exports and the Russian Federation, South Korea, and China for imports. In the last decade, Uzbekistan has achieved significant progress in reducing low-income rates and tackling malnutrition. Despite progress, Uzbekistan faces some socioeconomic challenges, including high unemployment rates, income inequality, and a significant informal sector. with a labor force of 19.5 million people and an unemployment rate of 8.9% in 2022. In the AoI, Sarimay has a relatively high employment rate due to the presence of the large water pumping station which employes several locals. Some locals have proven to possess skills suitable for both the construction and operation phases of the Project, thanks to previous training and involvement in community projects.

Trade and local markets are limited, with 29 retail shops available in the AoI and larger purchases requiring a trip to Pitnak, the district center. Agriculture faces challenges related to water availability, with most farming activities concentrated near the river for crops like fodder, potatoes, and tomatoes. Livestock breeding is a primary income source for AoI residents, with cattle and sheep grazed in vast areas during favorable weather conditions. While there are no major economic sectors beyond agriculture in the AoI, Tuprokkala district shows potential for industrial development with improved energy supply and road connections. Therefore, while agriculture remains vital, efforts to diversify livelihoods and improve access to services are ongoing. Challenges like land degradation and limited healthcare services persist, highlighting the need for continued investment in rural development and sustainable agriculture to enhance livelihoods in the Khorezm province.

Mobility and infrastructures

In the AoI, transportation options include a bus from Sarimay to Pitnak, as well as private shared taxis widely used by locals. Private car ownership is limited, with most households relying on public transport. The A-380 road serves as a vital axis, connecting settlements within the AoI and beyond. Internal roads within settlements are partially paved and have minimal traffic. The nearest railway station, Dautepa10F, is located about 15 km northwest of the Project area, while the closest airport is in Urgench, 125 km southwest. Settlements have social network groups offering taxi services, with buses mainly operating in the morning, traveling to Tuprokkala, Khazorasp, and Urgench.

The infrastructure networks located in proximity to the Project area include an electricity overhead line, water pipelines and a gas pipeline. One of the water pipelines belongs to JSC Uztrangaz while the Amudarya-Zarafshan pipeline belongs to NMMC and supplies water to the Navoi mining and metallurgical plant and the city of Zarafshan. The gas pipeline is managed by Uztransgas.

Community health, safety and security

In Uzbekistan, healthcare is primarily government-funded, aiming to provide accessible services to all citizens. The system includes hospitals, clinics, and medical centers, with recent efforts to upgrade facilities and equipment. Indeed, infrastructure has improved in recent years with the construction of modern medical facilities and the renovation of existing ones. However, there can still be disparities in infrastructure and resources between urban and rural areas. Primary healthcare, provided through family clinics and health centers, offers preventive care and basic emergency services. Specialized hospitals provide advanced medical care, serving as referral centers for complex conditions. In Sarimay, healthcare includes a family clinic, ambulance service, and pharmacy, while Nukus Maskani has one rural health center. For specialized care, residents often travel to Pytnak or Urgench, located 60 km and 120 km away respectively. Safety and security in settlements near the Project area are generally stable, with no significant issues nor tension among community members reported by makhalla chairmen.

Education

There are two schools in the AoI, School No. 11 in Sarimay and School No. 16 in Nukus Maskani; the schools include classes from primary classes from 1 grade to 4th grade (7-10 years old) and to high school classes 9 to 11 grades (15-17 years old). Most of the teachers are women. Teachers are mainly coming from the AoI, however there are also teachers from other parts of the country that have moved to the settlements. In addition, in the settlements of Sarimay and Nukus maskani there are also 3 kindergartens, one of which is private, where children aged from 3 to 7 are cared and given initial education. There is also a plan to build a new, modern school. This school will be a branch of School No. 11. It has been reported that the number of schoolchildren is currently high and there is a shortage of places in the schools. There is a plan to build a new specialized school to partly resolve this issue.

Human rights and vulnerable groups

In 2021, Uzbekistan achieved a Human Development Index (HDI) of 0.727, ranking 107th globally in the high human development category. Despite progress, the gross national income per capita remains comparatively low. Efforts to combat corruption and address social issues have been made, including reforms to uphold labor standards and tackle child labor and corruption. Concerns persist regarding adherence to international labor standards, especially regarding freedom of association and equal pay. Uzbekistan has implemented legislative changes to combat forced labor and child labor, particularly in agriculture and public works, yet challenges remain, including the risk of forced labor during cotton harvests. Economically, Uzbekistan faces challenges exacerbated by the COVID-19 pandemic and external conflicts.

Governance indicators and freedom of expression scores highlight areas for improvement. Human rights concerns persist, including allegations of excessive force by police and limitations on religious freedom. Gender disparities persist despite legislative efforts to promote equality. While women have made strides in education, they face barriers in political representation and the labor market. Rural women, in particular, encounter challenges due to traditional roles and limited employment opportunities. Informal employment is common among women in agriculture, lacking legal protections such as sick pay or maternity leave. Moreover, cultural norms may restrict women's access to the internet, further widening economic disparities. According to Uzbekistan's law #415, socially vulnerable groups also include elderly individuals living alone, people with disabilities, those with serious illnesses like AIDS or cancer, and orphaned or unsupported children. The National Strategy of Action 2017-2021 prioritizes social protection, including improving healthcare and providing social security. It offers various benefits to vulnerable families, such as childcare allowances, assistance for families with children, and financial aid for low-income families and people with disabilities.

Cultural heritage

In Uzbekistan, the Cultural Heritage Agency, under the Ministry of Culture and Tourism, is responsible for safeguarding cultural heritage sites, managing museums, and supporting archaeological research. Local branches oversee protection efforts, issuing directives for preserving heritage sites and ensuring compliance with regulations. Before commencing any projects, consultation with these branches is mandatory to identify and protect cultural objects. Construction work can proceed only after obtaining written authorization and adhering to instructions from the agency to address any unexpected discoveries. Regarding the identification of cultural heritage in the Project area, on May 24, 2023, the Khorezm province authorities formally requested information from the Ministry of Culture and Tourism. The response received on July 4, 2023, confirmed that there are no cultural heritage sites within the Project area. The nearest sites, such as the “Uch uchok” burial mounds and Tosh-kala caravanserai ruins, are located several kilometers away. Additionally, no mosques or religious buildings are present in the Sarimay and Nukus Maskani settlements.

Landscape and visual quality

The landscape in the Project area has a typically desert character, with limited vegetation and a dry aspect given by the climatic conditions. The terrain is generally made of sand and gravel, which, due to the minor vegetation cover, is exposed to surface erosion. The morphology is generally flat, however there is a small ridge that runs 200m outside and to the west of the Project site, which provides some elevation of the PV site area from the area of land to the west. Along the Amu Darya River the visual characteristics of the area change thanks to the presence of natural vegetation and farmed land, which is absent in other parts of the AoI. Human settlements are generally made of individual one-story houses, with a low density. The visibility of these settlements is therefore limited, and they do not have significant visual quality. Main detractor elements are represented by the overhead transmission lines that cross the area and that are highly visible due to their dimensions and the lack of elements of visual obstacles such as vegetation.

5.0 STAKEHOLDER CONSULTATION

Following the requirements of local law, and in alignment with the IFC Performance Standards and EBRD Performance Requirements, an effective Stakeholder Engagement process was conducted with affected communities and, where relevant, other stakeholders, in a structured and culturally appropriate manner.

The Stakeholder Engagement process has been ongoing since the beginning of the ESIA process. The objective of the Engagement process has been to inform and update stakeholders on the progress of the Project, and to collect feedback from them useful for the assessment of impacts and the identification of mitigation measures. The main activities performed during the ESIA process have consisted of a public meeting and key informant interviews with specific stakeholders. During these activities, participants did not raise specific concerns about the Project and its potential impacts during the construction and operation phase; the Project seemed to be well received by participants. The main questions posed by participants have been regarding employment opportunities generated by the Project and possible benefits for the local communities.

The results of the Stakeholder Engagement process have been considered when defining the impact assessment and identifying the mitigation measures. The engagement will continue in the future Project phases and will be based on the results of the previous activities.

6.0 SUMMARY OF THE ESIA METHODOLOGY

The Environmental and Social Impact Assessment (ESIA) is a systematic process used to identify, predict, evaluate, and mitigate the environmental and social consequences of proposed projects or activities. The ESIA methodology includes the following steps:

- **Baseline Data Collection:** Baseline data was collected to understand the existing environmental and social conditions in the project area. This involved field surveys, interviews with stakeholders, literature reviews, and data analysis.
- **Impact Identification and Assessment:** Potential environmental and social impacts of the proposed project were identified and assessed. This step considered both direct and indirect impacts, as well as cumulative and synergistic effects. Various tools and techniques, such as environmental modeling, impact matrices, and stakeholder consultations have been used to assess impacts.
- **Mitigation and Management Measures:** Based on the assessment findings, mitigation and management measures were developed to avoid, minimize, or compensate for adverse impacts. These measures aim to enhance project sustainability and reduce negative effects on the environment and affected communities.
- **Impact Prediction and Evaluation:** The predicted impacts were evaluated against established criteria and thresholds to determine their significance. This involved comparing predicted impacts with baseline conditions and considering the sensitivity of affected ecosystems and communities.
- **Reporting and Documentation:** The ESIA process culminates in the preparation of a comprehensive report that documents the assessment findings, methodologies used, predicted impacts, mitigation measures, and stakeholder engagement activities. The report also includes recommendations for decision-making and monitoring requirements.
- **Review and Decision-Making:** The ESIA report shall then be reviewed by relevant authorities, stakeholders, and the public to ensure transparency and accountability. Based on the findings and recommendations of the ESIA, decisions are made regarding project approval, modification, or rejection.
- **Monitoring and Follow-up:** After project approval, monitoring programs are implemented to track the effectiveness of mitigation measures and compliance with environmental and social commitments. Follow-up assessments may be conducted periodically to evaluate the actual impacts of the project and refine mitigation strategies as needed.

7.0 SUMMARY OF PROJECT ENVIRONMENTAL AND SOCIAL ADVERSE IMPACTS

The impact assessment conducted according to the Project standards included the identification, assessment, and quantification of the potential positive and negative environmental (i.e., physical and biological) and social impacts associated with the Project, as well as the risk of accidents, if any identified. The applicable standards require that Project proponents identify and manage risks and impacts within the AoI. The analysis of Project characteristics and the identification of positive and negative impacts that the Project were based on WSP professional judgment and on experience from past projects.

For the positive impacts identified, the ESIA reported the measures to enhance the positive effects of the Project on the local communities and the economy. For the adverse impacts identified, the ESIA defined relevant mitigation measures to avoid, or where avoidance is not possible, minimize, mitigate or compensate the adverse impacts, following a mitigation hierarchy. The mitigation measures served as basis for preparing the Environmental and Social Management Plans, part of the Project Environmental and Social Management System, detailed in the following section 8.1. These plans will be implemented to ensure that Project impacts are managed according to a mitigation hierarchy that aims at avoiding impacts as the main resort, and at mitigating or offsetting them as the last resort in case avoidance is not possible.

7.1 Positive impacts

The SPPP will be the first renewable energy power plant in the region of Khorezm. The success of the Project may create a precedent that will stimulate further investment in renewable energy projects in the country. The Project will, thus, contribute to supporting Uzbekistan's strategy to meet its growing energy needs and reduce reliance on fossil-fuel based electricity and energy imports. Specifically, the main positive impacts of the Project are:

- **Contribution to Uzbekistan's Green Energy Transition.** The Project will support Uzbekistan's strategy to meet its growing energy needs and reduce reliance on fossil-fuel based electricity and energy imports. The investment in and development of solar PV projects is an important element in achieving the principles of this strategy, and therefore this Project contributes to Uzbekistan's goal of transitioning to a greener economy by 2030, in line with the country's broader energy strategy.
- **Reduction of fossil fuel usage.** The Project will contribute to fulfilling Uzbekistan's obligation under the Paris Agreement. It is, indeed, expected that the Project will reduce fossil fuel usage by a significant amount[3] each year over its expected 25-year lifespan, helping to lower CO_2 emissions substantially.
- **Increased attraction of and market for renewable sources projects**. Since the Uzbek government is actively attracting the private sector to invest in renewable energy sources, the success of the Project may create a precedent that will stimulate further private investment in this sector and in the country.
- **Enhancement of the local economy.** The Project will contribute to local electric power supply improvement and reliability. The availability of additional energy sources will enable further economic development in the region.
- **Increase in employment rates.** The Project will create job opportunities for 200 workers during the construction phase, with a focus on prioritizing local labor. During the operational phase, the plant will then employ 20 permanent workers from the local community whenever feasible.
- **Increase of demand for raw materials, goods and services.** Throughout the construction phase, the solar project will increase demand for raw materials, goods and services, preferring, whenever feasible, the local supply chain. This surge in demand presents a valuable opportunity for local suppliers and manufacturers to thrive and contribute to the region's economic development.

7.2 Adverse impacts

A few adverse impacts on the social, biological and physical components were identified for both the Project construction and operation phases. The main adverse impacts and risks associated with the Project are:

- Emission of gaseous pollutants such as greenhouse gases, dust and particulate matter in the atmosphere and **degradation of the air quality** during both construction and operation phases. The construction activities generally lead to an overall increase of dust and particulate emissions deriving from the equipment and machinery operation and from the excavation activities. Vehicles and machinery used for transportation as well as construction and installation activities can emit in the atmosphere concentrations of greenhouse gases and other pollutants such as sulphur dioxide, ozone, nitrogen oxides, carbon oxides, and PAHs. During the operation phase greenhouse gases and pollutants will be emitted by vehicles during the solar plant maintenance and from the heating/cooling systems of the buildings, however this amount will be negligible.

[3] approximately 11,666 900 MMBtu (420,000 Tce) and 25,000 tons of CO_2 annually.

- **Removal or degradation of soil and vegetation** and land occupation during the construction phase. Earthworks, excavation activities, construction of Project's facilities and creation of unpaved roads can lead to the degradation of soil, weaken its structure and even change its texture along with possible breakdown of aggregates and the removal of smaller particles or entire layers of soil and organic matter where present. Additionally, construction activities require the removal of vegetation which can in turn impact flora species populations present in the area. This may impact existing habitats and fauna species dwellings in such habitats.
- Presence of new infrastructure, in particular, the transmission lines, lead to an **increased risk of collision and electrocution risks for birds** during the operation phase.
- The soil occupancy by plant buildings and facilities will subtract portions of territory leading to **losses in host natural habitats for both fauna and flora**. These habitats are often inhabited by fauna species of conservation concern and host typical flora species of the Khorezm desert, including psammophilous vegetation and the related ecosystem services provided (such as erosion regulation).

8.0 MITIGATION AND ENHANCEMENT MEASURES

The mitigation measures identified during the ESIA process are tailored to the Project based on current information and are aligned with IFC Performance Standards. In order to ensure effective management of environmental and social risks throughout the project lifecycle, the developer will prepare specific Environmental and Social Management Plans (ESMPs) which include all required mitigation measures according to the Environmental and Social Management System. The Management Plans will be implemented for the duration of the Project.

8.1 Environment and Social Management Plans

The Environmental and Social Management System developed for the Project is aimed at implementing all the mitigation measures identified during the impact assessment and ensuring the environmental and social performance of the Project. This Environmental and Social Management System was developed according to the Project standards and regulations, with the commitments undertaken in the impact assessment. The management system incorporates the following elements:

- ESMS Framework (part of the ESIA package);
- Stakeholder Engagement Plan (part of the ESIA package);
- Labour Management Plan;
- Pollution Prevention Plan:
  - Waste and Hazardous Management Plan;
  - Wastewater Management Plan,
  - Water and Energy Sources Management Plan,
  - Air Quality Management Plan,
  - Noise, Management Plan,
  - Soil, Drainage and Erosion Control Management Plan,
- Occupational Health and Safety (OHS) Management Plan;
- Community Health, Safety and Security Management Plan;

- Workers' Accommodation Management Plan;
- Traffic Management Plan;
- Invasive Species Management Plan;
- Biodiversity Management Plan;
- Chance Find Procedure;
- Grievance mechanism, including both internal and external mechanisms.

9.0 SUMMARY OF CUMULATIVE IMPACTS

A search has been undertaken to identify - in the Khorezm Solar PV surroundings - projects that could have the potential to result in cumulative impacts with the Project, based upon their scale and location. Concerning cumulative impacts at a global level, referring to the emission of greenhouse gases, it was concluded that the Project has negligible contribution.

The Khorezm Solar PV Project may interact with other developments in the region. Firstly, there is the Bukhara-Miskin-Urgench-Khiva Railway Electrification Project, located around 10 km away. While construction started in March 2023, it is unclear when it will end, possibly overlapping with the solar project's construction. Secondly, there is the Karakalpakstan and Khorezm Water Supply and Sanitation Project, still in the design phase as of May 2023. Based on the results found, if it is understood that there will be overlapping construction periods, coordination tasks must be carried out to find the best solutions to reduce potential cumulative impacts as much as possible.

Lastly, several transmission lines, are planned nearby, some with a distance of less than 1 km. One of these transmission lines, the Djankeldy line, it is already in construction phase and most likely it will overlap with the Project construction phase. Coordination will be needed to address cumulative impacts during construction. Other six lines are under development: Karakul (500 kV), SS Akchuka (220 kV), SS Nukus WPP-1 (500 kV), SS Nukus WPP-2 (500 kV), SS Nukus, WPP-3 (500 kV), SS Uchkuduk (500 kV). These latter transmission lines will most likely be constructed when the construction of the Project is already finished and will not overlap with the construction phase of the Khorezm Solar Project.

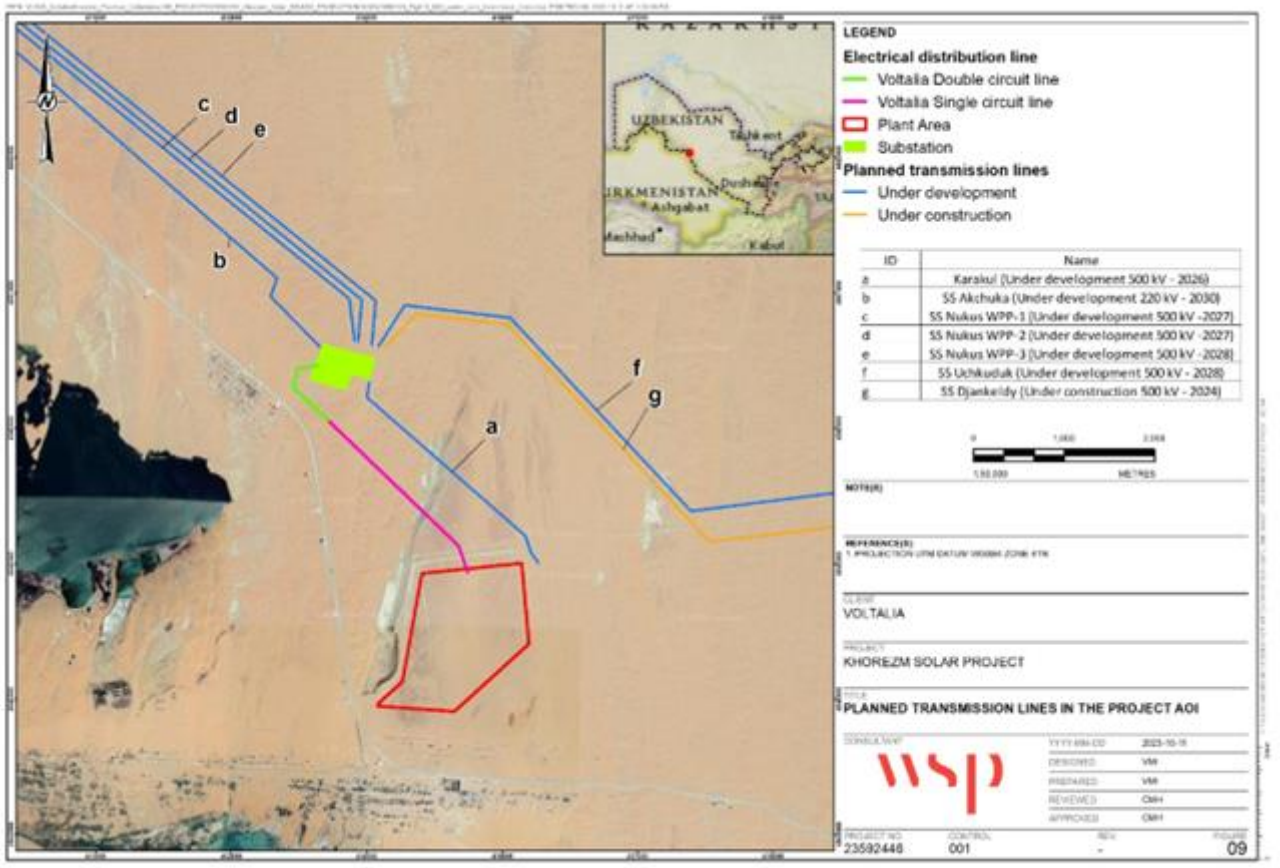


Figure 7: Planned transmission lines in close vicinity to the Project. Their expected completion years are shown in the legend. Line "g" is already under construction.

10.0 SUMMARY OF UNPLANNED EVENTS

The ESIA report includes a description of unplanned events that may occur during the construction and operations of the Project and the effects they may generate. Unplanned events are not expected to occur during the Project's normal construction and operational phase activities but are considered possible, albeit unlikely. Possible unplanned events during construction phase are considered to include traffic accidents, fires and explosions, release of pollutants, occupational health and safety related incidents, natural hazards and deliberate attacks or damage to Project facilities. These events represent potential risks during the construction phase but may occur also during Project's operations. Possible unplanned events for the operational phase include consequences of events triggered by natural hazards, deliberate attacks or damage to Project facilities, traffic accidents, and occupational health and safety related Incidents. For all these possible unplanned events, the ESIA concludes that they are unlikely or extremely unlikely; in case any of these events occur, their consequences will be limited and localized, and mitigation measures presented in the ESIA (specifically, in the Emergency Preparedness and Response Plan) are considered sufficient to lower their effects or make it negligible.

Signature Page

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